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TITOLO TESI

"URBAN CO-ACTION. The role of *glocal* climate action movements in a new adaptive co-design framework for urban resilience and ecological transition".

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Abstract (English)

The present research Thesis is part of a growing interdisciplinary field of studies concerned with finding *strategies to foster ecosystem stewardship* of social-ecological systems (SESs) as complex adaptive systems (CASs), such as *cities* and, in particular, of those that involve the notion of and practice of *participation* and *collaborative design*, to effectively build resilience in SESs as CASs, in the context of globally increasing concern for the actual climate change and ecological crisis, and for the existential threat to Planet Earth's life systems, represented by our role and impact as a species on planetary processes.

In search of new strategies to achieve pressing global and local targets of resilience and sustainability under conditions of uncertainty and abrupt change, cities and Urban Institutions around the world are opening to up experimentation, which is expanded by a growing number of *"urban climate change experiments"*, often emerging outside formal contexts of decision-making, led by actors other than municipal government, and generally characterized by local and global goals, polycentric multi-level governance, and collaborative design approaches.

Framed the context of *other glocal climate action movements* such as Tactical Urbanism, Place-making, and Extinction Rebellion, the object of the present research is one of these "experiments" which is the *global growing socio-technological phenomenon of Civic/Green Hackathons, and of Climathon® in particular*, an internationally dislocated but globally connected intense 24-hour collaborative design event, aimed at developing solutions to tackle climate change in urban settings.

Through *the double (theoretical and operational) lenses of social-ecological resilience and of participatory processes*, Green Hackathon and in particular Climathon® have been explored through an array of research methods and approaches, including several tools borrowed from the field of Sociology, and systematically analyzed by tracing the "process" beyond the "products", from the genesis of the challenge to the development of the outcomes, to critically understand the established format, the tools and approaches being utilized in reference to the declared objectives, and the position of these climate experiments with respect to the local efforts of Urban Institutions that have undertaken a path of resilience planning and ecological transition.

With the objective of helping Urban Institutions *in better coordinating, integrating and consolidating* bottom-up and third-party local contributions towards the achievement of the global targets of social-ecological resilience and sustainability, the findings of the present research have been used to develop a clear set of *Recommendations* addressed to Urban Institutions and organizing platform, for improving their ability to expand social-ecological resilience, and to understand the *role and importance* of Climathon® and of the other independent glocal climate action movements, in a *new adaptive co-design framework for urban resilience and ecological transition.*

The proposed *new adaptive co-design framework for urban resilience and ecological transition* is addressed primarily to Urban Institutions that have undertaken a path of resilience planning and ecological transition, to assist them in assessing, planning and managing participatory resilience

planning and processes more adaptively and to facilitate their recognizing *windows of opportunity to address change towards trajectories of desired sustainable development*.

The *framework* is an heuristic model and pragmatic tool, implementable and replicable in other regulatory contexts and decision-making processes within the field of urban resilience planning, to foster in prospective, active (Human) Ecosystem stewardship of Planet Earth and the enhancement and protection of Ecosystem Services through collective action, and ensure both human well-being and ecosystem sustainability, starting from cities.

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1. Between the ecological crisis and global goals of resilience and sustainability. Urban institutions in the perspective of a *Human Ecosystem stewardship*

The chapter positions the research in the context of the global ecological and climate change crisis, with regard to the existential threat to Planet Earth's life systems, represented by our role and impact as a species on planetary processes, together with our unsustainable models of development.

After nearly two decades of International negotiations, that have set ambitious global agendas and targets, for mitigating and adapting to climate change, and pursuing sustainable development, it is ever more recognized, that the eventual collapse of the Earth's fundamental ecosystems, cannot be prevented solely by international regulations and national laws and policies.

A global, macro-scale perspective of a Human Ecosystem stewardship of Planet Earth to tackle the complex nature of the issues involved in climate change and ecological crisis, must be integrated with the innovative local actions that are emerging at sub-national scales by informed, committed urban institutions and other actors.

The chapter highlights the essentiality of the strategies through which the so-called Resilient Cities are beginning to demonstrate institutional adaptive capacity under conditions of uncertainty and change due to the climate and ecological crisis, which is expanded through a growing number of "urban climate change experiments", often emerging outside formal contexts of decision-making, led by actors other than municipal government, and generally characterized by local and global goals and polycentric multi-level governance, and collaborative design approaches.

The ways in which climate change experiments have intersect all planning dimensions, from the micro to the macro scale, are producing a "mutation" the field of urban planning. For Cities and Urban Institutions, it becomes a matter of "resilience" to be able to intercept and govern these scattered actions more effectively, and this implies the notion and practice of "effective participation".

The present Chapter introduces one of these "experiments", as the object of the present research, the growing socio-technological phenomenon and movement of Civic/Green Hackathons, and of Climathon® in particular, an expressively collaborative design event, internationally dislocated but globally connected, aimed at developing solutions to tackle climate change at the urban level.

In the final section, the objectives, the empirical approach and the guiding research questions of the present research are presented.

1.1 Global ecological and climate change crisis

The global ecological crisis is unfolding day by day in front of our eyes, showing its breadth and gravity (UN Environment 2019; WWF 2018). Extreme weather events are becoming more frequent and more intense (WMO 2019) and the dangerous convergence between the i) effects of urbanization, land use and climate change (UNHABITAT 2011, IPCC 2019), ii) positive bio-geophysical feedbacks controlled by nonlinear processes connected to direct human degradation of the biosphere (Steffen et al. 2018), and iii) rising concentrations of CO_2 in atmosphere (NOAA Climate.gov, see Figure 1) that provoke climate changing patterns (IPCC 2014), could eventually

result in the collapse of many fundamental ecosystems (WWF 2016, WWF 2018), and consequently of the Ecosystem Services (ESs) and livelihoods that sustain human life and well-being on Earth (MEA 2005; Carpenter et al. 2009).

The complex interconnections of the world in which we live are recognized (Gunderson and Holling 2002, Carpenter et al. 2006, Schultz et al. 2013) and our role and impact as a species, together with our unsustainable models of development, on planetary processes (Rees 1992, IPCC 2007, Rockström et al. 2009, Steffen et al. 2018) is being discussed among the scientific community as a newly named geological epoch, the *Anthropocene* (Crutzen 2002; Steffen et al. 2007; Crutzen 2016).
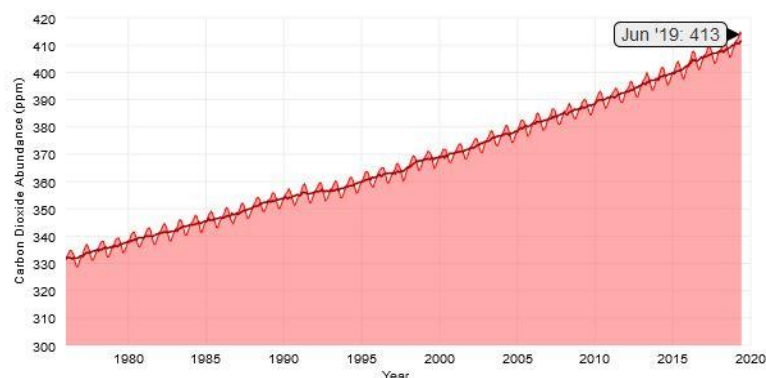
Figure 1: CO2 levels (source: NOAA Climate.gov, accessed on June 2019)

Today, there is global consensus among the scientific community (Oreskes 2004) concerning global warming and climate change[1] (CC) causes and consequences (IPCC 2007, IPCC 2014) and, regardless of the *climate change deniers* (Dunlap and McCright 2011) and opponents to net-zero targets[2], important steps have been accomplished by the international community in fixing objectives, limits and measurable targets (UNFCCC 1992, Kyoto Protocol 1997, Paris Agreement 2015, UN Agenda 2030 SDGs 2015, just to name the most famous ones) in the attempt to reduce risks related to climate change (UNISDR 2015) while achieving sustainable development (SD)[3].

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[1] In the context of this research, I assume the definition of United Nations Framework Convention on Climate Change (UNFCCC 1992), where climate change is defined as «a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.» (ibid., p.3)

[2] On September 23th 2019, a letter titled "There is no climate emergency" and signed by "a global network of more than 500 knowledgeable and experienced scientists and professionals in climate and related fields" who deem climate change to be a myth, was sent to leaders of European Union (EU) and United Nations (UN) institutions, pushing for environmental deregulation after Brexit. See https://www.independent.co.uk/environment/climate-change-science-deniers-boris-johnson-environment-leak-a9094631.html for references.

[3] For sustainable development, I refer to the «development that meets the needs of the present without compromising the ability of future generations to meet their own needs» (WCED 1987).

The goals of mitigating and adapting[4] to climate change effects and impacts, at all levels (Leemans and Eickhout 2004), can no longer be separated from that of pursuing sustainable development (Cohen et al. 1998, Swart et al. 2003, Schultz et al. 2013, Denton et al. 2014, UN Environment 2019), and accelerating an ecological transition. It is held that both are necessary to "build resilience" of *Social-Ecological Systems* (SESs) (Biggs et al. 2012, Stockholm Resilience Centre 2014).

"Resilience" is a multifaceted and multidisciplinary concept (Folke 2016) that emerged from the seminal work of C. S Holling (1973). Borrowed from the field of ecology, it describes a fundamental property of ecological systems that, from the general objective of *persistence of functions*, through the emphasis on *adaptability*, to its more recent orientation in emphasizing the *transformative capacity* of coupled SESs, in the face of uncertainty and abrupt changes (Holling 1973, Walker et al., 2004; Folke 2016), can give us many design indications concerning planning and design strategies for adaptation and, as a result, to make our cities more resilient and sustainable.

In this research, "resilience" is defined in the context of SESs as *Complex Adaptive Systems* (CASs) (Berkes and Folke 1998, Holling 2001, Gunderson and Holling 2002), such as urban ones (Batty 2007, 2012, Bettencourt 2015), as a *characteristic*, or better stated a '*dimension*', of the system and is connected to the *adaptive capacity* of reorganization and renewal of the system itself, in response to stresses (Gunderson and Holling 2002). The evolution of the concept and definitions of **resilience**, in particular as it relates to **participation**[5], will be illustrated in Chap. 3 .

1.2 Alternative scenarios: avoiding the Hothouse Earth Pathway

"Climate change is the key challenge of our time. Our generation is the first to experience the rapid increase in temperatures around the globe and probably the last to effectively combat an impending global climate crisis." –

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[4] With "mitigation" is intended an intervention that reduces the emissions sources or enhance the sinks of greenhouse gases (GHG). With "adaptation" is intended an "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (IPCC 2001).

[5] In this research I will refer to the word "participation" and to the related approaches in the field of design and planning, of "participatory design" and "participatory planning", or better based on an examination of the literature of the sector, "collaborative planning" (Bishop 2015), defined as a democratic approach, methodology and objective, distinct from and which goes beyond what in the field of user-center design and Human-Computer Interaction (HCI) is called "participatory design", or rather as a method to improve the interface or functionality of a product/process through the design contribution of the end users. Collaborative planning (or design, considering the scale, object and purpose of the process) encompasses other words in use (Bishop 2015) in the design and planning field, such as "consultation", "collaboration", "involvement", "engagement", "dialogue", which are also common activities in a participatory process. If in the text I will refer interchangeably to "participatory design" and "participatory planning", or "co-design" and "co-planning" it is because of the specific context of climate change and ecological transition, in which the scale, object and purpose of the process, is varied and complex.

This declaration[6] opens the joint document of 16 European heads of government (Sergio Mattarella the Italian President of the Republic, first signatory), published a week after the commencement of the negotiations on climate change Cop24 UN conference, which took place in Katowice (Poland) in December 2018.

Three years after the historic agreement reached in Paris during COP21on December 2015 to contain the rise of global temperatures within 1.5°-2° above pre-industrial levels, the IPCC "Special Report Global Warming of 1.5℃" (IPCC 2018), foresees very worrying consequences on the ecological, economic and social systems, even in the occurrence of the most optimistic scenario-target(s) set during COP21.

The progression in Europe of climate change effects (EEA 2017), as everywhere (WMO 2019, Leemans and Eickhout 2004, IPCC 2014 - see Figure 2), appears to be a symptom, acting as a "threat multiplier" (IPCC 2014; Baiani and Valitutti 2013), and not the cause of our ecological problem, represented instead by the systematic overcoming or "overshooting" (Catton 1982) of the planet's carrying capacity (Rees 1992) to support our global ecological "footprint" (or living, eating, moving, etc. See Figure 3) through the so-called Ecosystem Services (ESs), or the advantages that ecosystems provide to humanity in the form of "goods and services" (MEA 2005). The protection and enhancement of ESs' resilience to support human well-being, has already become an imperative which will require specific governance and management policies to meet current and future societal needs (Biggs et al. 2012).
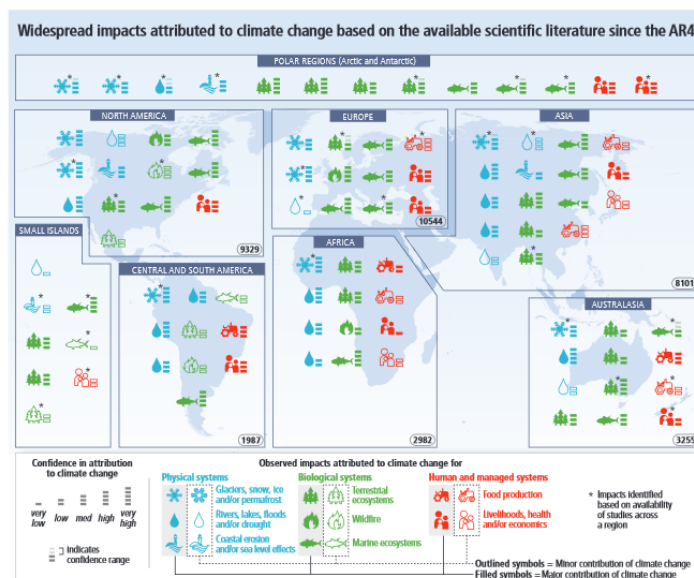
Figure 2: Image by IPCC (2014), Climate Change 2014: Synthesis Report, Summary for Policymakers, pag.7

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[6] Declaration signed by the President of the Republic, and other Heads of State and Governments: 'Initiative for Climate Ambition', Rome, 23/11/2018, excerpt. Online https://www.quirinale.it/elementi/19230

Ecological Footprint and Human Development Index of Countries (2016)

Source: Ecological Footprint (in number of Earths): National Footprint and Biocapacity Accounts, 2019 Edition, Global Footprint Network.
Human Development Index: Human Development Report, 2018, United Nations Development Programme.
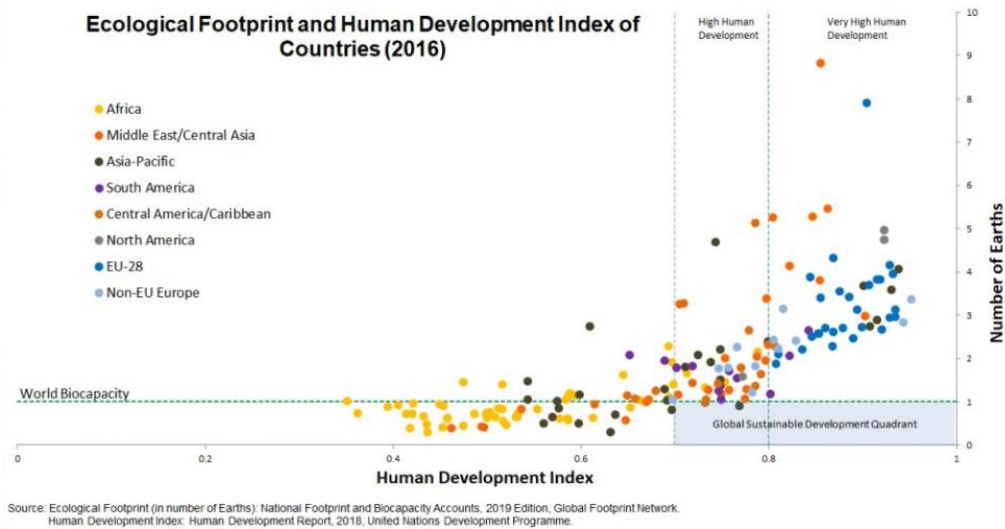
Figure 3: Ecological Footprint and Human Development Index (HDI) 2016 as elaborated by Global Footprint Network. (Source: https://www.footprintnetwork.org/our-work/sustainable-development/ accessed on July 2020)

Moreover, the latest studies[7] warn of the possible existence of a planetary threshold (Steffen et al. 2018, Lenton et al. 2019) that, if crossed, could prevent the stabilization of the climate at the intermediate temperature, as foreseen by Paris Agreement or more precautionary scenarios, causing continued warming, even if human emissions should be reduced. If this scenario occurs, Steffen et al. (2018) warn that "we cannot exclude the risk that a cascade feedback could push the Earth System irreversibly onto a "Hothouse Earth" pathway" (ibid. p. 8254. See Figure 4), while Lenton et al. (2019) suggest that several climate tipping points are already crossed.
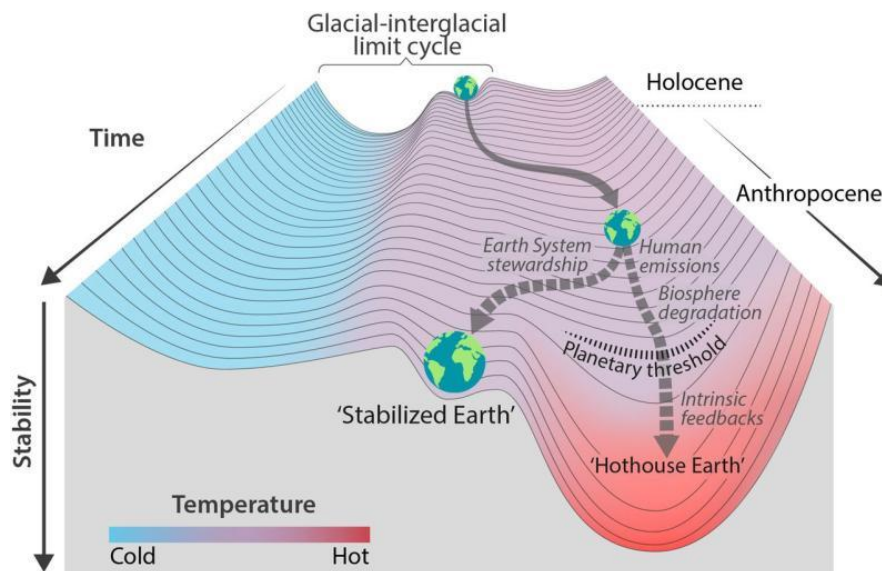
Figure 4: Steffen, W., Rockström, J.,… & Donges, J. F. (2018). Trajectories of the Earth System in the Anthropocene. Proceedings of the National Academy of Sciences, 115(33)

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[7] In particular, a very recent speculative paper (Steffen et al. 2018) which counts among its authors exponents of numerous research institutes specialized in the study of the environmental, economic and social effects of climate change.

To steer away from actual pathway and maintain the Earth System[8] on an "Alternative Stabilized Earth Pathway" (Steffen et al. 2018), the same studies argue for the necessity of Planetary (Human) Ecosystem stewardship (Chapin III et al. 2010, Olsson et al. 2010, Steffen et al. 2011, Peccei 1974). Ecosystem stewardship, a very recent evolution of the ecosystem management[9] approach, is a proactive governance strategy (Chapin III et al. 2010) "to respond to and shape social–ecological systems under conditions of uncertainty and change, to sustain the supply and opportunities for use of ecosystem services to support human well-being" (*ibid*., p. 241).

Stated differently, Ecosystem stewardship can be considered a "coordinated, deliberate effort by human societies to manage our relationship with the rest of the Earth System" (Steffen et al. 2018, p. 8257).

1.3 Local action for global targets

> "We are at a decisive moment in our role as custodians of the planet […] we need a significant shift in trajectory – indeed, the kind of transformational change prescribed by the Intergovernmental Panel on Climate Change in its recent report on limiting global warming to 1.5 degrees" –

These are the words of António Guterres, Secretary-General of the United Nations, in the foreword to the UN report Global Environment Outlook GEO-6: Healthy Planet, Healthy People (UN Environment 2019, p. xxvi).

Since 1992, when during the Rio Earth summit the fundamental landmark treaty to address climate change, the United Nations Framework Convention on Climate Change (UNFCCC), was agreed upon and signed[10], many steps and international efforts have been undertaken to address climate change and **build resilience**, mainly coordinated by the UN and addressed to Nation-states governments. At the same time, the main global strategies for adequately managing disaster risk[11] (UNISDR 2015) call into question civil society and call for greater involvement of

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[8] For the definition of Earth System, I refer to Steffen et al. (2007) "The term Earth System refers to the suite of interacting physical, chemical and biological global-scale cycles and energy fluxes that provide the life-support for life at the surface of the planet […] the Earth System includes humans, our societies, and our activities; thus, humans are not an outside force perturbing an otherwise natural system but rather an integral and interacting part of the Earth System itself" (ibid., p. 615).

[9] Western natural resource management has evolved in time from exploitation, to steady-state resource management (or sustainable management), to ecosystem management (Chapin III et al. 2010).

[10] Status as at 02-07-2020: 165 signatories and 197 parties (196 States and 1 regional economic integration organization). Source: https://treaties.un.org/Pages/ViewDetailsIII.aspx?src=IND&mtdsg_no=XXVII-7&chapter =27&Temp=mtdsg3&clang=_en#1. The objective UNFCCC of the treaty is to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" by setting non-binding limits on greenhouse gas emissions for individual countries and outlining specific international treaties (called "protocols" or "Agreements") to negotiate specific further (and eventually legally binding, e.g. Kyoto Protocol in 1997) action towards the objective of the UNFCCC.

[11] In recent times there has been a shift from disaster management (ex-post) to disaster risk management (UNISDR 2015).

institutions and local communities in achieving the objectives.

Given the global scale of the problem, the actual answer has been based on international (at a Nation-state level) negotiations (Bulkeley and Betsill 2003), while it is widely agreed that an effective response to climate change, in particular for what regards adaptation[12] (Tol 2005), requires interaction and collaboration between multiple actors at different levels, from the global to the local scales (Keskitalo et al. 2016). In one word, it requires effective multi-level governance and *glocal* action (Gupta 2007, Bulkeley 2013).

Because "addressing climate change will require unprecedented level of cooperation, between countries, different levels of Governments and the private sector" (De Boer, 2009), this implicates the issues of "agency", "governance", "co-planning" and "decision-making" and how resilience is built and change occurs in SESs as CASs, and in particular in what is considered the "ecological niche of mankind" (Indovina 2003), namely *cities*.

One evidence of this recognition of the role of sub-national levels, is the shift which occurred in Global Development Goals, previously set in 2000 by the Millennium Development Goals[13](MDGs), with the launch in 2015 of "Agenda 2030. Transform our World" (UNDESA 2015) which transferred the MDGs on a worldwide scale, through the new Sustainable Development Goals (SDGs)[14].

The two elements of novelty in the strategy are that i) the goals combine *global and local dimensions* of action (and targets), calling into question sub-national actors' and third parties' cooperation and responsibility in achieving the targets, and ii) that every single goal of the 17 SDGs, involves some work being carried out at the *city level*. One goal in particular - Goal 11. "Make cities and human settlements inclusive, safe, resilient and sustainable" links directly to the possibility of building resilience in cities.

This shift acknowledges that many cities around the world, due to their significant contribution to global greenhouse gases (GHGs) emissions and to their role in global warming process, are

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[12] According to Tol (2005) adaptation and mitigation differ in terms of spatial and temporal scales and differ also in terms of concerned economic sectors: adaptation benefits are local and short-term, while mitigation benefits are global and long-term; while both are relevant to agriculture and forestry sectors, mitigation is a priority in energy, transportation, industrial production and waste management sector, and adaptation in water management and health sector, and in coastal or low-lying urbanized areas (ibid.).

[13] The world leaders gathered in New York in 2000 at the Millennium Summit and committed their nations to a new global partnership to reduce extreme poverty, and set 8 time-bound targets concerning poverty eradication, universal education, health and equity and ensure environmental sustainability in face of dangerous deterioration of the environment, that expired after 15 years, with deadline in 2015.

[14] The 2030 Agenda for Sustainable Development contains 17 SDGs accompanied by 169 targets, that partially quantify the goals, and replace and integrate the eight MDGs of the Millennium. Again, SDGs expire after 15 years, in 2030.

already developing policies for mitigation and urban plans and projects of local adaptation, to reduce existing local vulnerabilities (through reactive and preventive adaptation), thus introducing the concept of *Resilient Cities and Communities* (Boeri et al. 2017).

It also acknowledges, that efforts at inter-national level are actually failing to reach agreement and concrete results (Ostrom 2009, Arriagada et al. 2018) and that in order to accelerate the achievement of SDGs, Agenda 2030 needs to refer strongly to sub-national local contexts and policies. The European Urban Agenda (2016) and the recent formation of Urban 20 (U20) further confirm the intention of *urban institutions* to play an important role in tackling global issues (Foster & Swiney, 2019).

Cities are also the focus of the draft Mission outline "100 Climate-Neutral Cities by 2030 - By and For the Citizens" of the new Horizon Europe program[15] in the area of climate-neutral and smart cities.

The Mission aims to support European Green Deal[16] goal of making Europe climate neutral by 2050, by fostering and showcasing 100 European cities in their systemic transformation towards climate neutrality by 2030. The objectives of the Mission include the development of drivers of transition such as "New forms of participative governance" to promote citizens as agents of change through bottom-up initiatives and innovation, and the opportunity to build a multi-level and co-creative process formalized in a Climate City Contract, tailored to each city (EU Directorate-General for Research and Innovation Clean Planet 2020).

The present research could represent, in its final products, a concrete contribution to help European cities in fulfilling the Mission.

1.4 The adaptive capacity of urban institutions in the face of climate change and global ecological crisis

> "The battle for sustainability will be won or lost in cities" (UN Deputy Secretary-General Jan Eliasson's opening remarks at the Mayor's Forum of the World Cities Summit, New York 2015).

In 2007 for the first time in history, the population living in the world's cities has exceeded the number of people living in rural areas. According to the UN Department of Economic and Social Affairs, Population Division, in 2018 an estimated 55 per cent of the world's population were living

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[15] Horizion Europe is EU new €100 billion research and innovation investment programme for 2021– 2027 (source: https://ec.europa.eu/info/horizon-europe_en).
[16] The European Green Deal is Europe's new plan to achieve zero net GHG emissions by 2050, while making EU's economy sustainable and fair (source: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en#documents).

in urban settlements – with Europe, at present, the world's most urbanized continent – and, it is projected that by 2050 around two thirds of the human population will live in urban areas (UNDESA 2018).

Due to their high concentration of population, industries and infrastructure, cities are the major contributors to emissions and resource consumption (Rees 1992, UN HABITAT 2011), but it is recognized that they are also the centers of technological and socio-cultural innovation (URBACT II 2014).

This poses cities and urban institutions[17] in a crucial role of being central to how vulnerabilities and risks of climate change are produced and, at the same time, to how solutions to address climate change possibilities and challenges can emerge (Bulkeley 2013), ultimately reducing their vulnerability through mitigation and adaptation measures and sustainable urban regeneration.

Although cities remain intrinsically powerless (Foster & Swiney, 2019) for what concerns the enforcement of rules to mitigate and tackle climate change which remain the prerogative of nation states, the rise of international networks of city associations (Acuto et al. 2019, in Foster & Swiney, 2019) are helping cities to gain *soft power* (*ibid.* Foster & Swiney, 2019) in shaping agendas at the global scale, based on their vast knowledge and experience in voluntary adaptation measures and experimentation.

In the context of an Applied Research Project conducted within the framework of the ESPON 2013 Programme (partly financed by the European Regional Development Fund), all European regions have been analyzed and classified with regard to their vulnerability to climate change and, more interestingly for the present research, with regard to their capacity to adapt in face of climate change. With a comprehensive methodological approach, the study analyzed the different climate change responsive territorial development policies across Europe combining exposure, sensitivity and adaptive capacity (ESPON & IRPUD 2011). The latter was based on five major determinants or dimensions – Economic resources, Knowledge and awareness, Infrastructure, Institutions, and Technology – which were assessed through several indicators and organized in aggregate dimensions of Awareness, Ability and Action (cfr. ESPON & IRPUD 2011, Table 1, p. 4 and Figure 3, p. 20). In the study "adaptive capacity" is defined according to IPCC (IPCC 2007c in ESPON & IRPUD, 2011) "as the ability or potential of a system to respond successfully to climate variability and change, and includes adjustments in both behavior and in resources and technologies",

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[17] In this work besides the physical and geographical dimension, I will refer to "cities" in most inclusive definition that combines social, biological, built and geophysical components (Pickett et al. 2014) and to "urban institutions", to intend local governments and local leaders but also urban agencies and other local institutions (non necessarily public bodies) that act in name of cities in shaping policies for urban resilience and ecological transition.

while the "institutional capacity" is measured by government effectiveness, regional co-operation and the existence of a national strategy.

In the context of this research, the concept of "institutional adaptive capacity" is expanded and related to a growing number of "climate change experiments" (Castán Broto and Bulkeley 2013) that involve cities, urban institutions and public bodies at different levels of government, in collaboration with a myriad of third parties, in a multiplicity of small incremental actions which have been often developed through "new methods" (Barresi and Pultrone 2018).

Such incremental actions have materialized both "within the bounds" of the cities' legitimate actions (i.e. their planning competencies, such as zoning laws, urban and strategic plans, regulations, etc.), on the "border" (within EU funded projects, in policies of promotion, etc.) and "outside" (in collaboration with independent initiatives), involving a myriad of third parties, from large companies, organizations and foundations, to business and third sector non-profit entities, associations, opinion groups, down to professionals and individual citizens, all willing to contribute with resources, ideas and knowledge to the resolution of the problem, thus reinforcing the perspective that facing "climate change is, truly, a global collective-action problem" (Ostrom 2010, p.1).

Urban climate governance or the attempts to govern climate change in urban areas (Castán Broto 2017) and therefore *urban resilience planning* (Pickett et al. 2004, Eraydin and Taşan-Kok 2013, Meerow et al. 2016, Meerow and Newell 2019) thus become central.

If Cities and Urban Institutions truly aspire to respond to the urgency of the situation, it becomes a matter of "resilience" for them to be able *to intercept and govern* these scattered actions more effectively, with innovative approaches and with the right timing that can better connect and integrate them into the planning tools in use.

Since "an effective architecture of a governance system for planetary stewardship is likely to be polycentric and multi-level rather than centralized and hierarchical" (Steffen et al. 2011, p. 757), the required "polycentric governance" (Arriagada et al. 2018, Ostrom et al. 1961, Ostrom 1990, 2009, 2010) to stir the Earth System away from the Hothouse Earth Pathway into the "Alternative Stabilized Earth Pathway" (Steffen et al. 2011), implies the question of "who decides, how and what" (Benello and Roussopoulos 1971) and therefore the notion and the practice of **effective participation** (for e.g., Arnstein 1969, Alexander et al. 1975, Lorenzo 1998, Wilkox 1994, Forester 1999, Bishop 2015) in processes of decision-making, co-planning and co-design, to tackle climate change and foster an ecological transition. Because of the complexity and the growing uncertainty

of future scenarios, the contribution of participation as a fundamental principle for "building resilience" (Stockholm Resilience Center 2014, Biggs et al. 2012, Folke et al. 2005) in CASs embedded in linked SESs, such as urban systems, is now widely recognized (De Boer 2009).

The intersection of *ecological resilience* (building) and *participation*, in theory and in practice, therefore, represents the field of knowledge and the **theoretical framework** (Chap. 3) of the present research, in search of possible answers to "expand ecological resilience" (Holling 1996) in the face of actual ecological and climate crisis and in the perspective of fostering active Human Ecosystem stewardship of Earth.

However, as highlighted by some scholars (Hester 2007) and as I will discuss in Chap. 3, some characteristics of the ecological-global problem domain, make the application of principles and methodologies of participatory processes, more problematic. The "intricate opposition" (Hester 2007) of contrasting dimensions of scale, time and different levels of knowledge involved, between ecological and participatory action (*ibid.*) are some of the critical issues to be considered and eventually resolved.

1.5 Big plans or little plans[18]? The mutation of Urban Planning and the rise of Urban climate change experiments

The ecological and climate change crises have impacted all aspects of human development (Asian Development Bank 2014), shattering to its foundations, in particular, the field of *urban planning*. The "new urban question" (Secchi 2011) in the the context of present research's interests , or that of the "environmental or ecological problems" (ibid.), is forcing urban planning to change, for three reasons:

> "perché obbligano a prendere in considerazione territori assai ampi e tempi molto estesi, […] In secondo luogo, i temi ambientali escludono previsioni certe. […] di una ben più radicale incertezza nei confronti dei nessi tra i diversi fenomeni e tra le diverse grandezze, La terza ragione […] è che l'incertezza ci obbliga a convivere con il rischio e che i rischi, non solo quelli ambientali, non sono spazialmente distribuiti in modo uniforme, non investono in modo uguale tutti i gruppi sociali. La

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[18] The title of this paragraph is inspired by "Can Big Plans Solve the Problem of Renewal? Speech at the Residential Areas and Urban Renewal Conference, Hamburg, West Germany, 12-14 October 1981" in Jacobs, J. (2017). *Vital little plans: the short works of Jane Jacobs*. Short Books, 177-188, in which Jacobs expresses her point of view about why little plans are more appropriate for city renewal (ibid. p.177) based on three objection to using big plans: big plans, in which everything has been foreseen, stifle alternatives and fresh possibilities, which is a contradiction in terms when you are planning for the future; big plans do not create a fertile ground for different possibilities and renewal should not imply fossilization; big plans are inflexible and "when change impinges itself on big plans, adaptation to change becomes hard" (ibid., p. 181).

modernità, anzi, ha di fatto prodotto situazioni socialmente discriminanti." (Secchi, 2011 pp. 93 - 94)[19]

This reversal of perspective, which calls into question the very concept of hierarchy in planning (Secchi 2011, page 93) is not new, and the "spatial turn", as Secchi reports, must be traced back to the end of the 60s, with Jane Jacobs' work and writings (Jacobs 1961, *in primis*) with her primordial use of ecological thinking in urban settings, and the idea of cities as "problems of organized complexity". New, probably, is the fact that the need for this reversal, now appears to be universally accepted. Big, comprehensive plans, have shown their limits (Hamdi 2013, Alexander 1965, 1975) and "Urbanism" is the internationally used term that, according to Gabellini (2018), now encompasses broader forms of city making, such as informal planning and the contamination with different knowledge, and which is globally recognized by practitioners, administrators and theorists in the field, in a meaning that unites processes and projects (ibid, Gabellini 2018).

Such a new orientation in the field of urban planning or "mutation" as Gabellini calls it (2018), could help, she writes, to overcome the long-running dichotomy between long term and short term planning or, better stated, between strategy and tactics "as two opposite ways of dealing with the urban question" (ibid, p. 32, my translation), thus opening the field for *experimentation*.

> Esperienze e valutazioni hanno mostrato che una pianificazione strategica esclusivamente orientata all'efficacia delle *performances* e basata su accordi tra selezionati *stakeholders* non riesce a fronteggiare l'incertezza e la diversità di visioni sul futuro della città, che è necessario costruire percorsi di co-produzione e considerare le progettualità esistenti, contemplare le retroazioni e la ridefinizione della strategia in un processo di apprendimento continuo. (Gabellini 2018, pp. 32-33)[20]

"Resilience", in this sense, becomes a perspective and an attitude that modifies and mobilizes planning practice (Gabellini 2018), in reaction to shocks and stresses and in a process of continuous adaptation. Such a shift could help complement slower global action with faster local ones (action), by investigating the policy space at different administrative levels (Gupta et al. 2007).

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[19] "because they oblige one to take into consideration much vaster areas and longer time periods, [...] Secondly, environmental themes exclude exact previsions [...] are much more radically uncertain when considering the interconnections between different phenomena of greatly varied dimensions. The third reason is that uncertainty obliges us to live with 'risk' and that such risks – and not only environmental ones – are not distributed uniformly in space and do not impact diverse social groups in equal measure. This 'Modernity', in fact, has produced situations which are socially discriminatory" (my translation).

[20] "Experiences and evaluations, have demonstrated that any strategic planning which is exclusively oriented towards the *efficiency of performance* and based entirely on agreements between *selected stakeholders* does not manage to confront the uncertainty and diversity of visions of the future of our cities … and that it is necessary to construct paths of co-production and to take into consideration all existing projectuality, to contemplate retroactions and to redefine our strategy as a process of *continuous learning*" (my translation).

From this perspective, cities and urban institutions at a worldwide scale, are already moving in a process of continuous *experimentation*.

The definition of "climate change experiments" was introduced by Castàn Broto and Bulkeley in relation to urban climate change governance as an experimentation process. This evaluation emerged from their extensive analysis of 100 global cities (Castàn Broto and Bulkeley 2013) which suggested "that, since 2005, experimentation is a feature of urban responses to climate change across different world regions and multiple sectors" (ibid., p. 1).

> "Climate change experiments are presented here as interventions to try out new ideas and methods in the context of future uncertainties. They serve to understand how interventions work in practice, in new contexts where they are thought of as innovative (Castàn Broto and Bulkeley 2013, p.3).

According to Castàn Broto and Bulkeley an intervention can be considered an "*urban* climate change experiment" when it possesses the following three criteria:

> "first, an intervention is experimental when it is purposive and strategic but explicitly seeks to capture new forms of learning or experience; second, an intervention is a climate change experiment where the purpose is to reduce emissions of greenhouse gases (mitigation) and/or vulnerabilities to climate change impacts (adaptation); third, a climate change experiment is urban when it is delivered by or in the name of an existing or imagined urban community" (Castàn Broto and Bulkeley 2013, p.3).

These forms of experimentation are spreading globally, are intersecting different planning dimensions from the micro scale of urban design and streetscape to the macro scale of environmental protection, climate change mitigation and adaptation, and disaster risk reduction, and have involved a multiplicity of actors in a myriad of small incremental actions, which, in many cases, are independent from urban institutions themselves.

As Castàn Broto and Bulkeley (2013) have highlighted, "previous research has largely overlooked the multiplicity of climate change responses emerging outside formal contexts of decision-making and led by actors other than municipal governments" (*ibid.*, p. 1), and some of these urban (climate[21]) experiments are in fact taking the form of grassroots glocal[22] movements which have developed locally on the basis of a few common and international rules and principles.

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[21] The attribute "climate" is obviously appropriate for the growing movements for environmental direct-action, while for Placemaking and Tactical Urbanism it is more appropriate to use only the urban attribute, even if there is a fundamental component of sustainable design and a tension towards environmental sustainability, and furthermore there are growing examples of Placemaking and Tactical urbanism explicitly addressed to tackle climate change effects. See Chap. 4, Par.4.4.

[22] The term "glocal" refers to the fact that these experimentations are locally anchored but transversely oriented towards global issues, adapted to each referring context.

This is the case of "Tactical urbanism"[23] (Lyndon and Garcia 2015) and "Placemaking"[24] (Schneekloth and Shibley 1995, PPS 2009a and 2009b, Adhya 2012, Kent 2019), as well as of the spontaneous global environmental direct-action movements, such as "Fridays for Future" and "Extinction Rebellion" (Whang 2020, Hensby 2019) which call for a greater citizen voice[25] in environmental decision-making in urban settings.

It is also the case of another growing socio-technological phenomenon, the so-called Civic Hackathons (Robinson and Johnson 2016, Trainer et al. 2016, Taylor and Clarke 2018) which are intensive and collocated (Trainer et al. 2016) collaborative design events that involve multiple actors in carrying out experimentations addressed to solving urban issues, in unusual fields for urban planning, such as ICT, GIS and Data management, and that are becoming very popular among cities worldwide (Briscoe and Mulligan 2014).

One typology of Civic Hackathons - Green Hackathons (Zapico 2013) - is aimed at developing solutions which foster sustainability and, in particular, the Climathon®, is a global event organized annually by the European EIT (European Institute of Innovation and Technology) platform Climate KIC, which is explicitly oriented to finding (identifying) "concrete solutions" to climate change challenges, and to increase resilience and foster ecological transition at the urban level.

In this sense, the phenomena of Green Hackathon and Climathon, in particular, represents a very interesting example of internationally dislocated and globally connected events that face highly complex issues of *social-ecological resilience and sustainability*, at all scales, while starting from an urban perspective. Both events utilize all available resources of local and global technology (ICT and big data, *in primis*, along with more traditional technologies) – green and blue infrastructure (or new use for grey ones), traditional and new knowledge, organizational and social innovation – to address and potentially resolve *challenges* of social-ecological resilience and sustainability, through a collaborative (design) approach.

Based on the criteria posed by Castàn Broto and Bulkeley (2013), I propose that Green Hackathon and Climathon can be fully considered as "climate change experiments" of the "urban" kind, and therefore call for further research "to advance interpretations and make hypotheses, and to outline possible routes" (Gabellini 2018, p. 34, my translation).

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[23] Tactical Urbanism is an approach to neighborhood building that uses short-term, low-cost, and scalable interventions and policies to catalyze long term change (Lyndon and Garcia 2015).

[24] Placemaking is a 'multi-faceted' approach to the planning, design and management of public spaces. Through small scale creative interventions and participatory methods, it aims to create benefits for the people that live and use a specific public space while strengthening the bonds among the community and with place (PPS 2009a).

[25] And of specific deliberative spaces. For e.g. in the UK, Extinction Rebellion's demand that government must create and be led by the decisions of a citizens' assembly on climate and ecological justice (source: https://rebellion.earth/act-now/resources/citizens-assembly/)

The vast global emergence of experimentation and the urgency of the situation, in fact, calls for careful observation of all forms of experimentation – and not only of the institutional ones (Castàn Broto 2017), and as for the metaphor of the path and the forest[26] (Lanzara 1993, pp. 52-53), the kinds of *project-action* that can be foreseen as emerging from these other "climate change experiments", could offer urban institutions the possibility of experimenting local sequences that make provisional sense before proceeding any further (ibid.), to facilitate urban resilience and ecological transition in "safe arenas for experimentation" (my definition, based on the "arenas for safe-to-fail experimentation" of Westley et al. 2013).

But at the moment, these "practices" have not yet been analyzed in relation to ongoing *urban climate governance* (Castán Broto 2017) and *resilience planning* (Eraydin and Taşan-Kok 2013, Meerow and Newell 2019), nor has there been research about how these scattered practices could be better governed and integrated within a **framework of collaborative (resilience) planning**[27]. The present research aims to be a contribution in this sense.

1.6 Why study Green Hackathon and Climathon®? The research questions and my contribution to international research

Against this background, the starting point of the present research has been the careful observation and analysis of the development of a new policy of the City of Bologna in Italy, "Bologna Città Resiliente", which grew from the City's consolidated tradition of participatory approaches in spatial planning (Ginocchini 2009, Allegrini 2016, Ginocchini and Petrei 2013).

The efforts of the Municipality of Bologna (Comune di Bologna, COBO) and of other urban institutions (e.g. The Foundation for the Urban Innovation, FIU) to find new pathways and procedures to achieve sustainability in the face of the growing uncertainty and risks due to climate change and ecological crisis, have moved Bologna – along with a growing number of cities across the globe - into uncharted territories of mixing mandatory and voluntary planning tools, municipality-led participatory processes, bottom-up approaches and third parties initiatives in an ongoing process of collaborative planning oriented towards urban resilience and ecological

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[26] In his book Lanzara (1993) refers to the "negative capacity" (Keats 1817) or the capacity to accept moments of indeterminacy and lack of direction, and instead understand the potential and action that these moments bring with them. "It is by exploring and researching that we produce the path: only the availability and ability to reposition ourselves with respect to the forest by accepting it as a resource, source of information, place of experimentation will allow us to reach our goal" (Lanzara 1993, trad.)

[27] The research assumes the definition of "collaborative planning" from the work and writings of Jeff Bishop, UK recognized expert of participatory planning at European level, that in his book "The Craft of Collaborative Planning" (2015) chooses the term "collaborative" to indicate participatory processes led in collaboration (nether top-down nor bottom-up), among maybe small but wide-range of stakeholders interested in generating a widely agreed solution or plan, a process that more likely could result in a win-win solution (cfr. Bishop 2015, pp,3-4).

transition.

The opportunity for me to observe from a close distance one of such experiments, was offered by my direct participation in the Climathon® 2017 Edition *Copernicus Climathon. Copernicus for the development of green and blue networks in the city: satellite data for resilient Bologna*, one of the three editions that took place in Bologna between 2016-2018.

As a participatory design practitioner, I was immediately able to recognize many elements (Lorenzo 1998) which characterize these events as a form of participatory activity (Taylor and Clarke 2018).

Given the fact that Climathon® deals with complex issues affecting a wide and diversified public, it seemed necessary to critically understand the established format, the tools utilized and its declared objectives, as well as the events' position with respect to other ongoing participatory and planning processes, in order to improve their degree of participation in consistency with their mission and, consequently, with their ability to improve the resilience of the urban contexts in which they are implemented.

Starting from this concrete experience, that evolved in an exercise of participant observation (Semi 2013) and in the following process of collaboration with the Municipality of Bologna around the "climate solution" proposed by my group in that context, the research has moved, on one hand, to explore the extent of the global movement of Climathon, and its origins within the Civic Hackathon phenomena, therefore in Green Hackathons, and, on the other hand, to more clearly judge that these "urban climate experiments" could be better understood and addressed through the lenses of *social-ecological resilience* (Holling 1973, Berkes and Folke 1998, Adger 2000, Walker et al. 2004, Folke 2006) and of *resilience thinking* (e.g. Folke 2016).

Situated between the fields of *Technology of Architecture* and *Urban and Territorial Planning and Design*, combining the themes of the PhD Architecture and Design Cultures Program of *Outdoor quality, climate change adaptation and mitigation strategies*, *Sustainability in planning and in urban design* and *Urban regeneration: techniques, tools and experimentations*, and with correlations in the field of Social Sciences, the research has therefore explored *through the double lenses of social-ecological resilience and of participatory processes*, Green Hackathons and Climathon® in the context of the growing experimentation by third parties (with respect to the urban institutions in charge) to find solutions to climate change and ecological crisis in urban settings and, ultimately, to demonstrate their *potentiality for innovating urban planning in a resilient and sustainable perspective*.

Tracing the "process" beyond the "products", from the genesis of the challenge to the development of the outputs, the research assessed not only the "degree of participation" of Green Hackathon and, in particular, of Climathon®, but also which forms of partnership and incentives have best facilitated the transformation of ideas into actions, which actors are involved, how costs and benefits are distributed, and how the final outcomes fit into other levels of urban policies or programming.

The objective of the research is to evaluate whether such practices (currently, neither institutionalized nor coordinated) if, *suitably linked to and integrated within the local resilience and environmental planning process* and *combined* with other small incremental, and in part self-organized urban climate change experiments[28], might represent a new and effective participatory approach to move *resilient planning towards collaborative ecosystem stewardship* (Chapin III et al. 2010), or *ecosystem co-stewardship*.

The research objective will be pursued by applying insight and prescriptive indications drawn from *social-ecological resilience (thinking)* in combination with the *participatory principles and engagement tools of the collaborative planning field*, to develop a **new adaptive co-design framework for urban resilience and ecological transition**, addressed to assist urban institutions in better coordinating, integrating, and consolidating bottom-up and third parties local contributions towards the achievement of the global targets of social-ecological resilience and sustainability[29], and its implementation and replication in other regulatory contexts and decision-making processes within the field of urban resilience planning.

In conclusion, this thesis aims to address and respond to the following critical research questions:

> \\ can Green Hackathon and Climathon® be considered participatory activities, and if they are, do they provide adequate degrees (and levels) of participation?
> \\ what are their potentials and limits in orienting and innovating current planning procedures and methods towards ecological stewardship?
> \\ can Green/Climate Hackathons together with other forms of small, creative co-design moments such as Placemaking and Tactical urbanism, and the emergence of spontaneous global environmental direct-action movements, represent for cities in the ongoing process of building resilience, an opportunity to experiment new forms of *resilient "collaborative" planning or ecosystem co-stewardship*?

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[28] As the ones mentioned, namely Placemaking, Tactical Urbanism and environmental direct-action movements.
[29] Such as UN Agenda 2030, in particular SDG11 and SDG13, Sendai Framework for Disaster Risk Reduction 2015-2030, Paris Agreement COP21 2015, and outcomes of Katowice COP24 2018, with regard to the IPCC Special Report "Global Warming of 1.5 °".

\\ could they help overcome the "intricate opposition" (Hester 2007) between the ecological and participatory dimensions, and what is their possible role?

\\ how can these co-design forms be included in ongoing urban resilience planning to help cities contribute to the achievement of the global targets of resilience and sustainability (UN Agenda 2030, in particular SDG11 and SDG13, Sendai Framework for Disaster Risk Reduction 2015-2030, Paris Agreement COP21 2015, and outcomes of Katowice COP24 2018, with regard of the limit of 1.5 ° of the IPCC Special Report "Global Warming of 1.5 °) as well as to support them in achieving the objectives of the European Green Deal, and in particular, by responding to Horizon Europe program's Mission "100 Climate-Neutral Cities by 2030 - By and For the Citizens"?

Through a range of tools, the research was conducted in an interdisciplinary perspective as concerns its methods and fields of study, combining basic and applied research and using different methods, including several tools borrowed from the sociological field, to analyze One Hundred events among Climathon and Green Hackathon, and to survey the actors (urban institutions and other subjects) that materially organized and participated in the events.

Following Ota De Leonardis' invitation to look at the institutions from a privileged observatory, that of the *practices* (De Leonardis, 2001, my italic), my research also closely observed through the double lenses of social-ecological resilience and of participatory processes, in two selected case studies, Bologna and Lisbon, the involvement of the two cities and two urban institutions, that have undertaken a process of ri-orientation of urban policies towards a resilience perspective, building space for experimentation on environmental issues.

My hope, as Lanzara (1993) would say, is to have produced, in the end, "the cognitive resources that extend the range of choices and possible actions, and enhance the action capacity of social actors [and] with possibilities of future action" (ibid, p. 227, my translation) to foster in prospective, active (Human) Ecosystem stewardship of Planet Earth (Chapin III et al. 2010) and the enhancement and protection of Ecosystem Services (Biggs et al. 2012), to ensure both human well-being and ecosystem sustainability, starting from cities.

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2. Research methods: objectives, sources and interlocutors, tools and expected results

The chapter describes the methods and, specifically, presents the array of tools and instruments which have been used in the research.

The research has been conducted in an interdisciplinary perspective and with an inductive scientific approach, in a processual and contextual cumulative investigative process over time, to put in place a series of operational tools, combining basic and applied research instruments and methods, and including several tools borrowed from the field of Sociology.

The chapter informs that after positioning the research within the context of climate change and ecological crisis, as outlined in (Chap. 1), documental research and scientific literature reviews were used to trace the concepts of social-ecological resilience and participatory approach Complex Adaptive Systems embedded in Social-ecological Systems, such as cities, and to build the two pairs of lens, both observational and operative (Chap. 3), necessary to observe and analyze the central object of the research.

The successive general analysis of the Green Hackathon phenomenon and of Climathon® (Chap. 4), through an examination of the scientific and generalist literature, allowed their classification within other situated forms of participatory activities and helped to lay the foundation for the empirical research that has been conducted through a combination of research methods and collection of diversified data, as listed:

1. *One Hundred Events of Climathon® and Green Hackathon Database*
2. *Online Survey on Climathon®|Green Hackathon: Co-action for resilience addressed to participants, organizers and partners of Climathon® and Green Hackathon;*
3. *Semi-structured interviews to key players and privileged interlocutors of the Climathon® and Green Hackathon movement;*
4. *Participant observation and in-person participation at the Climathon®2017 edition and during the successive incubation program;*
5. *Two case studies: Lisbon and Bologna.*

The chapter informs the reader that the analysis and different results of each tool are described and summarized in Chap. 5, while the operative and theoretical results are discussed in Chap. 6, together with the proposed new adaptive co-design framework for urban resilience and ecological transition.

The successive sections of the chapter are dedicated to describing the materials through the numbers and the details of the data collected, the analyses which have been carried out, as well as the expected results for the specific methods which have been used.

In addition, in the introduction to each instrument-method section it has been briefly explained how each tool has been applied with regard to the specific objective, with reference to the selected approach and to the scholars referenced for each methodology applied.

The present chapter illustrates the methods of my research, which has been conducted in an interdisciplinary perspective as concerns the fields of research and the range of tools which have been utilized. These combine basic and applied research instruments and methods, and include several tools borrowed from the field of Sociology.

The methods and tools that have supported the analysis of the results are described in the present chapter as *linearly deducted from a general theoretical framework*, but in fact, the research in its concrete development, has followed a different *iterative path*, starting from the direct observation of a concrete a *practice* and then expanding its perspective and analysis, while undergoing cyclic moments of reorientation based on literature review and direct observation.

The research has, therefore, been conducted with an *inductive* scientific approach, in a *processual* and *contextual cumulative investigative process over time*, coherent with the ecological resilience thinking approach (Holling 1996).

Nevertheless, to facilitate the readers in orienting themselves amongst the objectives, materials, sources (and interlocutors), tools and expected results of the present research, the following sections describe all the contents of the research in a linear, sub sequential way.

After positioning the research within the context of climate change and ecological crisis, as outlined in Chap. 1 **Between the eco-climate crisis and global goals of resilience and sustainability. The urban institutions in the perspective of a *Human stewardship* of the Earth System**, documental research and scientific literature reviews were used to trace the concepts of *social-ecological resilience* (with its fundamental concepts and heuristic models) and *participatory approach* (in action and theory, with its principles and tools) in Complex Adaptive Systems embedded in Social-ecological Systems, such as cities, and to build the **two pairs of lens**, *both observational and operative*, necessary to observe and analyze the central object of the research, which is the growing socio-technical phenomena and practice of Civic/Green Hackathons and, in particular, of Climathon, in relation to the efforts of urban institutions to address issues of resilience and ecological transition in cities through *experimentation*.

The theoretical, and also cultural and political, framework in which the research work moves its assumptions is outlined in Cap. 3. **Resilience and Participation (Theoretical Framework and State of the art Part 1)** following a temporal analysis of scientific and more generalist literature, with the objective of the relative analysis being to clarify the position of this research within the larger research field concerning the two topics, to highlight the existing touching points and the common open critical issues in the actual debate, and to integrate some aspects into my methodological approaches to data gathering and analysis.

These reviews also served to reconstruct the history and evolution of the phenomena of Civic Hackathons, Green Hackathons and Climathon that represent the central object of the present research, and to permit their classification within other situated forms of participatory activities, as described in Cap. 4 **Hackathon go Green: evolution of a safe arena (State of the art Part 2)**.

After a general analysis of the Green Hackathon phenomenon and of Climathon®, through the examination of the scientific and generalist literature, and their classification within other situated forms of participatory activities, the empirical research has been conducted through a combination of research methods and collection of different data, as listed:

- Secondary data analysis (Web Search) to build a Database of **One Hundred Events of Climathon® and Green Hackathon**;
- First-hand data collection through the **Online Survey on Climathon®|Green Hackathon: Co-action for resilience** addressed to participants, organizers or partners of Climathon® and Green Hackathon;
- First-hand data collection through **semi-structured interviews** to key players and privileged interlocutors of the Climathon® and Green Hackathon movement;
- First hand data collection through **participant observation and participation in person** at the Climathon®2017 edition and during the successive incubation program.

The combination of the analysis and results of these quantitative and qualitative research methods, together with secondary data gathering of documental and archive research of the overall planning and participatory context, permitted the construction of the last tool used in this research work:

- **Two case studies: Lisbon and Bologna** used to cross-check and refine the findings from the other tools.

The analysis and different results of each tool are described and summarized in Chap. 5 **The results of a global survey on the Green Hackathon and Climathon® movement**, while the operative and theoretical results are discussed in Chap. 6 **Introducing new dimensions of adaptive co-design for urban resilience and ecological transition.**

In the same final Chapter, the proposed **new adaptive co-design framework for urban resilience and ecological transition**, addressed to assist urban institutions in better coordinating and consolidating bottom-up and third parties local contributions towards the achievement of the global targets of social-ecological resilience and sustainability, is also illustrated and discussed.

The intersection of the areas and themes of the thesis' objectives with the various research methods and tools which have been therein applied, are synthetically presented in the following summary Table 1.

RESEARCH METHODS

Objective	Documental research and literature review	Event/case database	Survey online	Case studies	Interviews	Participant observation
State of the art and Theoretical framework (Resilience thinking and Participation; GH and CL)	√					
Background knowledge of Climathon® and Green Hackathon	√	√		√		
Format comparison		√		√	√	√
Degree of participation assessment			√	√		√
Relation with overall urban env/resilience planning	√		√	√	√	
Elements for adaptive co-design framework	√	√	√	√	√	√

The following sections describe all the *materials* through the numbers and the details of the data collected, the *analyses* which have been carried out and the *expected results* for each method used.

In addition, in the introduction to each instrument-method section, it has been briefly explained how each tool has been applied with regard to the specific *objective*, and with reference to the selected approach and the scholars referenced for the methodology applied.

The One Hundred Events Database of Climathon® and Green Hackathon

Objective

The construction of a database of one hundred events of Climathon® (CL) and Green Hackathons (GH) (specifically, 85 case of Climathon® and 15 cases of Green Hackathons) which started in February 2019 and ended in June 2019, was functional to my construction of an ample background knowledge of Climathon® and Green Hackathons experiences and, in particular, to analyze:

- timing of the events;
- geographical distribution of events;
- locations used for the events;
- the events' "challenge" thematic (and related key words);
- targeted participants;
- methodologies of engagement and interactive tools utilized;
- kind, number, background and distribution of partnerships among organizers (urban

institutions and other subjects);

- kinds of knowledge involved;
- types of information or resources given to participants;
- types of incentives given to participants;
- the presence or absence of preparatory and/or follow-up events or meetings;
- average number of participants;
- average number and types of solutions elaborated.

The database is attached to the present research as **Appendix I_One Hundred Events of Climathon and Green Hackathon Database**, in the form of a link to the excel format file to the Microsoft Drive folder in which it is stored. The data, anonymized from names and addresses of contacted organizers, is fully open to modification for research purposes, and can be explored through queries, pivot charts or other.

The categories to analyze the selected events, that in the Database correspond to the different "fields", are derived from Neri Serneri, G. (1997), *La formazione del ricercatore. Il contributo di un'esperienza*. In Quaderni del Dipartimento 4, Dipartimento Processi e Metodi della Produzione Edilizia, Università di Firenze, Alinea Editrice, Firenze and from Francis, M. (2005). Community design (re) examined. In Hou, J., et al, *(Re)constructing Communities. Design participation in face of change* 18-24, for what concerns general categories of case-study compilation, and from De Leonardis, O. (2001), Chap. 6 "Methods for observing institutions", in *The Institutions. How and why to talk about it*, Carocci Editore, Rome 2001, for what concerns in particular the analysis of places (venues), discursive practices and emotions that emerge (e.g. urgency). For general structure of analysis and further insight on Green Hackathon format, related in particular to the first five editions, namely Stockholm (2011), London (2012), Helsinki (2012), Athens (2012) and Zürich (2013), I refer also to Zapico et al. (2013).

Materials

Firstly, data were collected and analyzed among a total of 130 cases/events, that is, all the events (114) which occurred during the global Climathon® 2018 edition and the 16 Green Hackathon events connected to the platform Green Hackathon.com.[30] I decided to proceed with a comparison of the two types of events despite the fact that the Climathon® events all took place at the same time (24 hours between 25-26 October 2018, with minimum differences among cities involved) while the 15 Green Hackathon took place over a period of 7 years between 2011 and 2018. My reasoning was to consider the latter (GH) as a single event spread over several years,

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[30] Additional data related to one other independent Green Hackathon in Hong Kong in 2019 and for the three seasons of Y4PT (Youth for Public Transport) Global Transport Hackathon (2016-2017 involving 20 cities in the world; 2017-2018 involving 27 cities in the world; 2018-2019 involving 37 cities in the world) were also collected. This data was then removed from the database because I decided to focus my analysis on a confrontation between Green Hackathon.com official platform and Climathon® platform, as the first resulted to be the origin of the second.

even though not all of these events were organized directly with the fundamental collaborations of the same organizing structure (CESC KTH and Green Hackathon.com platform and contents).

Data have been collected through the following websites for Climathon®:

- https://Climathon®.climate-kic.org/en/ and in particular:
- https://Climathon®.climate-kic.org/en/cities-2018
- https://Climathon®.climate-kic.org/en/solutions?year=2018

For Green Hachathon data was gathered through:

- http://www.greenhackathon.com/ for Stockholm, London, OKFestival Helsinki, Athens, Zurich and Smart Cities Green Hackathon in Stockholm, through other landing pages:
- https://fi.okfn.org/meetups/energy-hackathon-2013/ for Energy Hackathon (Helsinki)
- https://energyhack.de/ for Energy Hack (Berlin)
- http://greencampushackathon.cs.hut.fi/ for Helsinki Green Campus
- https://www.fukushimahackathon.jp/ for Fukushima (then excluded because all information in Japanese)
- http://ict4s.greenhackathon.com/ for ICT4S Green Hackathon Stockholm
- http://greenbutton.greenhackathon.com/ Stockholm Green Button Hackathon STHLM
- http://greenhack.jp/ for Tokyo
- http://lisbon2016.greenhackathon.com/ for Lisbon 2016
- http://lisbon.greenhackathon.com/ for Lisbon Green Hackathon 2017
- https://hack-for-sustainability.confetti.events/ for Sustainability Challenge Uppsala

For the Climathon® entries in the database, my first choice had been to analyze only cities with more than 20 participants registered on the website. During the data gathering in May 2019, the website changed due to preparations for the new edition 2019. At that point, the data related to the numbers of registered participants had disappeared. After several telephone calls and e-mail exchanges regarding the nature and objectives of my research the platform[31] agreed to provide me the data (in date 26 June 2019). In the meantime, the survey was sent to the available email addresses for all 130 cases, regardless of the number of registered participants in each. Subsequently, this data was used to exclude cases with fewer than 20 participants who had also not completed the survey[32]. In the end the number of events included in the database were 85 for

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[31] The data was provided, upon my request, by the Data and Learning Champion for Climathon of the site https://climathon.climate-kic.org/en/ (which I thank for the collaboration). Afterwards, the structure of the site was changed in May 2019 and, consequently, it was impossible to trace the data in question. After a series of telephone and email exchanges regarding the nature and objectives of my research, the Climathon organization agreed to provide me with the data requested.

[32] This further layer of information (data about the number and kind of participants of the Climathon 2018 Edition, single events) brought me to also exclude several events for which the lack of information's in the official website (no data about event schedule, speakers and/or follow-up) made impossible the analysis and led to doubt that the event ever happened. It is the case of all the events which occurred in Australia and of several events in France.

Analysis

The database was built into an Excel chart, each record corresponding to a single event. The database fields are described in the following Table 2.

Table 2: One Hundred Events of Climathon® and Green Hackathon Database fields

N.(Case number)	CL/GH/YCL[33] (kind)	When (date)	City Host	Web site (internet address)	EU (X)	Non EU(X)	Location	Challenge thematic	Challenge key words (6 columns)	Main partner/organizer	Other partners	Length (hours, days) of events
	Tools/ methods used or declared	Who are they looking for	Who is on schedule	Preparatory materials provided	Incentive to the participants	Participants registered by site	Pre-Event	Post-Event	Solutions found (descriptions and numbers)	Organizer contact (email address)	Contacted to participate in the survey	Survey completed (X)

Specific aspects were analyzed from a qualitative perspective. These include:

- locations used for the events, reviewing and evaluating venues through their websites and in person (for what concerns the two case-studies of Bologna and Lisbon);

- reading of the challenge thematic, as described in the event website pages, to identify key words[34];

- evaluation of the declared interaction tools and of the resources deployed (human and non-human), by exploring the specific event website page;

- types of incentives given to participants by exploring the specific event website page;

- presence or absence of preparatory or post-event public meetings.

Once the record was filled in with all data (in total 2.253 entries) a new chart was created to analyze the composition of the partnerships. A "partners registry" was created to evaluate:

- kind of partners (municipality, authority, public agency, educational institution, enterprise, business incubator or coworking space, research center, international body, NGO or association, foundation, fund, utilities, platform, fablab, EIT, ClimateKIC, EU project, other);

- forms of partnership (public, private, public-private-partnership);

- kinds (areas or fields) of knowledge involved in the events (environmental sustainability, economic sustainability, social sustainability, innovation, data, technology, science, culture,

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[33] CL: Climathon; GH: Green Hackathon; YCL: Young Climathon.
[34] After Climathon official website changed, do to the preparation for the new edition 2019, the new version displayed also this information in a specific page https://climathon.climate-kic.org/en/challenges?year=2018. But because I had already almost completed my own cataloguing with a different perspective, I decided to continue with it.

participation) (Nb. This was possible only when the contribution of knowledge partners was specifically declared in the event's documentation);

- other role(s) in the event, when/if declared (e.g., sponsor, media partner, outreach partner).

In total, the "partners registry" comprises 610 records (in total, 4.048 entries), corresponding to 610 different partners afferent to the single events,

Pivot charts were then created to confront partner distribution, among Climathon® and Green Hackathon events, and by analyzing, through quantitative methodology, the following aspects:

- max, min and average number of subjects involved each event;

- weighted average of the kind and form of partners;

- weighted average of kinds of knowledge involved in the events.

Two other pivot charts were created to confront and weigh the distribution of specific challenge thematics among Climathon® and Green Hackathon.

Finally, graphic charts were created in another info graphic visualization program (namely www.visme.co)

Expected results

These analyses were meant to explore the potentials and limits of these activities in innovating urban planning, by reading the process beyond the products, from the genesis of the challenge to the outcomes, in terms of which forms of partnership and incentives make the ideas come into action, how costs and benefits are distributed, and *how* and *if* Climathon® and Green Hackathon fit (are integrated) into local processes of resilience planning and ecological transition.

As a result of this part of the research, besides all single statistical and qualitative aspects evaluated as explained above, in particular, I expected (aimed) to:
- isolate different patterns of development of the events;
- evaluate the differences between Climathon® and Green Hackathon, if existing;
- identify the most interesting cases.

Online Survey on Climathon®|Green Hackathon: Co-action for resilience

Objective

The second data collection tool used in the present research was an online "Survey on Climathon®|Green Hackathon: Co-action for resilience". It was addressed to participants, organizers and partners of the global event and growing phenomenon of Climathon® and of Green Hackathon.

The main objective of the survey was to assess and evaluate the "degree of participation" (as described in Par. 3.3) of the events. The specific questions and the terms utilized in the survey reflect the theoretical framework of the research and emerge directly from its two lenses (resilience and participation) which were briefly described in Chapter 1 and will be further declined in Chapter 3. In this perspective, it is necessary to specify that the research does not address systematically the field of study of participatory processes, for which the research invites to make reference to the scientific literature of the sector, but rather uses pragmatically principles, methodologies and techniques by relevant authors in the field[35] related to the notion of participatory and collaborative design in particular, to analys the data collected and to identify some critical issues and factors which could, eventually, improve the levels of participation and resilience (inclusiveness and democracy, fairness, etc.) as well as their effectiveness and efficiency (Lorenzo 2002).

Consequently, an assessment analysis was made of:

- motivations to participate in or organize the event;
- indications with respect to how the themes were chosen;
- whether, and in what ways, the overall principles effective participation (Bishop nd., Bishop 2015) were respected to improve the inclusiveness and democracy, fairness, effectiveness and efficiency of the process (Lorenzo 2002). The principles for an effective participation process which underline the analysis include: independent process; clear objectives; inclusive process (outreach channels, mix of age, gender and background distribution); appropriate knowledge base; sufficient resources (resources to deliver and manage over time, incentives and materials provided); diversity in the use of techniques and methods, working towards shared results; proper links with other local consultations or participatory processes in progress (cfr. Table 9, Par. 3.3));
- assess levels of participation as experienced by the subjects involved, through the evaluation of keyword selections.

An additional objective was to identify and analyze aspects which are not directly inferable from the database and therefore explored through specific questions inserted in the survey, such as:

- indications regarding the inclusion (or not) of the event in other processes of local resilience planning and ecological transition;

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[35] In particular: Bishop, J. (2015). *The Craft of Collaborative Planning: People working together to shape creative and sustainable places*. Routledge, New York and London; Lorenzo, R., (2002) "In molti sappiamo più che in pochi". Alcune riflessioni sul Concorso INU-WWF (Dove andare da qui?), in *Concorso Nazionale di Progettazione Partecipata e Comunicativa. Progetti vincitori e segnalati della Seconda Edizione 2000-2001*. Ed. Il Sole 24 Ore S.p.A., Milano; and Wilcox, D. (1994). *Guide to Effective Participation*. Partnership Books, London.

- where do the solutions elaborated during the event end up and through which processes-procedures are they eventually developed further;
- the relationship of the event(s) with the platform that provided the format (Climate-KIC and Green Hackathon.com).

These aspects are considered useful to explore the potentials and the limits of these activities in innovating urban planning, through a reading of the process beyond the products, from the genesis of the challenge to the outcomes, and in terms of which forms of partnership and incentives facilitate the ideas' becoming concrete actions, how costs and benefits are distributed, and – in conclusion – *how* and *if* does Climathon® and Green Hackathon fit into local and/or regional resilience planning.

Materials

In order to gather the data necessary to meet the above objectives, the survey was organized in 10 sections (cfr. **Appendix II Survey online protocol**):
- One section dedicated to the identification of the role each "participant" or "organizer/partner" in the event;
- Three sections specifically addressed to participants, of which one is dedicated to the evaluation of the event through the critical lens of participatory processes;
- Four sections specifically addressed to the organizers or partners, of which one is dedicated to evaluating the event through the lens of participatory processes;
- One section addressed to both the participants and organizers or partners, dedicated to identifying ways to improve the inclusiveness and 'democracy' of the event;
- One section to rate the subject's overall experience of Climathon® or Green Hackathon event.

The complete outline of the survey is attached to the present research in English (Appendix II_ Survey protocol Engl.pdf) and Italian (Appendix II_ Survey protocol It).

The online survey has been built in docs.google module. The link is the following:

- https://docs.google.com/forms/d/e/1FAIpQLSc3y4-_xeeocYc2WPEgbhm5GL9NnK9F3z_A6jt0HX4kP3cyRQ/viewform?usp=sf_link (English version)
- https://docs.google.com/forms/d/e/1FAIpQLSew9w7qwnCK85U-NfxCPFK_9UfQ3APPJ3wKViYUVwZ2-AWWlw/viewform?usp=sf_link (Italian version)

In accordance to the new General Data Protection Regulation (EU) 2016/679 (GDPR), since Google gathers personal data outside European Community, the survey was completely anonymous, without the possibility of tracing the personal data of the participants.

The survey was written in Italian and then translated in English and released on the 19th of June 2019. The survey was sent out to 106 main city partners (hosting cities) or organizers (16 Italian Climathon® cities; 78 foreign Climathon® cities; 12 Green Hackathons) namely to all of those for which it was possible to find an e-mail address. To guarantee a wider distribution, in the cover letter, the recipient was asked to kindly forward the survey to the partners and participants in the event.

Analysis

The data from the first part of the survey was analyzed through the descriptions, offered by the subjects, of:

- participant or organizer/partner data and background (questions 1-9);

- the event or the events attended (an option was given to organizers and partners to describe one previous edition) (question 10 to 50, with the following questions included);

- main motivation to organize or participate in the event (question 16 and 29 for organizers/partners; question 42 for participants);

- the impacts and outcomes of the event in terms of solutions and eventual implementations (question 18-21 and 31-34 for organizers, 46-49 for participants).

As concerns the primary objective of the survey, as explained above, the questions in this section were formulated through the lens of participation (in theory and practice). Specifically, they make reference to what has been called "The Ladder of Participation" (Arnstein 1969) which aim(s) to establish the "degree of participation", or the actual levels of participation activated for a specific event or process.

In the survey, I made use of the "ladder" of the UK Partnership Organization (1999) then updated in the Participation Framework (Bishop 2015), which recognizes four levels of participation - informing, consulting, involving or rather deciding together, dialogue or rather acting together - to establish an evaluation framework to assess the completed surveys. The levels were then assumed as *descriptors*, and each one was linked to **four keywords** (see Table 3), selected accordingly to the levels description, to help participants and organizers (cities, urban institutions and platforms) self-assess in the survey, the levels of participation as experienced or as activated within a Green Hackathon or Climathon event.

On the basis of these levels, question n. 51 (n. 55, for organizers and partners) is organized as a listing of keywords. Participants were asked to choose a maximum of four keywords that best describe their experience of the event. The keywords were presented to participants in random position.

The keywords used in the survey and the corresponding levels of participation are listed in the following table:

Table 3: The Evaluation frame describes the levels of participation as experienced or activated through the related keywords

Level of participation	Keyword
Informing	Learning Listening Socializing
Consulting	Contributing Discussing Connecting
Involving or deciding together	Sharing Co-decision making Co-designing
Dialogue or acting together	Collaborating Realizing Co-managing

To better analyze the outcomes:

- Questions 52, 53, 54 were addressed to the participants, to further explore their personal evaluations of the level and kind of engagement relating more specifically to: effectiveness of event outreach; clarity of the objectives of the event as presented to participants; basic involvement offered them in posing challenges and/or solutions; appropriate knowledge base given to participants; offer of sufficient resources (incentives); appropriate use of techniques and methods; attention directed the construction of shared results and any distributed benefits.

- Question 56 for organizers and partners, was posed to explore the same aspects, but in relation to Climathon® or Green Hackathon platform.

- Question 57 was posed to aid analysis as to how the event fits into other local processes and to unveil the underlying motivations of organizers and partners in posing a specific challenge.

- Question 58 was posed to gauge the organizer's level of engagement in relation to the participants and to the challenge's thematic.

Finally the propositive (or proactive) sections (questions) 59-64 are dedicated to gathering (and analyzing) suggestions which participants and organizers/partners might have as to how to improve the inclusiveness and the effectiveness of the events.

Expected results

As a result of this part of the research, I expected to:

- collect compiled surveys from at least 10 cities in Italy and 20 cities abroad;

- assess/evaluate the general "participatory degree" of the events;

- gather useful information concerning the ways the events fit into other experimentation and climate governance processes and in general into local processes of resilience planning and ecological transition.

Semi-structured interviews with key players and privileged actors

Semi-structured interviews were carried out with privileged actors of the processes and with researchers in the identified case-study cities. The interview technique was that of the "focused narrative" (Legewie 2006) or semi-structured/open interview which are based on an interview protocol that was previously shared with subjects.

This tool was oriented to analyze the motivations and the context in which urban institutions and other subjects exercise their agency as "institutional entrepreneurs" (DiMaggio 1988, in Westley et al. 2013) in the context of climate change governance and resilience planning on one hand (from the point of view of the urban institutions) and of social-technical-economic innovation for climate action on the other side (platforms and other subjects), by analyzing their "transformative agency" role and skills. Interviews were also reread through the lens and key concepts of social-ecological resilience (Holling 1996), and in particular of the adaptive cycles (Holling and Gunderson 2002) to assess which "fitness landscape" (Dorado 2005, in Westley et al. 2013) or functional phase (Holling and Gunderson 2002, Walker et al. 2004) the local context was undergoing at the moment of the interview to aid my addressing the proposed new adaptive co-design framework for urban resilience and ecological transition.

Objective

The main objectives of the interviews were to:

- identify relevant and useful elements to better construct the case studies;

- deepen the analysis of the "participation degree" of the event through the additional knowledge of participation and resilience theory and practice on the part of the subjects;

- analyze the motivations of the interviewees and the context in which each subject exercises its "transformative agency", to assess role and skills;

- reread the interviews through the lens of social-ecological resilience, to assess key concepts and which "fitness landscape" or "functional phase" the local context is presently undergoing, and to infer useful elements to address the proposed new adaptive co-design

framework for urban resilience and ecological transition;

- better understand the limits and potentialities of CL and GH in innovating urban and environmental planning in the context of the case-study through the specific contributions of informed, competent subjects.

Materials

Interviews were carried out on the basis of an interview protocol, which was previously shared with subjects. The interview protocol for organizers and partners was written in Italian, and successively translated into English. while the interview protocol for participants was written only in English. The three protocols are attached to the present research in the "Appendix III Protocollo di intervista semi-strutturata ad attori privilegiati e esperti soggetti della ricerca.pdf".

All the interviewees were informed of the aims of the research and of the methods of processing the data (pursuant to the new General Data Protection Regulation (EU) 2016/679 (GDPR) and in particular to art.13) before starting the interview, and all the interviewees agreed to the eventual publishing of their interviews including their names and roles.

In total, ten (10) interviews were performed with ten (10) different research subjects:

- Valeria Barbi, Eu Projects, Climate change and Sustainability Coordinator for Bologna Foundation for Urban Innovation (FIU). In Italian. First interview Date 02-05-19, Time 8.50pm (35min audio recorded via mobile phone), second interview Date 09-07-19, Time 9.29am (15min audio recorded in Bologna via mobile phone);

- Valentina Orioli, Deputy Mayor for Urban Planning and Environment of the Municipality of Bologna. In Italian. Date 03-05-19, (interview performed via email together with Martina Massari[36]);

- Mauro Bigi, Sustainability Special Projects for Bologna Foundation for Urban Innovation (FIU). In Italian. Date 03-05-19, (51min video recorded in Bologna via Skype together with Martina Massari);

- Francesco Rocca, Program Manager of Impact Hub Lisbon, hosting location of Climathon® 2018 Lisbon. In Italian. Date 09-05-19, Time 10am (28min video recorded in Lisbon via Skype);

- Helena Correia, challenge owner Climathon® 2018 Lisbon. In English. Date 07-06-19, Time 12.44pm (41min video recorded in Lisbon via Skype);

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[36] This interview and the following one were performed together with Martina Massari to inform two papers written together with Martina Massari: "The Role of Climathon® in the challenge of Multilevel Ecological Planning" presented in the annual international conference AESOP2019 at Venice on July 11th 2019, and, "Bologna tra politiche ambientali e collaborazione" presented at SIU Conference 2019, in Matera on June 6th 2019.

- Bernardo Tavares, former student of Faculdade de Ciências da Universidade de Lisboa (FCUL) and active part of Oficina das Energias, organizer of the two editions of Green Hackathon Lisbon 2016-2017. In English. Date 14 -06-19, Time 2pm (48min audio recorded in Lisbon via appear.in/go.parity);

- Raffaella Gueze, Sustainability Office Manager in the Environment and Green Sector of the Municipality of Bologna. In Italian. Date 20-06-19, Time 9.30am (30min video recorded in Bologna from Lisbon via Skype);

- Laura Donato, participant and winner of Climathon® 2017 Bologna. In Italian. Date 16-07-19, Time 1pm (37min video recorded in Bologna from Lisbon via Skype);

- Giovanni Fini, Coordinator of the intermediate unit Environmental Quality of the Municipality of Bologna. In Italian. Date 16-07-19, Time 3pm (40min video recorded in Bologna from Lisbon via Skype);

- Catarina Martins, participant and winner of Climathon® 2018 Lisbon. In English. Date 16-08-19, Time 15.00 (29min video recorded from Bologna via skype);

In all, a total of 5 hours and 54min was recorded.

Analysis

The analysis was performed on the basis of the semi-structured, open-ended interviews (Legewie 2006). A deep reading of the interviews (and dialogues) transcriptions aided my analysis permitting the further identification and comprehension (*together with the research subject)*, of three specific aspects:

Identify / Understand the motivations (and expectations) which drive organizers and partners to host and manage the Climathon® and Green Hackathon and the participants to participate. This was carried out through an evaluation of:

- degrees of awareness of the subjects;

- commitment of the actors involved;

- their satisfaction, or not, with respect to the development and the outcomes of the event;

- distribution of costs and benefits;

- relationship with the CL / GH platform;

- factors of success and failure;

- lessons learned and suggestions for improvement;

- differences between the two formats.

Identify / Understand the mechanisms which led organizers to choose a specific theme or challenge, and, successively, to put the identified design solutions into action, through the identification of:

- who was, of necessity, involved in the process (i.e., different planning levels, different kinds of knowledge, sectors, private subjects, local communities and purpose);

- with which forms of partnership and with what incentives did the solution or idea, eventually, become action;

- relationship between the winning group and the organizers/partners;

- factors of success and failure;

- lessons learned and suggestions for improvement.

Identify / Understand if and how these activities become part of local and other levels of urban and environmental planning, through analyzing and fully understanding:

- the institutional adaptive capacity of host cities in relation to the theme, framed within their local urban and environmental policies and plans;

- the interaction of these activities (the event) with other urban and environmental planning tools and levels;

- the emergence of possible new organizational models in the institutions involved which aided the implementation of the proposed solutions, or eventual new planning models (in terms of partnerships, or in the interaction with other territorial and regional tools or in the project development).

Expected results

I expected to collect, analyze and re-organize the information / data listed above, through the use of at least 6 interviews among partners, organizers and participants in the two case-study cities. I expected to inform my discussion, enrich my practical and theoretical bases and improve my conclusions (described briefly above, and more extensively in Chap. 6).

Two case studies: Lisbon and Bologna

The combination of the background analysis performed though literature and web search, and the analysis of the One Hundred Events Database of Climathon® and Green Hackathon were also functional to identify the two case studies for my research, the two European cities of Bologna (Italy) and Lisbon (Portugal), as described and analyzed in Par 5.3 and Par 5.4.

The reasons for choosing the two cities are connected to a series of considerations: both cities

have organized Climathon® in 2018, both have a strong tradition in participatory approach and practices, and both have undertaken an ambitious process of re-orientation of urban policies towards a resilience perspective, building space for experimentation on environmental issues.

The analysis was based on Francis' case study method (2005) for analyzing participatory community design, who defines a case-study as "a well-documented systematic examination of the decision-making process and outcomes of a project, which is undertaken for the purpose of informing future practice, policy, theory, and/or education" (Francis 2001, *ibid*.) and on the methodology of De Leonardis (2001) for observing institutions, that focus on the "how" and not only on the "what", through the observation of categories such as places and discursive practice, and taking into account the emotions that arouse.

Objective

The main objectives of the case studies analysis were to:

- understand in depth the local context in which the Climathon® and Green Hackathon events took place, in particular for what concerns the plans, policies and ongoing practices, and projects of the city Municipality and other involved urban institutions, in relation to participation, resilience and environmental planning;

- observe directly the locations and venues of the events, to infer further related elements useful for the comparison of the two formats;

- observe directly the key actors of the process in their context, to add new information to the interviews in order to enrich the analysis;

- understand if, and to what degree, the formats comply with social-ecological resilience key concepts and participatory principles, and are consistent to their missions to address and solve climate change and sustainability issues;

- read the local context under the lens of social-ecological resilience, to assess which "fitness landscape" or "functional phase" it is undergoing, and infer fundamental elements to address the proposed new adaptive co-design framework for urban resilience and ecological transition.

Materials

Combination of documentary analysis, semi-structured open in-depth interviews with subjects in the two cities, visits to the events' locations and venues and, in the case of Bologna, first-person participation in the Climathon® 2017 and participant observation during the incubation program and subsequent meetings with the local administration.

For Lisbon, the research has been conducted during the period of permanence for research purposes at ICS-ULisboa, between May and July 2019, and in August 2019 via skype.

Despite all attempts to conduct the two case studies with a common methodology, comprised of documentary research on environmental planning background and semi-structured interviews to key players – city host representatives, organizers, participant, other partners - the case-study on Lisbon Climathon®2018 edition, in the end, resulted different from Bologna because of the unavailability to be interviewed – after several contacts – of one research subject: the representative of Lisbon's Municipality. Furthermore, because in Lisbon there had also been two editions of Green Hackathon in 2016 and 2017, I decided to interview the organizers of the latter, to compare the two different formats.

Analysis

A deep reading of the local contexts and the ongoing plans, policies, practices and projects of the urban institutions involved, aided my analysis permitting the further identification and comprehension (*together with the research subject)*, of several specific aspects:

- better understand through direct observation and contact with key subjects in the two cities (on an emotional, intuitive level too) the degree of awareness of underlying social-ecological resilience and participatory key concepts and objectives, consistent with their mission, to tackle complex issues of climate change and sustainability through a participatory approach;

- better understand and identify the internal critical points and strengths of the two formats, as well as possible potential synergies between the two, that could help evolve the Climathon® event format in particular;

- better understand and identify the external critical points and strengths of the two formats, in relation to the interaction of these activities with other urban and environmental planning tools and levels;

- assess though the documentary analysis, the interviews and other direct observations in the two cities, specifically: whether the formats comply with social-ecological resilience and participatory key concepts and objectives; and in which "fitness landscape" or "functional phase" the local context was presently situated;

- identify potential links and possible connections, of Climathon® in particular, with other local resilience and environmental plans and policies, and with specific participatory practices and projects in place.

Expected results

I expected to gather enough materials, to infer useful elements and considerations to address and evolve the Climathon® format in particular, by highlighting internal critical points and straights, and identifying synergies with Green hackathon format, to improve its participation degree and enhance its potential in helping to innovate resilience and environmental planning, in an Ecosystem stewardship perspective.

I also expected to gather enough insight to understand in which "position" Climathon® could stand in relation to ongoing plans, policies, practices and projects, of the city Municipality and other urban institutions involved to assist urban institutions in better coordinating and consolidating bottom-up and third parties' local contributions towards the achievement of the global targets of social-ecological resilience and sustainability.

Finally, I expected to infer fundamental elements of use to addressing the proposed new adaptive co-design framework for urban resilience and ecological transition.

Participant Observation of a concrete experience

Finally (but not in order of time) the research included a part of research-action and participant observation (between the "direct participation and participant observation", Semi 2010) of a direct, personal experience.

Origin and Objective

As said in Chap. 1, the starting point of the present research has been the careful observation and analysis of the development of a new policy of the City of Bologna (Italy), called "Bologna Città Resiliente", which grew from the City's consolidated tradition of participatory approaches in spatial planning.

Thanks to my participation[37] in the Climathon®2017 (27-28 of October 2017) – of which I was part of the winning group with a proposal for a climate service for the city of Bologna (Stay Cool) – I was able to directly observe the development of one case of Climathon®, and to closely follow its subsequent business incubation program (not concluded for the reasons explained in Par. 5.5), and the following developments in an ongoing relationship with the Municipality of Bologna.

The observation was based on my theoretical and professional background (Wilkox 1994, Lorenzo 1998, Wates 2000, Bishop 2015) for what concerns aspects related to groups dynamics and development of participatory activities during the event, and on field notes and reflexive (following Semi 2010) enriched through interviews and informal conversations, in the following incubation and ongoing relationship with the Municipality of Bologna.

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[37] My experience as a participant in the 2017 Climathon® edition, was the main reason that my original doctoral thesis topic dropped the theme of cultural heritage while maintaining the themes of urban resilience and participatory approaches as the core of the research.

Materials

The reconstruction of my direct experience of the event, was carried out, successively, using the notes taken during the event, combined with the materials collected before, during and after the event. These included: materials provided to the participants, the presentations of the speakers, my own personal memories which were further refined and enriched through interviews and informal conversations with the members of the winning group, during the business incubation phase.

The incubation phase, which started in September 2018 and is still in progress, was activated within the European project ROCK - Regeneration and Optimization of Cultural heritage in creative and Knowledge cities, presented by the Municipality of Bologna, in collaboration with the University of Bologna and funded in the 2016 - 2017 Program of HORIZON 2020 (Climate action, environment, resource efficiency and raw materials - Call Greening the economy - Topic SC5-21 Cultural heritage as a driver for sustainable growth), and which actively involves the Department of Architecture (DA), Department d the Civil, Chemical, Environmental and Materials Engineering (DICAM) and the PhD program in Architecture and Project Cultures.

Analysis

This phase was directly observed and its reconstruction was carried out through a deep reading and analysis of my field notes and of the relevant interviews and conversations.

Expected results

This 'hands-on', experiential work helped to analyze specific, detailed aspects of the development of a Climathon® event.

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3. Resilience and Participation (Theoretical framework and State of the art Part 1)

The chapter positions the research topic in a growing interdisciplinary field of studies related to the resilience of cities as complex adaptive systems (CASs), embedded in coupled social-ecological systems (SESs), and interested in exploring how the notion and practice of effective participation is connected to the resilience of SESs as CASs, in the context of growing uncertainty and abrupt change due to climate change and ecological crisis.

The interception of resilience and participation, in theory and in practice, represents the field of knowledge and theoretical framework for this research, and the two pairs of lens, both observational and operative which are utilized to observe and analyze the central object of the research, or the growing socio-technical phenomena and practice of Civic/Green Hackathons and in particular of Climathon®, in relation to the efforts of urban institutions to address issues of resilience and ecological transition in cities through experimentation.

Though documental research and scientific literature reviews, the chapter traces the history and the fundamental assumptions, as well as the principles and tools, of the two fields of knowledge and highlights how these are, on one hand, intrinsically intertwined and, on the other, present some substantial limits and contradictions that must be overcome, to build effective resilience and foster ecological transition in cities, and therefore sustainability.

The principles and heuristic models inferred by the two different fields of knowledge, represent the starting point to attempt to answer to one of the leading questions of the present research, or how to overcome the "intricate opposition" (Hester 2007) between the ecological and participatory dimensions.

At the same time, they present features and indications functional to include both urban institutions in charge of climate governance and resilience planning of cities, and other active, informed and committed actors in the wider society, already willing to actively contribute to the achievement of the global targets of social-ecological resilience and sustainability, in a new, dynamic, adaptive, democratic and timely way.

The objective therefore becomes to concretely build a proposal for a adaptive co-design framework for urban resilience and ecological transition by recombining new dimensions within consolidated tools, to foster in prospective, active (Human) Ecosystem stewardship of Planet Earth and the enhancement and protection of Ecosystem Services through collective action, and ensure both human well-being and ecosystem sustainability, starting from cities.

3.1 Two pairs of lenses to face uncertainty

The present research is meant to be a contribution to a growing interdisciplinary field of studies related to the **resilience** of coupled social-ecological systems (SESs) as complex adaptive systems (CASs) (e.g. Berkes et al. 2003, Levin 1998, Levin et al. 2013), and in particular to the *resilience of cities* (i.e. urban resilience, Meerow et al. 2016) *as complex adaptive systems* (Resilience Alliance 2007) *embedded in coupled social-ecological systems* (Meerow et al. 2016), in the context of current climate change and ecological crisis.

In an interdisciplinary perspective, the research intends furthermore to understand how the notion and practice of effective **participation**[38] (for e.g., Arnstein 1969, Alexander et al. 1975, Lorenzo 1998, Forester 1999, Bishop 2015) is connected to the resilience of SESs as CASs (Biggs et al. 2012, Folke et al. 2005) and the ways which, starting from the observation of a concrete practice, it could *evolve* to face growing uncertainty and abrupt change connected to the actual ecological and climate crisis, in the perspective of fostering active *human ecological stewardship* of Planet Earth.

The interception of *resilience* and *participation*, in theory and in practice, therefore represents the field of knowledge and the **theoretical framework** for this research. These *two pairs of lenses*, *both observational and operative*, will be utilized to observe and analyze the central object of the research, which is the growing socio-technical phenomena and practice of Civic/Green Hackathons and, in particular, of Climathon®, in relation to the efforts of urban institutions to address issues of resilience and ecological transition in cities through *experimentation*.

My focusing on Green Hackathon and Climathon® as "urban climate experiments" (Castàn Broto and Bulkeley 2013) of a specific kind, led by third parties and independent subjects in collaboration with urban institutions, through the lens of *social-ecological resilience* and in combination with the *second pair of lens* adopted in the present research – that of *participatory processes* (in action and theory) – has the primary objective of identifying and analysing useful elements, which could better systematically integrate (and, in prospective, transform) "other" processes (and other "urban experiments") in relation to the overall local planning process for resilience and urban ecological transition, or *resilience planning* (Eraydin and Taşan-Kok 2013, Meerow and Newell 2019) in cities.

Each pair of lens have been used in the present research in several ways: i) as a *tool*, to assess the "degree of participation" of Green Hackathon and Climathon® events and connected process; ii) as a *theoretical grid* to analyze the answers of the respondents in the Online survey and in the interviews; and iii) as *framework* to analyze and understand in which "phase" the city is presently undergoing change(s) connected to the resilience planning process, in the two in Case Studies selected (Bologna and Lisbon).

Finally, the *principles and heuristic models* inferred from the two different fields of knowledge (*social-ecological resilience* and *participation*) have been used to concretely build the *proposal for an adaptive co-design framework for urban resilience and ecological transition* that completes this work in Chapter 6.

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[38] As defined in Chap.1, footnote 5.

Throughout the research, these tools have been employed in an iterative way, first by setting the concrete objectives of the research (theoretical framework, background knowledge of the research object, schemes of database, interviews, survey and case studies), then to assess the results and to review the assumptions, and finally to build the proposed prescriptive framework.

3.2 Resilience theory and resilience thinking for the adaptive capacity of urban institutions

Coupled SESs are linked systems of people and nature (Berkes and Folke 1998, Holling 2001) or, better stated, intertwined systems of people and nature in the biosphere (Folke 2011), and according to Folke (2011), the present research assumes that awareness about the biosphere connection is *crucial to sustainability*, in particular when dealing with Complex (Adaptive) Systems (CASs), or systems of interconnected components that have the capacity to adapt and self-organize in response to internal or external disturbance or change (Stockholm Resilience Centre 2014, glossary), such are cities (Lansing 2003, Batty 2007, 2012, Bettencourt 2015).

"Think global and act local" (Geddes 1915) is the motto of the 70s movement, "Friends of the Earth", that best expresses how cities can be considered far-reaching SESs, with local and global interdependencies and impacts, often underestimated because invisible to urban dwellers.

Considering the most inclusive definition of "cities", one which combines social, biological, built and geophysical components (Pickett et al. 2014), cities have been and remain fundamental units of human societies long before the rise of nations and, as Francesco Indovina says, they can be considered the "ecological niche of mankind" (Indovina 2003).

Following the evolutionary approach in urban planning (e.g. Geddes 1915, Lynch 1981) that understands cities as problems of "organized complexity" (Weaver 1958, Jacobs 1961, Alexander 1965, Bettencourt 2015) in analogy to organisms or ecosystems, and in contrast to the modernistic approach that sees cities as "machines" to be fixed or as structures to be designed (Pickett et al. 2004) the present research assumes, at its base, the definition of "ecological resilience" (Holling 1973) and its consequences on how to build resilience in SESs as CASs, and foster ecological transition in urban contexts (Ernstson et al. 2010).

In this paragraph, by reviewing the field of *resilience thinking*, and in particular the concept of **ecological resilience**, a concept which will be further expanded and developed by exploring the relationships among social and ecological systems (Berkes and Folke 1998) in "social-ecological resilience" (Adger 2000, Folke 2006), I will enucleate **three fundamental aspects** and **one tool** that will be used in the present research to analyze the growing socio-technical phenomena and practice of Green Hackathons and Climathon®, and to highlight some open issues in relation to resilience planning, as governed by urban institutions.

The perspective of urban institutions and their efforts in tackling global issues (Foster & Swiney, 2019) is, in fact, the one assumed in this research work to understand *how (and if)* growing experimentation from third parties (with respect to urban institutions in charge) to find solutions to climate change and ecological crisis in urban settings, can be better governed and integrated into local planning and, therefore in a *collaborative planning*[39] (Bishop 2015) perspective, to coordinate and consolidate the bottom-up local contribution to the achievement of global targets of resilience and of protection and enhancement of ecosystem services.

In the latest review of *resilience* and of *resilience thinking* (Folke 2016[40]) – a broad interdisciplinary field of research, dialogue and collaboration among social and environmental scientists (Folke 2016, 2006) – resilience is (described as) "about cultivating the capacity to sustain development in the face of expected and surprising change and diverse pathways of development and potential thresholds between them" (Folke 2016, p.1).

To say it differently, in the words of Walker and Salt (2012), resilience thinking "embraces human and natural systems as complex entities continually adapting through cycles of change" (ibid. p. 10) and seeks to understand the "qualities of a system that must be maintained or enhanced in order to achieve sustainability" (ibid., p.8).

The idea that complex adaptive systems, such as SESs can have more or less "resilience", emerged in the field of ecology thanks to the groundbreaking work of C.S. "Buzz"[41] Holling (1973) and his discovery though direct observation, that living systems have multiple basins of attraction or multiple stability domains, and that they are capable to absorb change and disturbance and still persist (Holling 1973), challenging the dominant stable-equilibrium view of ecosystems of his time (Folke 2016).

As Walker et al. states (2004), Holling's *definition of resilience as persistence* or "the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, and feedbacks, and therefore identity" (*ibid.*, p. 2) is strictly connected to *two other attributes* of SESs and that can influence their future trajectories (Walker et al. 2004), namely: *adaptability* which is connected to adaptation and adaptive capacity (of people, communities..), or "the capacity of actors in a system to influence resilience" (*ibid.*, p. 3), and *transformability*, or "the capacity to create a fundamentally new systems when ecological,

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[39] As defined in Chap. 1, footnote 21 and later in this Chapter.
[40] The article is a complete and broad state-of-the-art of resilience thinking, that follows the first review, written by the same Folke (2006) 10 years before on invitation of Elinor Ostrom and Marco Jansenn for Global Environmental Change.
[41] Crawford Stanley "Buzz" Holling (1930-2019) was a Canadian ecologist, Emeritus Eminent Scholar and Professor in Ecological Sciences at the University of Florida and one of the conceptual founders of ecological economics. Holling was both Editor-in-Chief of the scientific journal *Ecology and Society* and founder of the Resilience Alliance (RA) (see https://www.resalliance.org/), an international network of scientists, academics, and practitioners and "a crucible for creating novel solutions that would contribute to sustainable futures for people and the planet" according to his memorial editorial (Gunderson et al. 2019). The Alliance is now the publisher of the journal.

economic, or social (including political) conditions make the existing system untenable" (*ibid.*, p. 3).

This suggests, that resilience is not an ideal in itself (Holling and Gunderson 2002) but rather a dynamic characteristic of a system or, said differently, a "dimension" that can influence or inhibit a desirable trajectory (e.g. of sustainable development, Picket et al. 2014).

The first aspect of resilience of interest to the present research, are the substantial differences between managing SESs for "engineering resilience" or for "ecological resilience".

Holling first distinguishes "engineering resilience" from "ecological resilience" (Holling 1996), the first concept assumed in environmental sciences for long time, as Holling highlights, because the field was largely shaped by the physical sciences and engineering, while the second emerged from the ecological sciences, thanks to their derivation from the biological sciences (ibid.).

The differences between the two concepts represent for Holling two "alternative paradigms" (Holling 1996, p. 3) facing the issue of achieving sustainable development when managing resources The various aspects of these differences can be summarized as in the following table (Table 4):

Table 4: Differences among Engineering and Ecological resilience (elaborated by me from Holling 1996)

Features	Engineering resilience	Ecological resilience
Origins and fields of influence	Environmental sciences (shaped by physical sciences and engineering)	Ecology (shaped by biology and evolutionary perspective)
	Theoretical mathematics	Applied mathematics and applied resource ecology
	Deductive method	Inductive method
Conditions	Stability or near to equilibrium state	Instability or far from equilibrium state
	Single stable state possibility	Multiple stable states possibility
	Closed system	Open system
Design characteristics	Efficiency – constancy - predictability	Persistence – change – unpredictability
	Near equilibrium focus	Constructive role of instability
	Command-and-control	Learning-by-doing
	Fail-safe design	Safe-fail design(s)
Measurement of resilience (evaluation parameters)	Resistance to disturbance and speed of return to initial stadium	Magnitude of disturbance that can be absorbed before the system changes
Main objective(s)	To maximize constancy or productivity (of yields)	To ensure sustainability in face of surprises and the unexpected
	= *Efficiency* of functions	= *Existence* of functions

Providing many examples of how ecosystems managed to improve engineering resilience, maximize yields and ensures constancy in productivity in the short term, while in the long term producing loss of functional diversity and greater vulnerability to external risks and, therefore, loss of overall resilience that could overturn the system into an irreversible state (Holling 1996), Holling and his research group, started from ecosystems (i.e. observation of natural and human managed ecosystems, e.g. Walker et al. 1969 in Holling 1986, Walker et al. 1981) and then expanded and applied their reasoning to social-ecological systems (Berkes and Folke 1998), to better understand **how management institutions are not indifferent to the process**, together with property rights arrangements and knowledge systems (Ostrom 1990, 2005, Berkes and Folke 1998, Dietz et al. 2003) involved, and that when managing ecosystems for engineering resilience and therefore for efficiency, they can become, in time, more "myopic", static and dependent, thus exposing themselves to greater risks of crisis (Gunderson et al. 1995, Holling 1996).

This first fundamental aspect, that highlights how the "persistence" (or "resilience") of an ecosystem is connected to its **management style**, leads to the second fundamental aspect or its "adaptive capacity", which can be defined as the ability of the actors (institutions, humans and other organisms) to influence the resilience of a system (Walker et al. 2004) and to adapt within critical social-ecological thresholds (Folke 2016), by adjusting to potential damage and by taking advantage of opportunities and answering, in a timely manner, to threats and consequences.

Since CASs are characterized by self-organization (Levin 1998, 2013), not always this "adaptability" (Walker et al. 2004) is intentional, but nevertheless Holling and colleagues have observed that institutions which manage systems for ecological resilience through *adaptive management* are inherently flexible, diverse and "softly" redundant (Holling 1996) and that they are experimental at appropriate scales (Gunderson et al. 1995), miming how ecosystems and other ecological systems (such as e.g. physiological homeostasis, in Holling 1996) work in nature.

The third fundamental aspect of resilience thinking of interest to the present research, concerns the third attribute of SESs as CASs, that of their transformational capacity or "transformability" (Walker et al. 2004), and its potential to transform SESs trajectories toward ecosystem stewardship (Olsson et al. 2010, Chapin III et al. 2010) and, therefore, improve social-ecological sustainability.

"Transformability" means to being able to cross those thresholds within which it is possible to move with adaptive capacity, when the system is untenable and it is necessary to find a new pathway (Walker et al. 2004, Folke et al. 2010, 2016).

For planning scholars, this aspect represents the connection with planning social practices: "Turning a crisis into an opportunity requires a great deal of preparedness which in turn depends

on the capacity to imagine alternative futures: just such a capacity which does, or ought to, define planning in broad terms. Planning is thus about being prepared for innovative transformation at times of change and in the face of inherent uncertainties" (Davoudi et al. 2012, pp.303-304). But in consideration of faster and abrupt changes in interlinked human-nature systems and therefore in the face of growing uncertainty, and of the other considerations related to traditional "engineeristic" planning (as will be highlighted in Par. 3.4., cfr. Table 10), still much can be said about how resilience planning for CASs embedded in SESs, and the urban institutions in charge, can evolve towards ecosystem-based governance ("stewardship", Chapin III et al. 2010): *in primis*, by identifying and fostering innovation through experimentation at the right time within the planning process (Olsson et al. 2010, Westley et al. 2013) and by creating opportunities for urban planning to sustain ecosystem services. In a global process of building resilience from a local perspective, urban resilience planning must in fact embrace its "mutation" (Gabellini 2018) and update its procedures and practices, moving from an idea of merely reducing vulnerability, to one of preparing for transformation in an ecological perspective.

Echoing the findings in the field of ecosystem stewardship, resilience scholars from the field of organizational studies (e.g. Westley et al. 2006, 2011, 2013, Plowman et al. 2007), point out the role and effectiveness of *strategic transformative agency* (Westley et al. 2013) to navigate the transformations of Complex Adaptive Systems (CAS) embedded in linked SESs (or, specifically, the "urban transition" when related to cities, as defined in Ernstson et al. 2010).

According to Westley et al. (2013) strategic agency is not individual agency, but rather is produced through the strategies of a number of actors, each of whom takes actions that help the system to progress through different phases of innovation and transformation (*ibid*.).

In what has been called a "problem domain" (Trist 1983, in Westley et al. 2013), made up of actors, organizations and institutions concerned with and/or affected by a complex problem (i.e. climate change and ecological crisis) – an array of actors works at different organizational, jurisdictional and geographic scales to seize opportunities and mobilize resources that will gain (and create) support for innovations critical to transformations of socio-ecological systems.

These effort of individuals and collective subjects, in helping the overall system to progress while realizing particular goals of their own, is what is called "institutional entrepreneurship" (as defined[42] by Di Maggio 1988, in Westley et al. 2013). In the context of urban resilience planning it is of interest, with particular regard to: i) the innovative and **transformative roles (agency) of experiments**, as for example, Green Hackathon and Climathon® in particular, and other global

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[42] Westley et al. (2013) refers for the definition of "institutional entrepreneurship" to leadership scholars such as DiMaggio (1988), that describe it as the efforts of individuals seeking to change the institutions that govern a particular domain, while persecuting goals of their own.

experiments[43] ; ii) the innovative and **transformative roles (agency) of urban institutions** in an optic of a *new governance for ecological stewardship*, as "managers", or better yet "stewards", of the protection and enhancement of ecosystem services. I will return to the importance of strategic agency and institutional entrepreneurs for resilience planning shortly, after first introducing one fundamental tool of ecological resilience thinking, the so-called "adaptive cycle".

The literature review of research related to these three fundamental aspects, and in relation to planning for resilience and ecological transition in urban context, is resumed in Table 5, below .

Table 5: Summary of literature review of the main concepts within the field of Resilience thinking and as related to cities and resilience planning

Resilience thinking	*Eco-resilience and SESs as CASs*	*Adaptive co-management*	*Transformative agency*
General	Eco-resilience vs. Engineering Resileince. Holling 1973 Linking social and ecological resilience. Berkes and Folke 1998 Principles for building resilience in SES. Biggs et al. 2012, Stockholm Resilience Centre 2014	The adaptive cycle. Holling 1986, Gunderson and Holling 2002 Adaptive co-management for building resilience in SES. Olsson et al. 2004. Adaptive Capacity and Environmental Governance. Plummer and Armitage 2013 Transversal Resilience, adaptability and transformability in SES Walker et al. 2004	Strategic transformative agency and institutional entrepreneurship. Westley et al. 2013, Dorado 2005 Ecosystem stewardship. Chapin III et al. 2010, Olsson et al. 2010
Related to cities and resilience planning	Ecological resilience and Resilient cities. Pickett et al. 2004, 2012 Urban resilience. Resilience Alliance 2007. Social-ecological resilience for planning theory. Wilkinson 2012 Reslience planning. Eraydin and Taşan-Kok 2013 Urban resilience for whom, what, when, where, and why? Meerow and Newell 2019	Adaptive co-management in urban planning practice and policy. Crowe et al. 2016.	Urban Transition. Ernstson et al. 2010 Transformative climate governance. Hölscher et al. 2019

These three aspects of resilience of SESs are connected to and described dynamically by the

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[43] Such as the spreading experiments in the field of Place Making and Tactical Urbanism, and the globally growing climate action movements of Extinction Rebellion and Fridays for Future (in Europe) or the Sunrise Movement (in the US), that I will better describe in relation to my research object and objectives, in Par. 4.4.

fundamental heuristic tool of ecological resilience thinking (and theory) which is the "adaptive cycle" (or adaptive loop) (Holling 1986, Holling and Gunderson 2002). The **adaptive cycle**, a "metaphor" as the two authors describe it (Holling and Gunderson 2002, p. 33), is useful for understanding complex social-ecological systems at all scales - "from cells to ecosystems to societies to cultures" (ibid. p. 62) - and for addressing questions of how to improve resilience and foster desirable transformations in CASs embedded in SESs (Berkes et al. 2003, Levin et al. 2007, 2012). The adaptive cycle, describes[44] how (eco)systems subject to internal controls and external variability (stressors), cyclically undergo four different phases – or "functions" – that occur in succession – namely, *r* the exploitation phase, *K* the conservation phase, Ω the collapse or release phase, and *α* the reorganization phase (Figure 5) – and how, if endowed with the necessary resilience, the same (eco)systems are able to still persist, adapt and eventually change (Holling and Gunderson 2002, Walker 2004).
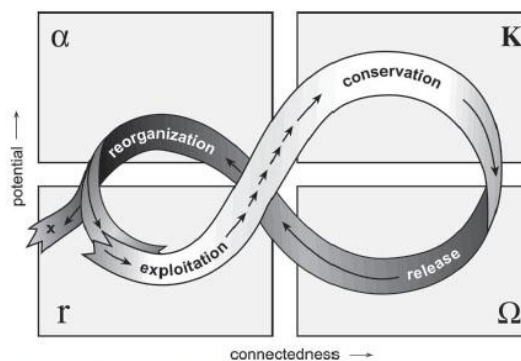
Figure 5: The adaptive loop (Gunderson & Holling (2002) Eds. Panarchy. Understanding transformations in human and natural systems. Island Press)

The succession of functions defines two macro phases: the "fore loop" – from r and K - represents the system slowly accumulating and sequestrating resources (nutrients, biomass but also skills, networks, knowledge etc.) and therefore growing; and the "back loop" (Berkes at al. 2003) – from Ω to α – represents instead the phase of "creative destruction" (Schumpeter 1950, in Holling 2001) when resources are stirred through rapid reorganization and novel recombination, leading to renewal.

The relationships among these phases are regulated not by two but by three properties or, better stated, by three dimensions, which are "potential" (or capital), "connectivity" (or internal controllability), and "resilience" (and its opposite, "vulnerability"), making the framework inherently three-dimensional as shown in Figure 6.

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[44] The descriptions of the "adaptive" cycle and of the "panarchy" structure are inferred by several articles and books (e.g. Holling 2001, Gunderson and Holling 2002, Walker 2004) and also by the comprehensive platform of the Resilience Alliance website www.resalliance.org.
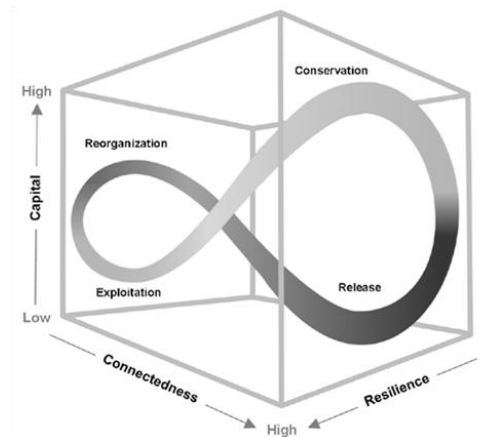
After the climax of the K phase, when the variables of potential and internal connectivity have increased, leading to accumulation of capital but also to more rigidity of the system as a whole, making it more vulnerable (aka less resilient) to external stressors, the system eventually collapses and undergoes the second phase, from Ω to α.

The α phase, which is characterized by low connectedness and therefore weak control (Holling 2001) but high ecological resilience due to the elements released (and high potential again), allows a new configuration through recombination. In this phase in fact "the system-wide cost of failure are low", creating the perfect conditions for "creative experimentation" (ibid. p. 395), able to restart a new and different adaptive cycle, that will undergo the same oscillations, and so on.

Nevertheless, as the authors notice, the end result of the cycle is not certain. If the system has an overall low resilience, it could flip into an Ω phase which is too chaotic to allow reorganization, or the potential could "leak out" during the α phase and degrade the system into a less organized and productive one (Holling 1986). In alternative, a truly "explorative" α phase (Westley et al. 2013), could represent an occasion to evolve the system into a more desirable future (e.g. more ecologically oriented).

These observations highlight the importance of assessing and actively managing the dimension of resilience (Folke et al. 2005) along the entire adaptation process to ensure its persistence, and introduces another part of this "metaphor", that represents the possibility of evolutionary change (or *transformability*, Walker 2004) in SESs as CASs.

The adaptive cycle is, in fact, part in fact of a *heuristic model of change* (Holling and Gunderson 2002) which describes the overall dynamics of (eco)systems as nested sets of such cycles, at progressive larger (and slower) and smaller (and faster) scales. These scales are called "Panarchies" by Holling and Gunderson (2002) to highlight the non-hierarchic nature of these cycles, even though they are "structured within and across scales of space and time" (Allen et al. 2014, p. 578), as "structures that sustain experiment, test results and allow adaptive evolution" (Holling 2001, p. 396).
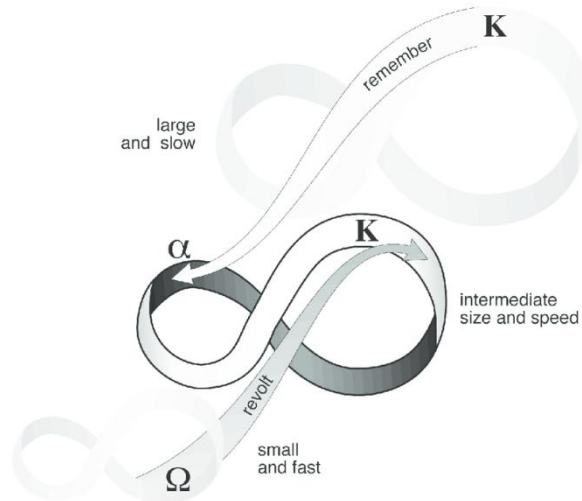
Represented in Figure 7, the nested cycles are, according to Holling et al. (2002), tied by cross-scale relationships: "revolt", that expresses the possibility of "critical change in one cycle to cascade up to a vulnerable stage in a larger and slower one" (ibid. p.75) and "remember", representing how the accumulated capital (social capital, knowledge, trust…) of a larger process can facilitate renewal in smaller adaptive cycles (Holling et al. 2002).

The dynamics of the adaptation cycle and of the interconnected structure of the Panarchies, represent an evolutionary framework – both conservative and creative at the same time (Holling 2001) – that has been observed in several large ecosystems and in some people-nature systems (e.g. Westley et al. 2011, 2013) and which have generated further research about institutions' and communities' adaptive capacity (e.g. agg. Rif) and, more significantly for the present research that aims to foster transitions in urban governance (Ernstson et al. 2010), about the *transformative capacity* towards ecosystem stewardship in social-ecological systems (Olsson et al. 2010).

This evolutionary concept brings with it the idea of complex, non-linear, self-organizing processes (Berkes and Folke 1998) and raises the question of finding the appropriate spatial and temporal scale to overcome the mismatch between ecosystems and human governance systems (problems of "fit", Young 2002 in Olsson et al 2010, and Berkes and Ross 2016) and impresses a shift (in terms of policy, planning or design) towards a more desired pathway. In this regard, I will return in Par. 3.5 to the related problem of the "opposing geometries" (Hester 2007) of ecological and participatory action, an issue that represents a leading question for the present research.

In the intentions of Holling and colleagues[45], the framework is meant, in fact, to be more *prescriptive* than *descriptive* (Holling 2001) in order to "sustain and generate desirable pathways for societal development in the face of increased frequency of abrupt change" (Folke et al 2005, p. 442). Research in both these directions has multiplied over time (Folke 2016) and has transferred across several fields (e.g. very recently in the field of economy, for analyzing the innovation

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[45] Expanded by the work of their collective think tank, the Resilience Alliance www.resalliance.org.

ecosystem, Boyer 2020).

As already stated, one significant attempt in this direction, has been performed by Westley et al. (2013), in a very stimulating article[46] in which, through a mix of theories concerning the **role of strategic agency** in the transformation of CASs (e.g. in particular Dorado 2005, in Westley et al. 2013) and related categories[47], the research group came to develop a *new adaptive cycle* that takes into consideration the factors of *agency*, *context* and *problems domain innovation* (or "strategy") to orient institutions towards successful ecosystem stewardship. This new adaptive cycle, in relation to our case, can be directly related to the establishment of "urban climate change experiments" in "safe arenas for experimentation", as I define Green Hackathons and in particular Climathon®, based on the idea and necessity of providing:

> "arenas for safe-to-fail experimentation, facilitating different transformative experiments at small scales, and allowing cross-learning and new initiatives to emerge and spread across levels and scales, constrained only by avoiding trajectories undesirable from a sustainability perspective" (Westley et al. 2011, Biggs et al. 2015, in Folke 2016).

This idea of providing space for transformative experiments in a facilitated setting, is connected also to the idea of the "safe rituals of participation" (Forester 1999) and to the transformative theory of social learning, that affirms that our arguments change while "we change", since "we learn about value in deliberative settings […] through transformations of relationships and responsibility" (Forester 1999, p. 115).

Relatedly, the new adaptive cycle proposed by Westley et al. (2013) combines, in fact, the adaptive cycles phases (Holling 1986) with four different "fitness landscapes" (Westley et al. 2013) in which, what they call, "institutional entrepreneurs (IE)[48]" must orient themselves, when working with SESs as CASs.

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[46] Westley, F. R., Tjornbo, O., Schultz, L., Olsson, P., Folke, C., Crona, B., & Bodin, Ö. (2013). A theory of transformative agency in linked social-ecological systems. *Ecology and Society*, *18*(3).

[47] Dorado (2005) recognizes three different "opportunity contexts" in which innovation can take place, from "opaque", to "hazy", to "transparent", according to the "likelihood that an organization field will permit actors to identify and introduce novel institutional combinations and facilitate the mobilization of resources required to make it enduring" (Dorado 2005, p. 113, in Westley et al. 2013).

[48] Westley et al. (2013) refer for the definition of "institutional entrepreneurship" to leadership scholars such as DiMaggio (1988), that describe it as the efforts of individuals seeking to change the institutions that govern a particular domain, while persecuting goals of their own.
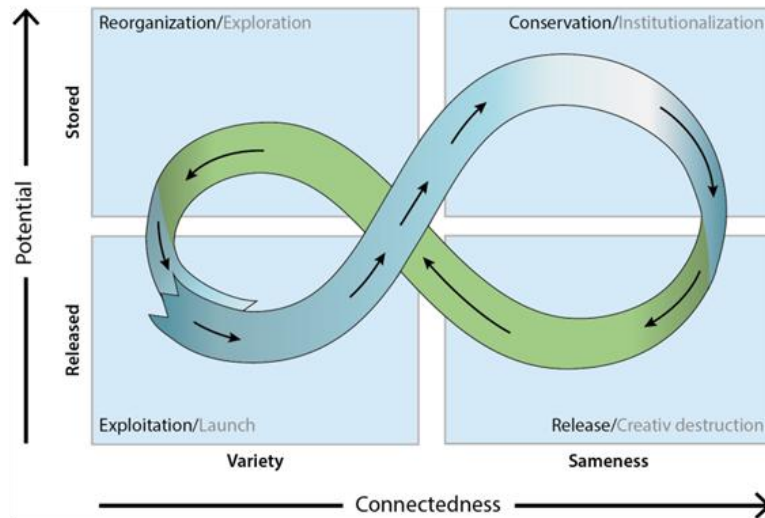
Westley et al. 2013 reread Holling's adaptive cycle (1986) to illuminate the role of innovation in the dynamics of resilient social systems (ibid.). In their cycle, creative destruction occurs "when old ideas and routines collapse; exploration, when new ideas are developed; launch when successful ideas are supported by investment of new capital; and institutionalization, when the innovation becomes an established part of our day to day life. Understanding SES involves being attuned to the different phases of the cycle and understanding the processes and dynamics that characterize each phase". (Westley et al. 2013)

This scheme is further enriched in its Panarchies (Gunderson and Holling 2002) allowing the specific context to jump into a new and more desirable configuration. This occurs if (and when) the IE are able to recognize the "opportunity context" in which they are situated and identify the right moment at which to act and to invest resources, as expressed in the following scheme by Westley et al. 2013.
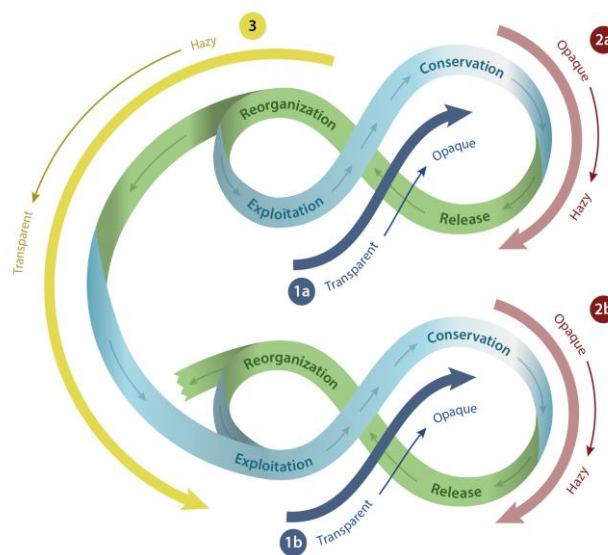

Figure 9 : A model of agency, context and problem domain innovation and the shift to a new configuration of the social – ecological system. 1a,b) Institutionalizing innovation. 2a,b) Releasing resources for innovation. 3) Stimulating merging innovations and partnerships (as described by Westley et al. 2013).

Finally, Westley et al. 2013 combine context and strategy by analyzing in the following Figure 10

(Table 2, ibid.) the associated agency to the different "opportunity contexts" (as identified by Dorado 2005) in complex social-ecological systems.

Table 2. Comparing models of context dynamics and agency.

	Opaque – Hazy	Hazy – Transparent	Transparent – Opaque
Opportunity contexts After Dorado (2005)	A few organizations dominate. Institutions and beliefs are well established. As challenges to the established order emerge, the context moves from opaque to hazy.	Old organizations lose their dominance. Institutions and beliefs are open to reinterpretation. As new organizations and understandings emerge, the context becomes transparent.	Multiple organizations that are loosely coupled are present, and many different beliefs coexist. As some of these disappear and others become more tightly coupled, the context becomes opaque again.
Associated ways of mobilizing support for change After Dorado (2005)	Accumulation Accumulation implies that support and acceptance of new institutions emerge as the uncoordinated actions of countless actors probabilistically converge.	Accumulation, Convening, and Leverage Convening means bringing actors "to the table," not to convince them of a predefined way forward, but to work together.	Leverage, Accumulation Leverage means that politically skilled actors mobilize support and acceptance for certain ideas.
Associated agency After Dorado (2005)	Routine, Strategic Routine agency involves re-enacting of past patterns of behavior and thus brings stability to institutional fields. Strategic agency involves actors defining their valued interests and deciding on a particular course of action to serve them.	Routine, Sense-making, Strategic Sense-making involves developing a coherent story that helps actors deal with a problematic present.	Strategic, Routine Strategic agency involves actors defining their valued interests and deciding on a particular course of action to serve them.
Phases of social-ecological transformations After Olsson et al. (2004)	Preparing for transformation Agents build ecological knowledge, develop a shared vision, and expand their social network.	Navigating the transition Agents use a window-of-opportunity to create a new governance system.	Building resilience of the new regime Agents develop motivation and values for ecosystem management, direct the local context through adaptive comanagement, and navigate the larger environment.
Phases of change in complex adaptive systems After Holling (1986)	Conservation-Release Biomass and nutrients have accumulated and a few species dominate. Disturbances such as wildfires release these resources.	Release – Reorganization – Exploitation Pioneer species that are able to make use of the released energy enter. Others follow, and the ecosystem is reorganized.	Exploitation – Conservation Ecological succession, in which pioneer species are eventually outcompeted. A few species become dominant once again.

Figure 10: Comparing models of context dynamics and agency (from Westley et al. 2013, Table 2.)

The relation of these concepts and other relating to the inter-connected skills, strategies and methods which are necessarily involved in successful ecosystem stewardship (cfr. Table 1 in Westley et al. 2013, as applied in Par. 4.4.), with "participation" (in theory and action) is very strong. These recall the strategies and methods which can be referred to all participatory workshop management methods and theories, as well as the skills and actors involved in participatory processes (cfr. Table 3 in Westley et al. 2013). I will better expand on these aspects in the following Par. 3.3 and then apply them, operatively in Par. 4.4, in connection to the rise of other global spontaneous movements for urban resilience and ecological transition, beyond Green Hackathons and in particular Climathon®.

Since the present research is oriented towards helping urban institutions to address their efforts in tackling issues of climate change, and to coordinate and consolidate the bottom-up local contributions to the achievement of global targets of resilience and the protection and enhancement of ecosystem services, to consider *ecological resilience*, *adaptive co-management*,

transformative agency and the *adaptive cycle* (and their evolutions) as a **theoretical framework** for my work - the ***first pair of lenses*** which will be utilized to observe my research object that is the growing socio-technical phenomenon of Green Hackathons and Climathon® as "urban climate experiments" (Castán Broto and Bulkeley, 2013), in particular *from the point of view of the institutions* (cities, platforms, and other subjects) that organize them - has a threefold value:

i) to understand if the format and approaches of Green Hachathon and Climathon® in particular are consistent with social-ecological resilience theories and thinking, to be more consistent to with their mission, which is to improve resilience to climate change and foster sustainability at a local urban scale and at a global scale (1st concrete operational objective);

ii) to observe my research object within its local context, in terms of how ecological resilience and resilience thinking can contribute to increasing the "fitness" of these events within the systems with which they interface, namely the urban system and ongoing resilience planning process (2° concrete operational objective);

ii) to investigate how social-ecological resilience interacts with participation, which is the *second pair of observational lenses*, and to identify which contradictions emerge and which gaps need to be overcome and successively to develop, on this basis, a new combination of tools, principles and underlying concepts, inferred   from the two theoretical frameworks which represents a concrete, effective tool to assist urban institutions to better govern and integrate the "scattered" practices within urban resilience planning, which could help overcome this contradiction (theoretical knowledge objective).

3.3 From Participatory Democracy to complex adaptive systems: Participation Matters

As anticipated in Chapter 1, the research work refers to the word "**participation**" (in theory and in practice) as a substantial **democratic** approach, methodology and objective[49], given that a high degree of participation is a characteristic feature of democracy (De Toffol and Valastro 2013[50]).

"Participation" is a term that defies a single definition, depending on the field or sector of its application (educational, social, economic, spatial…), and some have referred to its meaning in the field of development as an "umbrella term for a supposedly new style of development intervention" (Oakley 1991, p. 6).

Encompassing other words in use in participatory processes (Bishop 2015) such as "consultation", "collaboration", "involvement", "engagement", "dialogue", the term "participation"

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[49] In this sense the meaning must be distinct from what in the field of user-center design and Human-Computer Interaction (HCI) is called "participatory design", a method to improve the interface or functionality of a product/process through the design contribution of the end users.
[50] Several definitions of "participation" and related concepts of this paragraph are taken by the "Dizionario di democrazia partecipativa" (2013) edited by of the Centro Studi Giuridici e Politici (F. De Toffol and A. Valastro) of Umbria Region (Italy).

indicates different forms and levels of involvement of the members of a collectivity in the government of the same (De Toffol and Valastro 2013) or, depending on the scale, the object and purpose of the process, of the "stakeholders", interested parties or beneficiaries of a right, recipients of a policy or project, of a government action or in general of the exercise of a power.

The concept of "participation" is linked to the model and political ideal of "participatory democracy" (e.g. Benello and Roussopoulos 1971; Allegretti 1990, Venti 2009, for the Italian context), a form of governance of the *res publica* based on the abiding inclusion, collaboration and dialogue between the institutions and the civil society (De Toffol and Valastro 2013), which has origins[51] in the Anglo-Saxon libertarian and communitarian anarchism movements for "decentralization" (e.g. the "Little government" of William Goodwin, 1793, in Woodcock 1971), in the ideal of "mutualism in nature" (e.g. Kropotkin, 1902, Bookchin, 1980) as opposed to the Darwinian idea of competition among species, and in the so-called "American pragmatism" of, in particular, John Dewey with his ideas of "hands-on learning", and of how public administrators should be responsible for making programs "work" in a pluralistic, problems-oriented environment, but also as connected to his evolutionary theories of active adaption of interdependent organisms-in-environments (Stanford Encyclopedia of Philosophy 2018, retrieved online).

Since this research will be treating the topic of "participation" and participatory processes in "urban settings" and/or as managed by urban institutions, it will be necessarily connected to other *applicative terms* in the field of spatial design and planning and development, such as "participatory design" or "co-design", and "participatory planning" or "co-planning". These are all widely utilized approaches since the end of the 90s in Italy with some precursors (e.g. De Carlo 1973, Lorenzo 1998, 2002a, 2002b, Magnaghi 1998) which followed the consolidated experiences in the Anglo-Saxons context, some of which date from the end of the XIX Century (e.g. Patrick Geddes (1915) who introduced the idea of ecological renewal and design of cities thanks to the earlier participation and protagonism of social actors) and those experienced in the United States since the 1960s (e.g. Jacobs 1961, Alexander 1975, and several experiences of *advocacy planning* leaded by Architecture Faculty Departments).

The following Table 6 synthetically presents some definitions of participatory design or planning offered by from well-known experts in the field[52], based on the prevalent aspects of the

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[51] For the origins of participatory democracy I refer to Woodcock 1971, and other essays in Benello and Roussopoulos 1971.

[52] Raymond Lorenzo, M.C.P. at Harvard University and B.S. in Industrial Engineering at Columbia University, is professor and freelance consultant in Participatory Urban Planning, Design and Management, in Italy and internationally, and has written more than 15 publications with topics relative to participation, environment and development, urban sustainability, and child-friendly cities. Mark Francis, recently passed away, was Professor Emeritus of Landscape Architecture and Environmental Design at the University of California, Davis (CA, USA), researcher and

participatory process.

Table 6 – Definitions of Participatory design or Planning, based on the prevalent aspect of the process

General context	Prevalent aspect	Definition	References
Participatory Design or Planning	*Community-based design, Learning process*	*Participatory planning is an **educational process**. By letting different people work together, mutual knowledge is allowed, the problems of others are understood. Everything contributes to the growth of the sense of belonging to the locality [or the issue] by building the concept of "community" (R. Lorenzo, nd.)*	Jacobs 1961, Lorenzo 1998, Wates 2000
	Democratic Design	*Planning and designing **with, instead of, for** people (M. Francis, nd.)*	Alexander 1975, Francis et al. 1987, Carr et al. 1992, Hester 2010, Francis 2016, de la Pena et al. 2017
	Collaborative Planning	*A form of design that involves the union of **multiple points of view** in order to create **the best possible solution** in terms of plans, projects and strategies. It is therefore essential that it enables different skills, competencies and experiences to interact (J. Bishop, nd.)*	Iacofano 1990, 2001, BDOR 1991, Wilkox 1994, Forester 1999, Bishop 1994, 2015

As can be seen in Table 6, two other important terms are in use, and will be used, within this research work, with some important distinctions. The first is the term "community (based) design" or "community planning", very much in use in participatory process for spatial design or planning. This term must be used with caution in the context of this research because, in the case of Civic/Green Hackathon and in particular Climathon®, it would be not correct to think that these activities are directed to a specific community or that the activity (at least in the actual form) arises by a specific socially or geographically based community, if not in the broadest idea of an "urban community", and not always, since the participants travel between cities to participate, as better explained in Chap. 4 and 5. It is therefore true that there is a community of scope that participates at these events (interested in climate change for Climathon®, or in the specific topic of a Civic Hackathon) and that it can have a global dimension (international students or scholars,

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author of more than ten books and, in the order of a hundred, articles in the field of participatory design, and founding member of the international Pacific Rim Community Design Network, a network of practitioners and scholars working in the field of participatory design and planning across the Pacific Rim region, an opportunity to share and compare each other's experiences and advance their practice and research. Jeff Bishop is a professional architect and a recognized international expert, trainer and author, with more than 40 years of experience at the vanguard of collaborative planning in the UK.

globetrotter entrepreneurs and environmental experts).

The other term, "collaborative planning" (sometimes contracted in the terms of "co-design" and "co-planning") will, on the other hand, be used extensively in the research, and I assume the definition of "collaborative planning" from the work and writings of Jeff Bishop. In his book "The Craft of Collaborative Planning" (2015), Bishop chooses the term "collaborative" to indicate participatory processes led in collaboration (neither top-down nor bottom-up), among maybe small but wide-range of stakeholders, interested in generating a widely agreed solution or plan, a process that more likely could result in a win-win solution (cfr. Bishop 2015, pp. 3-4).

Finally, if in the text the choice is to refer interchangeably to "participatory design" and "participatory planning", or "co-design" and "co-planning" it is because of the specific context of climate change and ecological transition, in which the scale, object and purpose of the process, is varied and complex.

While this is not the place to produce a complete review of the many different "schools of participation" and the myriad approaches in the fields of spatial design and planning, and the extremely variegated methodologies and tools[53], for the scope of the present research, I will focus (base my argumentations) on the classical, fundamental "ladder of participation" tool (e.g. Arnstein 1969) and its evolutions (Wilkox 1994, Partnership LTD 1999, Bishop 2015) and on the principles of "effective participation" which are connected.

Green Hackathons and in particular Climathon® are in fact expressively collaborative design events aimed at developing solutions to tackle climate change at the urban level, that deal with complex issues affecting a wide and diversified public, where multiple levels of knowledge, institutions, resources and actors, are systematically involved in the development of "urban climate change experiments" to increase resilience and foster the ecological transition of cities.

Since they could represent "safe arenas for experimentation" in the sense indicated by Westley et al. (2013), it seemed productive and necessary to observe this growing international phenomena[54] through the *second pair of lenses* adopted in the present research – that of *participatory processes* (in action and theory) – to critically understand the established format, the tools in use and the selected objectives, as well as its position with respect to other ongoing participatory and planning processes, to improve their own "degree of participation" (Arnstein 1969, or "levels of

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[53] If interested to deepen the topic, in the context of the present research implicitly refers to, for community planning techniques and methodology to Iacofano 1990, Bishop 2015; workshops and meeting facilitation techniques and methodology, Hester 1990, Iacofano 2001, De Sario 2005; for participation in the contest of environmental education, Jensen, Kofoed et al. 1995, Lorenzo 1998; for the latest in design for democracy and environmental education, Lawson, De La Pena et al. 2017; for participation handbooks Wates 2000 and Elliott et al. 2005; for web resources to www.communityplanning.net and www.communityplanningtoolkit.org; for the European contest, to Urbact nd., and for the Italian contest, to Sancassiani et al. 2009, Nanz & Fritsche 2014.
[54] I will describe the evolution and expansion of the socio-technical phenomena of Civic/Green Hackathon and in particular of Climathon®, in Chap. 4.

participation" Wilkox 1994, Bishop 2015) consistent with their mission and, consequently, to positively impact their ability to increase the resilience of the urban contexts in which they are implemented.

To assess the performance of Green Hackathons and in particular Climathon® as safe arenas for urban climate experimentations and their degree of participation, the research relies, as said, on the classical tool of the "ladder of participation" (Arnstein 1969) and its evolutions in participatory design and planning (Wilkox 1994, Partnership LTD 1999, Bishop 2015).

In combination with the overall principles[55] for effective participation (e.g. Wilkox 1994, Lorenzo 1998, Bishop 2015), such ladders are in use among practitioners and academics in the field of participatory and community design processes (e.g. also for climate change governance, cfr. Hurlbert and Gupta 2015, Gupta 2016), both as a framework to design participatory processes, and as a tool to assess what levels are activated within the process.

Sherry R. Arnstein's classical ladder of participation (1969) defines eight "degrees" of participation, that can be grouped in three levels – "non participation" corresponds to the first two rungs of the ladder, or "manipulation" and "therapy"; "tokenism" encompasses "informing", "consultation" and "placation", while "citizen power" corresponds to "partnership", "delegated power" and "citizen control" (see Figure 11). Her model is based on the idea that citizens participation is defined by the extent and possibility of citizens to exercise (or less) control, or "power", over a decision, plan or project that affects them. It is obvious that for Arnstein only the three higher rungs of the ladder are to be considered substantial participation (Wilkox 1994), since they represent increasing degrees of decision-making clout (Arnstein 1969).

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[55] As stated by Bishop (2015) "there are probably as many lists of principles of engagement as there are books on the subject" (*ibid*., p. 16) but the same author, however, attempts to draw up a complete list of principles, from the beginning of a process to the end, which will be listed later in this paragraph and in Figure 15.
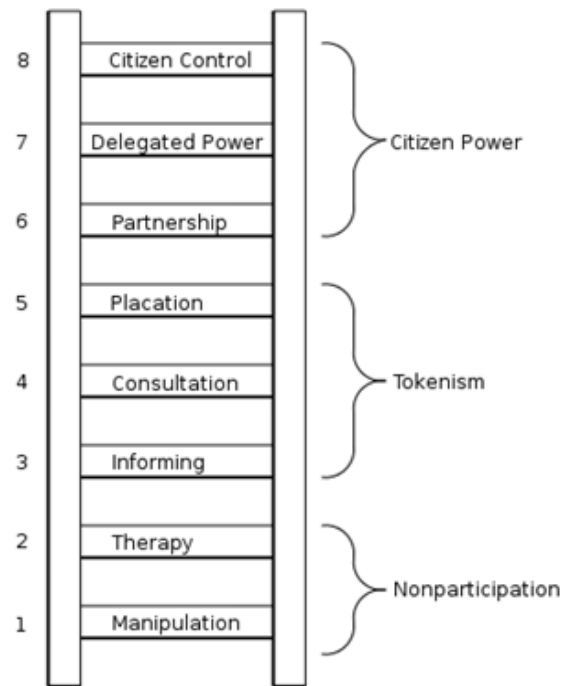
Figure 11: Sherry R. Arnstein "A ladder of citizens participation" (1969)

Bishop highlights that Arnstein's ladder carries within it another "serious weakness that must be addressed if any form of collaborative working is to move forward" (Bishop 2015, p. 12) that can be noticed and understood by looking at the ladder in a different way (see Figure 12).
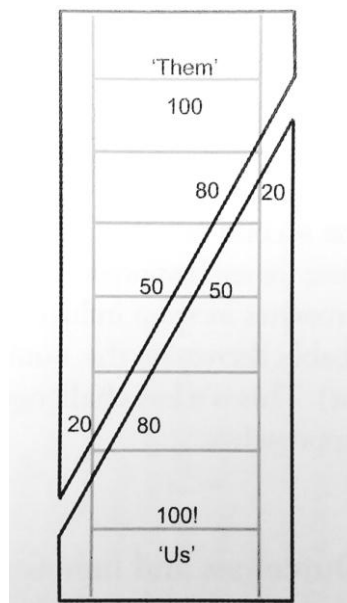

Figure 12: Another way of seeing Arnstein's ladder (Bishop 2015, p. 13)

"a shift up the ladder merely places more and eventually all power with one party or another, from 80/20 lower on the ladder (more to those in power) to 20/80 near the top (more to the citizens) and 50/50 in the middle. This is fundamentally a win/lose model and, for any complex social issue, it is

probably impossible to argue that the wholesale transfer of power to from one group to another is any form of progress at all." (Bishop 2015, p. 13).

This happens in Arsteins ladder and in many of its derivations, also because, as Bishop notices, the majority of the engagement work "are still largely determined by those who initiate the process rather than by those involved in it" (ibid., p. 3).

But in the case of Green Hackathons and in particular Climathon®, which are independent activities managed by independent subjects (platforms) in collaboration with urban institutions, and in general in the perspective of a growing number of "climate change experiments" (Castán Broto and Bulkeley 2013) that involve cities, urban institutions and public bodies, in collaboration with a myriad of third parties, in a multiplicity of small incremental actions to increase resilience and foster ecological transition at the urban level and beyond, it is necessary to operate a different mindset, oriented towards what Bishop (2015) calls "collaborative planning".

> "By contrast, collaborative working and consensus building are about trying to achieve a win/win result in which there is real added value from bringing together skills, knowledge, information, power and so forth from a range of parties. It is about both or all, not one or the other." (Bishop 2015, p. 13).

In reference to the final objective of the present research, which is to assist urban institutions in better coordinating, and consolidating bottom-up and third parties local contributions towards the achievement of the global targets of social-ecological resilience and sustainability, we assume the definition of "collaborative planning" as developed by Bishop (2015), to indicate participatory processes led in collaboration (neither top-down nor bottom-up), among perhaps a small number but wide-range of stakeholders interested in generating a widely agreed solution or plan, a process that more likely could result in a win-win solution (cfr. Bishop 2015, pp,.3 -4).

Since Arnstein's ladder, many other alternative ladders have been developed by practitioners in the field of co-planning who were, probably, less explicit in judging positively or negatively the level (or form) of participation enabled by the particular process, but nevertheless, as Bishop (2015) underlines, "all, almost without stating it, imply[ing] that higher levels are better" (ibid., p. 11).

A different example is the ladder developed by Wilkox (1994), successively absorbed into the Partnership LTD ladder (1999), and presently in use, with some slight differences[56], also in Italy

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[56] The ladder in use in Region Emilia Romagna (Emilia Romagna 2008) includes four levels of participation: from simple not deliberative "information", and "consultation" to influence the decisions made, to "participatory planning and design" when problem analysis and the development of solutions are jointly defined, and "empowerment" in the case of

and precisely in Emilia Romagna[57]. In the case of this "Five levels of participation" ladder (Wilkox 1994), the author declares openly «I do not suggest any one stance is better than any other - it is rather a matter of "horses for courses". Different levels are appropriate at different times to meet the expectations of different interests.»[58]
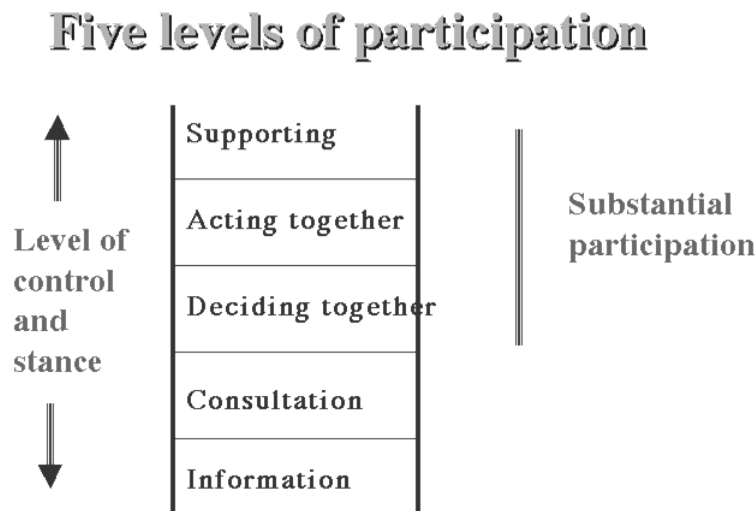
Five levels of participation

Figure 13: Five levels of participation (Wilkox 1994, Partnership LTD 1999)

The five rungs are described by Wilkox as "**Information** - The least you can do is tell people what is planned"; "**Consultation** - You offer a number of options and listen to the feedback you get". "**Deciding together** You encourage others to provide some additional ideas and options, and join in deciding the best way forward"; "**Acting together** - Not only do different interests decide together what is best, but they form a partnership to carry it out"; **Supporting independent community initiatives** - You help others do what they want - perhaps within a framework of grants, advice and support provided by the resource holder."[59]

Still, the "highest" rungs of the ladder - as can be noticed in Figure 13 - are referred to as "substantial participation", while "consultation" and "information" are someway not considered so, since the control of the process remains mainly in the hands of the initiator of the process, leading to less commitment by participants.

 On the basis of the following three considerations: i) to trace clear lines between levels in participatory processes is not possible, because the divisions are uncertain; ii) it is fundamentally wrong to consider higher levels to be better; iii) "good processes can, even should, include

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partnerships and/or support to independent initiatives. The different levels inform the Regional Law for Participation L.3/2010, now revised in the L.15/2018.

[57] The Italian region where one of the case-studies of the present research is located, Bologna.

[58] "The Guide to Effective Participation" (Wilkox 1994) is online and can be accessed here (http://partnerships.org.uk/guide/main1.html#anchor426596)

[59] Cfr. "The Guide to Effective Participation" (Wilkox 1994) Online http://partnerships.org.uk/guide/main1.html#anchor426596

opportunities for different people to engage at different levels at different times and on different aspects" (cfr. Bishop 2015, p 10), Bishop has therefore evolved beyond Wilkox's position, by proposing a **new ladder**, a "Participation frame", or as the author calls it, "a preferred levels framework" (see Figure 14), that **cancels the hierarchy** between the levels, while **introducing a new "dimension"** that of the number of subjects involved, or those who can be involved, in the process.

Table 1 A preferred levels framework

Type	Description	Example methods
Informing	Letting others know of decisions, opportunities, ideas. May be about addressing attitudes/perceptions or behaviour (through education). Informing may also involve sharing – listening to different points of view, and allowing people to understand differences, rather than explicitly trying to inform about decisions.	• Giving information through leaflets, guided tours, websites, e-news • Running education programmes • Giving talks • Public Relations work through the press
Consulting	You will make the decision, but you want to inform that decision by gathering stakeholders' views first. Often one-off engagement.	• Market research surveys • Focus groups • Exhibition/questionnaires • Public meetings • 1:1 meetings • Face to face or electronic • Citizens' Panels (post/ email)
Involving	You will make the decision(s), but you want stakeholders to be able to shape decisions on an ongoing basis. This results in longer term and more influential relationships in which final decisions are made by the commissioning organisation(s), but very much based on the working relationship with those involved.	• Advisory bodies • Liaison groups • 1:1 relationships with owner occupiers • Workshops • E-consultation • Citizens' Panels (meeting)
Dialogue	You share and develop the decision-making more equally with your stakeholders on an ongoing basis that allows for and balances all views.	Partnerships Consensus building Managed delegation E-dialogue Action packs

Increasing influence/ control over decision   *Increasing number of people involved*

Figure 14: Table 1 A preferred levels framework (Bishop 2015, p.15)

The "Participation frame" (my term) that emerges, recognizes four levels or forms of participation – **Informing**, **Consulting**, **Involving** or rather **deciding together**, **Dialogue** or rather **acting together** –that are described according to the general approach connected to each level and are modeled on the levels of Wilkox (1994), while listing also some collaborative working methods that could be used for each approach (Bishop 2015).

More interestingly, the **two arrows** at the sides describe how by moving through the different approaches, the extent of influence and control over the decision grows while the number of people involved decreases, and vice versa.

I will return to the importance of this **new dynamic "dimension"** that Bishop introduces in the ladder, in the following paragraphs,, where I will explain how these ladders and principles are, on one hand, **intrinsically intertwined** with the principles of social-ecological resilience, and in particular to those that that have been identified as able to enhance resilience in SESs as CASs (Biggs et al. 2012), and on the other, present some **substantial limits and contradictions** that

must be overcome to effectively build resilience, in particular regard to climate change, and fto oster ecological transition, and therefore sustainability.

I will in fact introduce the **contradiction** that emerges when observing these practices and processes under the two lenses of *social-ecological resilience* and *participatory approaches*, with the objective of finding a **useful recombination** (Hester 2007).

Given the fact that GH and CL are independent initiatives of third parties with relation to the urban institutions that collaborate to their realization, as I will explain in Chap. 4, I decided to assume the "ladder" proposed by Bishop (2015) – the "Participation Frame" - and not that of the UK Partnership Organization (1999) one, because the level of "Supporting independent community initiatives" is therein implicit.

In the present research, I made use of the "ladder" of the UK Partnership Organization (1999) as updated in the "Participation Frame" (Bishop 2015, my term), to create an **evaluation frame** to assess the "degree of participation" of Climathon® and Green Hackathon events) through distributing and analyzing the collected data from the organizers and participants in the survey I conducted, the **Online survey on Climathon®|Green Hackathon: Co-action for resilience**, as described in Chap. 2 and then analyzed in Chap. 5.

In my "Participation Evaluation frame" tool, the levels are assumed as *descriptors*, and each one is linked to **four keywords** (see Table 6), selected accordingly to the levels description, to help participants and organizers (cities, urban institutions and platforms) self-assess in the survey, the levels of participation which they experienced or activated within a Green Hackathon or Climathon® event. The results of the self-assessment are described in Par. 5.2.

Table 7: The Participation Evaluation frame describes the levels of participation as experienced or activated through the related keywords

Level of participation	Keyword
Informing	Learning Listening Socializing
Consulting	Contributing Discussing Connecting
Involving or deciding together	Sharing Co-decision making Co-designing
Dialogue or acting together	Collaborating Realizing Co-managing

The levels and keywords can be organized also in a different form, as in the following Table 8. The quadripartite disposition in the Participation Evaluation frame, again wants to underline the non-hierarchy between the different forms of participation activated in a process, and will be functional to the propositive part of this research work.

Table 8: The Participation Evaluation frame in a non non-hierarchic disposition (my evolution, based on Bishop 2015)

Dialogue/Acting Together	Consulting
Collaborating Realizing Co-managing	Contributing Discussing Connecting
Learning Listening Socializing	Sharing Co-decision making Co-designing
Informing	**Involving/Deciding together**

To expand the assessment and fulfill the objective of the research, which is to critically understand the established format of GH and CL and to improve the inclusiveness and democracy, fairness, effectiveness and efficiency of the process (Lorenzo 2002a) from the beginning of a process to the end, I assumed a list of **overall principles for an effective participation process** (Bishop nd., Bishop 2015), combining and synthesizing those listed by Bishop (2015) as in Figure 15, and proposed by the same author in other contexts (Bishop, nd. The 'Building Blocks' of Effective Participation, working notes).

- Explicit overall process
- Independent design and management
- Agreed process
- Clear scope
- Commitment to abide by outcomes
- Openness, honesty, trust
- Inclusiveness
- Mutual education and exchange
- Building common ground
- Common information base
- Methods not method
- Decisions made by consensus
- Clear feedback and final reporting
- Shared responsibility for success, outcomes and implementation
- Work hard on the detail

Figure 15: Principles of engagement summarized (Bishop 2015, Table 2, p. 19)

The **overall principles for effective participation** that I assumed and that underline the analysis

of the results of the present research, as described in Chap. 5, are listed in the following Table 8:

Overall principles for effective participation	• Independent process • Clear objectives • Inclusive process (outreach channels, mix of age, gender and background distribution) • Appropriate knowledge base • Sufficient resources (resources to deliver and manage over time, incentives and materials provided) • Diversity in the use of techniques and methods • Working towards shared results • Proper links with other local consultations or participatory processes in progress

Together, the *overall principles of participation* and the *Participation Evaluation Frame* form the **theoretical framework** and the ***second pair of lenses*** utilized to observe my research object, that is the growing socio-technical phenomenon of Green Hackathons and Climathon® as "urban climate experiments" (Castán Broto and Bulkeley, 2013), in particular *from the point of view of the institutions* (cities, platforms, and other subjects) that organize them, and possess a threefold value in operationally assisting the reaching of research objectives:

i) to observe my research object, that is the growing socio-technical phenomenon of Green Hackathons and Climathon® as "urban climate experiments" (Castán Broto and Bulkeley, 2013), in particular *from the point of view of the institutions* (cities, platforms, and other subjects) that organize them, under the *lens of participatory design and planning approaches*, *tools and principles of effective participation* (Bishop nd., Bishop 2015), to assess their "participation degree", by tracing the "process" beyond the "products", from the genesis of the challenge to the development of the outputs, to highlight critical points and strengths of the format, objectives and approaches, and improve their inclusiveness and democracy, fairness, effectiveness and efficiency (Lorenzo 2002) consistently with their mission (1st concrete operational objective);

ii) to observe my research object within its local context, in terms of how these events interact with ongoing other local participatory processes, to understand factors of timing and opportunity and possible synergies, to increase the "fitness" of these events within the systems with which they interface - that is, the urban system and ongoing local resilience planning process (2° concrete operational objective);

iii) to investigate how participation interacts with social-ecological resilience, i.e. the *first pair of observational lens*, in order to identify which contradictions emerge and which gaps need to be overcome, and to provide, accordingly, a new combination of tools, principles and underlying concepts, inferred from the two theoretical frameworks – in the form of an effective tool to assist urban institutions to better govern and integrate these "scattered practices" within urban resilience planning, which could help overcome this contradiction (theoretical knowledge objective).

3.4 Participation and resilience: an inseparable pair

Several aspects intrinsically connect the field of **participation** (in theory and practice) in spatial design and planning and ecological of **resilience** (building) for SESs as CASs and, in the face of complexity and growing uncertainty regarding future scenarios due to current climate change and ecological crisis, the contribution of participation as a fundamental principle for "building resilience" in coupled SESs (Stockholm Resilience Center 2014; Biggs et al. 2012), is widely recognized also at a climate governance level (De Boer 2009).

Besides sharing origins within complex adaptive systems thinking (as applied to cities as problems of "organized complexity" e.g. Weaver 1958, Jacobs 1961, Alexander 1965, Bettencourt 2015) and some precursors in ecological-evolutionary planning (e.g. Kropotkin 1902, Geddes 1915), to tackle climate change and, in perspective, to stir Earth System away from the Hothouse Earth Pathway into the "Alternative Stabilized Earth Pathway" (Steffen et al. 2011), it is in fact recognized that an "unprecedented level of cooperation" is needed (De Boer 2009), and in this scenario, non-state actors, including local communities, are to be increasingly involved (Bulkeley and Newell 2010).

The required "polycentric governance" (Arriagada et al. 2018, Ostrom et al. 1961, Ostrom 1990, 2009, 2010), to achieve an effective "multi-level rather than centralized and hierarchical" governance system for planetary stewardship (Steffen et al. 2011, p. 757), implies the question of "who decides, how and what" (Benello and Roussopoulos 1971) and therefore the notion and practice of effective *participation* (for e.g., Arnstein 1969, Alexander et al. 1975, Lorenzo 1998, 2002, Forrester 1999, Bishop 2015) in processes of decision-making, co-planning and co-design addressed to build resilience to climate change. In much the same way, we can identify some striking similarities, between the characteristics of Holling's engineering and ecological resilience dichotomies and the approaches and outcomes of the two main dichotomies in planning/design theory and practice, that can be identified as Traditional (or Technocratic/Rationalist) Planning and Participatory (or Collaborative) Planning.

Since sustainability is a normative concept based on socially derived goals, while ecological resilience is a mainly scientific (conceptual) framework grounded in systems thinking, useful to

identify the elements facilitating or inhibiting the achievement of those goals (Childers et al. 2014, in Pickett et al. 2014), from this perspective resilience thinking could be considered a fundamental concept for operationalizing sustainability (Pickett et al. 2014),

Nevertheless, many have criticized that resilience itself can be considered an objective concept (Brown 2014, Cretney 2014, Meerow and Newell 2019) and in particular when in connection to climate change, is increasingly described as a "wicked problem" (Sun and Yang 2016) and a "super wicked problem" (e.g. Levin 2007).

The present research embraces a position which considers resilience thinking as an "integrative approach for dealing with the sustainability challenge" (Folke 2016 p.14, Holling 2001). Its scientific base, therefore, must be integrated with social science (Stone-Jovicich 2015) and participatory methodologies, that enable a common understanding of principles and a sharing of goals and actions, and are already being used (Paba 2002) for dealing with "wicked problems" at urban and other scales, and in more uncertain and complex contexts (Christensen 1985, Balducci 2011).

In the following sections, I will highlight how this integration is already expressed in the ways participatory planning and design approaches and are, under several aspects, already **intrinsically intertwined** with the principles of social-ecological resilience.

As mentionend earlier, the dichotomies between "engineering resilience" from "ecological resilience" (Holling 1996), in much the same way, possesses some striking similarities with the characteristics of the two main dichotomies in planning/design theory and practice, that might be identified as Traditional (Conventional/Rationalist) Planning and Participatory (or Collaborative) Planning.

The parallels in the dichotomies of the features of Engineering and Ecological Resilience with those of Traditional Planning and Participatory Planning, are overlayed and summarized as follows, in the Table 10.

Table 10 - **Differences among Traditional and Participatory planning (elaborated by me, in comparison with Holling 1996)**

Features	*Engineering Resilience* ***Traditional Planning***	*Ecological Resilience* ***Participatory Planning***
Origins and fields of influence	Environmental sciences (shaped by physical sciences, engineering, and economics) Theoretical mathematics	Ecology (shaped by biology and evolutionary perspective) Applied mathematics and applied resource management
	Rationalist Planning, Market-Driven	***Systems Theory, Environmental Social***

	Economics, Engineering	*Sciences, Pedagogy, Relational Psychology, Group Dynamics, Urban Ecology*
Conditions (Forms of co-involvement)	Stability or near to equilibrium state	Instability or far from equilibrium state
	Single stable state possibility	Multiple stable states possibility
	Closed system	Open System
	Procedural and Normative	*Processual and Contextual*
	Consultation through experts concerning pre-determined plans	*Collaboration and Co-production of shared plans*
	Design Interaction only between those directly involved in implementation	*Ample participation of 'all' stakeholders and interested parties*
	Other interests consulted very late in the process	*Design interaction of 'all' in all phases of the process*
Design characteristics	Efficiency, constancy, predictability	Instability, far from equilibrium state
	Near equilibrium focus	Multiple stable states possibility
	Deductive	Inductive
	Fail-safe design	Safe-fail design
	Only 'experts' design	*Facilitate effective, interactive design between all actors.*
	Deductive approaches	*Inductive approaches*
	Data management to realize the project	*Enhancement of all available human resources and information to realize shared, effective projects*
Measurement of Resilience (evaluation parameters)	Resistance to disturbance and speed of return to initial stadium.	Magnitude of disturbance which can be absorbed before system changes.
	Reach pre-established objectives *(in the frame set by client / institution)*	*Attain the widest consensus regarding the design decisions.* *(effective solutions in evolution)*
Main Objective(s)	To maximize constancy or productivity (of yields)	To ensure sustainability in face of surprises and the unexpected
	= *Efficiency* of functions	= *Existence* of functions
	Fail-safe products	*Safe-fail products*
	Determine "best" solution	*Identify shared, effective and appropriate solutions in evolution and over dynamic cycles*
	Acquire political approval for project	*Attain shared consensus regarding design decisions and process*

The above aspects (of Participatory Planning) can be related to the management style of SESs as

CASs and to the adaptive capacity of institutions in charge of (eco)systems management (i.e. urban institutions for cities). In fact, some resilience scholars (e.g. Olsson 2004) have observed that *adaptive co-management* or, better said, **adaptive co-governance** when speaking, for example, of urban institutions, relying on polycentric governance (Ostrom 1996) that link multiple organizational levels (Olsson et al. 2004, Folke et al. 2005) and provide for collaborative, flexible, learning-based approaches (Folke et al. 2003, Berkes 2009), have even better chances of dealing effectively with uncertainty and change (Olsson 2006) and in general that "these approaches have the potential to deal with the complexity of interdependent social-ecological systems and enhance the fit between ecosystem dynamics and governance systems" (Olson et al. 2010).

Further lines of research in resilience thinking (in theory and practice) synthesized by Folke (2016), are of interest to the objectives of the present research, and in connection to participation (in practice and theory, the other *observational lens* of the present research) as applied to the adaptive governance of complex adaptive systems such as cities for the following reasons: i) institutions are linked to ecosystems, in ways that are influenced by resilience (Gunderson et al. 1998, Berkes and Folke 1998, Ostrom 1999); ii) even if uncertainty and unpredictability will always be inherent in CAS management, decisions nevertheless still must be made and when possible learning must be incorporated (e.g. Allen et al. 2011, in Folke 2016); iii) agency (e.g. Adger 2000, Olsson et al. 2004, Berkes 2009) and political and power dimensions of sustainability (e.g. Adger 2005) play a role, in particular for adaptability and transformability. In particular, agency, as said, can become strategically transformative (Westley et al. 2013), as already explained in Par. 3.2.

The final fundamental relationship between participation (in theory and in practice) and resilience theory and resilience thinking, is represented by the so-called "Seven principles for building resilience in social-ecological systems" (Biggs et al. 2012).

Based on growing research and literature in adaptive management, Biggs et al. (2012) identified **seven generic policy-relevant principles**, successively assumed by the Stockholm Resilience Center[60], for enhancing the resilience of desired ES in the face of disturbance and ongoing change in SES, because:

> "Enhancing the resilience of ecosystem services (ES) that underpin human well-being is critical for
> meeting current and future societal needs, and requires specific governance and management policies."
> (Biggs, et al. 2012)

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[60] The Stockholm Resilience Center is an international center that carries out advance interdisciplinary research for governance and management of socio-ecological systems, with particular attention to the aspect of resilience to secure ecosystem services for human well-being and resilience for long-term sustainability. The center is a joint initiative between Stockholm University and the Beijer Institute of Ecological Economics at The Royal Swedish Academy Sciences. https://www.stockholmresilience.org/

Enhancing the resilience of ecosystem services[61] means, in fact, building the capacity of SES to sustain a set of desired ES in the face of change and uncertainty (Biggs et al. 2012) and since society expresses different values and needs, decisions about "resilience of what to what" are an inherently political question (ibid., p. 423, in quotes in the text). Sub sequentially, decisions concerning "resilience" in the public realm are also a question of "participation".

The fact that Biggs and colleagues share this view is evident in their "Seven principles for building resilience in SES" (2012) which contain – as will be demonstrated below – a number of parallels with the overall principles of participation (Bishop nd., Bishop 2015) which inform the framework of this research.

It is also interesting to note that, in the published article (Biggs et al. 2012), the authors point out that the seven principals were identified and elaborated, in fact, through a participatory process: "On the basis of the literature, a "mock court workshop" at which proposed principles were debated, and a modified Delphi survey of leading experts in the field (Supplemental Material), we identified seven generic principles for enhancing the resilience of ES." (ibid., p. 424).

In Table 11 below, the seven principles are presented by the authors, alongside with a more extensive declination (or "key message") for each, and in relationship both to principles of overall effective participation (Wilkox 1994, Bishop nd., 2015) and to the key words that characterize each level within the Participation evaluation frame (my evolution, based on Bishop 2015):

Table 11: A schematization of Biggs et al. (2012) Seven principles for building resilience in social-ecological systems, as summarized by Stockholm Resilience Centre (2014)

Seven principles for building resilience in social-ecological systems (Stockholm Resilience Centre 2014, key message and symbols)	Key message	Overall principles of effective participation (Wilkox 1994, Bishop nd., 2015) as related	Participation evaluation frame (my evolution, based on Bishop 2015) key words
Principle one **Maintain diversity**	Systems with many different components (e.g. species, actors or sources of knowledge) are generally more resilient than systems with few components. Redundancy provides 'insurance' within a system by allowing some components to compensate for the loss or failure of others. Redundancy is even more valuable if the components providing the redundancy also react differently	Guarantee diversity of stakeholders and interested parties, (Be inclusive, involve «everybody»), Diversity of methods and techniques (suitable for participants), all ideas valorized / considered; identification of multiple, interdisciplinary	**Listening** **Socializing**

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[61] All SES produce a set of ES that include provisioning (e.g. food, freshwater etc.), regulating (e.g. climate regulation), cultural services (e.g. recreation), sustained in general by supporting services such as photosynthesis, nutrient cycling, the creation of soils, and the water cycle (MEA 2005).

and redundancy	to change and disturbance (response diversity).	variables.	
Principle two **Manage connectivity**	Connectivity can both enhance and reduce the resilience of social-ecological systems and the ecosystem services they produce. Well-connected systems can overcome and recover from disturbances more quickly, but overly connected systems may lead to the rapid spread of disturbances across the entire system so that all components of the system are impacted.	Facilitate collaboration and communication between parts (internal and external to process/experiment), foster alliances and collaborative networks, seize opportunities and mobilize resources.	**Connecting** **Sharing** **Collaborating**
Principle three **Manage slow variables and feedbacks**	In a rapidly changing world, managing slow variables and feedbacks is often crucial to keep social-ecological systems "configured" and functioning in ways that produce essential ecosystem services. If these systems shift into a different configuration or regime, it can be extremely difficult to reverse.	Mediation of conflicts in order to create shared ideas/proposals; continuous evaluation of process by participants to improve process and products	**Listening** **Discussing** **Co-decision making**
Principle four **Foster complex adaptive systems thinking**	Although CAS thinking does not directly enhance the resilience of a system, acknowledging that social-ecological systems are based on a complex and unpredictable web of connections and interdependencies is the first step towards management actions that can foster resilience.	Provide adequate up-front information and institutional training; learning exchanges with other experiments which are more advanced, become part of international networks	**Learning** **Connecting**
Principle five **Encourage learning**	Learning and experimentation through adaptive and collaborative management is an important mechanism for building resilience in social-ecological systems. It ensures that different types and sources of knowledge are valued and considered when developing solutions, and leads to greater willingness to experiment and take risks.	Facilitate dialogue between diverse actors, use inductive approaches, foster creativity (e.g., visioning, brainstorming, co-design, etc.)	**Learning** **Co-designing** **Collaborating** **Realizing**

Principle six Broaden participation	Broad and well-functioning participation can build trust, create a shared understanding and uncover perspectives that may not be acquired through more traditional scientific processes.	Communicate and promote experiments, inform and motivate citizenry to enlarge participation	**Connecting** **Sharing** **Listening** **Socializing** **Contributing** **Collaborating**
Principle seven Promote polycentric governance	Collaboration across institutions and scales improves connectivity and learning across scales and cultures. Well-connected governance structures can swiftly deal with change and disturbance because they are addressed by the right people at the right time.	Institutional innovation towards "good governance": integrated administrative and technical approach, horizontal departmental collaboration, collaborative partnerships	**Co-decision making** **Co-managing** **Connecting**

Considering the planning process as a complex adaptive (human) system (CAS), which adapts through cycles of change and which seeks to understand (and to govern, or "steward") the qualities of a(nother) system – the environmental one and, in our case, the urban – that must be maintained in order to achieve sustainability, it appears that the seven principles and, in particular, the wording of 6 of their declinations (P1, P2, P4, P5, P6, P7), can be related to the *principles* of effective participation (Wilkox 1994, Bishop nd., 2015).

In particular: **(P1) Maintain diversity and redundancy** Diversity of actors, methods and tools and of context are undeniably qualities of an effective participatory process; **(P2) Managing connectivity** Horizontal and vertical networks and partnerships are fundamental to work towards shared results in effective participatory processes, but the principle invites to avoid too tight networks that can stiffen and cage-in the process **(P5) Encourage learning and experimentation** can be related to the necessity to facilitate dialogue between diverse actors, use inductive approaches, foster creativity (e.g., visioning, brainstorming, co-design, etc.) and adaptive management; **(P6) Broaden participation.** Broad and well-functioning participation is also important to communicate and promote experiments, inform and motivate citizenry to enlarge participation; **(P7) Promote polycentric governance systems.** Institutional innovation towards "polycentric governance" means also integrated and intersectional administrative and technical approach, horizontal and vertical departmental collaboration.

Finally (P4) Foster an understanding of SES as complex adaptive systems (CAS). The fourth principle underlines the need for governance systems (like planning) to become aware and conscious of itself as a CAS. the authors state "CAS thinking does not directly enhance the resilience of a system, nevertheless, acknowledging that social-ecological systems are based on a complex and unpredictable web of connections and interdependencies is the first step towards management actions that can foster resilience" (Stockholm Resilience Center 2014)) Therefore, this awareness and knowledge must be fostered, by providing adequate up-front information and institutional training, continuous analysis of participatory process by managers, learning exchanges with other experiments which are more advanced, become part of international networks.

An additional, strong piece of evidence, as shown in their own scheme below (Figure 16), is the fact that the authors have grouped four of the principles under the heading of "attributes of the governance system". "Good governance", able to build resilience of Ecosystem services in Social-ecological systems, and "participation" go hand-in-hand, in theory and in practice.
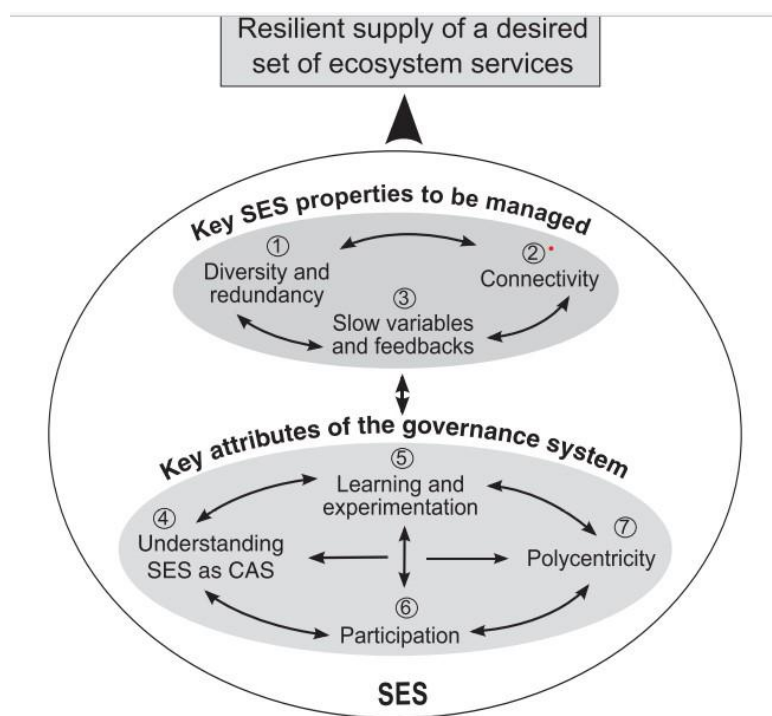
3.5 Participation and ecological geometries: a contradictory pair

While, as previously said, the contribution of participation as a foundation principle for "building resilience" (Stockholm Resilience Center 2014; Biggs et al. 2012; Folke et al. 2005) is recognized by scholars in the field of ecological resilience and resilience planning, and principles and

underlying theoretical concepts of resilience and participation are intertwined, for some scholars in the field of participatory design and community planning (in particular, Hester 2007), the question also raises some **substantial limits and contradictions**.

Hester[62] (2007) in a paper presented during the 6th Conference of the Pacific Rim Community Design Network, "Community design by intricate oppositions" analyses the reasons for which, on one hand, as regarding the "mutation" (Gabellini 2018) that urban planning in general is undergoing, it is fundamental for community and participatory designer and planners, to consider and encompass the new dimensions of ecology and resilience, within collaborative design (or democratic, as Hester calls it):

> "A minority world view--including community designers--argues that the city has no enduring structure, even if it has a robust economy, unless it is ecologically sound [6][63]. It cannot be ecologically sound unless that ecology is sensed, understood and stewarded by actively participating inhabitants and its nation state [7][64]." (Hester 2007, p. 1).

But on the other hand, Hester goes on to highlight how some of the characteristics of the ecological-global problem domain, make the application of principles and methodologies of participatory (democratic) processes, more problematic:

> Ecology and democracy share the importance of sense of place, phenomenology of the locality, slowness, and responsibility for the commons in the broad sense of land, water, food, transport, education and economy [9]. But there are extraordinary conflicts between ecology and participatory action. Deep democracy governs from the grass roots up--a populist neighborhood perspective; ecology governs entire systems from the top down--a federalist or global capital view. And there are dozens of other equally vexing oppositions.

Hester goes on in the article, listing and then analyzing through concrete examples, all the contrasting dimensions between ecological and participatory action (Hester, 2007).

The different "geometries" that Hester (2007) highlights are summarized in the following Table 12.

Table 12: A schematization of different geometries between ecological and participatory action according to Hester (2007)

Features	*Hester's description (2007)*	*Contrasting dimensions*

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[62] Randy T. Hester is professor emeritus at the University of California, Berkeley (CA, USA), a sociologist and practicing landscape architect, co-director of Community Development by Design and director of the Center for Ecological Democracy. He is also active part of the Pacific Rim Community Design Network http://prcdnet.org/. In his most famous book "Design for Ecological Democracy" (2006), Hester calls for the need to form new relationships with both ecology and democracy. Design for Ecological Democracy in Hester's definition is "something that is neither community nor ecological design but is really a hybrid" of both, based on the values of shared experiences, civic participation, and inhabiting science.

[63] 6. Michael Hough, *City Form and Natural Process* (New York: Van Nostrand Reinhold, 1984), in Hester 2007.

[64] 7. David W. Orr, *Ecological Literacy: Education and the Transition to a Postmodern World* (Albany: State University of New York Press, 1992), in Hester 2007.

Leading actor or agency	*"Deep democracy governs from the grass roots up--a populist neighborhood perspective; ecology governs entire systems from the top down--a federalist or global capital view. And there are dozens of other equally vexing oppositions."*	***Top down vs. Bottom up, Grass root agency***
Scale	*"Like global capital, ecology requires bigness to function, especially for core habitat, hydrology and interior species; participation seeks smallness for face to-face deliberation."*	***Bigness vs. Smallness***
Timing		***Long-term view vs. Short term achievements***
Type of knowledge involved	*"Ecology is based increasingly on remote science and abstract theory; participation attends to near knowledge and firsthand experience. Ecology champions professional specialists; participation champions native lay people."*	***Remote science vs. Near knowledge and firsthand experience***
Underlying values		***Personal sacrifice vs. Protecting existing lifestyle***

The "intricate opposition" (Hester 2007) of contrasting dimensions of leading actors, scale, time and different levels of knowledge and values involved, between ecological and participatory action (*ibid.*), according to Hester, invites participatory design practitioners and scholars to face these critical issues, that need to be considered and "embraced", to be eventually resolved.

This requires "minds that can hold two or more contradictory ideas at the same time" (Hester 2007, p. 4), and this can result "difficult to do, especially for community designers whose work has often been defined by resistance to the dominant paradigm. That approach encouraged simplistic binary thinking needed in a protest society" (*ibid.*).

This consideration is directly related to Bishop's analysis (2015) of Arnstein's Ladder of Participation (1969), and points to the necessity, he underscores, to overcome that substantially win-lose framework in the collaborative work we are facing.

The challenge for participation (and for community designers), according to Hester (2007), is to put in place design capabilities that rather embrace the different social and ecological geometries, because "recombining, while not compromising these geometries across disciplines and scales can best shape distinctive and resilient cities" (*ibid.*, p. 3).

This invitation has laid unanswered since then, at least in the field of participatory theory[65], while as I tried to explain in Chap. 4 in practice, the growing socio-technical movement and phenomena of Civic/green Hackathon, and Climathon® in particular, and some other participatory global climate action movements as outlined in Par. 4.4, have instead undertaken practical steps in this direction, by attempting to embrace global and local dimensions of ecology and democracy within their experimentations.

My further endeavor and contribution to international research, in the field of participatory planning and design studies and resilience planning, is to observe and study these growing practices through my two pair of lenses, and try to transfer the findings within a more general framework of *collaborative governance for resilience planning*, able to embrace dynamically the two dimensions of ecological issues and participatory action, therefore to foster co-stewardship for Ecosystem enhancement and protection.

Through combining Hesters' leading question to community designers on how to overcome the "intricate opposition" (Hester 2007) between the ecological and participatory dimensions, and Bishop's win-win model and more dynamic "Participation frame" (2015), I envisaged the possibility to find a new win-win framework capable of including / involving, in a dynamic, adaptive, democratic and timely way, Urban Institutions responsible for the climate governance of cities and for planning their resilient future, and other active, informed and committed actors in the larger society, that are already willing to actively contribute to the achievement of the global targets of social-ecological resilience and sustainability, and to foster in this prospective, active (Human) Ecosystem stewardship of Planet Earth (Chapin III et al. 2010) and the enhancement and protection of Ecosystem Services (Biggs et al. 2012), to ensure both human well-being and ecosystem sustainability, starting from cities.

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[65] There have been instead an interesting development in the field of climate change governance, due to the researches of Margot Hurlbert and Joyeeta Gupta (2016), and their proposal to update Arnstein's ladder, with a "split ladder of participation", based on triple-loop learning.

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4. Hackathon go Green: evolution of a safe arena (State of the art Part 2)

This chapter traces the origins, the evolution and the extent of the main object of the present research, the growing socio-technical phenomenon of Green Hackathon, and in particular of Climathon®, as a very interesting example of globally interconnected co-design events that aim to tackle highly complex social-ecological issues, by involving multiple levels of knowledge, institutions, resources and actors, in the development of "urban climate change experiments" to increase resilience and foster ecological transition, from an urban perspective.

Through literature review and documental research, these moments of intensive and collocated collaboration, are explored from the original hackerdom open-source movements and tech-centric hackathons, to the mainstreaming of issue-oriented Civic Hackathons, to understand characteristics, limits and the underlying "hacker's ethic" values, still present in Green Hackathon and, partially, in Climathon®.

Green Hackathon and Climathon® are then presented and described in their salient features, to draw a first comparison between the two formats and to relate them to the two pair of theoretical lenses for the present research, that of social-ecological resilience and of participation.

Finally, the chapter places Green Hackathon and Climathon® within a tradition of participatory practices addressed to designing "desirable futures", by indentifying one possible precursor in Jungk's "Future Workshops", and by framing them within a wider group of growing glocal climate action movements, that are practicing "urban climate change experiments" – such as Tactical Urbanism and Placemaking one hand, and the environmental direct-action movements of Extinction Rebellion, on the other.

In conclusion, the skills and strategies enacted by all these movements towards successful ecosystem stewardship, are explored in relation to overall urban institutions' efforts to contribute to the achievement of global targets of resilience and sustainability, to understand their possible role within a concrete proposal for an adaptive co-design framework for urban resilience and ecological transition, as the one that will be proposed as a final product of the present research.

4.1 The Civic Hackathon phenomenon: from the digital community of open source a format for civic collaboration

As easily can be found in internet, the word Hackathon is a portmanteau of the words "hack" and "marathon", where "hack" is intended as to play around with something (material or immaterial, software or hardware, issues or technology) in an exploratory, creative and joyful way, and not in its alternate meaning as a reference to computer crime (Zapico 2013a, Turkel et al. 2018), while "marathon", stands for an non-stop enduring event.

Hackathons are moments of intensive and collocated collaboration (Trainer et al. 2016), rapid design and development events (Lodato e DiSalvo 2016), during which a group of people, not necessarily a community, gathers in a place for a set amount of time, to allow participants to exercise "bursts of creativity around technology" (Taylor and Clarke 2018) and, until some years

ago almost exclusively, to "write the code" (Trainer et al. 2016). The spatiality of proximity (Trainer et al. 2016), seems to be the main feature of Hackathons, in converse to other distributed online collaborative work, producing gains in productivity thanks also to "overhearing conversations" among participants, that help address impromptu important issues and problems regarding the artifacts (*ibid.*, p. 1119).

A popular activity in the Makers'[66], open source[67], and digital Tech's communities, Hackathons events are tied to Hackers' culture or *Hackerdom* (Raymond 2000) that emerged, as Raymond (2000) reports, in the 60s and 70s in the United States of America, around higher education hubs and their computer science departments and labs, such as MIT's and Stanford University's Artificial Intelligence Laboratories, and enterprises research centers like famous Palo Alto Research Center XEROX PARC.

Hackerdom, as well as Makers' movement, share with "participation" some theoretical fundaments tied to "American Pragmatism", and in particular to John Dewey's (1927, in Dougherty 2012) theories about "learning by doing", that is echoed in the first imperative of the so called "Hacker Ethic".

> "Access to computers and anything which might teach you something about the way the world works should be unlimited and total. Always yield to the Hands-On Imperative!" (Levy 1984)

The "imperatives" of Hacker Ethic are a set of norms and values, a "philosophy of sharing, openness, decentralization [beside free access to computers and information] and to improve the world" (Levy, 1984), that remains at the core of many information technologies that surround us today, of the Internet in particular (Zapico 2013b).

A community and the possibility of sharing experience (Levy 1984) and working/learning/making in a playful and creative way (alternative to capitalistic and protestant work ethic, Himanen 2001 in Zapico 2013a), are the other fundaments of hackers' life and activities.

"Hackathons" appear, in this sense, a perfect setting for exercising Hackers' philosophy in common.

Briscoe and Mulligan (2014) suggest that the so-called local area network (LAN) parties, that they

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[66] The members of the Makers' Movement (Dougherty 2012) are "tinkerers" interested in engaging playfully and "passionately with objects in ways that make them more than just consumers" (ibid., p. 11), in particular with new technologies and digital tools, since the movement originates in the early days of Silicon Valley computer industry in association to the so called "hackerspaces" (Davies 2017). Even if hackthons for the majority, in fact, are focused of software development, this does not exclude hardware development (Briscoe and Mulligan 2014).

[67] According to Putnik, G. D. and Cruz Cunha, M. M. (Ed.). (2008). *Encyclopedia of networked and virtual organizations*. IGI Global, an "open source community" is a "a loosely organized, ad-hoc community of contributors from all over the world who share an interest in meeting a common need, ranging from minor projects to huge developments, which they carry out using a high-performance collaborative development environment, allowing the organizational scheme and processes to emerge over time. The concept represents one of the most successful examples of high-performance collaboration and community-building on the Internet".

describe as large "highly caffeinated" parties that could last for days, during which technology enthusiasts would gather in one place with their modified computers and game consoles, to share and impress their peers, have influenced the hackathon format in its core elements, such as "the timeframe for the gathering, and the nature of pursuing a shared activity overnight" (*ibid.*, p. 3).

Lodato and DiSalvo (2016) describe:

> "The structure of most hackathons is similar: they occur over the span of day or two, challenges are presented to participants, teams form around these challenges, the teams engage in a fervor of activity to produce solutions of (varying completeness), and at the end of the event, the teams present their work, in some cases judges are brought in and awards are given." (*ibid.*, pp.1-2)

Once exclusively addressed to software developers or to test a specific technology, Hackathons have grown globally (Briscoe and Mulligan 2014), becoming in time more mainstream (Taylor and Clarke 2018), and are now organized by a wide range of different kind of organizations (cultural, health, educational,…), and for many different purposes (Taylor and Clarke 2018, Trainer et al. 2016).

The first two events called officially "Hackathons" happened in 1999[68], but it is around 2010 that these events start to expand globally[69], driven by large corporations in search of creative innovation[70] through internal or public hackathons, but also from government and urban institutions striving to manage and take advantage from open data and digital technology, by engaging citizens and developers in finding solutions to social-environmental issues, in the so called "Civic Hackathons" (Johnson and Robinson 2014).

> "A civic hackathon is an event designed to improve a public service either through innovative software programming, data analysis, or graphic and web design […] civic hacking is a form of civic activism that uses technology to solve problems in mutually beneficial ways" (Turkel et al. 2019).

The format in these "issue-oriented"[71] (Lodato and DiSalvo 2016) hackathons, remains the same of "tech-centric" ones (Briscoe and Mulligan 2014), but the objective, or to "bring together ad hoc groups under the auspices of conceiving and prototyping technologies to address social

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[68] See Briscoe, G., & Mulligan, C. (2014). *Digital Innovation: The Hackathon Phenomenon*, for further details.

[69] A search by term "hackathon" performed in Google Trends on August 12th 2020, shows a constant growth between 2010 until the end of 2019, and then a reversal of the trend in 2020 that could be connected to the impossibility of practicing events in presence, due to the Covid-19 Pandemic. Nonetheless, several hackathons were held online on this topic, including 14 events in different parts of the world and in the midst of the pandemic, such as The Global Hack organized by the United Nations 9-12 April.

[70] Sourcing creative innovation is the objective of many corporate and company public (in this case it becomes "outsourcing") hackathons, it is the case of famous Google Hachathon or Facebook ones.

[71] Briscoe and Mulligan (2014) give a slightly different definition from Lodato and DiSalvo (2016) of "focus-centric" hackathons, as they call them. "Focus-centric hackathons target software development to address or contribute to a social issue or a business objective, and could even be considered *applied* hacakthons." (ibid., p. 5, italics in the original text)

conditions and concerns" (Lodato and DiSalvo 2016, p.1), is different.

International examples of Civic hackathons are "Apps for Democracy", according to Turkel et al. (2019) the first open government data hackathon to be held in the USA, in Washington DC. in 2007 , or the National Day of Civic Hacking, a series of simultaneous events (more than a hundred in 2014) across the United States, this year in its 8th-annual edition, to "'bring together citizens, software developers, and entrepreneurs across the nation to collaboratively create, build, and invent, using publicly released data, code, and technology to solve challenges relevant to our neighborhoods, our cities, our states, and our country"[72], or the Youth For Public Transport (Y4PT) Global Transport Hackathon series [73] held in Montreal 2017, Dubai 2018 and Stockholm 2019, with the aim to advance transport sector towards sustainability, by combining human creativity and information and communications technologies (ICTs), in collaborative environments.

The scientific and lay literature review, I performed in the field of Human Computer Interaction (e.g. Taylor and Clark 2018, Trainer 2016), Digital media communications and innovation (e.g. Briscoe and Mulligan 2014, Gregg 2015, Krewani 2017), and also, in the field of Public Affairs (e.g. Turkel et al. 2019) and of Geography and Environmental Management and Urban and Regional Planning (e.g. Johnson and Robinson 2014), has shown that the phenomenon has been studied only very recently and not in a coordinated way.

Research has concentrated on the "classification" of this type of events (Briscoe and Mulligan 2014) and on analyzing the "format and outcomes" (Trainer 2016) and the role of "spatiality" and strict "proximity" of participants in improving productivity (ibid.), as well as on the prevalent nature of the events, as a form of "participation" (Taylor and Clark 2018) or "invested participation" (Briscoe and Mulligan 2014), tied to "issues of significance to the participants of the hackathon (e.g. social issues of concern such as open government, or a specific issue of interest to a community such as a Culture Hack), and/or the provision of an award or prize which adds a competitive element which encourages individual investment for personal gain". (*ibid.*, p.2)

Several scholars recognize the fact that hackathons are potentially a form of "deliberative democracy" (Turkel et al. 2019) that differ from classical deliberative settings because "civic hackathon participants are asked to build a product", and that "experimental material participation" (Lodato and DiSalvo 2016) is enacted in these intensive and ad-hoc collaborative design events (*ibid.*), by enabling social dialogue and learning (Taylor and Clark 2016), and experimental aesthetic forms of activism (Krewani 2017). In only one case found (Pogačar and Žižek 2016) Civic Hackathons are analyzed as participatory activities to be used at their full potential in relation to urban development.

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[72] hackforchange.org.
[73] https://www.y4pt.org/projects/hackathon/.

Some critical issues about hackathon events have been highlighted, raising issues of little inclusivity, in terms of background, age and gender balance (Briscoe and Mulligan 2014, Taylor and Clark 2016).

Other criticisms have been raised about the risk that hackathons configure forms of "procurement" (Johnson and Robinson 2014) and creative labor exploitation under the flag of civic-voluntarism (Gregg 2015), as well as a lack of productivity and sustainability of these events (Johnson and Robinson 2014, Turkel et al. 2019).

The point of view explored in all these cases, is mainly that of the "participants", rather than that of the organizers or benefitting institutions (local and national).

Based on the examination of the literature review, on my participation at one significant hackathon event (as described thoroughly in Par. 5.5.), and on the analysis of more than one hundred Green Hackathon and Climathon® events (cfr. Chap. 5), my interest in researching the phenomenon of Civic Hackathons, as they spread globally and become mainstream (Gregg 2015, Taylor and Clark 2018), rests on several elements.

First, I recognize, as Lodato and DiSalvo (2016) that "Given their structure and intensity, hackathons present an interesting case study of contemporary socio-technical arrangements, particularly with regard to design". (*ibid.*, p. 2)

I furthermore suggest, as anticipated in Chap. 1 and will better explain in Par 4.3. and Chap. 5, that the Climathon® format, in particular, represents a very interesting example of internationally dislocated and globally connected co-design events that aim to tackle highly complex issues, and where multiple levels of knowledge, institutions, resources and actors, are systematically involved in the development of so-called "urban climate change experiments" (Castán Broto and Bulkeley 2013), to increase resilience and foster ecological transition starting from an urban perspective.

This aspect is intrinsically tied to my first pair of theoretical lenses, that *of social-ecological resilience*, to observe the Green Hackathon and in particular the Climathon®, as a growing socio-technical phenomenon dealing with complex issues of social-ecological resilience and sustainability, that need to be further explored, to improve their effectiveness in producing environmental change, consistently with their mission.

The second element of interest, to say it again with Lodato and DiSalvo (2016), is that "while technological work is sometimes accomplished through these events, issue-oriented hackathons more significantly produce experiences of material participation". (ibid. p.2)

This aspect relates to my second pair of theoretical lenses, that of *participatory processes or*

participation, and to the necessity (highlighted by the literature review) to further analyze these co-planning moments in particular *from the point of view of the institutions* (cities, platforms, and other subjects) that organize them, by reading the process beyond the products, to understand their "degree of participation" (based on Wilkox 1994, Bishop 2015), which forms of partnership and incentives make the ideas come into action, who are the actors and stakeholders involved, how charges and benefits are distributed, and how Climathon® in particular, does fit into local urban resilience planning and in relation to other ongoing participatory processes.

The urban perspective, represents the third element of interest for studying Civic/Green Hackathons and again, Climathon® in particular, due to its explicit tie to "cities".

As Alexandra Paio said[74] quoting Carlo Ratti (2014) "it is a very pressing moment for cities" and "the reason for that is that all the digital technologies that have changed our lives over the span of twenty years, now are entering the physical space".

Together with the recognized capacity of open/public Hackathons to represent a potential progression in the "democratization of technology use, innovation, and production" (Toombs et al. 2014) in a historically difficult field for participatory activities due to an almost religious faith in technology science (Goodman 1969) and to the general inaccessibility of hidden technology

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[74] Researcher of the Department of Architecture and Urbanism (ISTA) of the ISCTE-UIL University of Lisbon, with whom I discussed as speaker, together with José Carlos Mota (researcher at the Public Policy, Institutions and Innovation Research Group at the University of Aveiro, Portugal), the International Seminar "Cities on the Make – Tactical Urbanism, Placemaking and Civic Hacking" held in Lisbon on July 22th 2019 (see Figure 17) and organized by Roberto Falanga (researcher of ICS –U Lisbon), and of which I had proposed the title and topic, based on the partial results of the present research.

(Illich[75] 1973), this aspect is of particular interest in **drawing parallels** between Civic Hackathons' format and outcomes, and more recognized forms of small scale participatory planning and design practices that are spreading in the attempt to democratize urban planning and design (i.e. the "mutation" in Urbanism that Gabellini (2018) points out, as anticipated in Par. 1.5), and other globally raising spontaneous environmental direct-action movements, like the ones described in Par. 4.4.

These three elements of interest represent, as well, many gaps in the state of the art for research about Civic Hackathons, that the present thesis work aims to fill.

For what concerns, instead, the criticism made against the Hackathon format's lack of sustainability (Turkel et al. 2019) in general, in the next paragraph I will introduce a specific practice of Hackathons that tried to overcome this limit, the Green Hackathon (Zapico et al. 2013) and that I found are most probably the origin of Climathon format, my object of research in particular.

4.2 Hackathon go Green. Hacking for sustainability from Sweden to the world

In the official website[76], Green Hackathon are defined as "a series of coding events with a sustainability purpose" and also as "a series of events where the focus is in sustainability, using computer technology for working towards reducing energy use, making emissions visible, increasing awareness and knowledge, changing lifestyles, creating collaborations for sustainability".

Figure 18: Lisbon Green Hackathon 2017 (source: Fb page Lisbon Green Hackathon - photo courtesy Oficina das Energias)

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[75] Ivan Illich, represents among other things one of the fundamental references for hackers' culture and early hackerdom, in particular to his book Tools for conviviality (1973), as reported by Levy (1984).
[76] http://www.greenhackathon.com/.

Green Hackathon were started in 2011 by Jorge Luis Zapico (PhD in Media Technology and Graphic Production from KTH Royal Institute of Technology, Stockholm) and Hannes Ebner (PhD in Media Technology from KTH Royal Institute of Technology, Stockholm), both part of the - Centre for Sustainable Communications (CESC), an interdisciplinary research center for exploring ICT possibilities for sustainability "with a team comprising computer scientists, sustainability researchers, sociologists, anthropologists, designers, and urban planners" (Zapico 2013c, p. 17), situated in KTH Royal Institute of Technology of Stockholm.

Zapico, presently a researcher of the Department of Computer Science and Media Technology at the Linnaeus University (Växjö, Svezia) focused on the intersection of ICT and sustainability, and a "hacker" as he reclaims to call himself (Zapico 2013a), developed with Ebner the Green Hackathon series, as an "artifact" of his Doctorial research work, as described in his PhD thesis, discussed in 2013. The title of the present chapter is borrowed in part by Zapico's PhD dissertation "Hacking for Sustainability" (2013c).

In his thesis work (Zapico 2013c) in fact, Green Hackathon series are one of the five artifacts - "prototypes, events, software applications" or "hacks", as he calls them (*ibid.*, p. 16) – developed through a "research through design approach" (ibid., p. 32) to explore his research questions about "*how can these new technologies and approaches for working with data could be used in ICT for Sustainability*" and "*the role of the cultural "hacker" values*" (*ibid.*, p. 16, in italics in the text) in the related risks and opportunities*,* and embody the results.

In alternative to scholars that criticize Hackathons for lack of productivity and sustainability (Johnson and Robinson 2014, Turkel et al. 2019), and based on the observation that:

> "The work looking at computer technology and sustainability has been oriented towards practical applications for solving practical problems, and it has overlooked the more normative and ethical perspectives. The research have focused either at understanding the negative direct impacts of hardware such as energy use of internet and the generation of e-waste […] Computers and internet are treated either as a system to be understood, or as tools that can be used for some purpose". (Zapico 2013b, p. 1)

Zapico's research work, and consequently the principles that inform the Green Hackathon series format and mission, reverses this perspective, when he argues that tension toward sustainability is intrinsically embedded in "hackers ethic" (Zapico 2013b), and at the core of ICT technologies and artifacts in themselves, when they embody Hackerdom's cultural values (Levy 1984, Raymond 2000):

> "Sustainability is not only about technological fixes, but it needs a broader change of how we do things, how and why we work, how we deal with knowledge and how we innovate. The hacker ethic

provides an alternative work ethic, challenging the status quo, can be an important contribution to sustainability. Openness and a hands-on approach are the main two concepts that can be argued to be the most relevant for sustainability." (Zapico 2013b, p. 3)

According to Zapico (2013b) in fact, the use of open source, open knowledge and open data based on community collaboration to create the "commons" of accessible information, have proven to be a more efficient than other business models (*ibid*.), while the hands-on approach is strictly connected to accessing technology knowledge and, therefore, to social and individual learning and development.

"The new way of doing things embodied in the hacker ethic presents a challenge to the status quo. The values of passion and creativity, openness and sharing, the creation of commons, the community oriented thinking, the hand-on approach, should be important values for a sustainable society. We need to keep promoting these values, to keep showing how they can create a better society. We need to open up knowledge, to prototype and iterate towards sustainability. And we need to do it fast." (Zapico 2013b, p.4)

Some connections with the theoretical framework of *participation* and *social-ecological resilience* of the present research work, can be drawn.

On the one hand, a *condition* (cfr. Table 4, Par. 3.2) of open system, prototyping (*safe-fail design(s)* of *Ecological resilience*, Holling 1996), learning by doing and iterative approach to problem-solving (*adaptive capacity*, Walker et al. 2004), is the alternative proposed by Green Hackathons to other models based on closed system and command and control management style (*fail-safe design* of *Engineering resilience*, Holling 1996, cfr. Table 4, Par. 3.2).

On the other, the cultural "hacker" values" of ensuring openness of data, information and resources, recall the "*clear objectives*" and "*inclusive process*" of the *Overall principles for effective participation* (based on Wilkox 1994, Bishop nd., Bishop 2015) and therefore the accountability of outcomes, that are likewised based on *working towards shared results* (*ibid.*).

Further elements, based on the observation of the full series[77] of Green Hackathons under the double pair of lenses of social-ecological resilience and participation, are described and analyzed in detail in Chapter 5, that contains the results of all the data collected in the present research through the multiple methods and tools employed.

Based on the assumption of openness, hands-on approach and social learning, Green Hackathons were initiated in Stockholm in 2011 by Zapico and his colleagues of CESC, with a double explicit objective of "broadening participation by involving non computer professionals in the creation and shaping of innovative ICT technologies" and sharing open knowledge "by

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[77] Only one event of the series was excluded from the analysis, for the reasons explained in Chap. 2.

bringing people with different expertise to work with problems and with data usually reserved for sustainability practitioners and researchers" (Zapico et al. 2013, p. 2).

Coherently with the "hackers spirit", the objectives and focus of the single Green Hackathons were set by local organizers, as long as it concerned issues of sustainability (i.e. energy, food, climate change) with the objective of creating workable prototypes or proofs of concept (Zapico et al. 2013), as well as the format, length and activities performed during the event, while funders Hannes and Jorge, would provide organizers with online support and a simple checklist developed within past events[78].

Local organizers were left free to use the branded logo of Green Hackathon, or in alternative, to use their own name and website, and just be part of the "greenhackathon" network (source http://www.greenhackathon.com/organizing-a-green-hackathon/).

The first Green Hackathon was held in Stockholm in October 2011, in a very impressive venue, the R1 – the first nuclear reactor in Sweden, refurbished into a research and art space and located at the KTH main campus in Stockholm. The event was quite successful, with more than thirty participants creating eleven interesting hacks.

Figure 19: Former nuclear reactor R1, now a research center and art space of KTH campus in Stockholm, Sweden (source: Green Hackathon.com)

The interesting thing is that one of the main partners of the event was EIT ICT Labs, the doctoral school portion of the European Institute of Innovation & Technology (EIT) which, as will be said in Par. 4.3, is the body which supports Climate KIC, and therefore Climathon®. It is reasonable to say that Cimathon's origin and inspiration for basic format, is tied to this event in common.

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[78] See http://www.greenhackathon.com/organizing-a-green-hackathon/.

Since 2011, 16 different events have been organized locally by different partners in several different countries, under the Green Hackathon umbrella with the aim of creating an "international community of practice" (Zapico et al. 2013).

CESC was shut down on the 31st December of 2017, a fact which eventually led to the end of the Green Hackathon movement.

4.3 Climathon. Hacking cities for solutions[79]

Climathon® is a global 24-hour marathon, of globally dislocated but contemporary events, aimed at finding solutions to climate change challenges through co-design, developed by EIT Climate-KIC, one of the eight Knowledge and Innovation Communities (KIC) created in 2010 by the European Institute of Innovation & Technology (EIT), to accelerate the transition to a zero-carbon economy. EIT is a body created by the European Union in 2008 to strengthen Europe's ability to innovate and formed by a community of more than a thousand partners among universities, research centers and companies including SMEs (source: www.eit.europa.eu).

From a review of major search engines for scientific literary production, an extremely small number of publications relating to the topic resulted, in the order of 2-3 and non-accessible. The rest are more lay publications, such as reports of events.

According to EIT's official website, Climathon® is meant to be an action to catalyze innovation and encourage fresh new thinking from beyond the mainstream (*ibid.*) and a format that cities or other organizations interested can use, simply by applying to host the event through the official website.

"Climathon. *Cities. Hacking. Solutions*". This title stands out on the official website[80] of Climathon® 2019 edition, and in effect it summarizes the intrinsic characteristics of what kind of hackathon is Climathon®, in the declination of Climate-KIC.

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[79] Several parts of this paragraph and of the following have been included in a paper written together with Martina Massari: "The Role of Climathon® in the challenge of Multilevel Ecological Planning" (2020) presented in the annual international conference AESOP2019 at Venice on July 11th 2019. I personally wrote all the parts included in this paragraph, related to the development of Climathon event.
[80] https://climathon.climate-kic.org/en/.

The most evident difference with Green Hackathons, beside a more specific while still broad theme (*tackling climate change effects and causes*), lays in the fact that Climathon®s are directly addressed to *cities*. Cities are the ground where solutions are imagined to take place, and cities are in almost all cases the main partners and organizers of the event.

The *hacking* attribute is what connects Climathon®s to the general movement of Civic Hackathons, as described in Par. 4.1, and to the "hackers ethic" that gives to the event its playful character, despite the complexity and emergency of the theme treated. During a Climathon®, individuals and groups are invited to play around with data, trends in weather patterns, urban vulnerabilities, assets and systems, to invent creative ways to tackle local impacts such as urban heat inland effect (UHI) or achieve more sustainable balance in water, waste or management, by using technologies in innovative ways, creating sustainable business models or designing ICT applications.

The last attribute is what Climate-KIC aims to achieve: *solutions*.

Climathon® are in fact expressly collaborative events aimed at developing solutions to tackle climate change effects at the urban level and to increase urban resilience, fostering the ecological transition of cities.

This aspect however, together with the following considerations, demonstrated some intrinsical differences between the Climathon® and Green Hackathon format, and in relation to the theoretical framework of present research work, that of *participation* and *social-ecological resilience*.

Although never made explicit in Climathon®'s branded communication, that presents the event as

follows:

> "What is Climathon? Taking action in your city. Originally conceptualised as a 24-hour hackathon by Climate-KIC, Climathon has since taken off as a global movement, engaging citizens on climate action — and providing cities with continued support on the unique challenges they face. […] Climathon is more than a hackathon, it's a movement. (source: Climathon brochure 2018)

Climathon® is in fact a proprietary format[81] of EIT Climate-KIC, "Europe's leading climate innovation initiative" as it defines itself (www.climate-kic.org), one of the nine Knowledge and Innovation Community (KIC), established in 2010 by the European Institute of Innovation and Technology (EIT), and specifically addressed to accelerate the transition to a zero-carbon economy.

Initiated in 2015 with 19 cities involved, it grew to 104 in 2017 and 113 global cities in 2018[82], including 90 European Cities of which 15 in Italy alone, distributed in 46 countries and 5 continents (source: https://climathon.climate-kic.org/en/). Even in the growing scenery of Civic Hackathons as described in this chapter, Climathon® today remains the biggest single global hackathon event in the world. It is held yearly, in October or November, for 24 hours contemporary in all the numerous cities involved.

Like other Hackathons, Climathon® are moments of intensive and collocated collaboration (Trainer et al. 2016) during which participants with different backgrounds (ICT, environment, economics, technology, social etc.), skills (creatives, developers, designers, entrepreneurs, institutions' officers, technicians etc.) and levels of knowledge (university level students, researchers, decision makers, stakeholders, interested citizens, etc.) are invited to come together and, in a playful way, to co-design solutions for tackling climate change in their city or region.

As will be thoroughly analyzed in the following Chap. 5, which contains the analysis of all the data collected in the present research, the format proposed by Climate-KIC encompasses moments of information to introduce the topic, team building, brainstorming and networking among participants, experts and some ad hoc stakeholders related to the challenge, moments of training on business tools and presentation skills (business model canvas elements, pitching etc.) alternated to moments of relax (yoga lessons, coffee and lunch break, movie screening, art performing etc.).

As described by one of the respondents of the interviews performed within this research work (see

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[81] Climathon® trademark was registered in 2017 by Climate-KIC Holding B.V. Since 2020 Edition cities willing to participate the event, need to pay a fee to Climate-KIC to access branded communication and general website.
[82] Numbers given in the Local Organizer Brochure for Climathon 2019, provided by the platform and confirmed by the research performed within this thesis work that concentrated on Climathon 2018 edition and was carried out during May and September 2019. For numbers of Climathon 2019 edition, see https://climathon.climate-kic.org/.

Chap. 5) «Climathon® is not only a respectable scientific event, but is meant to be also a fun social event that focuses on the engagement on the climate change theme in an informal way» (Valeria Barbi - FIU).

The working groups, often formed impromptu and following a strict timetable, challenge each other for a prize, which is typically access to an incubation program.. This speed and urgency, together with the competition, helps creativity to burst, while the awareness of the contemporary happening of the event in other cities of the world and the importance of the goal (*tacking climate change effects and causes*) invests the participants of a sense of commitment and pride[83].

The follow up for the winning ideas/groups, as proposed by Climate KIC and offered by the local organizers (in many cases in collaboration with business partners) usually consists in a free business training or incubation program, to help the groups further develop their "solution" and bring it to the market.

In this respect, Climathon® may represent an "arenas for safe-to-fail experimentation" (Westley et al. 2011, Biggs et al. 2012, in Folke 2016) or "safe arenas for experimentation" as I suggest to call them, where the participants, through a co-design and "open innovation" approach (Chesbrough *et al.* 2006) are allowed to experiment and openly discuss, imagine, develop and eventually realize creative and innovative solutions for global and local adaptation and mitigation of climate change.

The tension towards "transforming the world" towards *desirable futures* is very strong, and the Climathon® global format represents a very interesting example of internationally dislocated and globally connected events, that face highly complex issues, where multiple levels of knowledge, institutions, resources and actors are systematically involved in the development of so-called "urban climate change experiments" (Castán Broto and Bulkeley 2013), to increase resilience and foster ecological transition starting from an urban perspective.

On the other hand, the business–oriented approach and more competitive format in the search of "solutions" which should demonstrate market viability and economic sustainability seems to represent a loss of the original "openness and sharing", as well as the "hands-on imperative", of Green Hackathons.

For all these reasons, it seemed productive and necessary to observe the growing, international Climathon® phenomenon through the two *pairs of lenses* adopted in the present research – that of *participation* (in action and theory) and of *social-ecological resilience* (thinking) – to critically understand the established format, the tools in use and the selected objectives from the point of

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[83] The analysis of the concrete development of Climathon® contained in this paragraph is based on the descriptions of Climathon® programs around the world displayed in the official website, on the answers of our respondents and on my direct participation to the 2017 edition of Climathon® in Bologna.

view of the participants and of the urban institutional organizers, as well as to position it with respect to other ongoing participatory and planning processes, to improve its "degree of participation" or "levels of participation" (Arnstein 1969, Partnership LTD 1999, Bishop 2015) consistent with the mission, and with the double objective of positively impacting their ability to increase the resilience of the urban contexts in which they are implemented and to help cities better coordinate, integrate and consolidate local bottom-up and third parties contributions to the achievement of the global targets of resilience and sustainability.

As said in Par. 4.3, since Green Hackathon events are not running since CESC shutdown in 2017, for the objective of this research, the interest in comparing the two formats stands in inferring useful elements from Green Hackathon' format, to improve Cliamathon's format in particular.

In Chapter 5, I will summarize the results of the analysis carried out through the diversified tools and methodologies to compare the formats under the two theoretical pair of lenses in the present research – that of *participation* (P) and of *social-ecological resilience* (R).

4.4 Are Civic Hackathon participatory activities? Possible precursors and close relatives: *placemaking, tactical urbanism and climate action movements*

Even if Climate-KIC never does refer openly to the word "participation" or "participatory design" in its Climathon® communication, many elements make these events a form of participatory activity. Precisely, the tools employed such as team building activities, visioning or back casting and design thinking methods, stakeholder needs' analysis and dialogue, informal setting, action planning and prototyping (e.g. Hester 1990, Wates 2000, Iacofano 2001, Elliot et al. 2005) are some common tools and characteristics of participatory processes while other aspects such as interweaving different kinds of knowledge, mutual understanding and learning, and the building of trust and a sense of community (Lorenzo 1998) are all typical outcomes of such processes.

Regarding Green Hackathon, the reference to using these events "to broaden participation and increase interdisciplinary cooperation" is clearly stated by the organizers (Zapico et al. 2013, p. 2) who recognize that "the competition is in itself clearly not the main driver for the participants apart from other motivations such as doing things together with others, contributing to the community, partaking in the creative joy of making something new together, and of showing off." (ibid., p. 6).

In general, while not being a dominant narrative of Hackathons - which are more tied to the corporate idea of stimulating digital innovation through collaborative work (Briscoe and Mulligan 2014) - we can affirm that issue-oriented Civic Hackathons are a recognized form of "participation" (Taylor and Clark 2018) and "experimental material participation" (Lodato and DiSalvo 2016) and even a form of "deliberative democracy" (Turkel et al. 2019), as highlighted in the literature review in Par. 4.1.

This allows a partial answer to my first research question – *can Green Hackathon and Climathon®* *be considered participatory activities, and if they are, do they provide an adequate "degree of* *participation"?* – and makes the case for analyzing Climathon® in particular (since Green Hack are no longer running), which deals with complex issues affecting a wide and diversified public, in order to critically understand the established format, the tools used and the chosen objectives, as well as its position with respect to other ongoing participatory and planning processes. This will be done to improve their "degree of participation" (as described in Par. 3.3), as consistent with their mission and, consequently, their ability to increase the resilience of the urban contexts in which they are implemented.

The research will try to answer to the second part of the research question, as related to other connected issues, in Chapter 5.

Recognizing issue–oriented Hackathon as participatory design activities is the first necessary step to understand the possible *role* of Civic/Green Hackatons and of Climathon® in particular, in facilitating urban institutions efforts of *urban climate governance* (Castán Broto 2017) and *resilience planning* (Eraydin and Taşan-Kok 2013, Meerow and Newell 2019), by framing them within a wider group of growing *glocal* independent movements that are practicing, I argue, "urban climate change experiments" (in the definition of Castan Broto and Bulkeley 2013, as anticipated in Par. 1.5) with a participatory approach.

This is the case of "Tactical urbanism" (Lyndon and Garcia 2015) and "Placemaking" (Schneekloth and Shibley 1995, PPS 2009a and 2009b, Adhya 2012, Kent 2019), as well as of the spontaneous environmental direct-action movements, such as "Fridays for Future" and "Extinction Rebellion" (Whang 2020, Hensby 2019) which call for a greater citizen voice in environmental decision-making in urban settings. The term "glocal"[84] refers to the fact that these experimentations are locally anchored but transversely oriented towards global issues, adapted to each referring context.

As Castàn Broto and Bulkeley have highlighted, "previous research has largely overlooked the multiplicity of climate change responses emerging outside formal contexts of decision-making and led by actors other than municipal governments" (*ibid.*, p. 1), and some of these urban (climate[85]) experiments are in fact taking the form of grassroots Glocal movements, which have developed locally, on the basis of a few common and global goals and principles.

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[84] The adherence to the motto "Think global and act local" (Geddes 1915) of the 70s movement, "Friends of the Earth", is quite clear in their origins and actions.

[85] The attribute "climate" is obviously appropriate for the growing movements for environmental direct-action, while for Placemaking and Tactical Urbanism it is more appropriate to use only the urban attribute, even if there is a fundamental component of sustainable design and a tension towards environmental sustainability, and furthermore there are growing examples of Placemaking and Tactical urbanism explicitly addressed to tackle climate change effects.

Representing local answers to the pressing global issues of urban sustainability, resilience and justice, these small scale, low-cost (and low-tech) temporary urban experiments are discussed in this paragraph to explore their characteristics, in relationship with overall environmental and urban planning and to my research object and objectives.

Before introducing these movements, I hold it useful to take a step back and find some interesting references in a particular form of workshop from the past, intended to co-design "desirable futures", that can reasonably be considered a *precursor* of Civic/Green Hackathons and Climathon® events.

Started in 1962, the "Future Workshops" were meant to be a "democratic institution" (Jungk and Müllert 1987) in the words of its inventor, the writer, journalist and pacifist Robert Jungk (May 11th 1913, Berlin – July 14th 1994, Salzburg).

Like Civic Hackathons, the objective of these intense and collocated workshops[86] was to tackle complex socio-economic and environmental issues by using participatory methods to develop social innovation, and to plan a visionary future "from below" in this way "turning the affected into the involved"[87] and releasing the "most neglected resources of all: people's imagination" (Jungk and Müllert 1987).
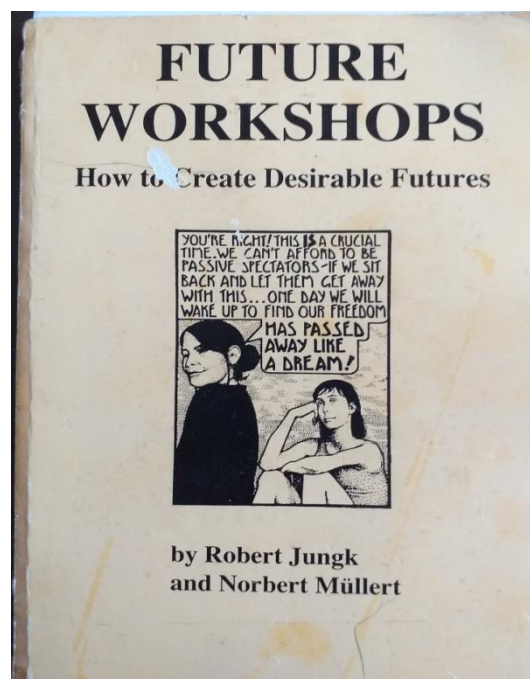
Figure 21: R. Jungk and N. Muller "Future Workshops. How to Create Desirable Futures" book cover (1987)

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[86] For a description of the material development and outcomes of the many workshops designed and managed for governments, political parties, research centers and other organization in Germany, UK, USA, Denmark and Austria, by Junk together with Robert Muller, I refer to Jungk, R., & Müllert, N. (1987). *Future Workshops: How to create desirable futures*. Inst. for Social Inventions.

[87] As referred in Die Robert-Jungk-Bibliothek für Zukunftsfragen, public online repository of Jungk's work. See https://jungk-bibliothek.org/future-workshops/

Jungk's method was explicitly addressed to releasing untapped energy and creativity to visualize "futures fit for humans" (Jungk and Müllert 1987, p. 18). His workshops would typically cover a weekend, running for three or four hours, during the morning or the afternoon of each day, during which participants were guided through collective work in a preparatory phase to decline the topic, followed by three workshop phases – the criticism phase, the fantasy phase and the implementation phase – addressed to finding social inventions for change (Jungk and Müllert 1987).

His concerns about people being excluded from the decision-making process was, in particular, related to technology and, in particular at his time, to the scientific-technological progress in nuclear energy and in the development of large-scale nuclear facilities (Die Robert-Jungk-Bibliothek für Zukunftsfragen, online).

In alternative, Jungk, a central figure of the first peace movements against the nuclear arms race, understood democracy as a space for active civil society, and he saw in citizens' self-organization in NGOs, social movements, public campaigns etc., the true innovative political factors of the current parliamentary democracies (Die Robert-Jungk-Bibliothek für Zukunftsfragen, online).

This brief excursus about "Future Workshop"'s legacy is functional to an understanding of how, in particular, Climathon®'s reference to being a "global movement" addressed "to spark systemic change"[88] at a city level, can be contextualized within a tradition of participatory practices, that has culminated in the recent global spread of the previously mentioned *glocal,* independent climate-action movements that aim to reverse current trends of climate change and ecological crisis, by co-designing and enacting alternative "desirable futures".

These movements are, on one hand, questioning the concept itself of hierarchy in urban and environmental planning (Secchi 2011) and, on the other hand, calling for bottom-up protagonism in environmental decision-making and action.

The first and more attested movement is that of Tactical Urbanism and Placemaking.

Both approaches were developed in the North American context, and while being distinctly promoted by different groups of founders, practitioners and activists, these practices share much of the same theoretical background and objectives.

Placemaking[89] (PM), is a 'multi-faceted' approach to the planning, design and management of public spaces. Through small scale, creative interventions and participatory methods, it aims to

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[88] As declared by Climate KIC about Climathon®2020 edition, see https://climathon.climate-kic.org/en/the-latest/press-release-global-awards-2019/.

[89] I presented parts of this excursus about Placemaking in Lisbon during the International Seminar "Cities on the Make – Tactical Urbanism, Placemaking and Civic Hacking" (see footnote 9). My presentation was also related to my five year long experience in teaching and practicing (together with Raymond Lorenzo) Placemaking approach in the historical neighborhood of Borgo Bello in Perugia (Italy). See https://placemakinginperugia.wordpress.com/.

create benefits for the people that live and use a specific public space while strengthening the bonds among the community, with and through the place itself (PPS 2009a).

Project for Public Spaces, a New York based nonprofit organization, founded in 1975, has pioneered this approach (and, in fact, invented the term "Placemaking" during the '90s) , and is now a central hub[90] of the global Placemaking movement, that connects people, ideas, resources, expertise, and partners through its International Placemaking Leadership Council, and its latest evolution, the PlacemakingX[91] (Kent 2019).

Understood in its original meaning, as an innate activity of human kind since all times, which is the natural propensity of human beings to establish creative interaction with the environment (Schneekloth and Shibley 1995), the term represents an alternative to conventional ways of city-making that have, over time, excluded people from the production of the places where they live (e.g. Jacobs 1961, Alexander 1974, Norberg-Schulz 1988).

Grounded in its origins[92] to a different vision of cities, PPS's Placemaking is based on simple principles and to design and places assessment guidelines (PPS 2016) that, together with methods and principles of collaborative design and planning, foster the re-appropriation of public spaces by citizens and create places which best fit the needs of those who use them (Lorenzo 2016).

Both a process and a philosophy, Placemaking is also "political" due to the intrinsic nature of place identity (Toolis 2017). Since local people know best what they need, they should be directly involved in the decisions about, and creation of, changes in the public realm.

Sometimes independently developed by grass root movements, placemaking interventions are more often inserted in a wider planning process, led or managed in accordance with local planning authorities, due to the scale of the interventions that usually have the dimensions of a plaza or a street.

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[90] See https://www.pps.org/projects and https://www.pps.org/blog.

[91] Project for Public Spaces ended the activities of the International Placemaking Leadership Council in 2019, to show its full support for PlacemakingX (source: https://www.placemakingx.org/faq).

[92] The theoretical background of Project for Public Spaces explicitly refers to the legacy of Jane Jacobs and and those of their forefather William H. Whyte. Even if Jacobs never refers directly to the term placemaking or to "participation" nevertheless her work (e.g. 1961) is pervaded of concepts related to. Adirban Adya (2012) affirms that Jane Jacobs's "model of skepticism" based on "empirical understanding, critical questions, and every day human observation", has anticipated many components of the theory of placemaking, such as "confirmation, interrogation, and action framing" (Schneekloth, L. H., & Shibley, R. G. 1995). William H. Whyte was instead an urban planner dedicated to observing social life in public space (e.g. White 1980).

Figure 22: Foro Lindbergh, Parque Mexico HOTC, MexicoCity (source: Projects for Public Space website)

Better known at an international level, and for this reason more analyzed in urban planning and political science scientific literature (e.g. Silva 2016, Hou 2020), is Tactical Urbanism (TU) (Lyndon and Garcia 2015), usually associated to images of unsanctioned (Hou 2020), temporary (Silva 2016) and incremental actions (Pfeifer 2013) such as "chair bombing", "guerrilla gardening", "open streets", "pop-up" park lets, retail areas and bicycle lanes.

In the intentions of its mentors[93] (Silva 2016), Tactical Urbanism uses short-term, low-cost and scalable interventions and policies to catalyze long term change at a neighborhood level (Lyndon and Garcia 2015).

If compared to other forms of participatory design, Tactical Urbanism through its *do-it-yourself* approach[94], as well Placemaking with its L-Q-C[95] principle (PPS nd.) add one more fundamental element - the concrete realization of feasible and small-scale improvements, realized by the users and inhabitants themselves, creating stronger bonds of caring and respect with the place and the project (Lorenzo 2016). The concrete realization of small-scale reversible projects, allows also for readjustment based on ready, available data and on immediate feedback from community members (Wilson 2020).

In this sense, Tactical Urbanism and Placemaking represent an alternative vision of city making, one that embraces the unplanned in planning as a co-evolutionary adaptive process between

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[93] The proactive consultants of the firm Street Plans, based in Florida USA. See http://www.street-plans.com/

[94] That recalls the *hands-on imperative* of makers and hackers (Levin 1984, Raymond 2000) and, in fact, the two movements are sometimes associated in the so called Urban Hacking interventions (Krewani 2017).

[95] The Lighter-Quicker-Cheaper approach and principle invites practitioners to practice reversible, adjustable, flexible small-scale interventions in public space that can be redone in time if they don't work well (Lighter); to plan and implement interventions within a strict timetable to realize and celebrate, to create immediate benefits (Quicker) using low tech, recycled materials and local resources to reduce impact (Cheaper).

plans and society (Silva 2016), in coherence with the "mutation" in urbanism (Gabellini 2018) which, according to Gabellini (2018), is moving practitioners, city administrators and theorists in the field to encompasses broader forms of informal planning and the contamination with different knowledge in their urban plans - in a meaning that unites processes and projects (ibid, Gabellini 2018).

Tactical Urbanism and Placemaking share several features of interest within the present research: i) both create bonds with place and, therefore, social capital though a participatory approach, ii) both allow local communities (in some cases, in accordance with urban institutions) to experiment design alternatives in "safe arenas" (being small scale, temporary, low cost and safe-to-fail) by changing the field of action to identifying new solutions and to testing out ideas at the right scale, in the right place, at the right time (as for Westley et al. 2013), iii) both are able to mobilize planning by focusing urban institutions' interest and by driving larger investments for local change.

Examples, in fact, of urban institutions and cities around the world that are embracing "tactical urbanism" methods to implement gradual change and test planning alternatives are growing (e.g. New York City's "DOT Plaza Program", Barcelona's "Superillas" and the very recent Milano Piano "Strade Aperte"), often configuring open and ongoing collaboration of urban planning institutions with local citizens' groups practicing placemaking and tactical urbanism (Pfeifer 2013).

Finally, both Tactical Urbanism and Placemaking are gradually moving towards ever more explicit objectives of building resilience and fostering sustainability and ecological transition through actions that enhance and protect ecosystem services (ES) in the form of Nature Based Solutions (NBS), for example through glocal collective movements of "De-paving" and "Food Urbanism" and, I argue, are configuring new "urban climate change experiments" (Castan Broto and Bulkeley) through creative direct action, demonstrating agency and institutional entrepreneurship towards the enhancement and protection of Ecosystem services (Dorado 2005, in Westley et al. 2013).

Much more "immature", in confront, are the globally growing *climate action movements* such as *Fridays for Future* and *Extinction Rebellion* in Europe, and the *Sunrise Movement* in the USA that in the last years are gaining visibility and, in some cases, wide political support.

While the most famous of these is probably the first – "Fridays for Future", an international climate action movement, initiated in the August 2018 when the then 15 years old Greta Thunberg[96]

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[96] Through Greta's powerful speeches (e.g. at the United Nations Climate Action Summit in September 2019), the movement has brought their claim that the "climate crisis is humanity's greatest existential threat" and therefore must be treated as a crisis, to the attention of the highest levels of climate governance. Greta Thunberg spoke publicly during COP24, COP25 and other main climate negotiation moments since 2018. The movement, according to urgency of the

started to strike school every Friday in front of Swedish parliament, demanding urgent action on the climate crisis (source: https://fridaysforfuture.org/what-we-do/who-we-are/) –, and the last one's name - "The Sunrise Movement" - is tied mainly to the United Stated political scene and to the so-called Green New Deal[97], it is the second one, an international social-environmental movement (Des Bois 2019) called "Extinction Rebellion" (XR), that is of most interest for the present research.

> "The science is clear, the facts are incontrovertible, and it is unconscionable to us that our children and grandchildren should have to bear the terrifying brunt of an unprecedented disaster of our own making. [...] When a government willfully abrogates its responsibility to protect its citizens from harm and to secure the future for generations to come, it has failed in its most essential duty of *stewardship*. The "social contract" has been broken, and it is therefore not only our right, but our moral duty to bypass the government's inaction and flagrant dereliction of duty, and to rebel to defend life itself." (The Guardian, Open letter signed on 26 October 2018[98] by 94 scientists, in support to Extinction Rebellion launching on 31 October 2018)

Born in 2018[99], with a declaration of rebellion in front of Westminster Palace in London, followed by five days of mass protests and disruption, Extinction Rebellion describes itself as a decentralized mass movement of concerned citizens that practice non-violent civil disobedience against government inaction on climate change, in order to rebel against "the violent and toxic system", as they call it in their communication[100].

Through training, creative, and engaging performances and direct action – like blocking roads, recreating funeral marches, performing die-ins and surprise nakedness (Hensby 2019), and more traditional civil disobedience tactics such as hunger strikes[101] - XR has taken to the streets in cities across the globe[102] to raise awareness on the global ecological and climate change crisis,

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situation, demands national and international leaders to commit and undertake all the necessary steps to "keep the global temperature rise below 1.5 °C compared to pre-industrial levels; ensure climate justice and equity; listen to the best united science currently available" (Declaration of Lausanne 2019). Their efforts have not yet had the desired response, but nevertheless the international network of young activists has grown strong, the quoted Declaration of Lausanne was signed in August 2019 by 400 climate activists from 38 countries.

[97] The Sunrise Movement was started in 2017 by a very small group of young graduates who had participated in the divestment campaigns from fossil fuels. In 2018 with the support of Alexandria Ocasio-Cortez, representative of the state of New York and the youngest elected to the congress, the group obtains the creation of a selection committee of Congress, to discuss and elaborate a green "New Deal". The "Green New Deal" is published in 2019 and represents a very ambitious legislation package to address both climate change and economic inequality in the USA by 2030.

[98] See https://www.theguardian.com/environment/2018/oct/26/facts-about-our-ecological-crisis-are-incontrovertible-we-must-take-action

[99] XR was launched at the end of October 2018 in the United Kingdom by environmental activists Roger Hallam and Gail Bradbrook, along with other activists from the campaign group "Rising Up!".

[100] Source: https://rebellion.global/See XR XR's official website and global communication channel, that gathers all the local websites.

[101] An example of how these actions are used to force communication channels with urban local authorities and with which effects, will be described in Par. 5.3 in relation to Bologna's Case Study.

[102] The international network claims that at September 2020 some 250,000 people organized with a participatory and inclusive organizational system (Ginanjar and Mubarrok 2020) in more than 1,000 local groups, across 73 countries are

calling for legitimacy, democratic decisions and urgent action, and is actually facing mass arrests (ibid.) and extreme ideological black-listing[103].

Figure 23: Map of XR groups and chapters at global level (source: https://rebellion.global/groups/#countries)

Anybody can be part of XR and take action autonomously, as long as they share its 10 values[104] and its "demands" to governments, which are three: 1) "Tell the truth" by declaring a climate and ecological emergency and working with other institutions to communicate the urgency for change; 2) "Act now" to reduce greenhouse gas emissions to net zero by 2025 and to reverse the loss of biodiversity ; 3) governments must move "beyond politics" creating and being led by the decisions of a Citizens' Assembly on climate and ecological justice (source: Our demands https://rebellion.global/). Following the example of Ireland's Citizens' Assembly, established in 2016 to address various political issues including the Constitution of Ireland, in particular, XR Citizens' Assembly will be a form of deliberative democracy with members randomly chosen from the population, to discuss and address issues of climate change and ecological transition which is especially useful when difficult trade-offs are necessary (source: Go beyond politics https://extinctionrebellion.uk/go-beyond-politics/citizens-assembly/). Some of XR's requests have been accepted by governments and local administrations[105], also in Italy, as I will describe in Par. 5.5. in relation to the Bologna Case-Study, with some interesting consequences.

This is not the place to analyze the effectiveness of XR as a political movement[106] or the criticisms that have been already raised in this sense, as a "defective theory of change based on limited and selective readings of the relevant social science literature" (Ahmed 2019), or the recent literature

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a part of Extinction Rebellion. (https://rebellion.global/press/2020/09/01/global-rebellion/). At date (Nov 2020), the XR groups established in Italy are 19, 34 in Spain, 104 in France.

[103] Source: https://www.theguardian.com/environment/2020/jan/11/extinction-rebellion-could-sue-police-listing-extremist -ideology.

[104] https://rebellion.global/about-us/.

[105] According to XR there are currently Citizens' Assemblies on the Climate and Ecological Emergency taking place in France, the UK and Canada (source: https://rebellion.global/why-rebel/).

[106] Extinction Rebellion's founders claim that their efforts to build a mass movement are based in political science, since studies show that for worldwide movements for change it took just 3.5% of a nation's population engaged in sustained nonviolent resistance to topple a dictatorship (Hensby 2019).

that focuses on the novelty of a movement focusing on grief and loss (Sideris 2020, Cunsolo and Ellis 2018), in that ER's tactics are very different from the positive and playful approaches of Civic Hackathons, and of Placemaking and Tactical Urbanism.

What is of interest in the context of the present research is that, like Civic Hackathons (Climathon® in particular), Placemaking and Tactical Urbanism, XR actions are inherently "urban", and "experimental" in terms of trying out different forms of social and self-organization, and that all these actions don't occur in void, but are carried out in connection and, often, in contraposition with local urban institutions, and, especially, in contamination with the other movements described in this paragraph, by their hacking existing infrastructures (social, economic and environmental) and pragmatically testing different, innovative solutions.

These forms of creative experimentation and participative interaction with the city environment, - situated between "co-design" and "co-action" – and that recall strongly the image of Jacob's "little vital plans" (1981, in Jacobs 2016), intersect, in fact, with different planning dimensions - from the micro scale of pocket parks and streetscape to the macro scale of global environmental protection - and call into cause the multi-levels of climate governance. These experimentations are, in effect, *glocal* since they are locally anchored but transversely oriented towards global issues and connected through global networks of learning and feedback, and could potentially produce more lasting effects in local urban infrastructure and development. However, at present, they are characterized by little connectedness to overall planning processes (in the case of Green Hackathons and Climathon®), by temporariness (as for Tactical Urbanism and Placemaking) and by little or no legitimacy (as in the case of environmental direct-action movements such as XR).

Exploring their role and actions in relation to urban institutions' efforts of resilience planning and ecological transition, as for the metaphor of the path and the forest[107] (Lanzara 1993, pp. 52-53), could represent for urban institutions a possibility of experimenting local sequences that make provisional sense before proceeding any further (ibid.), in "safe arenas for experimentation" (based on the "arenas for safe-to-fail experimentation", Westley et al. 2013) - at the right scale, in the right place, for the right time (ibid.).

This could also have some very concrete developments for the Horizon Europe program in the area of climate-neutral and smart cities and, in particular, for the draft Mission "100 Climate-Neutral Cities by 2030 - By and For the Citizens".

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[107] In his book Lanzara (1993) refers to the "negative capacity" (Keats 1817) or the capacity to accept moments of indeterminacy and lack of direction, and instead understand the potential and action that these moments bring with them. "It is by exploring and researching that we produce the path: only the availability and ability to reposition ourselves with respect to the forest by accepting it as a resource, source of information, place of experimentation will allow us to reach our goal" (Lanzara 1993, trad.)

The Mission, in fact, aims to support the European Green Deal goal of making Europe climate neutral by 2050, by fostering and showcasing 100 European cities in their systemic transformation towards climate neutrality by 2030. The objectives of the Mission include the development of drivers of transition such as "New forms of participative governance" to promote citizens as agents of change through bottom-up initiatives and innovation, and the opportunity to build a multi-level and co-creative process formalised in a Climate City Contract, tailored to each city (EU Directorate-General for Research and Innovation Clean Planet 2020).

The present research could represent, in its final products, a concrete contribution to assist European cities in fulfilling the Mission.

All these movements are in fact moving towards one common objective – confronting the climate change consequences and avoiding ecological crisis –, therefore, as anticipated, I argue that all three can be considered "urban climate change experiments" in the perspective of Castán Broto and Bulkeley (2013), and that they demonstrate agency and *institutional entrepreneurship* in complex adaptive systems such as urban systems (Dorado 2005, in Westley et al. 2013), through specific skills and methodologies that are demonstrated to be involved in successful ecosystem stewardship (Westley et al. 2013).

To better understand (and analyze) the range of skills enacted by these three kinds of "urban climate change experiments", I used Westley et al. (2013) scheme, that describes the strategies and methods connected to successful ecosystem stewardship (Table 1. Westley et al. 2013), to "check" which, if any, specific skills and strategies are present in each *glocal* climate action movement (Table 13).

For Tactical Urbanism (TU) and Placemaking (PL), the assessment was drawn mainly upon my professional experience and studies in the field, for Extinction Rebellion (XR) from literature review and for Green Hackathon and Climathon® (CL) from the analysis conducted within this research and contained in following Chapter 5. As already stated, in Chapter 2, this thesis has essentially followed an *iterative path*, starting from the direct observation of a concrete a *practice* and then expanding its perspective and analysis, while undergoing cyclic moments of reorientation based on literature review and direct observation.

Table 13: Assessment of skills involved in successful ecosystem stewardship as enacted by *glocal* climate action movements (developed starting from Table 1. In Westley et al. 2013)

Strategies and methods (Westley et al. 2013)	Description (Westley et al. 2013)	Strategies and skills involved in Urban Climate Change Experiments		
		CL/GH	TU/PM	XR
1) Facilitating	Building/enhancing knowledge of the ecological	√	√	√

knowledge building and utilization	resources.			
	Generate and integrate a diversity of ideas, viewpoints, and solutions.		√	
	Promote and steward experimentation at smaller scales (cf. active adaptive management).	√	√	
	Catalyze community awareness and social learning.		√	√
	Conduct research, spread alternative ideas and knowledge		√	√
2) Vision building	Provide a common vision that attracts a diversity of supporters upon which all can agree.		√	√
	Creating new "social imaginaries" / create community cohesion across a set of macro level shared aspirations.	√		√
3) Developing social networks	Bridge different and similar actors and stakeholders across and within organizational hierarchies and types. This could be divided into three subcategories: • Bonding, i.e., link with similar others. For example, establish local fishing organizations, knowledge exchange among local villagers, etc. • Bridging, i.e., bring together similar and/or different groups to create momentum, gain support, and to react to various challenges. This could be called horizontal linking. • Linking, i.e., communicate and engage with key individuals in different sectors, and to link across scales.	√ Bridging and Linking	√ Bonding and Bridging	√ Bonding and Bridging
	Create and protect safe spaces for interaction.	√	√	
	Seek ways to bring all parties to respect the perspectives of all sides.*			
	Create opportunities for stakeholder involvement in management and research.		√	
	Building multiactor and multilayered coalitions with a borad range of social organizations.	√		
4) Building trust, legitimacy, and social capital	Developing networks (bonding/bridging/linking social capital).	√	√	√
	Recognition of management initiatives by formal authorities.	√		√
	Building consensus on rule compliance and representing stakeholder heterogeneity.**			
	Mediating between organizations and the broader 'public.'***			
5) Facilitating / developing (social) innovations	Identification and introduction of new alternatives, processes, products, and options, and of new ways to conduct businesses.	√	√	
	Fostering knowledge building and innovations by bringing together different kinds of thinking.	√	√	
6) Preparation, mobilization for change	Prepare the system to be able to effectively take advantage of forthcoming opportunities for change (windows of opportunity), including: • raising awareness of a resource challenge • leveraging limited resources and find new sources of funding • building vertical social capital to influence policy decisions • linking innovative ideas to resource opportunities ("management up-down")	√	√	√
7) Recognize or create and seize windows of opportunity	Timing when to connect and mobilize others, i.e. creating the right links at the right time around the right issues.****			
	Willingness to take risks and convince others to take risks.		√	√
	Venue shopping: pitching right idea to right organization.	√		

8) Identifying and communicating opportunities for "small wins"?	Ability and capacity to identify (often small) projects upon which actors involved can agree.		√	
	Reconceptualize issues. Able to take a whole system perspective, find leverage points in system.			√
9) Facilitate conflict resolution and negotiations	Fair and low cost conflict resolution.		√	

*This strategy actually is non applicable to none of the three practices of urban climate change experiments, if not GH, because Climathon® is mainly competitive, and TU/PM and XR are at the moment independent movements, and in some cases (XR) antagonist movements to local institutions in charge of resilience planning.**, ***, **** are relative to the Urban Institutions skills and strategies, and not to the independent movements, as it will better discussed in Chap. 6.

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5. The results of a global survey on the Green Hackathon and Climathon movement

The Chapter presents the analytical results of the materials and data gathered through the use of the different tools employed within the present research, namely:

- *the One Hundred of Climathon® and Green Hackathon Events Database;*
- *the online survey "Co-action for resilience" addressed to participants, organizers and partners of Climathon® and Green Hackathon;*
- *the two case studies of Bologna and Lisbon, analyzed tracing the history of local environmental and resilience planning and through semi-structured interviews to key players and privileged interlocutors, involved locally in the Climathon® and Green Hackathon events;*
- *and, the Participant observation and in-person participation at the Bologna Climathon®2017 edition, and during the successive incubation program.*

By reading the "process beyond the products", the observed events of Green Hackathon and, in particular, of Climathon®, the main object of the present research, are dissected through several categories of analysis, from the genesis of the challenge to the outcomes, in order to identify the patterns and differences in the development of the event between the two formats, and the potentialities and limits of these activities in innovating urban planning, in a resilient and sustainable perspective.

Green Hackathon and Climathon® are systematically assessed under the two pairs of lenses of social-ecological resilience and participation, and in relation to the main theories and evaluative frameworks that represent the theoretical framework for this research, with the intention to identify ways to improve the effectiveness of these expressly collaborative design events, aimed at developing solutions to tackle climate change challenges at the urban level.

The "degree of participation" of the two formats and their coherence with principles for building resilience is social-ecological systems, are extensively explored through methodologies of engagement employed, actors involved, resources and incentives provided, how costs and benefits are distributed, which forms of partnership have best facilitated the transformation of ideas into actions, and how the final outcomes fit into other levels of urban resilience planning and policies.

The results highlight critical points and strengths in both formats, and in general Climathon® is evaluated as a positive evolution of Green Hackathons, in terms of the inclusiveness of diverse participants, partners and knowledge distribution, and of its high educational value in raising awareness and mobilizing opportunities and action towards the new and urgent issue of helping our cities to assume a stronger role in governing collective Ecosystem stewardship.

The Chapter closes with a synoptic Comparative Assessment Table that summarizes and confronts the findings for the two formats, in light of the main theories and evaluative frameworks, assumed within the two pairs of theoretical lenses.

The outcomes of Chapter 5, will feed and inform the proposal for an adaptive co-design framework for urban resilience and ecological transition, addressed to assist urban institutions in better coordinating, integrating, and consolidating bottom-up and third-party local contributions towards the achievement of the global targets of social-ecological resilience and sustainability, and are presented in Chapter 6.

5.1 The "One Hundred Events of Climathon® e Green Hackathon" Database

The present and the following paragraphs (5.1 to 5.5) summarize the results of the analysis carried out through the diversified tools and methodologies as described in Chap. 2.

The database, the survey, the interviews within the two Case Studies selected (Bologna and Lisbon), as well as the participant observation of my participation to the Bologna Climathon®2017 edition and following developments, where used to identify and analyze (in some cases, together with the subjects themselves of the research) on one hand the themes, differences and trends, between Green Hackathon and Climathon® and, on the other, the limits and potentials of each, under my two theoretical pair of lenses of *social-ecological resilience* (R) and *participation* (P), and in relation to urban resilience planning and ecological transition.

The Chapter closes with a synoptic **Comparative Assessment Table** that summarizes and confronts the findings for the two formats, in light of the main theories and evaluative frameworks assumed within the two pair of lenses.

In this first Paragraph, I will summarize the analytical results of the **Database**[108] **of One Hundred Climathon® and Green Hackathon events**, developed in the context of the present research.

The objective of the Database was to collect and organize background knowledge of the growing socio-technical phenomenon of Green Hackathons and, in particular, of Climathon® in order to: identify patterns and differences in the development of the event between the two formats, and to explore the potentialities and limits of these activities in innovating urban resilience planning.

The analysis was carried out by reading the "process beyond the products", from the genesis of the challenge to the outcomes, identifying which forms of partnership and incentives facilitated the ideas' becoming actions, how charges and benefits are distributed, and how and if Climathon® and Green Hackathon fit into local resilience planning.

The final database comprising 85 cases/events of Climathon® (CL) and 15 case/events of Green Hackathon (GH) for a total of One Hundred Events, was thoroughly analyzed to extrapolate several quantitative and qualitative pieces of information, as explained in Chap. 2, useful for

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[108] As anticipated in cap.2, after initially including all events of Climathon 2018 edition and all events connected to the series of Green Hackathon started in Stockholm in 2011, plus other 4 cases (one single independent Green Hackathon in Hong Kong and three series of global Civic Hackathons addressed to sustainable transport) for a total of 134 events/cases, I opted to eliminate the last 4 cases, initially classified in the database as Other Green Hackathons, to make the data homogeneous to be compared for confrontation. The initial choice of gathering data, in the case of Climathon events, regarding only for the those events with more than 20 participants was temporarily abandoned site has changed in its layout structure during the work of building the dataset, as explained in Chap. 2 and then once again adopted once when the info was recuperated. In this sense, I would like to thank Climate-KIC and in particular the Data and Learning champion for Climathon who, despite not being possible to provide the complete dataset given the independent nature of the research, provided (on my request) one of the missing data in the new configuration in date 26th June 2019, namely the number of participants registered for each event on the official website.

comparing the two different formats and improving their effectiveness with regard to their mission.

As anticipated in Chap. 2, I decided to proceed with the comison between Climathon® and Green Hackathon, considering the latter as a single event spread over several years, as all the events were organized, if not directly, with the fundamental collaboration of the same organizing structure (CESC KTH and Green Hackathon.com platform and contents). For Climathon®, a sub-category of formats was isolated, that of the Young Climathon® (YCL), addressed exclusively to schools. In 2018 only two YCL were organized, both in the Netherlands, at Amersfoort and Utrecht by the same organization. The data was collected according to the same database fields for both formats. The database fields are described in Chap. 2, in the following table (Table 14) they are reorganized according to the analysis.

Table 14: The Database fields reorganized according to the analysis

Timing of the Events	• When (date) • Length (hours, days) of events • Pre-Event description • Post-Event description
Geographical distribution of the events and relation to Institutional Adaptive Capacity in Europe	• City Host • EU (X • Non EU(X)
Analysis of the Venues of the Events	• Location
Average number of participants per event and analysis of the Targeted participants	• N. of participants registered • Participant targets
Identification and analysis of Challenge themes	• Challenge thematic • Challenge key words
Analysis of methodologies of engagement and interactive tools applied in Events	• Tools / methods used or declared
Analysis of the types of resources provided to participants	• Programmed speaker and topics • Preparatory material provided
Analysis of the types of incentives given to participants	• Incentive to the participants
Analysis of preparatory or follow-up events or meetings	• Pre-Event description • Post-Event description
Analysis of Partnership distribution among organizers and the kinds of knowledge fields involved*	• Main partner/organizer • Other partners
Average number of solutions elaborated	• Solutions found (and number of)

* This aspect was analyzed through new derived sheet was created within the database in the form of a "registry of partners" as explained, in the relative paragraph.

Timing of the Events

The Climathon®2018 Edition event(s) occurred, over a period of 24 hours, between 25-26 October in all the cities involved. Minimum variations occurred due to different organizational strategies and available locations, but the **24 hour format** in a single day was practically identical in all the cases/events. This format as a **singular, contemporary global event** is one of the strong points of Climate-KIC organization. There were only three exceptions, two in Nigeria, where the time available to participants was 8 hours in Lagos and 48 hours in Jalingo, and one in

Russia (Moscow), where participants performed a 48-hour-long Hackathon[109].

Other exceptions were the two events of Young Climathon®. Here, the format was designed to fit schools' palimpsest with sessions of 1 and a half hours and 3 hours in each class involved, distributed over two different, successive, days (18th October in Amersfoort and 19th October in Utrecht, Netherlands).

The Green Hackathons, on the other hand, demonstrate a much more **variable format** in terms of length of hacking hours, ranging from 35 hours in Athens (Greece) in 2012 to 7 hours in Stockholm during the ICT4S (ICT for Sustainability) Festival in 2014.

This resulted also in their being less rigid in terms of schedule and attendance requirements: "The OKFestival Green Hackathon has a more flexible format than regular hackathons. It will be more like a drop-in jam session to get hands-on with some of the subject matter than a full 24 hours hackathon with stress and financial prizes. […] The hack space will be open during two days between 11:30 and 20:00 and you can choose to stay the whole time or drop in and out during that time to attend other presentations" (GH Helsinki, Finland).

P and R Comparative Assessment Table

In both CL and GH, all events are **single moments,** not inserted in a series of events, even if at times they are anticipated or followed by another meeting or public encounter.

This represents a limitation in terms of relationship with the local urban resilience planning context, allowing no spreading of results, if only occasionally online, and especially **no possibility for further feedback** among the winning groups and experts involved in the event and other potential stakeholders.

Nevertheless, the fact that CL is a **recurring annual event**, represents an opportunity for progressive learning and improvement, and their simultaneity represents a strong motivational factor for participants and organizers, thanks to **global resonance and communication** of the event, **calling into question global and local scales of action**.

GH, on the other hand, offers a more **flexible format** in terms of timing and local organization, in line with the hacker and maker culture.

Geographical distribution of the events and relation to Institutional Adaptive Capacity in Europe

Climathon® declares itself to be a global happening (the web site celebrated for the 2018 edition

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[109] The event was dedicated to the search of innovative blockchain-based solutions for energy markets.

114[110] cities participating, in 46 different countries and in 6 continents). According to my analysis, the 85 events of the 2018 edition selected in the research occurred in 4 continents, in 38 different counties. Of these, 63 events occurred in 23[111] European countries, of which specifically 14 in Italy alone. From this data analysis, we can say that Climathon® remains primarily a European phenomenon, even when regarding events organized outside the EU. For example, among the non-European cases, the Shanghai edition seems to have been organized thanks to the strong connection of the University of Edinburg with the China-UK Low Carbon College, born by joint efforts of Shanghai Jiao Tong University, of the University of Edinburgh and other universities of Great Britain with the government of Shanghai and Lingang.

From the data, Green Hackathon results, decidedly, a North European phenomenon, with only one case located out of the geographical Europe (I here consider Zurich in Switzerland as part of Europe geographical continent) namely in Tokyo, Japan (two if we consider the other case which was excluded from the analysis because of the language barrier) and three in South Europe (Athens 2012, Lisbon 2016, Lisbon 2017). No event, since Green Hackathon started in 2011, has been held in Italy. (see Figure 24, 25 and 26)

Figure 24: Geographical distribution of One Hundred Events database

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[110] In effect the newest version of the website declares 113 cities, it was not possible to isolate which one was deleted, and according to my database, there were several events for which it was difficult to ensure they actually happened, among the ones with less than 20 participants.
[111] The number and database were updated post official Brexit.

Figure 25: Geographical distribution of One Hundred Events database (Climathon®)

Figura 26: Geographical distribution of One Hundred Events database (Green Hackathon)

Another interesting aspect is the intensity of Climathon® and Green Hackathon events per country (the number of contemporary events in different cities for Climathon® and the number of annual editions for Green Hackathon). The data analyzed geographically (mapped) at the European level - since both events originate in Europe and, in consequence, have a higher occurrence in this area (the only exception is China[112] where two Climathon® events occurred in

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[112] Another case of multiple events in an extra EU country occurred in Australia, where according to Climathon official website 8 contemporary events apparently happened, but no evidence backed the occurrence. The events were excluded from the One Hundred Events as explained in cap. 2.

2018)[113] - Figure 27 and 28 show countries in the One Hundred Events database that hosted at least two events of Climathon® or Green Hackathon, and their numbers. In this case, it is evident that Climathon® is preeminently a Southern European event (one might say almost a 'Mediterranean' one), while Green Hackathon remains grounded in its Scandinavian origins.

Figure 27: Geographical intensity of One Hundred Events database (Climathon®)

Figure 28: Geographical intensity of One Hundred Events database (Green Hackathon)

[113] Switzerland, Norway and United Kingdom are in this case considered part of Europe geographically, but differentiated in the map by color.

As explained in Par. 1.4 the present research is oriented towards understanding just how these events/tools of change could help cities in Europe (and, eventually, globally) improve their urban resilience planning and ecological transition agenda (as related primarily to climate change impacts). In this perspective, it is interesting, and useful, to confront the intensity of Climathon® and Green Hackathon events per country with the prevision of aggregate potential climate change impact as forecasted in ESPON Climate Climate Change and Territorial Effects on Regions and Local Economies and with the adaptive capacity of the different European regions as evaluated in the same study (cfr. ESPON & IRPUD 2011, Map 18, p. 19 and Map 19, p. 21).

The following maps[114] show in overlay that European areas which are exposed to greater potential climate change impacts (areas in darker red), overlap widely with those that have organized more Climathon® events in 2018. On the other hand, the correlation with the regions with overall capacities to better adapt to climate change effects (areas in darker green and blue) is less linear. Southern Europe countries and regions with less adaptive capacity have organized numerous events, but some (fewer) regions with high capacity have done so, also (see, e.g., United Kingdom). It is important to take into consideration the fact that the ESPON research has been conducted in 2013 while the edition of Climathon® studied took took place in 2018. (see Figure 29)
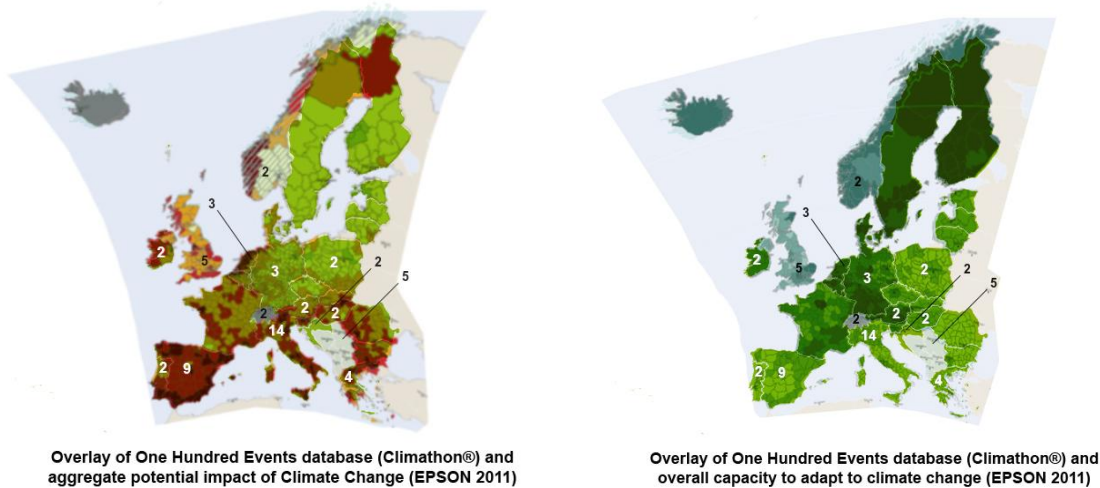
Overlay of One Hundred Events database (Climathon®) and
aggregate potential impact of Climate Change (EPSON 2011)

Overlay of One Hundred Events database (Climathon®) and
overall capacity to adapt to climate change (EPSON 2011)

Figure 29: Overlay of One Hundred Events Database (Climathon®) and aggregate potential impact of climate change (left), and overall capacity to adapt to climate change (right) (ESPON & IRPUD 2011)

In the case of Green Hackathon, the total number of events resulted too low to be able to draw any conclusions. Nevertheless, the overlay maps are here included to allow further analysis (Figure 30).

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[114] EPSON maps have been deformed to fit the different projection of the maps developed in this study and colors filtered to help readability. For original maps cfr. ESPON & IRPUD, 2011, *Map 18: Aggregate potential impact of climate change* (p. 19) and *Map 19: Adaptive capacity of European regions in regard to climate change* (p. 21)

Overlay of One Hundred Events database (Green Hackathon) and aggregate potential impact of Climate Change (EPSON 2011)

Overlay of One Hundred Events database (Green Hackathon) and overall capacity to adapt to climate change (EPSON 2011)
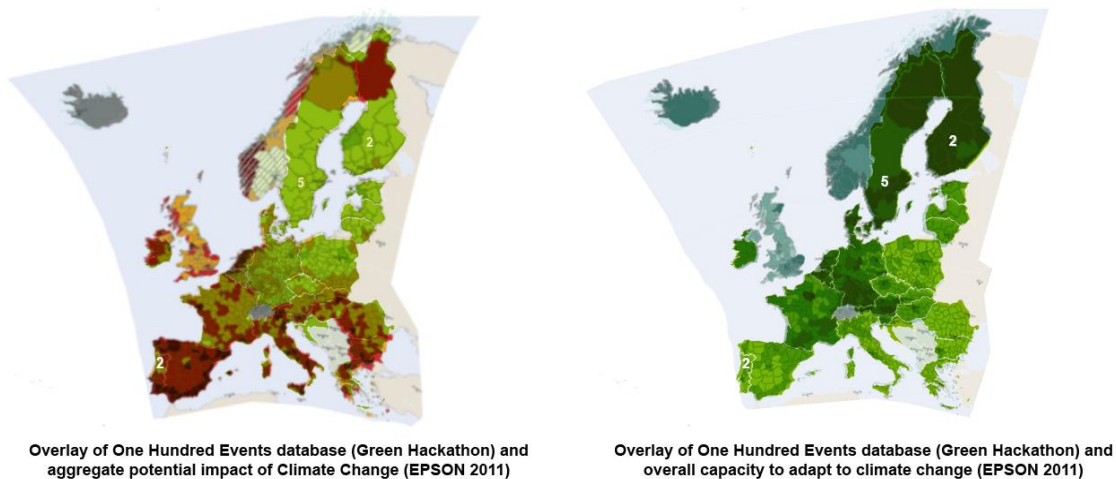
Figure 30: Overlay of One Hundred Events Database (Green Hackathon) and aggregate potential impact of climate change (left), and overall capacity to adapt to climate change (right) (ESPON & IRPUD 2011)

P and R Comparative Assessment Table

Geographical distribution and intensity of GH and CL events show a **substantial International character** and resonance for CL, with a higher density in **Mediterranean area**, while GH remain mainly a **Northern European** phenomena.

The higher density and popularity of Climathon© events in countries with lower institutional adaptive capacity (ESPON & IRPUD, 2011) as shown in the overlayed maps, seems to indicate the necessity of local urban institutions in these Regions to **build knowledge and increase awareness of the issue**, and this connects to Westley et al. 2013 first set of skills, strategies and methods to address successful ecosystem stewardship (cfr. Par 4.4. and Table 1, ibid.).

Analysis of the Venues of the Events

Analysis demonstrates that in the case of both formats, the venue (or choice of locations) have played a significant role. In most cases the event has been held in appealing modern architectural structures (e.g. coworking places, innovation centers, museums, etc.) or in original, particular locations (e.g., renewed industrial buildings, former silos or bunkers). It is important to note that various co-working international networks host and promote Climathon®, such as "Start It" and "Deli" in the Balcans, or Impact HUB (100 locations in 50 countries around the world). The latter, starting from the Edition 2019, it also an official supporter of all Climathon®'s events.

In some cases, especially when partners of the event include Universities, the event is hosted in University facilities, but even in these cases the choice has been to use catchy, open spaces or workshops. Likewise, in the case of Green Hackathons, the spaces utilized are often workshops that provide raw materials (usually hardware, 3Dprinters, or else). In all cases, a fast and powerful

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Wifi and internet connection, is fundamental and unavoidable.

Figure 31: Flyer of Torino Climathon® 2018 held at MAcA – Envronmental Museum, Turin (left) (source: https://www.acomeambiente.org/home/05_location_logo_maca/); picture of Lisbon Impact HUB, location of Lisbon Climathon® 2018 edition (photo©Viviana Lorenzo)

P and R Comparative Assessment Table

The reason for these events to use appealing and well equipped spaces to perform the face-to-face activity, is two-fold : on the one hand it **encounters the tastes of the creative community** (mainly practitioners, innovators and social entrepreneurs, or students) that participate in these events through colorful and "play inspiring" spaces, and on the other, these spaces present those **characteristics of flexibility** (movable chairs, open space for plenary moments and niches or side rooms for working in smaller groups, informal areas like kitchens or couches to rest, relax and socialize, etc.) which are fundamental for the success of events that utilize, over a 24 hour period, diversified forms of interaction among participants.

The **setting**, in fact, is a fundamental aspect in all kinds of participatory activities where the aim is to "facilitate" (aka "to make easy", Bishop 2015) a certain intentional process addressed to the achievement of a common, shared goal (in this case the development of "good solutions" in a short amount of time). For a description of effective settings in participatory events, cfr. Bishop ibid., pp. 125-128.

From the perspective of skills involved in successful ecosystem stewardship (Westley et al 2013, (cfr. Par 4.4. and Table 1, ibid.) and of the possibility for participants to perform "safe rituals of participation" (Forester 1999) these venues represent **ideal "safe spaces for interaction"** (Westley et al. 2013) or "safe arenas for experimentation", as I renamed them within the present

Average number of participants per event and analysis of the Targeted participants

It must be first said that for Climathon® the average number of participants, in my analysis is non-reliable data, because the only data available was the number of participants registered on the official website[115]. These numbers do not necessarily correspond to the effective number of participants in the single event. Nevertheless, just to give an idea of the numbers declared: for 82 of the 85 events[116] the total number of registered participants was 4.790, with an average number of participants of event/case of 58 persons. These was a maximum number of 333 registered participants in Khartoum and a minimum of 1 participant in Hong Kong[117].

For Green Hackathon it is impossible to give any indication of attendance figures, because in the majority of cases the number of participants is not declared, only the number of teams. These are still, in some cases, quite high numbers (e.g., there were 16 teams in Uppsala Sweden in 2017).

In Climathon® targeted participants appear almost the same across all events. This is most likely due to the way the online registration to the event is built into the website, which classifies the participants in: "Entrepreneur", "Student", "Professional", "Developer", "Policy maker" or "Other". However, through a more accurate analysis of programs and event descriptions, it appears that some cities and partners have also tried to target other specific groups, according to the specific challenge set for the event. This is the case in Lisbon which was looking for "citizens, businesses and public/private organizations […] to reduce Plastic & Food Waste, designing innovative ways to become a Green Smart City", and the case of Wuppertal which called for "start-ups, companies, NGOs, research institutes, citizens" to help the city to "protect itself from future flooding and heavy rain events"; and the case of Bologna which involved "communication or social science expert, pedagogist, psychologist, IT expert, a software developer, an architect, an engineer, and a simple, passionate citizen" in its search for solutions to air pollution at a city level. In Krakow, the outreach was oriented to invite people "to cooperate" at the event, such as "companies interested in the subject of corporate social responsibility, scientists, people who want to create solutions for climate protection, specialists in the field of environmental protection and sustainable development, media wishing to promote the event, volunteers who want to support organizational activities".

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[115] Then deleted in the newest version of the website, probably for this reason. Even the data provided by Climathon lately is incomplete, and served only for some cases. When it was impossible to confirm the data, in the database was signed as n.d.=not declared.

[116] In 3 cases the organizers did not declare numbers of participants, but were included because they answered to the online survey.

[117] Hong Kong is one of the readmitted cases because they answered at the survey, thus attesting that the event happened.

Only in one case, Cagliari, the partners openly looked for, solely, "associations", in another, Tallin, "innovators", were called upon, while a more very detailed list of profiles such as "participants from the fields of urban planning, computer programming, graphic and interface design, marketing, data science, GIS and EO, project management, environmental engineering, environmental protection, finances and other hackathon related fields" were invited in Riga. In Essen, the invitation stated, simply, "Everybody is Welcome!"

In Young the Climathon®s the target participants are obviously "students", and in fact in the two events/case of 2018 Edition (Amersfoort and Utrecht), groups of students from different primary schools and High Schools for a total of 141 pupils, were involved.

Green Hackathons, resulted to be **less inclusive** in their overall communication, and were oriented to attract only a certain "community" of participants. Their typical targeted participants are the "gifted", as defined by one of the respondents, mainly ICT developers and "makers", "geeks" and students of higher education - challenged to face complex environmental issues.

From the comparison, Climathon® appears in this sense to be a **positive evolution** - broadening and balancing the audience with more professionals from diversified backgrounds, entrepreneurs, and other kinds of participants. University students, in the analysis of both cases, resulted the majority of participants, probably because of their time availability, in relation to the (24 hour) format.

<div style="border:1px solid #000; background:#d9d9d9; padding:10px;">

P and R Comparative Assessment Table

From the comparison, CL appears to be a positive evolution of GH - **broadening and balancing the audience** with more professionals from diversified backgrounds, entrepreneurs, and other kinds of participants. University students, in the analysis of both cases, resulted the majority of participants, probably because of their time availability, in relation to the (24 hour) format.

While the average number of participants in both formats is **adequate for a productive workshop**, the **lack of diversity among target participants**, remains a point to be addressed from the perspective of the overall principles of effective participation (Bishop nd. 2015) and of Biggs et al. 2012, Stockholm Resilience Center 2014 (cfr. Par. 3.4, Table 9) Seven principles for building resilience in social-ecological systems, in particular Principle 1 (Maintain diversity and redundancy), Principle 5 (Encourage learning) and, obviously, Principle 6 (Broaden participation).

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Identification and analysis of Challenge themes

While not one of the objectives of the present research, CL and GH events however have been

analyzed to understand the *challenge thematics distribution* as a contribution to international research whether aimed at evaluating trends, in climate change adaptation through participatory methods.

The first step consisted in collecting the descriptions (or abstracts) of the challenges proposed to participants through the official webpages of Climathon® and Green Hackathon, or of single events, as for e.g. for CL events "Clean air is vital to human life. How can we maintain it clean? How can we ensure everyone in Mexico City has access to clean water in a sustainable way? How can we reduce the waste generated in the city, or at least, improve recycling and disposal?" (CL Mexico City, Mexico) or "Looking for new ideas addressing climate, environment and energy challenges of cities of Unione Terre d'Argine, to become a resilient community. How can citizens fight against climate emergencies and create new opportunities for growth?" (CL Carpi, Italy), and "Share a new vision for Villa San Martino District; How can green and public spaces make citizens of Villa San Martino happier? How can we encourage our citizens to reduce their carbon footprint and reduce energy consumption? How can we make the mobility in Villa San Martino more safe and sustainable? How can we make our district more attractive by engaging the community?" (CL Pesaro, Italy).

For GH events, the challenge description was for e.g. "A weekend of hacking on climate change; sustainability; energy and carbon emissions. Solve problems and invent new ideas and applications that help address climate change. Help out our planet with some innovative coding" (GH London 2012, UK) or "Lisbon Green Hackathon is an all night long marathon in which teams of up to four participants must come up with develop, program and build a prototype for something that will hopefully make the world a greener place" (GH Lisbon 2017, Portugal).

Once the descriptions were collected, the second step of my analysis consisted in identifying (selecting) "key words" to describe synthetically (as descriptors) the challenges in the 100D.

This step allowed the identification of 47 descriptors for 85 CL events and 21 descriptors for 15 GH events which were, successively, reduced to 14 macro categories for further analysis, as synthesized in Table 15.

Table 15: Climathon and Green Hackathon challenge descriptors

Descriptors (keywords)	Macro categories	CL counting	GH counting
CL - climate change adaptation (19)	climate change	38	1
CL - climate change mitigation (9)			
CL - urban heat island (4)			
CL - extreme weather management (3)			
CL - climate-neutral neighborhoods (1)			
CL - local actions to address global climate challenges (1)			
GH - climate change (1)			
CL - reduce air pollution (10)	pollution	23	0
CL - zero emissions (5)			

CL - reduce plastic pollution (5)			
CL - reduce emissions (1)			
CL - reduce light pollution (1)			
CL - reduce noise pollution (1)			
CL - waste management (19)	**waste management**	**19**	**0**
CL - sustainable urban mobility (17)	**mobility**	**17**	**1**
GH - sustainable mobility (1)			
CL - sustainable food system (7)	**sustainability**	**15**	**7**
CL - urban sustainability (4)			
CL - sustainable land use (1)			
CL - resource management (1)			
CL - resource management (forest) (1)			
CL - sustainable development (1)			
CL - sustainable tourism (1)			
GH - environmental purpose (1)			
GH - sustainability (3)			
GH - greener future (2)			
GH - sustainable food system (1)			
CL - energy management (4)	**energy**	**10**	**4**
CL - renewable energy (3)			
CL - energy transition (1)			
CL - renewable energy (1)			
CL - energy (1)			
GH - energy efficiency (1)			
GH - energy (2)			
GH - energy use (1)			
CL - behavioral change (6)	**behavioral change**	**10**	**1**
CL - citizen behavioral change (2)			
CL - improve citizen participation (2)			
GH - customer behavior (1)			
CL - urban resilience (4)	**(urban and community) resilience**	**8**	**1**
CL - community resilience (3)			
CL - resilient communities (1)			
GH - resilient future (1)			
CL - green spaces (6)	**NBSs**	**8**	**1**
CL - green buildings (1)			
CL - green spaces (1)			
GH - green infrastructure (1)			
CL - water management (7)	**water management**	**7**	**0**
CL - smart cities (5)	**smart cities**	**7**	**0**
CL - smart agriculture (1)			
CL - green smart cities (1)			
CL - circular economy (7)	**circular economy**	**7**	**0**
CL - open data (1)	**data**	**2**	**8**
CL - data (1)			
GH - innovative coding (2)			
GH - open data (3)			
GH - big data (1)			
GH - social media data (1)			
GH - improve existing datasets (1)			
CL - Copernicus (2)	**other**	**5**	**4**
CL - rural areas (1)			
CL - health (1)			
CL - cultural heritage (1)			
GH - accessibility (1)			
GH - IOT (1)			
GH – n.d. (2)			
Total		**177**	**28**

These macro categories allowed a comparison between   the CL and GH formats in terms of the

prevailing themes for the challenges, as summarized in Chart 1 and Chart 2.

Challenge themes
Climathon®
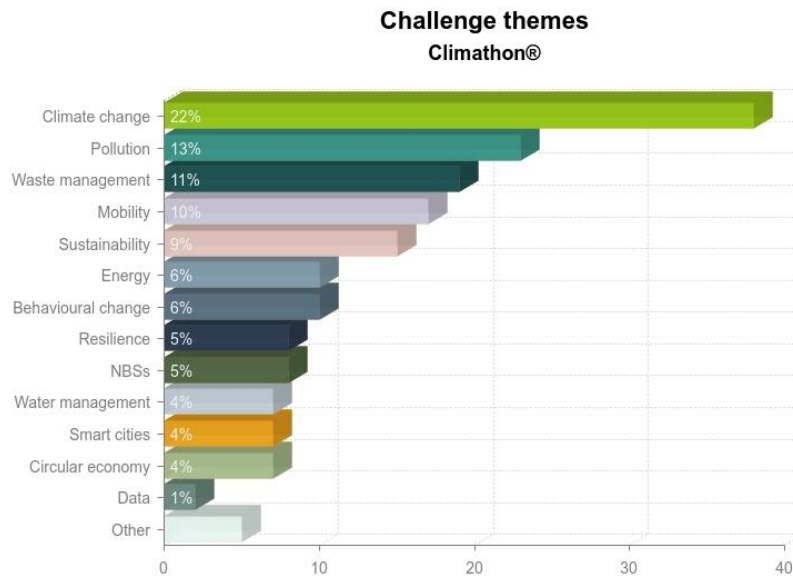
Chart 1: Challenge themes for Climathon

Challenge themes
Green Hackathon
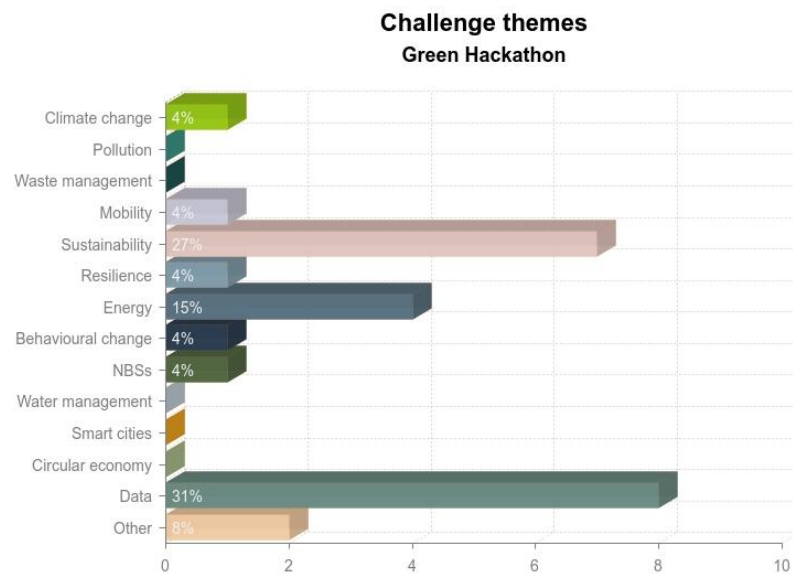
Chart 2: Challenge themes for Green Hackathon

The above charts demonstrate how CL events express a wider range of challenges with a prevalence on "climate change" as the core thematic (22%). CL challenges are also concerned with "pollution" (13%) (in part connected to climate change, as emissions), urban infrastructural issues are represented such as "waste management" and (sustainable) "mobility" (10%), and "sustainability" in general (9%), and in other cases issues more directly connected to an *integrated environmental answer* as for e.g. "sustainable food systems". The last percentage (i.e., integrated environmental) could be increased by including those challenges calling for an

ecological answer to environmental crisis, such as NBSs (5%). It is interesting to note that energy (only 6%) was not a major concern of 2018 CL edition, except in connection with pollution (as related to the reduction of emissions) and that the use of *technological answers*, (e.g. "smart cities") (4%) and of *economic solutions* or alternative economic models such as "circular economy" (4%) where not often chosen as challenges.

If we compare these to the GH events, here the challenges focus on three main aspects – sustainability (27%), energy (15%) and data (31%) – coherently with their statute and often in combination. Unlike CL, the most frequent challenges concern the use of data as a *technological answer* to environmental issues and often include "innovative coding". Coding, which is a typical feature of hackathon, results completely absent in the CL format.

Challenge themes correspond and, in part, overlap with the "knowledge" distribution among the partnerships involved in the organization of the events (cfr. paragraph 5.1 sub *Partnership distribution among organizers and kinds of knowledge involved*).

P and R Comparative Assessment Table

The wide array of challenge descriptors in particular in CL, underlines the complex, systemic nature of climate crisis, which calls for a **greater awareness and understanding** of its multiple causal factors with different local impacts and related vulnerabilities i.e., pollution, energy, mobility, etc. with regard to the "skills" (or "strategies") towards successful ecosystem stewardship, such as "facilitating/developing (social) innovations by fostering knowledge building and […] bringing together different kinds of thinking" (cfr. Westley et al. 2013, Table 1).

With relation to Biggs et al. (2012) and Stockholm Resilience Center (2014), the effort of organizers and participants to find "solutions" to "super wicked problems" (Levin 2007), through an array and combination of environmental-economic-socially sound solutions, demonstrates coherence with P4 "Foster complex adaptive systems thinking" (Biggs et al. 2012, Stockholm Resilience Centre 2014).

On the other hand, an important aspect to be considered in the context of the theoretical framework of the research (resilience and participation) concerns **citizens involvement in climate action** (Biggs et al. 2012, Stockholm Resilience Centre 2014) P6 "Broadening participation", to "build trust, create a shared understanding and uncover perspectives that may not be acquired through more traditional scientific processes", and in an optic of improving these events as **collaborative environmental-action workout sessions** (cfr. Chap. 6), is neglected in CL, since the challenges of "behavioral change" (6%), that is connected to a social answer to environmental issues, and of "resilience" (5%) (encompassing "community resilience") are both

greatly under-represented and furthermore, within the category of "behavioral change", the challenge to "improve citizen participation" to find solutions, is proposed in only 2 cases. The same is true for GH events, where the absence is even more accentuated, as the only challenge calling for "behavioral change" is defined simply as changing "*customer* behavior", connoting even less interest in or awareness of "participants as *citizens*".

Analysis of methodologies of engagement and interactive tools applied in Events

As anticipated in Par 4.4 for "methodologies of engagement" in the optic of the present research, I intend the range of techniques and tools used, in particular, during public meetings and workshops, to "facilitate" teamwork and to reach a common-shared goal or decision. There exists such a vast range of literature concerning the different ways to help groups to work together to analyze a problem, to imagine a solution, to develop a plan and to implement it, that would be impossible to quote within this research work[118] at the moment.

The term "engagement" can sometimes create confusion with the methods utilized to reach targeted participants and make them participate in the event. For this activity I have chosen to use the term "outreach". Since it was not possible to derive the exact outreach channels and methods used by the organizers of CL and GH, from the data collected in the database, this aspect was analyzed instead through the questions of the online survey (namely question n.39 and 59) and during the interviews (see Par. 5.3 and 5.4).

One of my initial hypotheses (based on my personal experience during Bologna Climathon® edition in 2017, cfr. Par. 5.5) was that there is a lack of diversified methodologies of engagement in the management of the events. My analysis of the 100D showed, instead, a good variety of methodologies and in some cases also the willingness to embed the activities in "real life-settings", that is, to encourage participants to explore the challenge location and to meet and dialogue with locals and stakeholders.

In the Database, all available, relevant online information was collected in the field "Tools and methods used / declared". Naturally, an analysis was only possible for those events where the applicable information was available (30 out of 85 for CL, 5 out of 15 for GH).

Through an analysis of the schedules and the descriptions of events[119] it appears that the

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[118] If interested to deepen the topic, in the context of the present research I refer to, for community planning techniques and methodology to Iacofano 1990, Bishop 2015; workshops and meeting facilitation techniques and methodology, Hester 1990, Iacofano 2001, De Sario 2005; for participation in the contest of environmental education, Jensen, Kofoed et al. 1995, Lorenzo 1998; for the latest in design for democracy and environmental education, Lawson, De La Pena et al. 2017; for participation handbooks Wates 2000 and Elliott, J., et al. 2005; for web resources to www.communityplanning.net and www.communityplanningtoolkit.org; for the European contest, to Urbact nd., and for the Italian contest, to Sancassiani et al. 2009, Nanz & Fritsche 2014.
[119] As confirmed also by interviews' respondents, and as I could experience myself.

principal effort of the organizers was to provide participants with the most information possible concerning the topic (especially in CL, for climate change and other complex issues) and the issues connected to the specific challenge, through frontal presentations (by local officers, practitioners and experts).

In both CL and GH events, the organizers provided at least one facilitator (or "coach", as defined by organizers of Climathon® in particular) and a set timetable to help participants finalize the work. Coaches are recruited from sponsors, or from local stakeholders and enterprises, like in the case of Bologna (see par. 5.5).

Experts and mentors ("from applied and academic research and from different profiles ranging from biology or health to strategic innovation", in the case of CL Valencia) were available in all cases, to support teams "through the project development process - from the idea to the final solution concept" (as in CL Krakow) during the entire 24 hours (CL) or, alternately, for a set, limited amount of time (CL and GH).

Another aspect that CL and GH consider important, is to make the experience both inspirational and fun. As described by one of the interviews respondents (Valeria Barbi – FIU Bologna) «Climathon® is not only a respectable scientific event, but is meant to also be a fun social event that focuses on engagement in the climate change theme in an informal way». This aspect is ensued in several ways: "inspirational workshops and talks, like-minded people" (CL Lausanne, Switzerland), "Fast-talks […] intended to bring enthusiasts to speedy inspiring speeches to stimulate the participants inventions' creativity" (GH Lisbon 2016, Portugal), "Interactive experience sessions to boost reflection on the perception of ourselves and the concept of "time" (CL Bologna); "Climathon® Slams - A series of motivational talks and discussion sessions throughout the day" (CL Bangor, UK); "Inspirational speeches, let's cook together , Energizing Session – Make your own Cocktail" (CL Pireus, Greece); "Morning Yoga , morning walk" (CL Novi Sad, Serbia); "Yoga or Zumba Session & BREAKFAST – Make your smoothy" (CL Kragujevac, Serbia). In this last case (the only one recorded in the 100D), inspiration is pursued also through the medium of "art": "Creative Interpretation of Climate Change - Collaborate on creating an 'installation' with poet Martin Daws and Gwenan Griffith of the Sustainability Lab. Creatively interpret climate change through poetry and animation" (Bangor, UK).

The use of typical corporate or company team management and engagement tools to enhance creativity or speed up results, such as "best practice" exposure, business model development methods ("BAM! Design "Crash Course" on how to choose an idea and build it into a Business Plan in less than 24h", CL Grimstad, Norway) and, in particular, the "Business Model Canvas" – a conceptual framework developed by Osterwalder and Pigneur (2010) to quickly transform a

business idea into a business model, with intuitive sections for start-ups or social entrepreneurs to describe how their proposal creates value –, "pitch" speech training (a concise planned oral description of the company or idea that can be quickly and easily understood by potential investors, or an "oral presentation of an opportunity, delivered to potential stakeholders" as defined by Clark (2008) and referenced in Spinuzzi et al. (2014) to prepare the final presentation to a jury, sessions on how to "access finance and attract investment" (CL Burjassot, Spain) and an "overview of different funding options for environmentally friendly business startups" (CL Graz, Austria), and training on "Lean approach session (prototype, build and learn)" (CL Varadzin, Croatia) based on Lean Production systems (Krafcik 1988), are a prerogative of Climathon® only[120]. This happens explicitly in several cases of CL in the 100D, and even if my analysis of Climathon® official website descriptions (cfr. Par. 4.4) did not directly evidence a business-oriented approach, and these activities are not mentioned nor suggested in the platform's guidelines (source: Climathon® Organizers Toolkit, in particular Playbook. Only the "pitches" are suggested), the interviews and my personal experience (cfr. Par. 5.5), rather, confirm its use.

All of the above, united to the structuring of the Climathon® events as a "competitive setting" (that is, based on competition between teams to "win the challenge". Nb. the GH results in a more collaborative setting) may be viewed as a contradiction. In fact, some interviews respondent agreed with this (see Catarina Martins' interview, in par. 5.4) and, from the prospective of participative approaches, this contradiction represents a critical point which eventually might be one of the reasons why the solutions developed are not easily (usually) implemented.

For what concerns more explicitly participatory activities[121], only the Climathon® events description demonstrates that some variety of techniques and methods have been used to find, share and develop solutions to the challenge among the participants. Some examples are: "Research & Brainstorming" (CL Toledo, Spain), "World Cafè"[122] (CL Carpi, Italy), "4 topic-based 70 min workshops" (CL Varadzin, Croatia), "Tactical urbanism"[123] - imagining prototyping, Interactive Design "experience" in the city: what is experience data? Why not walk around the city and find out...?" (CL Edinburg, UK). Some participatory activities were addressed to gathering the needs and insight of local communities and stakeholders: for example, "Feedback and interview

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[120] Only the "Pitch" sessions are present also in Green Hackanthon events, namely in GH Lisbon 2016 "IDEAS PITCHING No matter how far-fetched; at this point everyone needs to come up with some kind of idea for a 1 minute "elevator presentation" for the remaining participants".

[121] For references see note n. 11.

[122] "The World Café is a creative process for facilitating collaborative dialogue and the sharing of knowledge and ideas to create a living network of conversation and action. In this process a café ambiance is created, in which participants discuss a question or issue in small groups around the café tables. At regular intervals the participants move to a new table. One table host remains and summarises the previous conversation to the new table guests. Thus the proceeding conversations are cross-fertilised with the ideas generated in former conversations with other participants. At the end of the process the main ideas are summarised in a plenary session and follow-up possibilities are discussed" (Elliott et al. 2005, p. 185).

[123] For Tactical Urbanism definition and references, see Par.4.4.

methods: after that, go outside and to talk to people about the problem to develop an understanding of it" (CL Wuppertal, Germany).

In one case (CL Birmingham, UK), community meetings were held during the 24 hours to help participants to better frame the issue, in the following terms: "Experience the reality of what communities wake up to, travel, work and play in. Talk to people, participate in some of the things they do, to really understand the challenges being faced and see what the barriers to the behavior change are... On the day we will be surrounded with experiences, residents, academics, service providers, activity providers, volunteers, politicians and anything else we can think of which will prompt thought and discussion - all there to help you challenge the 'norm' and help us create some innovative but practical solutions to our challenges. Using the problems framed from the day, target tech experts to come up with digital solutions to overcome barriers in communities". Program: Community Meet 1 - Children and Parents Community Meet 2 - On your bike Community Meet 3 - Older generation Community Meet 4 - Active Streets Closure City walking tour".

In one case[124] (CL Pesaro, Italy) there is a reference and a connection to a previous participatory process: "the participants will be inspired by the vision and prospective of the district, those are the output from the participatory process in Villa San Martino".

Several Climathon® events programmed Design Thinking workshops: "Designing for Citizens" by Design4Future, a service design company (CL Athens, Greece), "Design thinking by Quicksand - How to Inspire, Ideate & Implement" (CH New Delhi, India), "Design Thinking Workshop and Team Building" (CL Izmir, Turkey). This specific methodology, emerged at Stanford University in the early 2000's and then rapidly spread across the USA, Canada and most of Europe, as a design model to solve complex problems using creative vision and management (Brown, 2008) but its roots are in *pragmatism* and *reflective practice* (Johansson-Sköldberg et al. 2013), which are also two foundations of the participative approach in education and community design field (Schon, 1983).

Some other activities are derived from educational contexts, such as the "Learning village in tables method"[125] (CL Zagreb, Croatia).

All the Green Hackathons for which information was available, demonstrate, in general the use of a more hands-on workshop approach - coherently with the Makers Movement (Dougherty 2012) which originated in hacker spaces (cfr. Par. 4.1): "For each challenge there will be a workshop to

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[124] Actually, there is also the case of Bologna, that connected all the Climathon 2018 event to the ongoing participatory process of Laboratorio Aria, as described in par. 5.4. In this section it is inserted in the section "Types of resources given to participants", in the 100D this characteristic is listed under the field "Preparatory materials provided".
[125] Learning Village is a quite dated behavioral approach, developed by Ulrich et al. (1971). Is unclear how it was used in the context of CL Zagreb.

work hands on with it (See schedule). All the results will be collected on site and discussed during the wrap up" (GH Helsinki 2012), "After some ideas crystallized into groups; the hackathon started and the groups had around seven hours to build their concepts and prototypes" (GH Stockholm "ICT4S" 2014). In this last case, that phase was anticipated by team building activity among participants to get to know each other's background and skills. "The keynote was followed by a time for team building and networking time; with "speed dating" to get the participants to know each other and their respective field of expertise and to generate ideas".

Only one Climathon® (CL Delft, Netherlands) explicitly refers to hands-on activities in the same way: "During 24 caffeine-filled, sleepless hours, you and fellow participants will brainstorm, build, draw, break, test, and deploy whatever you can imagine to help the municipality of Delft with its pressing climate change issues".

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P and R Comparative Assessment Table

The analysis of the "words and intentions" of the organizers in both formats, shows reference to a **good variety of engagement methods** and tools used, fulfilling (in theory) overall principles of effective participation (Wilkox 1994, Bishop nd., 2015). It remained to be seen whether the quality of their intentions was actually concretized in practice. This evaluation was carried out through a careful analysis of the data emerging from the other research instruments.

The competitive setting and the primarily business oriented-approach in CL contradicts (and conflicts) with the collaborative tools applied and the shared goal of tackling climate change, denoting the platform's fundamentally **"engineeristic resilience" (Holling 1996) mind set** which puts greater importance on efficiency of productivity and "single stable state possibility" (one winning solution) than on a "multiple stable states possibility" (which would favor more / better shared ideas between the working groups) of the platform, that could undermine Climate-KIC's general mission.

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Analysis of the types of resources   provided to participants

According to the analysis of the database, both CL and GH organization provided a certain (considerable) amount of resources to participants.

In the case of CL, the main resource comprised the experts, speakers and mentors, involved in the program. These "experts" could be public officials, technicians, researchers, professionals, innovative businesses, services or companies that work on issues connected to the challenge. Through AV presentations and talks, they provided participants with information about the problem setting and, as previously said, the format invited experts to remain available throughout the event, to help participants improve their ideas, often testing them on their expertise.

The dataset for CL (based on the official website of CL) shows that in few cases[126] participants were provided with preparatory materials with detailed information about the challenge issue and the problem setting, in some cases well contextualized into the local situation. For example: presentation of the City Council's Strategy on Climate Change and its connection with other Spanish cities (CL Marbella, Spain); scientific articles in English and other preparatory material relating to the Port of Ravenna (CL Ravenna, Italy); scientific introductions to Urban Heat Island effect (CL Zagreb, Croatia); information's about geographic information systems, and environmental communication and research, with a sociological method (CL Bologna, Italy); data Sets and Tools (CL Athens, Greece); detailed climate profiles (CL Zagreb, Croatia); the National Climate strategy & Action plan (CL Novi Sad, Serbia)

In Green Hackathons, the main resource that the organizers provided to participants were free and accessible datasets (GH Stockholm 2011, GH London 2012) and API's (*Application Programming Interface* (*API*) (GH Zurich 2013), always connected to the specific challenge of the Hacking event. For example in the case of GH Stockholm Green Button Hackathon STHLM 2014: "Green Button Data; Energimolnet APIs" useful resources were provided: Eprice spot market prices for various EU countries/regions; Endev.js simple JavaScript library for working with web data sources; AMEE environmental and energy data for UK companies; Open Energy Information a collection of various energy datasets apps and communities; Open Stockholm Data various open data from Stockholm".

One main difference within the Green Hackathon event format, is represented by the availability of hardware (e.g., Arduino sets and other materials to develop ideas into real prototypes and the possibility to access raw datasets and other tools such as 3D printers. "Maker space and open data of partner companies" (GH Berlin 2018, Germany). This, again, collocates the GH setting and consequently participants, as already mentioned above, much more clearly in the "makers movement" than CL[127].

"HACKING: The goal will be to develop the idea's concept in greater details as much as possible and shall include the development of some kind of prototype as software or hardware. There will be some common electronic material for all teams but the main responsibility is from the participants who must bring or purchase the material as they see fit." (GH Lisbon 2016, Portugal)

P and R Comparative Assessment Table

In both formats, and especially in the CL events, the materials and resources, as well as the

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[126] Cfr. with the following paragraph concerning the Online survey, where the question about whether the organizers had provided or not preparatory materials to the participants before the Climathon®/Green Hackathon, was answered positively by 45% of compilers.
[127] Which results in the fact that CL are more open to diverse participants, with different backgrounds, ages and gender.

presence of expert speakers and mentors which provided the participants a **wide, rich variety of resources**, technical, economic and social data and information concerning the challenge themes (successively applied to their search for a solution to the 'problems'), satisfies both the requisite of the "Appropriate knowledge base" characteristic from the overall principles for effective participation (based on Bishop nd., 2015) and that of the first of nine skills or strategies of Westley et al. 2013 for ensuring successful ecosystem stewardship – i.e., "Facilitating knowledge building and utilization".

In many cases, it also can be inferred that the presentations by local institutions regarding their local resilience planning, actions and strategies, represent Westley's (2013) fourth "strategy-method", which is the "building of trust, legitimacy and social capital" in that it permitted, on the part of the participants, **the access and "recognition of management initiatives by formal authorities".** The presence and collaboration of different (urban and beyond) institutions at different levels during the events, a strong point in CL in particular, which results in a accomplishment of Biggs et al. (2012), seventh principle "promote polycentric governance".

Analysis of the types of incentives given to participants

To analyze *how charges and benefits are distributed* among organizers/partners and participants, the "prizes", or better the incentives as described in the official websites of the events, given to winners of CL and GH events, were collected and analyzed qualitatively.

As concerns CL, several hosting cities and organizers have specifically declared (38 for CL events, against 5 for GH) to have provided incentives to the winning teams.

Incentives were sometimes given in terms of monetary prizes to further develop the ideas created (CL Rovereto, Italy), often united to "Coaching, acceleration and continued support" (CL Lausanne, Switzerland), or business incubation through, for e.g., "the participation of each participant at the entrepreneurial training academy ("Innovation Academy 2019") organised by Trentino Sviluppo" (CL Rovereto, Italy) or "a month of mentoring in Technology park Varaždin provided by the city of Varaždin" (CL Varaždin, Croatia). For example, "The winning team will receive further support from Advance London, provided […] to launch and scale up their business" (CL London, UK), or free access to co-working spaces "The winner teams will get access to coworking spaces as well as coaching to accelerate their idea and/or further develop it. Among others, the prizes will be sponsored by Coworkit – Coworking Space Solingen, Gründerschmiede in Remscheid and Technologiezentrum Wuppertal W-tec." (CL Wuppertal, Germany) and to innovations centers " Six months of using the Zagreb Innovation Centre infrastructure free of charge" (CL Zagreb, Croatia). In several cases, the free business incubation

and coaching were provided with the support of Climate KIC and its programs: "winning team's solution will have access to Climate-KIC's pre-incubation program - the Greenhouse" (CL Delft, Netherlands), sometimes in addition to training offered by partners or organizers"; "The best solutions will get the chance to be further developed with the support of Climate-KIC, the City of Zurich and Energie 360°" (CL Zurich, Switzerland) or "Climate Launchpad program organized by CONOT (Center odličnosti nizko oglične tehnologije) and Climate – KIC" (CL Ljubljana, Slovenia).

In one case, the monetary prize was united to professional advice to undertake innovation projects and for industrial protection of the proposed solution (CL Marbella, Spain). At other times, the incentive is in the form of entering a certain network, as for e.g. "CMCC Foundation will provide research guidance via its extensive network of researchers and experts" (CL Venice, Italy) and "The winners of the marathon will have the opportunity to participate, free of charge, for the final stage of the Best Practice Award, a national event, where banks and financial intermediaries specialized in business creation and development seek out ideas to be funded". (CL Salerno, Italy) Additionally incentives took the form of offering "visibility" simply through participation to events, like in the case of several Italian cities, invited to participate the event organized by Climate-KIC Italy in Rimini, Ecomondo a fair of European level for circular economy (for e.g. CL Carpi, Italy).

Of particular interest to the present research, was the fact that, in some cases, the hosting cities made themselves available to discuss and support the wining ideas. As in these examples, "The winner will also have mentorship from the Municipality of Sofia in the development of a joint project by donor programs" (CL Sofia, Bulgaria), or "The winning team will be awarded with a tasty prize and will be invited to discuss and develop the idea further with the City of Ravenna" (CL Ravenna, Italy) or "Winners will be invited to discuss and develop the idea further with the City of Helsinki"(CL Helsinki, Finland), and in one case, the Municipality supported the winning ideas with its own funds "The Municipality of Kraków will actively support realization of the selected project after the Climathon®. 4000 PLN (1000 euro) for the winner!" (CL Krakow, Poland).

Other prizes were in the form of tech equipment vouchers (CL Šabac, Serbia), and of gadgets or other "amenities" such as "Free tickets for SPAL football matches" (CL Ferrara, Italy) or "dinner at restaurant Garestin for the whole team" (CL Varaždin, Croatia) and "an amazing trip to the beautiful town of Perstorp […] All expenses will be covered!" (CL Lund, Sweden).

Finally in one case (CL Piraeus, Greece) the prize was very articulated and specifically connected to the event's challenge[128].

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[128] "The winning team and the participants of Climathon® Piraeus will receive the following prizes: Ticket for the incubation programme of BlueGrowth Piraeus (www.bluegrowth.gr). The services include: Advisory support and training; Access to the BlueGrowth Marinescape (a lively human ecosystem of experts, mentors and investors in the

In general, organizers of CL seemed aware that it is important to offer substantial prizes in exchange for the "work" and the innovative ideas of the participants. Nevertheless, this practice appeared to be insufficient for the further development of the solutions.

Regarding GH, the information gathered concerning prizes and incentives given to winning participants demonstrated, for some events, a different approach regarding the "property" of "solutions" generated. See, for example, "Any IP you create at the event is your own. You can release it as open source; keep it to yourself; whatever you want. If you join a team with others; it's up to you to sort out the IP issues between yourselves. The London Green Hackathon organizers make no claim to any IP you create; though we will talk about the presented work far and wide and might use images of it (unless you specifically ask us not to)" (GH London 2012, UK). In two cases, it is explicitly declared that there was no competition component, nor jury or prizes (GH Helsinki "OKFestival" 2017, Finland and GH Zurich "ICT4S – ICT for Sustainability" 2013, Switzerland).

Some others, instead, are more similar to the prizes offered by CL organizers/partners, like "Two projects from Energy Hackathon 2013 will be invited to the launch event of Peloton Summer Camp programme (Friday 24 May). From this event; 10 projects will be chosen for a startup coaching program that takes place during summer + autumn 2013" (GH Helsinki, Finland) and in one case, the monetary prize was very consistent: "The best projects will be funded with 30,000 euro. This funding is available for startups, individuals, university teams, etc." (GH Berlin "Energy Hack" 2018, Germany).

P and R Comparative Assessment Table

The prizes (or incentives) which "promise" (to be verified) the continuing development of the winning ideas through access to existing incubation systems, accompaniment and mentoring by experts and contacts to other potential stakeholders (outside the process) have pertinence to Westley et al. (2013) strategies in support of successful ecosystem stewardship, in particular to point 3 "Developing social networks" – through "**linking, bridging actors and stakeholders across and within organizational hierarchies**" – to create momentum, build support, etc.

Blue Economy). Up to 3 teams will be eligible for incubation services by the Athens Center for Entrepreneurship and Innovation (ACEin), the incubation center of Athens University of Economics and Business. The services include: Advisory support and training to help the teams to further develop their ideas; Access to ACEin's network of experts and mentors; A friendly and lively office space to (www.acein.aueb.gr). Full access to the SMIRES Training course 2019 on the Economics of Sustainable Water Management of Intermittent Rivers and Ephemeral Streams in accordance to the Water Framework Directive (WFD), the Millennium Ecosystems Assessment (MEA) and Sustainable Development Goals of the UN Agenda 2030. The course will be held in Athens on the 4th - 6th of February, 2019. Fishing tour to experience how plastic is captured, on a daily basis, in fishing nets, organized by Enaleia (www.enaleia.com). Set of coasters by PHEE (https://phee.gr/). PHEE designs and manufactures unique natural products by recycling the leaves of seagrass Posidonia Oceanica".

On the other hand, for what concerns the principles of effective participation (Bishop n.d., Bishop 2015), the **competitive setting** (especially in CL), represented by relatively small prizes, could compromise principles of collaborating towards a common goal or "working towards shared result", which should be the general mission of these events.

Analysis of preparatory or follow-up events or meetings

Since preparatory and follow-up meetings are important components of any participatory process, the research aimed to verify their presence or absence in the CL and GH events. From what was possible to find[129] through the official web pages of Climathon® and Green Hackathon, only 9 events (8 CL events and 1 GH) declared that there was a preparatory meeting or similar event. From the web pages, one can read "We are holding a panel debate on the same topic in Lund 11/10. Attending this event is a great way to learn more about the challenge and to warm up for Climathon® in Lund 2018 (CL Lund, Sweden)", or "On 28th september at 19h (7:00 pm), join us to the Lab'O (1 avenue du Champ de Mars - 45100 Orléans) to meet experts and exchange with them about several approaches of flood risk management and resilience" (CL Orleans, France) and "Pre-Climathon® (15 Oct. h 16/19) Guided by experts, the meeting will offer participants an opportunity for information and discussion on the challenge on Climathon® Torino. Participants are invited to bring ideas and projects to form groups that will compete for Climathon®" (CL Torino, Italy) or, for example, "PRE-WORKSHOP 16th of October 2018 / 9:30-17:30 17th of October 2018 / 9:30-17:30 18th of October 2018 / 9:30-17:30: 3 pre-events in Cesis, Liepaja and Riga a week before the 24-hour hackathon" (CH Riga , Latvia). In other cases, through a combination of online and offline training for challenge preparation and team building[130], at times, to gain some time to better manage the event, preparation was offered to the participants, as in the case of Zurich "10 OCTOBER 2018 / 18:00-21:00 Pre-Workshop: Introduction to the challenges, pre-ideation and team-building" workshop" (CL Zurich, Switzerland).

For GH the only pre-event identified was for the GH Berlin "EnergyHack" in 2018, where a "Kick-off event: "FOR THE CITY * FOR THE ENERGY TRANSITION' - Hacking for an energy-efficient city" in the form of a keynote speech and roundtable, took place immediately before the hackathon event.

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[129] The Online survey gave more insight into this aspect (see Par. 5.2) while for GH the interviews were the only way to find this information (see Par. 5.4)

[130] It is the case of CL Krakow in Poland: "Remote work and on -line mentoring- we help applicants to fine-tune ideas. Webinar and own work-each participant will receive the knowledge necessary to be able to create a project to protect the climate - a project that will have a chance to be rewarded during Climathon; 2 trainings "Creative Startup for climate"-trainings will be held at Ambasada Krakowian, and AGH (in cooperation with the Scientific Circle of Staff at the Faculty of Management). Training will be an opportunity to gain valuable knowledge regarding, among others techniques of building a strong and creative team, as well as challenges related to the activities of startups. During training, we will provide you with extensive knowledge of climate change and environmental protection".

Concerning the provision of follow-ups to the event, I found that only in 8 cases (all CL) was there any reference in the event web pages, for example: "28 NOVEMBER 2018 / 16:30 - 19:00 City Event with Climathon® winners. City event with the winning teams; Elevator-Pitches, Speed-Dating and Apéro" (CL Zurich, Switzerland) and "15.11.2018: Climathon® Wuppertal Follow-up. At the follow up-workshop we want to bring all winners and those who are interested together, so that we can discuss the ideas of the Climathon® and work together with experts on further development" (CL Wuppertal, Germany), or in the case of four (4) of the Italian hosting cities for CL events the invitation to winners to participate in the "Giovedì 8 Novembre 2018 FOLLOW UP - Climathon® 2018: le innovazioni e le soluzioni ideate dalle città italiane, presso Rimini Fiera Ecomondo" and present their ideas in that context[131].

P and R Comparative Assessment Table

The low number of pre and follow-up events in both formats inferable from the Database, indicates that most organizers did not take into consideration the importance of offering a more structured process (Bishop 2015), one which inserts the events into an overall strategy or process.

Giving the participants (at least, the winners) an opportunity to discuss their proposals more in depth with the same experts and institutions present at the events, and also with other interested stakeholders selected by the organizers or by the platform, on the basis of the project itself would allow participants and organizers to collect feedback from local stakeholders, in order to build networks and identify funding sources and possible new partners to realize the ideas .Furthermore, an analysis the CL websites evidences that the platform provides almost exclusively information concerning the most recent events, through catchy communication (slogans). This seems to suggest a lack of transparency regarding past events, and does not allow adequate info for reading and evaluating the process among all actors involved.

This is a critical point with regard to "Proper links with other local consultations or participatory processes in progress" overall principles and of Biggs et al. (2012) principle 3 "Manage slow variables and feedbacks" as related to Mediation of conflicts in order to create shared ideas/proposals; continuous evaluation of process by participants, to improve process and products.

The GH platform, instead, as confirmed by the case-study (see Par. 5.4), **results more transparent** in giving account of the events through **detailed public reports**.

Analysis of Partnership distribution among organizers and the kinds of knowledge fields involved

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[131] This was also the case of my personal experience with CL Bologna 2017 (see par. 5.5).

One significant element of the analysis was to understand the differences between the two formats regarding the composition of the partnerships that organized the events. To do so, a new derived sheet was created within the database in the form of a "registry of partners". Using the official web pages of each CL and GH event, main partners (MP) and other partner (OP), were analyzed one by one, registered and mapped, according to several aspects to assess partnership distribution in terms of the *number* of partners per event, of the *nature* of the organization (public/private/PPP), the *field of activity* and *kind of contribution* to the event, for example, as "sponsors" (intended as partners providing economic support of some kind[132], and media and outreach partners) or as "knowledge partners". By "knowledge partners" I intend partners involved in an active way within the single event, providing expertise and knowledge content through speakers, skills and resources. The Knowledge partners' distribution have been further mapped, in relation to their principal *knowledge field* contribution. The new sheet of the "registry of partners" resulted in 4154 data entries. The database fields are described in the following table (Table XX).

Table 16: Database fields' descriptors in the "Registry of partners"

Who	What	Name	Field of activity	Kind	Contribution		
CL/GH	MP/OP	Partner	municipality/authorities or utilities/public agency/educational institution or research center/enterprise/business incubator or coworking space/ /international body/ngo or association/foundation/fund/platform/fablab/EIT/ClimateKIC/EU project/other	public/private/PPP	knowledge partners: environmental sustainability/economic sustainability/social sustainability/innovation/data/technology/science/culture/participation	sponsor/media partner/outreach partner	other

Regarding the *number* of partners involved per event, the analysis shows that for CL, the 85 events involved a total of 451 partners (MP and OP), ranging from a minimum of 2 to a maximum of 11 partners, with an average of 5 partners per event. For GH, the 15 events involved 130 partners (MP or OP) in total, ranging from a minimum of 2 to a maximum of 23 partners, with an average of 9 partners per event.

Concerning the *kind* of partners involved in the events, the results of the analysis (see Chart 3) demonstrate that CL and GH partnerships differ quite substantially. In particular, the numeric percentage of public subjects involved in the organization of CL events (42.1%, 46.7% if we consider also the PPPs) is much higher when compared to the total number of partners, than in GH events (24.6%, 25.4% if we consider PPPs). The partnerships of GH events are in fact in large part composed of private enterprises (74.6% are business, but also NGOs and associations),

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[132] Funding, prizes, locations etc.

while CL involve private partners in a lesser proportion (53.3%).
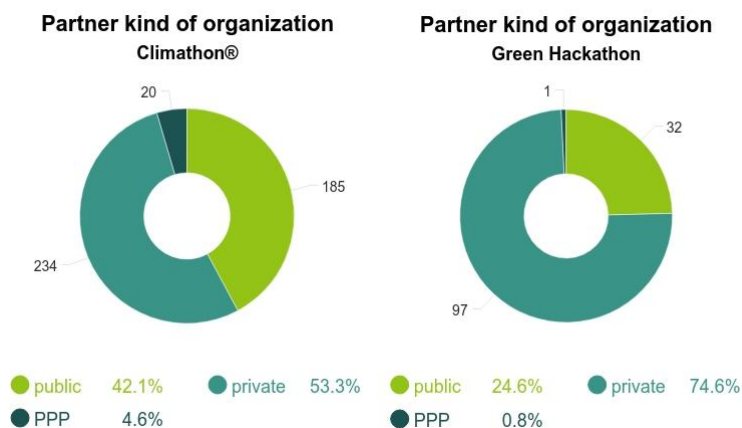
Chart 3: Partner kind of organization of Climathon® (left) and Green Hackathon (right)

Going more in depth, the analysis of the *field of activity* of each partner (see chart XX and XX) shows how CLs main partners and organizers are Municipalities[133] (12.5%) and public authorities or utilities (11,4%), with enterprises (16.2%) and business incubators and coworking spaces (9.6%), in collaboration with a quite large number of educational institutions (20.3%), while GH partnerships are composed mainly of enterprises (37.3%), while often[134] educational institutions (Universities *in primis*) or research centers are the Main partner which promotes the event.
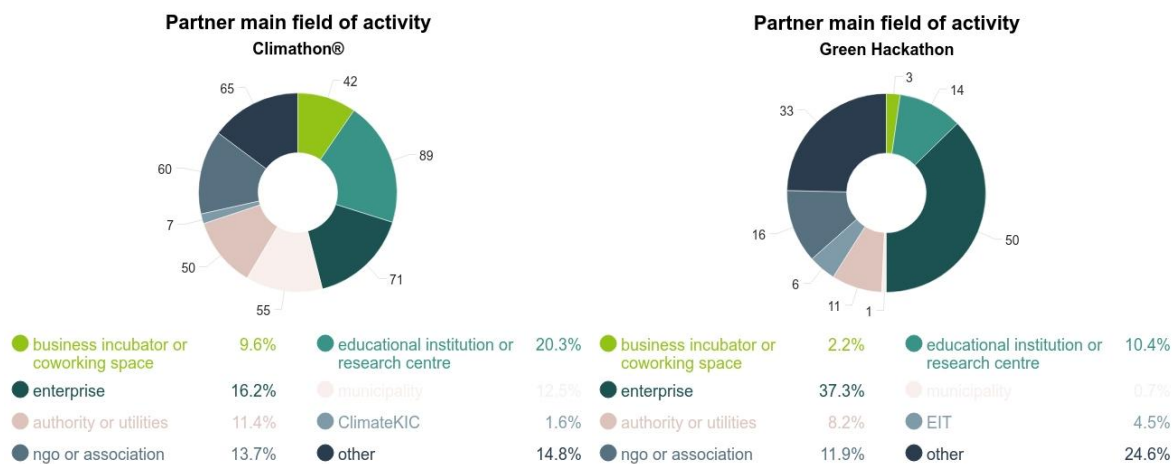
Chart 4: Partner main field of activity of Climathon® (left) and Green Hackathon (right)

To ascertain the *kind of contribution* (see chart given by partners during the event), partners were first divided in two macro groups in relation to their concrete contribution to the development of the event, as "sponsors" (subjects providing economic sponsorship of some kind, and media and outreach partners) or "knowledge partners" (when providing knowledge content through

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[133] Municipalities are also typically main partners of CL events, as derivable by the "registry of participants" included in the 100D, where single partners are mapped as Main partners or Other partners.
[134] A consideration derivable by the "registry of participants" included in the 100D, same as for the previous note.

speakers, expertise and resources). Once all "others" have been excluded[135], in some cases, the two groups overlap when partners have contributed both as sponsors and and as knowledge providers. This was found in 16 cases[136] of 302 for the CL (5%) and in 16 cases of 80 for GH (20%). In GH, in fact, technological sponsors often provided both prizes (such as electronics, gadgets, etc.) and expertise, during the event. In several cases, in the partnership there is connection a to ongoing European Projects, precisely, 12 partners for 12 CL events (14% of total events) and 6 partners for 3 GH events[137] (20% of the total events). This finding confirms the a European Union dimension of both CL and GH events.
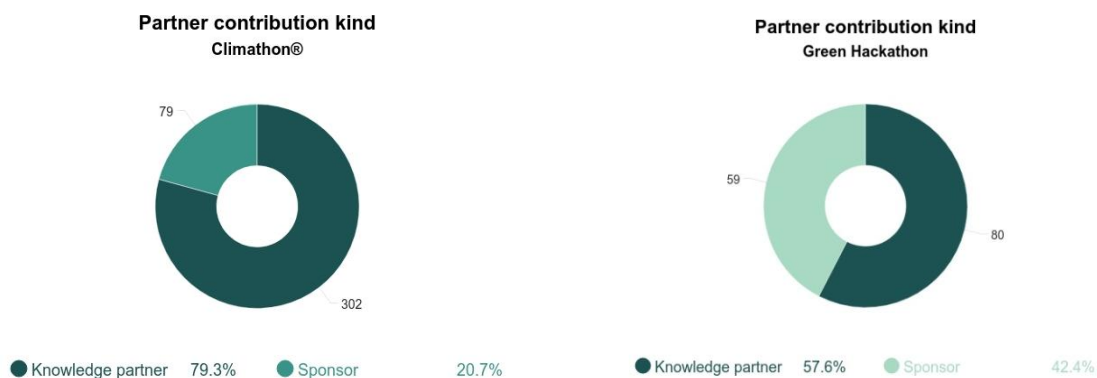
Chart 5: Partner contribution kind Climathon® (left) and Green Hackathon (right)

Subsequently, the analysis mapped each "knowledge partner" in relation to its field of expertise and/or experience, based on the following   *categories* and their *combinations*: environmental sustainability, economic sustainability, social sustainability, innovation, data, technology, science, culture, participation. To facilitate their visualization and to highlight the most recurrent fields of knowledge among organizers and partners, the cases of low recurrence were excluded[138] and the highest level halved[139].

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[135] Municipalities, authorities and others for which it was not possible to draw the kind of contribution.

[136] Of witch one consisted in a EU project platform, namely FabSpace 2.0. Derived from Science 2.0 and Web 2.0 Technologies, a European initiative to bring all Geo-Enthusiasts together in-line with the Copernicus mission and vision, the FabSpace 2.0 project is meant to give the opportunity to be a part of creating a Geo-network for Geo-data-driven innovation by leveraging space data in European Universities.

[137] In GH Athens 2012 (Greece) 4 partners where connected to ongoing EU projects and specifically: AGINFRA+ - Accelerating user-driven e-Infrastructure innovation in Food & Agriculture (Horizon 2020 funding), Natural Europe, VOA3R and ODS Open Discovery Space.

[138] Knowledge fields with less of 2 partners were removed from visualization in radar chart to facilitate visualization and understanding, as well as combinations of CL and GH knowledge fields with less than 4 partners involved.

[139] In particular for CL the value of " was halved from 65 to 32.5.
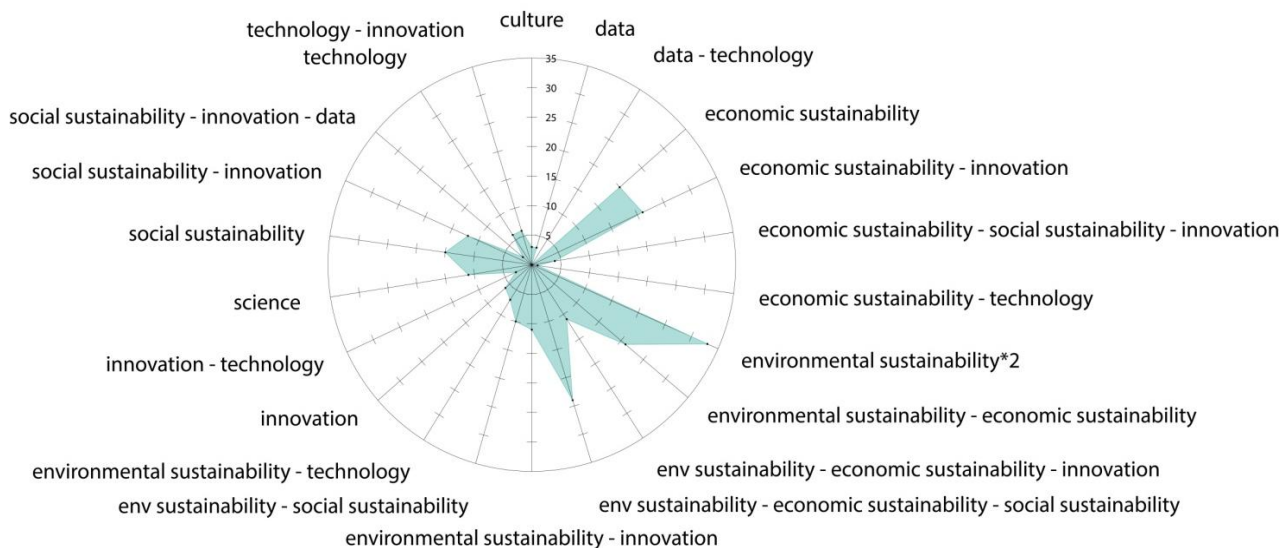
Chart 6: CL knowledge partners field of expertise
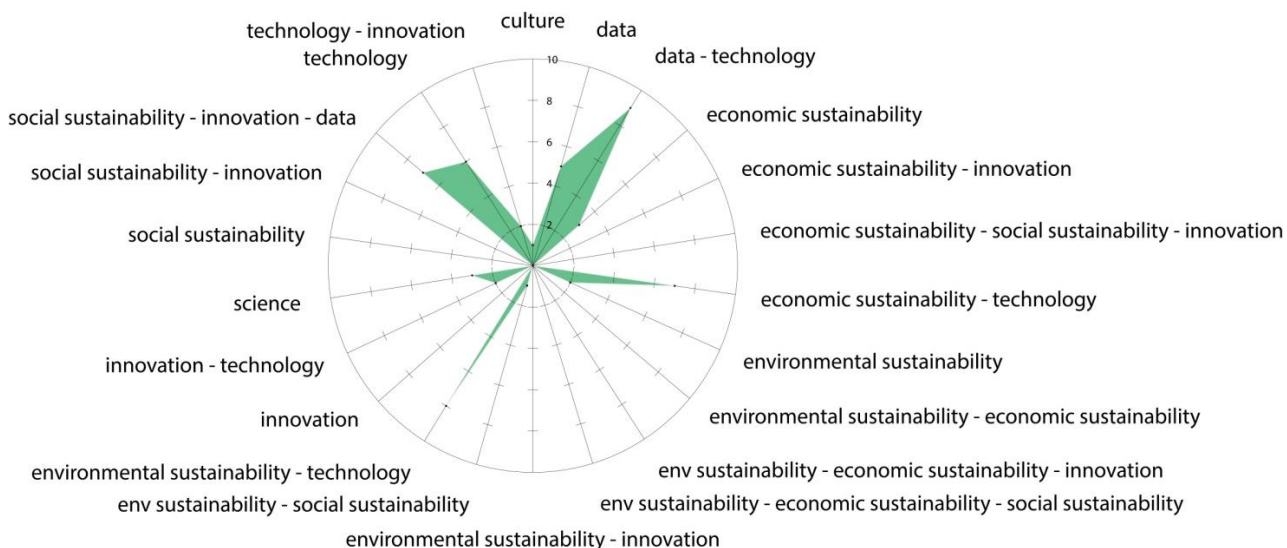
Chart 7: GH knowledge partners field of expertise
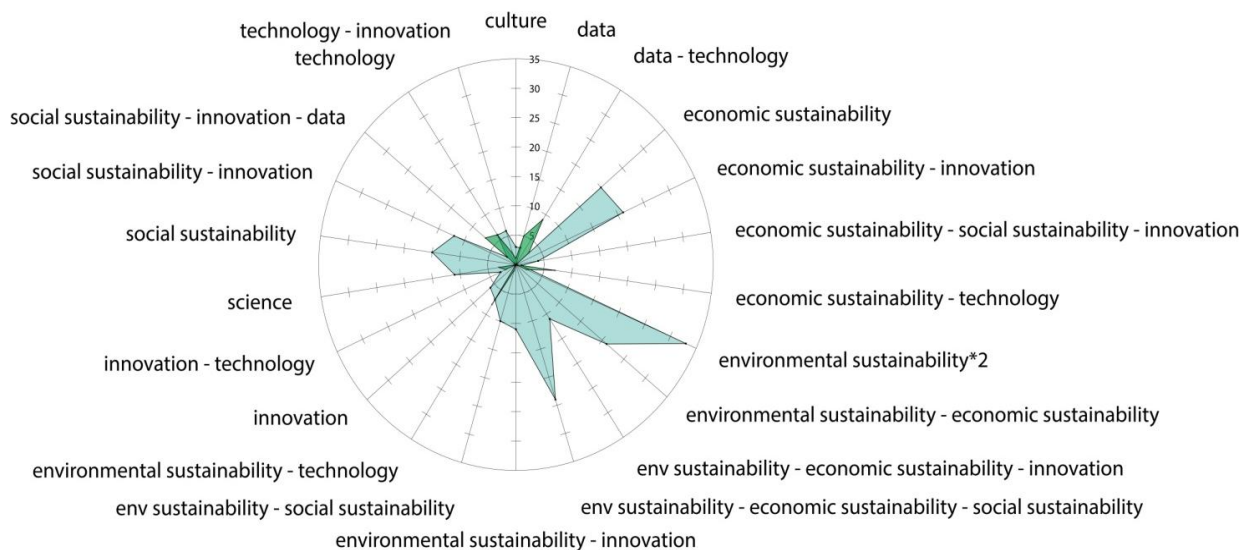
Chart 8: CL and GH knowledge partners field of expertise overlay

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The analysis evidences that the most significant differences between the two formats, resides in two aspects.

First, there is a greater *diversity* among CL partners that covers the three main ambits of environmental sustainability[140], economic sustainability, and social sustainability and almost all the other categories with the exception of "data" and "participation"; and there is a substantial *specialization* of GH partners in "data", connected to technology and innovation and, in turn, involved in the fields of social economic and environmental sustainability.

Secondly, there is a tendency for CL of involving partners with knowledge and attitude towards *innovation*, at times in *social innovation*, while GH tends to rely on partners with knowledge in *technology*, highlighting having more trust in the technological factor than in the human factor capacity to respond to climate change challenges and environmental crisis.

Finally, from the analysis, it has emerged that very few subjects involved in both formats have knowledge in *participation* or participatory processes. In only one case, CL Coventry (UK), one of the partners is a subject who organizes events on Nudgeathon, (events that are very similar to Climathon®s and derived from hackathons). These events are shorter events (lasting a few hours) during which, on the basis of pressing and current social issues, "a push" (literally) is given to real behavioral problems relating to those issues, and solutions are developed *together* "to help people to make better decisions"[141]. The mention of this type of approach, as well as the fact that the themes are chosen by the Partners that the platform has selected for each event, indicates a more genuine participatory approach.

However, in general, this results in the fact this ambit (participation) does not appear in the charts (cfr. paragraph 5.1 sub *Challenge themes*).

P and R Comparative Assessment Table

The composition of partnerships among the two formats, and the field of activity of each partner, demonstrates for CL a **greater diversity** and **heterogeneity** among partners, that cover many different fields, with knowledge and attitudes towards **innovation**. This denotes coherence with the CL mission and is pertinent to Biggs et al. (2012) P4 principle "foster an understanding of SES as complex adaptive systems (CAS)" to build resilience of ecosystem services and tackle complex issues such as climate change.

It also demonstrates an **intentionality in managing connectivity** (P2, Biggs et al. 2012) on the part of the organizers to facilitate collaboration and communication between parts (internal and

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[140] Very preponderant, with 65 partners in this ambit.
[141] From http://www.nudgeathon.com/about/.

external to process/experiment), to foster alliances and collaborative networks and to seize opportunities.

Again, in reference to Westley et al. (2013), the organizational intention and capacity to involve partners at different scales and levels, demonstrates a interest and understanding in the applying the skills and strategy of **bridging** and **linking**, and in the creation and protection of "**safe spaces for interaction**".

However, in practice, the **substantial lack** of organizers/partners in both formats possessing knowledge / experience **of participation or participatory processes**, remains a critical point to be addressed.

Average number of solutions elaborated

As explained in Par. 3.4, Climathon® are expressively collaborative events aimed at developing solutions to tackle climate change effects at the urban level and to increase urban resilience, fostering the ecological transition of cities. Green Hackathons as well are described as "moments to get together to create and implement new ideas for a more sustainable future" (from CL official website).

The analysis of the events included in the 100D demonstrates that for CL an average number of 4 solutions emerged per event, from a minimum of one idea to a maximum of 18 solutions developed and presented to the final jury, and for GH an average number of 11.In the case of CL, at times, only a single idea was developed among all participants, as in the case of Bologna 2018 edition.

One interesting consideration is that the number of participants (if, effectively, corresponding to the number of subjects registered on the site) is independent of the number of solutions developed. There are some cities with less than 20 participants[142] which elaborated a number of solutions, such as in the case of CL Valletta, Malta where 16 participants elaborated 3 solutions (Clean city Liveable city, E-VALLETTA, Segway-to-Go) and cases of cities with more than 100 registered participants where no solutions were reported on the site or found online.

For reasons of time, but mainly for opportunity, I chose to not include in this research qualitative analysis of the solutions proposed by participants, that range from draft ideas, to functioning apps and web platforms, and business plans for climate services, waste management platforms etc. As well, it was not possible to derive the actual implementation of the solutions from the 100D. More insight and information, however, was derived by the Online survey (see Par. 5.2).

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[142] This consideration is possible to the fact that solutions were collected for all 130 cases, before excluding those with less than 20 participants.

5.2 The online survey "Climathon® and Green Hackathon: Co-action for resilience"

The online survey "Climathon® and Green Hackathon: Co-action for resilience" was released on the 19th of June 2019 in two versions, one in Italian addressed to CL events' organizers in Italy, and one in English for event's organizers of CL and GH abroad).

On August 14th 2019, at the close of the survey[143], a total of 13 surveys were completed from Italy and 34 from abroad[144]. In the end, a total of 46 completed[145] surveys were included in the research.

The objective of the online survey was to evaluate the "degree of participation" (as described in Par. 3.3) of these events and whether the overall principles of effective participation are respected (cfr. Table 9, Par. 3.3, based on Bishop nd., 2015), to highlight the critical issues and factors that could improve their inclusiveness and democracy, fairness, effectiveness and efficiency (Lorenzo 2002), to analyze the results under the lenses of participation (P) and through my second theoretical pair of lenses, that of social-ecological resilience (R), to improve resilience and ecological transition.

From the two perspectives, the data was analyses in order identify and interpret, the following:

- geographical, demographical distribution and background of respondents;

- coherence with overall principles of effective participation (Bishop nd., 2015), according to the following aspects:
    o which, how and by whom the challenges were chosen;
    o motivations to participate in and/or to organize the event;
    o relevance, independence and transparency of topics and objectives;
    o resource based provided and oureach channels;
    o outcomes and follow-up process;
    o links to other processes of local resilience planning.
- levels of participation as experienced (keywords) by participants and organizers (Participation Evaluation frame, cfr. Par 3.3. Table 8).
- suggestions by research subject to improve the two formats in coherence with participation principles.

The above analysis are intended to explore the potential and limits of Green Hackathon and

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[143] The survey closed officially on August 12th and then reopened for two days on request of one of the interlocutors and therefore closed on August 14th 2019 with 13 surveys completed from Italy and 34 from abroad.

[144] My research objectives for Climathon were met since, as declared in Chap. 2 my objective was to collect compiled surveys from at least 10 cities in Italy and 20 cities abroad; for Green Hackathon instead, my objective was not met (at least 5 cities), but I decided to include the results the same even if not significant for confrontation, to infer some elements useful to better understand the events.

[145] One survey was, successively, eliminated because to it proved to be incomplete, bringing the total to 46 surveys included in the research.

Climathon in particular, in innovating urban planning, and to offer suggestions to improve the two formats in coherence with overall principles of effective participation (Bishop nd., 2015) and with general social-ecological resilience theories (Holling 1986, Holling and Gunderson 2002), with regard in particular to the Seven principles for building resilience in social-ecological systems (Biggs et al. 2012) and the theory of transformative agency (Westley et al. 2013), by reading the "process beyond the products", from the genesis of the challenge to the outcomes.

As stated in Chap. 2, the survey was organized accordingly in 10 sections:

- 1 section dedicated to identifying the role "participant" or "organizer/partner" in the event;
- 3 sections specifically addressed to participants, of which 1 dedicated to evaluate the event through the lens of participatory processes;
- 4 sections specifically addressed to organizers or partners, of which 1 dedicated to evaluating the event through the lens of participatory processes;
- 1 section addressed to both participants and organizers or partners, dedicated to proposing ways to improve the inclusiveness and democracy of the event;
- 1 section to rate the overall experience of Climathon® or Green Hackathon event.

The following subparagraphs describe the overall outcomes of the survey, combining the results of both the Italian and the English Google Module. For separated results please see Annex 1_Results_Survey Italia and Annex 2_Results_Survey International, attached to this relation.

Considering the small number of responses obtained by GH organizers, namely three (to be related to the relationship between CL (85) and GH (15) total events analyzed in the database), it was still possible to infer some elements of comparison.

The section dedicated to assess participants' perception in respect of principles, was organized in "statements" describing the event development, to be assessed through a qualitative value scale ("not at all" to "very much"). One of the organizer/partner did not complete this section, therefore the total number of answers for Climathon® is 31 instead of 32.

Geographical, demographical distribution and background of respondents

The research included surveys complted from 46 organizer/partners and participants of Climathon® and Green Hackathons events. Of the total number, in Italy all 13 have been completed for CL events, 11 of which by organizers/partners/hosting cities (role, see chart XX) and 2 by participants. Abroad, 30 were completed for CL events (21 by organizers/partners/host cities and 9 by participants) and 3 for GH events (all by organizers).

Chart 9: CL (left) and GH (right) partner role in the event

All participants described at least one event, while 7 described also a previous edition, for a total of 53 events described, distributed as follows: 39 CH 2018 editions, 10 CH2017 editions, 1 GH2017 edition and 3 GH 2016 editions. The following summary table synthesizes (Table 17 countries of origin, the location of the event, the number of individual compilers, and the edition of the events described.

Table 17: Survey answers distribution, according to type of event (CL o GH), countries of origin, location of the event, number of individual compilers, and the edition of the events described

ITALY

13 ANSWERS		BOLOGNA	ANCONA	FERRARA	VENEZIA	SALERNO	TORINO	RAVENNA	PESARO
CL	Organizer	1 2018 - 2017	1 2018	1 2018 - 2017	1 2018	1 2018	1 2018	1 2018	1 2018
		1 2018 - 2017				1 2017			
		1 2017							
	Participant	1 2018							
		1 2017							

ABROAD

34 ANSWERS		LISBON	WUPPERTAL	REYKJAVIK	ORLEANS	GANDESA	MOSKOW	SANTIAGO DE COMPOSTELA	JALINGO	CONVENTRY	HONG KONG
CL	Organizer	1 2018	1 2018	1 2018 - 2017	1 2018	1 2018	1 2018 - 2017	1 2018 - 2017	1 2018	1 2018	1 2018
		1 2018		1 2018							
	Participant	1 2018		1 2018							
				1 2018							
				1 2018							
				1 2017							

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ABROAD											
		LJUBIJANA	ESSEN	VILNIUS	LARISSA*	BURJASSOT	NIS	LAGOS	TALLIN	MEXICO CITY	SUZHOU	KRAKOW
CL	Organizer	2018	2018-2017	2018		2018-2017	2018	2018		2018-2017	2018-2017	2018-2017
	Participant				2018				2018 / 2018 / 2018			

ABROAD		
3 ANSWERS	LISBON	STOCKHOLM
GH Organizer	2016 / 2017-2016	2016

Concerning organizers/partners, the respondents for CL were mainly Organizers or Challenge Owners as called by the platform (60%), Hosting cities (31%), and 1 Partner (9%). For GH, the compilers were all Organizers.

Role as Organizer/Partner
Climathon®

● Hosting city	31.3%	
● Organizer (Challenge Owner)	59.4%	
● Partner	9.4%	
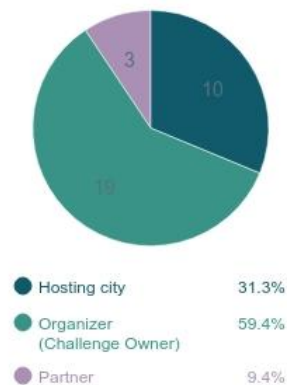
Chart 10: Specific partner role in the Climathon® event

The distribution of organizers/partners by kind of organization, reflects the one that emerged from the 100 Database, both for CL and GH. A slight difference was found in CL, where we find a prevalence of public bodies (68% mainly represented by municipalities, urban agencies and other authorities at the supra-urban level, especially abroad, against 32% private bodies). For GH the distribution reflects the one in the 100Database, with a prevalence of private bodies (67% mainly associations and companies, against 33% public) as organizers of the events.

Kind of organization
Climathon®

Kind of organization
Green Hackathon

31.8% 68.2%

33.3% 66.7%

| ● public | 68.2% | ● private | 31.8% | ● public | 33.3% | ● private | 66.7% |
| ● PPP | 0.0% | | | ● PPP | 0.0% | | |
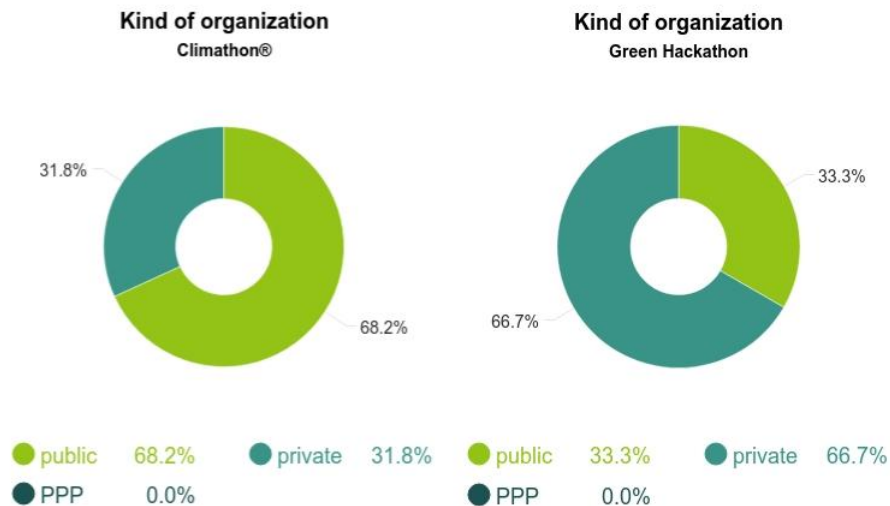
Chart 11: Partners distribution by kind of organization

For what concerns participants' age, gender distribution and background, this data can be analyzed only for CL, since no participants have filled in the survey for GH events (see Table XX). The charts show a prevalence of female and young participants among compilers, from varied backgrounds (researchers, managers, start-uppers, students and professionals) mainly in the field of technology (7) and environment (5) (as for the organizers), but also educational (2), culture, health and services (1 each), with high levels of education (6 with university degree, 5 post-graduate).

Participant gender
Climathon®

Age distribution
Climathon®

3

8

2

3

6

| ● Male | 27.3% | ● 18-30 | 54.5% | ● 31-45 | 27.3% |
| ● Female | 72.7% | ● 46-60 | 18.2% | ● over 60 | 0.0% |
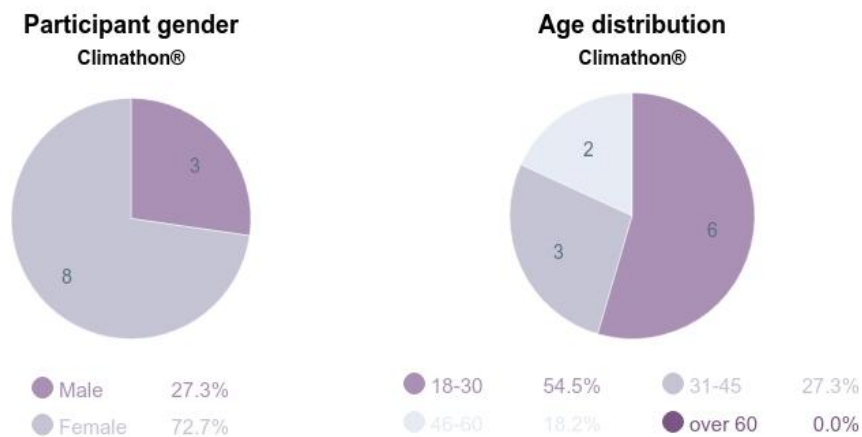
Chart 12: Participants by gender (left) and age distribution of respondants

Challenges and actors motivations

The number of events described in the survey were 59 in total - 55 for CL (14 of the 2017 edition) and 4 for GH (one in 2017, 3 of 2016).

The CL *challenges* ranged from: how to "implement sustainable mobility" and "foster sustainable energy", "improve resource, food or water management" and "air quality", "develop blue and

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green infrastructures" and "make urban spaces more pleasant", "facilitate climate adaptation and "build sustainable and resilient cities".

For GH challenges are all generally oriented to "develop, program and build a prototype for something that will hopefully make the world a greener place".

For what concerns the two cities then identified as case-studies, Bologna and Lisbon the challenges were in the words of compilers: "solutions for public communication on air quality" (CL Bologna 2018); "innovative services for the development of green and blue infrastructure" (CL Bologna 2017); "Under the premise in transforming Lisbon towards a Zero-Carbon City, this year's Climathon® has the objective in following through with the European Green Capital 2020 initiative, by planning tomorrow today, through the use of technology, in striving towards a more environmentally-friendly European Capital. In order to create alternative frameworks and solutions made available through technology and innovation, the challenge sets out to transform the city of Lisbon's waste management processes — reduce, recycle and reuse plastic and food waste generated on a daily basis" (CL Lisbon 2018).

The main *motivations* to organize for the organizers of the events (see Chart 13), demonstrate for CL both an educational intention, to use the event to raise awareness about the specific challenge and about climate change topic in general, and an attitude of openness and listening to "third party ideas" for finding innovative ideas.

Participants are more proactive in wanting to contribute to "help find solutions to unresolved urban problems" and possibly, to network to "find potential local partners" to develop their ideas. In GH (see Chart 14) the main motivations are to find "solutions" and "innovative ideas", while there is no mention of networking among local stakeholders or local partners.
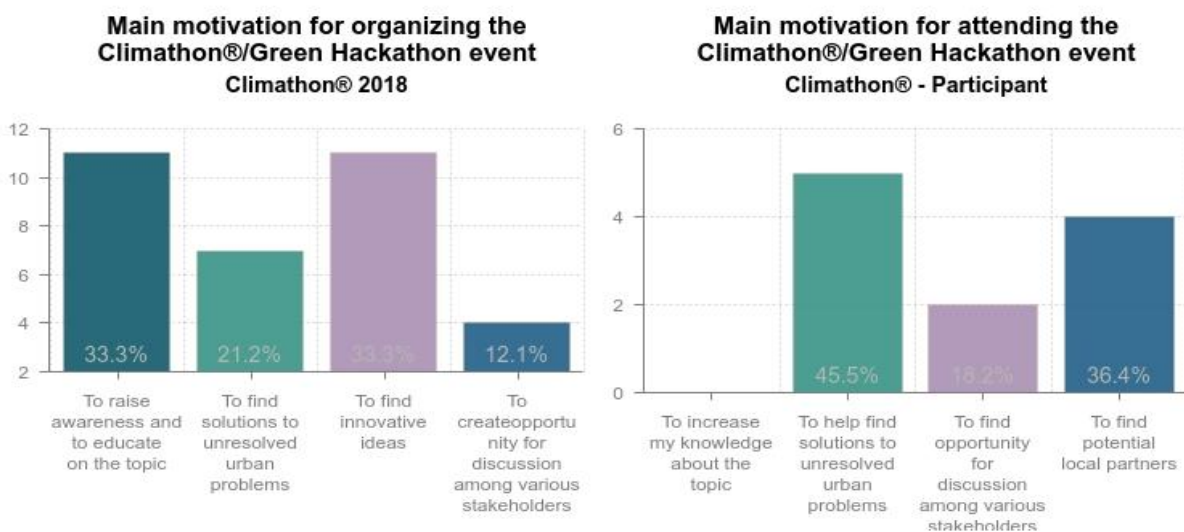
Chart 13: Main motivations for organizers (left) to organize the Climathon event, and for participants to attend the Climathon event (right)
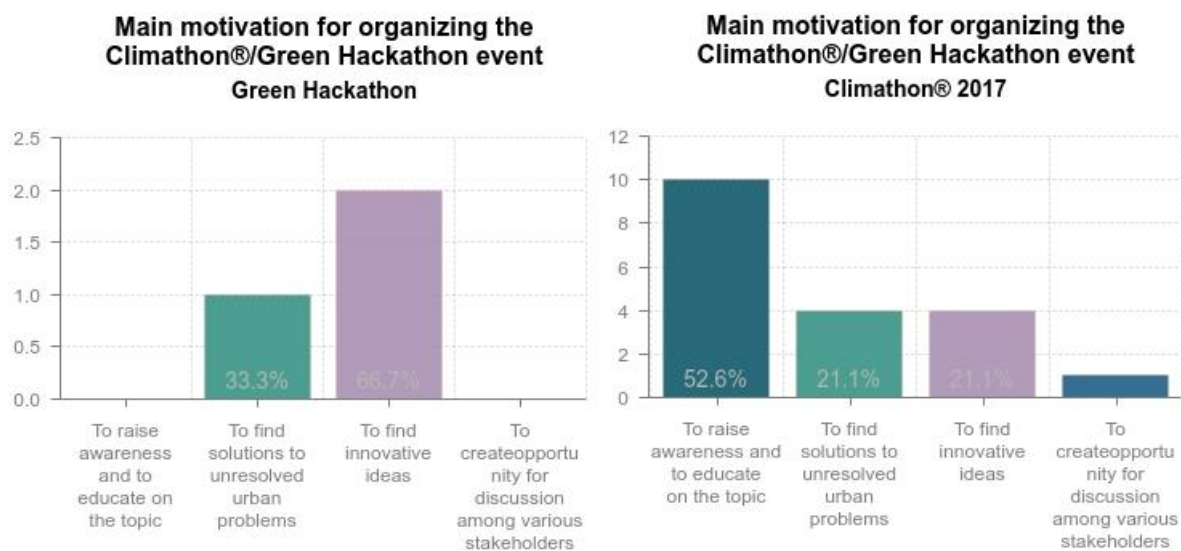
Chart 14: Main motivations for organizers (left) to organize the Climathon event, and for participants to attend the Climathon event (right)

"Other" reasons were indicated by compilers such as: "Connect different kind of actors and knowledge for better solutions", "Engage with local stakeholders and interested citizens on critical issues".

No major change in the challenges occurred in general between one edition and another, neither it was possible to infer trends in the topics, meaning that each hosting city/organizer had chosen the challenge based on local needs or political choice, as confirmed by the answers to the question "If your organization has contributed to define the topic/challenge of the event, based on what priority the topic was chosen" in the following section.

Some difference can be instead found in the main motivations to organize the event between one edition and another, in 2018 the main motivations for organizers are equally distributed among "to find innovative ideas" (33.3%) and to "raise awareness and to educate on the topic" (33.3%), where in 2017 the main motivation for organizers was to raise awareness and to educate on the topic (52%). This could represent an evolution in terms of a general raising in awareness, at least in Europe, about climate change threat and possible actions of mitigation and adaptation, as confirmed also in a recent poll (2019) of the European Commission Eurobarometer[146].

P and R Comparative Assessment Table

The challenges' choices demonstrate a **greater variety and range of topics among CL** events than not GH. CL organizers tend to set very specific and detailed challenges for participants, most probably connected to their local efforts and needs (as will be further analyzed in the following section) in relation to climate change impacts and vulnerabilities or other environmental

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[146] See Special Eurobarometer 490, https://ec.europa.eu/clima/citizens/support_it#tab-0-0

issues.

The challenge descriptions demonstrate **awareness** among local organizers of the **complex and systemic nature** of the issues treated, showing coherence with Biggs et al. 2012, Stockholm Resilience Center 2014, P4 "Foster an understanding of SES as complex adaptive systems (CAS)", and also **institutional competence** in the skills and strategies described by Westley et al. 2013, related to all aspect of the first point "facilitating knowledge building and utilization".

On the other hand, posing very detailed challenges in CL strictly orients the possible solutions given by participants, preventing a more loose and broad phase of vision building (which would also help the groups in "working towards shared results", more coherently with overall principles of participation, Bishop nd., 2015), as instead happens in GH, thanks to a more generic challenge posed.

Motivation of organizers and participants demonstrate **strong attention towards P5 "Encourage learning and experimentation"** (e.g. to find innovative ideas) which a central principle for building resilience SESs (Biggs et al. 2012, Stockholm Resilience Center 2014) and a strategy for "facilitating / developing (social) innovations" (Westley et al. 2013, point 5).

Independence, relevance of topics, and transparency of objectives and development

The absolute majority of events (91% of CL 2018 edition, 95% of CL 2017 edition, 100% of GH 2017 and GH 2016 events) was organized by the compiler organization with the support of Climate-KIC or of Green Hackathon platform, with just a small number of events organized by Climate-KIC or by Green Hackathon platform directly, while the organization provided the location, contents and/or stakeholder and network. This fact denotes a *good degree of independence* in the development of the event, but it is necessary to consider that both platforms provide some kind of guidelines. In the case of CL, these have become more consistently strict in terms of communication content (branded) and are actually (2020 edition) based on a MoU (Memorandum of Understanding, non-accessible) that outlines the rules of collaboration between the Local Organizer and the platform[147]. GH provides more loose guidelines[148], and according to the interviews (see par. 5.4), the platform was available for confront during the preparation and the development of the event.

To investigate *at what degree the events were based on an independent process, transparent in the goals and clear in the objectives*, compilers of the survey (separately, Organizers/partners and participants) were asked to evaluate the statements shown in the charts, through a qualitative

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[147] See Organizer Toolkit, https://climathon.climate-kic.org/en/be-an-organiser/, in particular the Playbook.
[148] See Organizing a Green Hackathon http://www.greenhackathon.com/organizing-a-green-hackathon/. The platform also suggests to read The Hack Day Manifesto https://hackdaymanifesto.com/.

value scale ("not at all" to "very much"). The confront between CH and GH organizers/partners was oriented to understand the *transparency* of Climate KIC and Green Hackathon Platform in communicating goals and underlying values of the formats, and the degree of independence of the local organizers/partners from Climate KIC and Green Hackathon Platform (promoters of the format/event) in choosing topics and challenges, and being able to set goals and develop the event, according to local or personal needs (see Chart 15 to18).

My organization has been informed of the promoter's initiatives and ideas regarding the topic of the event/challenge
Climathon® *

● Not at all	3.2%
● Enough	38.7%
● Not much	6.5%
● Very much	51.6%

My organization has been informed of the promoter's initiatives and ideas regarding the topic of the event/challenge
Green Hackathon

● Not at all	33.3%
● Enough	33.3%
● Not much	33.3%
● Very much	0.0%
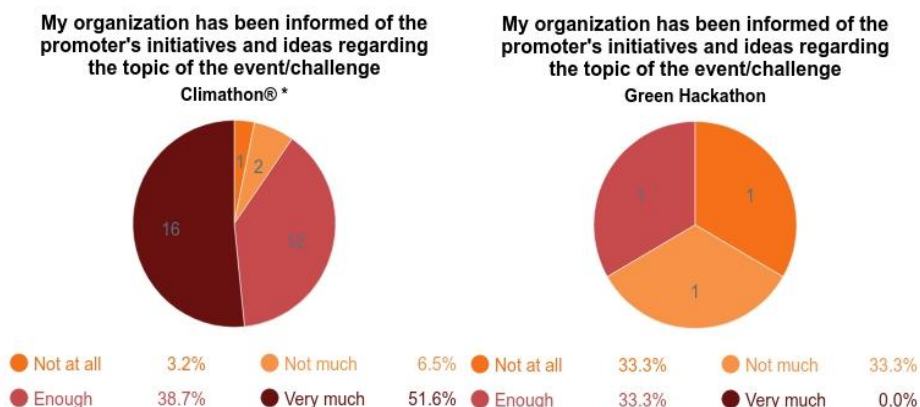
Chart 15: Answers regarding the degree of transparency of the platform with regard to the organizers of Climathon event (left) and Green Hackathon (right)

My organization has been consulted about the topic of the event/challengeof the event / challenge
Climathon® *

● Not at all	12.9%
● Enough	25.8%
● Not much	12.9%
● Very much	48.4%

My organization has been consulted about the topic of the event/challengeof the event / challenge
Green Hackathon

● Not at all	33.3%
● Enough	66.7%
● Not much	0.0%
● Very much	0.0%
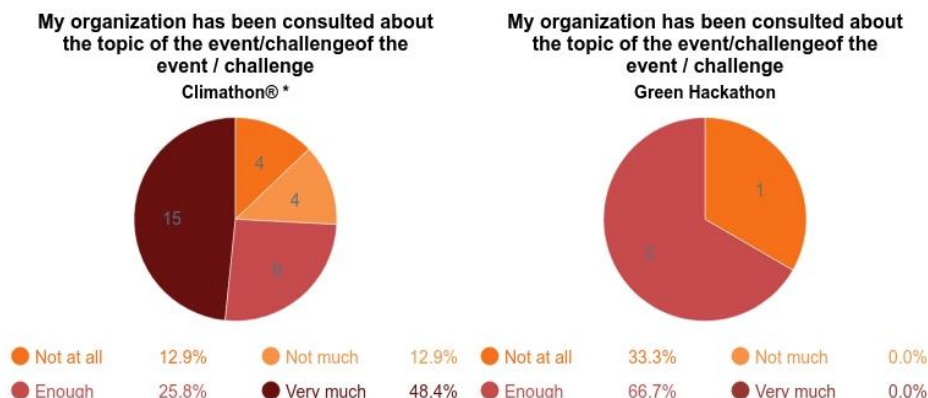
Chart 16: Answers regarding the degree of independence of the organizers of Climathon event (left) and Green Hackathon (right) with regard to the platform

My organization was involved in proposing and defining the theme of the challenge
Climathon® *

● Not at all	6.5%
● Enough	22.6%
● Not much	0.0%
● Very much	71.0%

My organization was involved in proposing and defining the theme of the challenge
Green Hackathon

● Not at all	33.3%
● Enough	33.3%
● Not much	0.0%
● Very much	33.3%
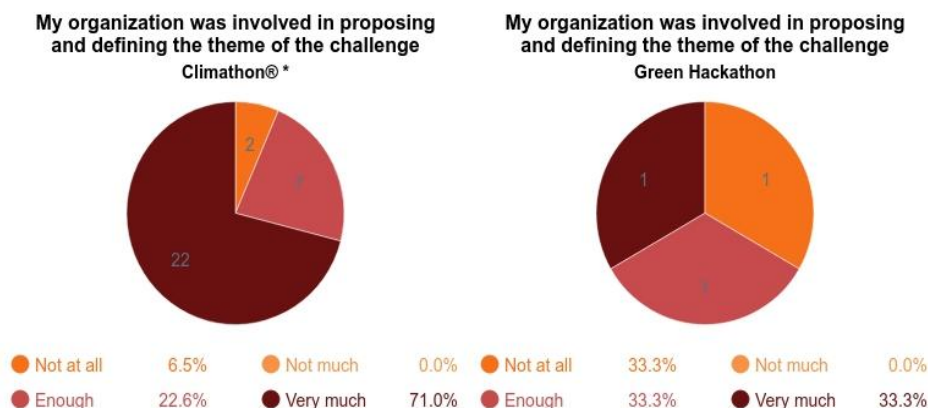
Chart 17: Further answers regarding the degree of independence of the organizers of Climathon event (left) and Green Hackathon (right) with regard to the platform

My organization has collaborated to the development and outcomes of the event/challenge
Climathon® *

My organization has collaborated to the development and outcomes of the event/challenge
Green Hackathon

● Not at all	6.5%	● Not much	22.6%
● Enough	16.1%	● Very much	54.8%

● Not at all	33.3%	● Not much	0.0%
● Enough	33.3%	● Very much	33.3%
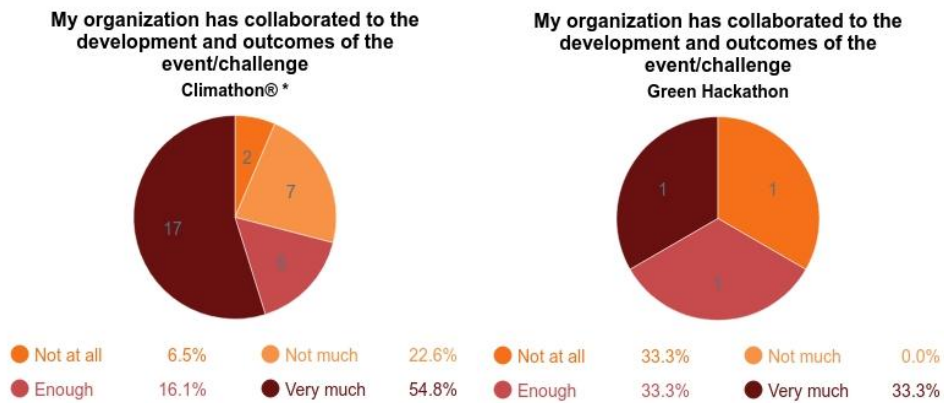
Chart 18: answers regarding the level of collaboration to the event development and outcomes, of the organizers of Climathon event (left) and Green Hackathon (right)

The results show that CH organizers/partners consider that Climate KIC platform **was very clear** (compilers agree 52% very much and 38% enough with the statement) **in communicating their ideas and values** connected to the format/event. CH organizers/partners agree also that they were adequately consulted (48% very much and 26% enough) about the topic (in general, climate change effects and mitigation/adaptation) and **strongly involved** (71% very much) in proposing and defining the challenge. CH organizers/partners consider also **adequate** (55% very much and 16% enough) **their level of collaboration to the event development and outcomes**. For GH the small number of answers makes it difficult to evaluate[149].

For what concerns the possibility to *fully express their positions and ideas* within the events, the results show (see Chart 19) that for CH compilers this possibility was adequately ensured (40% enough, 40% very much), while for GH it is not possible to draw conclusions.

The organization of the event/challenge made it possible to fully express the ideas and positions of my organization
Climathon® *

The organization of the event/challenge made it possible to fully express the ideas and positions of my organization
Green Hackathon

● Not at all	3.3%	● Not much	16.7%
● Enough	40.0%	● Very much	40.0%

● Not at all	33.3%	● Not much	33.3%
● Enough	0.0%	● Very much	33.3%

Chart 19: Answers regarding the degree of independence of the organizers of Climathon event (left) and Green Hackathon (right) within the event with regard to the platform

Concerning the *relevance* of the chosen challenge in relation to the organization and to the

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[149] Again, it is necessary to consider that the number of compilers of GH events is very small compared to CL, but still the charts have been included to understand the nuances of differences between the two formats.

(environmental, social and cultural) local context, results show (see Chart 20) as well, a strong agreement with the statement, both for CL than for GH organizers/partners, highlighting that the chosen challenges are considered priorities both for the organizations, than for the local context.

The proposed challenge is relevant to my organization
Climathon® *

The proposed challenge is relevant to my organization
Green Hackathon

⬤ Not at all	6.7%	⬤ Not much	0.0%
⬤ Enough	33.3%	⬤ Very much	60.0%

⬤ Not at all	0.0%	⬤ Not much	0.0%
⬤ Enough	0.0%	⬤ Very much	100.0%
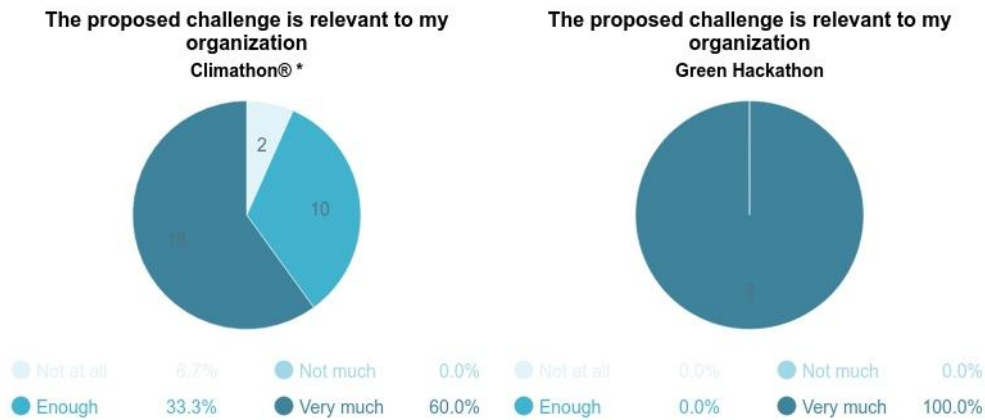
Chart 20: Answers regarding the relevance of the challenge topic for Climathon organizers (left) and Green Hackathon (right)

The proposed challenge is a priority for the context (environmental social cultural) in which it is inserted
Climathon® *

The proposed challenge is a priority for the context (environmental social cultural) in which it is inserted
Green Hackathon

⬤ Not at all	0.0%	⬤ Not much	0.0%
⬤ Enough	33.3%	⬤ Very much	66.7%

⬤ Not at all	25.0%	⬤ Not much	0.0%
⬤ Enough	25.0%	⬤ Very much	50.0%
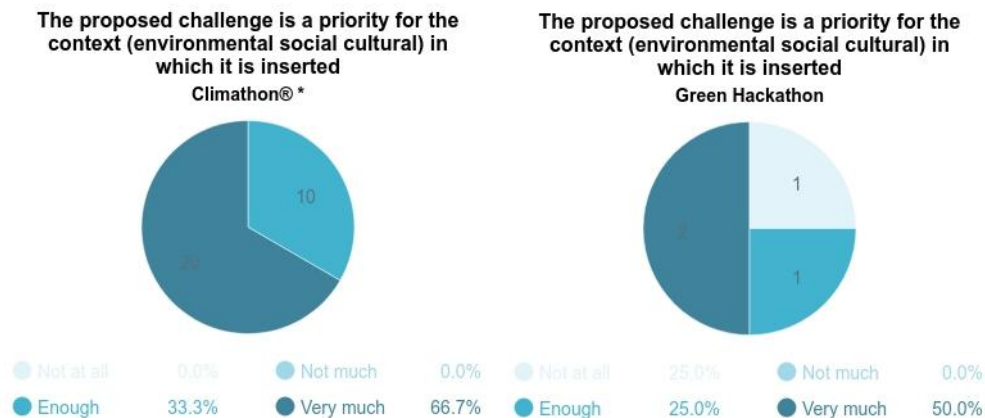
Chart 21: Answers regarding the importance (priority) of the challenge topic for the local context for Climathon organizers (left) and Green Hackathon (right)

These considerations are reflected in the answers to the question "If your organization has contributed to define the topic/challenge of the event, based on what priority the topic was chosen?" (see Chart 22). The answers show challenges were chosen in accordance to local **political strategies or community needs based on "previous participatory process with citizens and stakeholders", plus for "experimentation"**. "Other" answers were: "priority of city/major issues", "together and in discussion with the partners we made this decision", "regarding the need of our local community", "citizen concern with the subject and municipality priority, political and operational in the city", "esigenze del territorio" ("local needs", my translation), "climate relevance and financial support linked to the challenges". For GH answers were "experimentation", "previous participatory process with citizens and stakeholders" and "my organization has not helped to define the theme of the event/challenge".

Based on what priority the topic was chosen
Climathon®

- Political choice — 29.2%
- Company choice — 12.5%
- Previous participatory process with citizens and stakeholders — 25.0%
- Experimentation — 25.0%
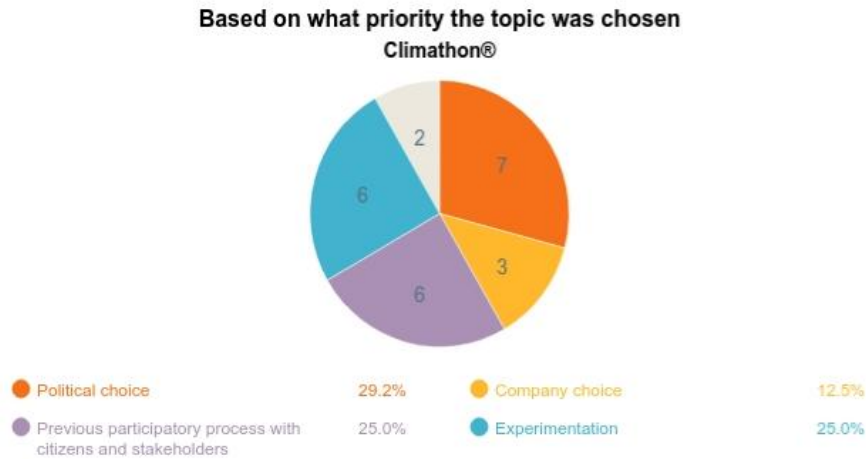
Chart 22: Answers regarding the challenge choice based on priorities for Climathon organizers

Similar statements were submitted to participants (see Chart 23). The results (all for CL, since the online survey did not receive answers by GH participants) show that while the proposed challenge was **very much relevant to their interest** (very much 63,6%; not surprisingly since the format is voluntary and attracts participants based on their interest), **it was not necessarily considered a priority for the local context** (63,6% enough). This difference of views should be further explored, and in **an ideal process could be improved by opening the possibility for participants to suggest possible topics** or challenge before the event.

The proposed challenge is relevant to my interests
Climathon®

The proposed challenge is a priority for the context (environmental, social, cultural) in which it is inserted
Climathon®

- Not at all — 0.0%
- Not much — 0.0%
- Enough — 36.4%
- Very much — 63.6%

- Not at all — 0.0%
- Not much — 0.0%
- Enough — 63.6%
- Very much — 36.4%
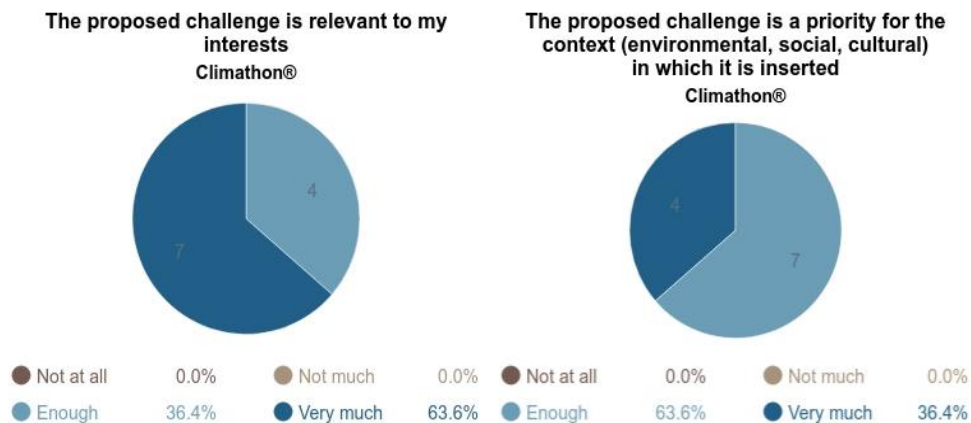
Chart 23: Answers regarding the relevance of the challenge topic (left) and the importance (priority) for the local context (right) for Climathon participants

P and R Comparative Assessment Table

The survey reveals a **good independence** of the organizers, for both CL and GH, from the promoting platforms, concerning in general organization of the event, and the choice of the **specific challenges, which result** for the large majority as being **based on local needs** and priorities. However for CL the format guidelines are about to become more strict in future

editions, due to its propertary format.

The platforms resulted also **very clear in communicating with transparency their objectives and values** to organizers and partners, that were **adequately consulted and assisted** in setting local challenges and development of the event.

The **independent process**, **clear objectives and inclusive process** (at least in the confront of organizers and partners), is thus coherent with overall principles of effective participation (Wilkox 1994, Bishop nd., Bishop 2015).

In the participants opinions, while the challenges were considered **relevant to their interest**, they however held that the challenges were necessarily **not a priority for the local context**.

This difference of views should be further explored, because **fundamental for** Westley et al. (2013), point 4 "**Building trust, legitimacy and social capital**", with particular regard to "mediating between the [ojectives of] the organization and the broader public", and **to ensure a more inclusive process** (Overall principles of effective participation Wilkox 1994, Bishop nd., Bishop 2015), contributing to satisfy the same objective of building successful ecosystem stewardship.

Furthermore, it highlights the "opposing contradiction" between participatory action and ecological dimensions (Hester 2007) and different perception among actors, which must be mediated with regard to Biggs et al. (2012), Stockholm Resilience Center (2014), P3 "Manage slow variables and feedbacks".

In an ideal process, this aspect could be improved by **opening the possibility for participants to suggest possible topics** or challenges before the event, taking as an example Jungk's "Future Workshops" which aimed at "turning the affected into the involved" (Jungk and Müllert 1987).

Resource base provided, outreach channels and methodologies of engagement

Abroad, for what concerns CL events, only 50% of the organizers compilers had provided participants with a supplementary *resource base of knowledge* regarding the challenge context or topic, by organizing a preparatory event for the participants (2) or providing participants with preparatory material (6), or both (4).

In Italy, it resulted that more CL organizers had organized a preparatory event for the participants (1), had provided participants with preparatory material (3), or both (3) for a total of 65% providing participants with a larger resource base of knowledge.

All GH events had organized a preparatory event for the participants (as confirmed by interviews, see Par. 5.4) and provided participants with preparatory material to understand the challenge context or topic.

Participants were also asked to assess whether they were provided with the necessary information's to understand the topic and the objectives of the event, results show that compilers agree quite strongly (very much 54,5%, enough 27,3%).
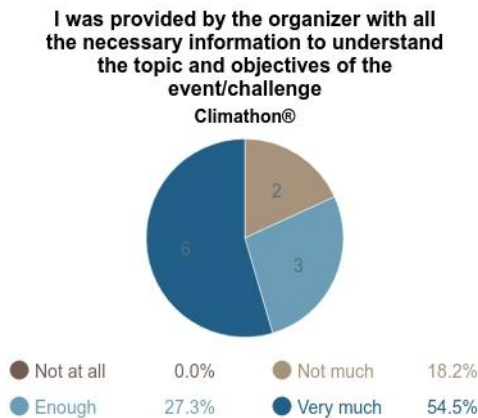
Chart 24: Answers regarding the adequacy of resource base for Climathon participants

This answer is confirmed also by CL organizers/partners answer that strongly agree (very much 53,3%) they have provided the necessary information to allow participants understand the topic and objectives of the event.
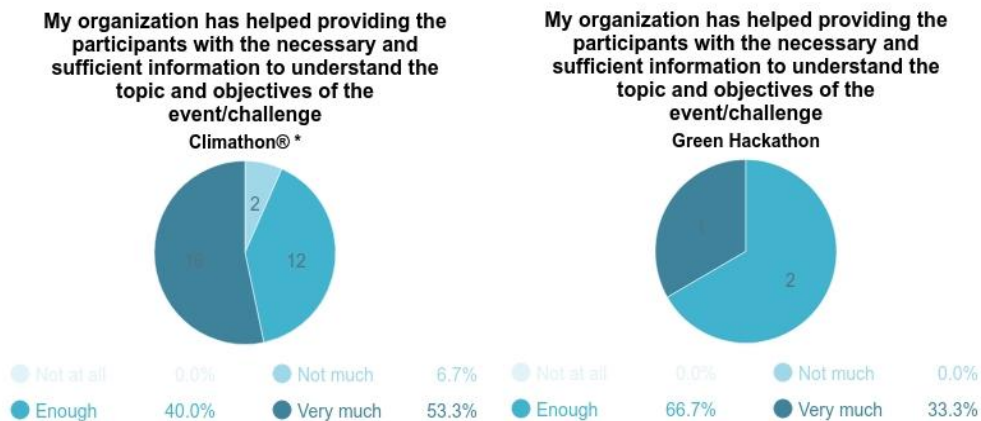
Chart 25: Answers regarding the adequacy of resource base provided to participants, for Climathon (left) and Green Hackathon (right) organizers

Finally, participants confirm that they were informed (81,8% affirm they were) about how the possible outcomes of the event would be used by organizers and partners.

I have been informed of the possibility and how the outcomes of the event/challenge will be used by the organizer or the partners
Climathon®

● Yes   81.8%   ● No   18.2%
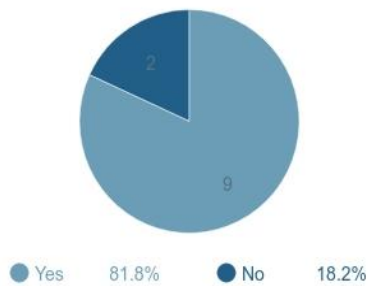
Chart 26: Answers regarding the degree of transparency of the organizers with regard to the participants of Climathon event

The combination of the two point of views with this last answer, allows to assess an adequate degree of transparency of the process for CL.

For GH this was not possible, since there were answers only by organizers.

For what concerns the *outreach channels* (see Chart 27) used by organizers to reach potential participants, the majority of participants were informed about the event through internet and the social networks, but also through "direct invitation by organizers and institutions" (3) or "website's newsletters or online magazines".

Indications on the importance of the outreach channels to improve the process inclusiveness are offered by the participants, in the "propositive section" of the online survey, as will be described later in this report.

How were you informed of the event?
Climathon® - Participant

● Internet   36.8%   ● Social network   36.8%
● Direct invitation by   15.8%   ● Newsletter or online   10.5%
  organizers and institutions   magazine
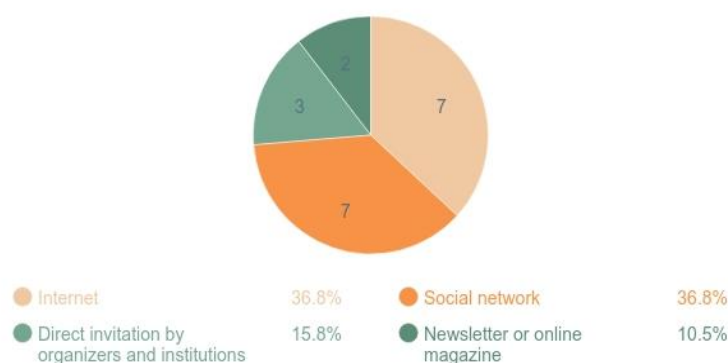
Chart 27: Answers regarding the outreach channels of Climathon event

For what concerns the *methodologies of engagement* employed during the events, participants opinions are divided about whether the management methods allowed them to fully express their ideas or positions within the group (27,3% not much, 45,5% enough, 27,3% very much). Participant answers demonstrate that the organizers efforts to offer a variety of participatory workshops and tools during the event, was not successful. One explanation could be related to

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the low number of partners in the events with consolidated or professional experience in the management of participatory processes, as highlighted by the 100 Events database.

The management methods of the event
allowed me to fully express my ideas and
positions within the group
Climathon®

● Not at all	0.0%	● Not much	27.3%
● Enough	45.5%	● Very much	27.3%
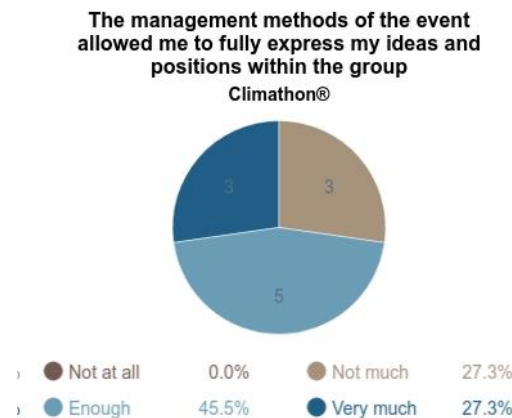
Chart 28: Answers regarding the adequacy of engagement methodologies for the participants, provided during the Climathon event

This aspect could be improved by having more moments managed by professional facilitators and making use of a more variegated range of participatory activities within the event.

P and R Comparative Assessment Table

The information gathered among the organizers (for both CL and GH) together with the participants' opinions (for CL), demonstrates a good accomplishment of one the overall principles of effective participation (Wilkox 1994, Bishop n.d., 2015) or providing an **appropriate knowledge base**, fundamental also to P4 "foster an understanding of SESs as CASs" (Biggs et al. 2012, Stockholm Resilience Center 2014).

Concerning the **outreach channels** enacted by organizers of both formats, the use of internet and direct invitations represents a limit with regard to several principles of participation and for building resilience in SESs (Biggs et al. 2012, Stockholm Resilience Center 2014) such as P1 "maintain diversity and redundancy", P2 "manage connectivity" and "broaden participation", especially if in the case of CL, since the general objective of the format is to raise global awareness about the topic and reaching new potential partners or stakeholders.

For what concerns the methodologies of engagement, participants opinions are divided about whether the management methods allowed them to fully express their ideas or positions within the group, denoting that the organizers efforts to offer a variety of participatory workshops and tools during the event, was not successful.

The **ineffectiveness of engagement methodologies** during the event should be addressed to foster Westley et al. (2012) point 1 "Facilitating knowledge and building and utilization, through

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offering managed/facilitated activities able to "generate and integrate a diversity of ideas, viewpoints and solutions", and point 5 "facilitate the developing of (social) innovations" point 5), as well as P2 "manage connectivity" (Biggs et al. 2102, Stockholm Resilience Center 2014).

One explanation for these weaknesses, could be related to the low number of partners in the events with consolidated or professional experience in the management of participatory processes, as also highlighted by the One Hundred Events Database.

Outcomes, follow-up process and links to other processes of local resilience planning

In the Online survey compilers, both organizers/partners and participants (in this case only if they resulted "winners"), were asked if they had the possibility to continue to collaborate or develop the winning idea, and how did the development of the winning idea continue.

For CL organizers/partners, for the 21 Climathon®2018 editions abroad described in the survey, the answer was Yes (9) and No (12); for the 10 Climathon®2018 editions in Italy, the answer was Yes (5) and No (5); for the 12 Climathon® 2017 editions abroad the answer was Yes (4) and No (9); for the 6 Climathon® 2017 editions in Italy, the answer was Yes (2) and No (4). The trend among the two editions nevertheless shows some positive progression in the further development of ideas and solutions emerged during the events.

For the participants of the 8 Climathon® 2018 editions abroad, among 5 winners, the answer to the question *"did you have the chance to continue collaborating or developing the winning idea?"* was Yes (3) and No (2); for the single Climathon® 2017 edition abroad, there was no answer, the participant was not among winners; for the 2 Climathon® 2017 editions, the answer was Yes (2).

For GH organizers/partners, for the 3 Green Hackathon to the question *"Has your organization been able to continue to collaborate or develop the winning idea?"* the answer was No for all compilers, and for all editions (2017 and 2016).

For what concerns the ways in which the development of the winning ideas has continued, the compilers refer that it continued through "independent development" (namely for 15 CL and 2 GH events) in line with the organizers and partners answer's about their inability to continue collaborating on the idea, "business incubation program" (for 8 CL and 2 GH events, and for 2 CL participants), "opening of a discussion table" (for 6 CL events), "Private Public Partnership" (for 5 CL events).

Since compilers were free to choose more answers to this question, total answers do not correspond to the total number of events, and the results must be assessed as a combination of answers. In particular, when the development continued through independent development, this was often in combination with a business incubation program provided as a prize from the

organizers or partners, instead collaboration among partners and participants, happened mostly in the case of "opening of a discussion table" or establishing a "Public Private Partnership". In few other cases, the results were directly used by the organizers, as in the case of CL Coventry (UK) 2018 edition, where there was "information given to the local council to include in their Air Quality Action Plan".

In the cases where the continuation of the development was not possible, these include reasons such as "Incubation programmes were not accepted by the winning teams. Development of ideas depend heavily on the team dynamics and the time the team members can spare for developing their idea further which is difficult for most people studying or working", but nevertheless "This team was inspired to go on new or other projects in the field of sustainable/ social innovation and founding. Without the Climathon® I guess they won't be that motivated in these topics".

In the cases where the continuation of the development was possible, compilers describe some concrete applications (some still under development at the time of the survey) such as "experimentation proposal in Ferrara for the CLIMB solution implemented in Trento and Rovereto for smart pedibus in primary schools" (CL Ferrara 2017 edition, within the Progetto Urban Challenge fase II CLIMB), "the Winning Idea Team presented an Idea to the City Council to co-produce with the Beer Companies a Reusable Cup for the City's Festivities - Santos Populares, and future daily usage. To avoid disposable plastic glasses thrown in the streets" (CL Lisbon 2018 edition), and an "educational package to increase risk culture" (CL Orleans 2018 edition).

In one case[150] the development seemed much more structured in term of connection with local and multi-level planning and governance system (CL Lagos 2018 edition), providing guidelines and an overall strategy for the outcomes.

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[150] "1. DECENTRALIZATION OF ACTIVITIES A social structure for street associations should be recognized under LAWMA [n.d.a. Lagos Waste Management Authority]. A hierarchical order of waste generation, transportation and management should be established.
This will be structured in the following order; i. The State Government ii. The Local Government iii. Street Associations
- The State Government is to be in charge of Laws and Regulations (LR) including some aspects of waste management.
- The Local Government should be equipped enough to tackle waste of any magnitude and capacity of staff should be built to cater for same.
- Street Associations these are communities units with members in charge of monitoring and recording the development within that area. Feedback would be given to the larger body on the details for the type of waste generated from households, the number of occupants in each household.
2. PLANNING BEFORE DEVELOPMENT Development in Lagos State is ahead of its Planning. This is one of the reasons why data collection on waste management has not been so easy. The government has not been able to capture the rate at which waste is being generated in the State. With adequate planning and development control details on waste management, this will be easily remedied. The following is hereby proposed;
- A proposed model plan for areas in the state; an estimate of the population capacity of the project must be stated and response to details of waste management facilities should fit the population needs of the plan.
- Spatial information on existing locations in the state must be updated to the master plan in order for new development to be tracked on the systems with the help of GPS and Waste Management APP (WMA).
- A Waste Management Master Plan (WMMP) should be created for the state in order to make informed decision to monitor and track information related to waste that is being generated."

On the participant side, the possibilities of continuation included the development of a "phasmatographic analysis of fish freshness (combination of two projects' results […] in the relevant Greek Operational Program [and] going through different development programs (incubators etc), participating in various events & competitions (Climate Launchpad etc). Now we are in the Climate-KIC accelerator[151]" (CL Athens 2018 edition), or, more independently, from the hosting city, as happened for "an app mockup for peer-to-peer energy trading platform for future energy prosumers. They are now on board in EIT Climate-KIC Accelerator programme at the stage level 1" (CL Vilnius 2018 edition); while in the case of non continuation "we didn't win the main prize, but we were awarded. We had few meetings later, a meeting with Tallinn Transportation Agency, but afterwards it was difficult to continue the project"[152](CL Tallin 2018 edition).

Even in the cases in which CL organizers or participants had the chance to continue collaborating or developing independently the idea, the implementation of the solution was not possible in the large majority of cases. Among reasons for this, were that "winning ideas were either not the competence of the municipality; interesting, but not feasible; or ideas that were already under implementation", and "after several insights, the idea proved to be unworkable".

As partial conclusion, the implementation of the solutions proposed by participants and teams, appears to be the most weak aspect, both for CL and for GH. Nevertheless, as one of the compilers says "This team was inspired to go on new or other projects in the field of sustainable/social innovation and funding. Without the Climathon® I guess they won't be that motivated in these topics".

P and R Comparative Assessment Table

The implementation of the solutions proposed by participants and teams, appears to be the most weakest aspect of the actual format of these events, both for CL and for GH.

The **lack of a follow-up process**, with no provision for subsequent meetings to further discuss the ideas that emerged within the event with partners and possibly other stakeholders, represents a problem with regard to Westley et al. 2013 fourth strategy (skill) "building trust, legitimacy and social capital" and to overall principles of effective participation (Bishop nd., 2015), in particular, of transparency, clear objectives and working towards shared results.

Low commitment towards outcomes by partners and organizers can produce the effect of participants' unwillingness to participate in future events and to, therefore, loose trust in the

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[151] Inserisci breve spiegazione programma di Climate KIC
[152] This case is very similar to my personal experience with CL Bologna 2017 edition, as described in Par. 5.5.

organizing institutions (failing on point four "Building trust, legitimacy, and social capital", in Westley et al 2013, Table 1), and with a subsequent weakening of vertical social capital (failing point sixth "Preparation, mobilization for change", ibid.)

This aspect highlights a fundamental issue, the **lack of an overall process** connected and able to include the outcomes of the CL and GH event, thus contradicting Biggs et al. (2012), Stockholm Resilience Center 2014, P5 of Encourage learning" and principle 3 "Manage slow variables and feedbacks", in particular.

These observations denote a general undervaluation of the importance of "fostering resilience within SESs as CASs" through principle 7 "Promoting polycentric governance" (Biggs et. al 2012), in order to ensure the **effectiveness of the outcomes**. To achieve this, the overall process must be **more carefully planned**.

Levels of participation as experienced (keywords)

The evaluation of the "degree of participation" of CL and GH events, represents the core objective of the survey, within the present research, and while the evaluation is based on all the questions related to the overall principles of effective participation (Wilkox 1994, Bishop nd., 2015) submitted to compilers, the specific analysis through the tool of the "Participation evaluation frame" (my elaboration, based on Bishop 2015) and related keywords, is very useful to draw a general assessment and comparison between the two format, and other several elements.

Referring to the ladder of the UK LTD Partnership Organization (1999) then updated in the Participation Framework (Bishop 2015), which recognizes 4 levels of participation – informing, consulting, involving or rather deciding together, dialogue or rather acting together – and to the underlying principles of effective participatory process" (Bishop nd., 2015), participants were asked to choose the *4 keywords* that better described their experience during the event. The keywords and the corresponding levels of participation are listed in the following Participation evaluation frame (my elaboration and evolution, based on Bishop 2015) table:

Table 18: The Participation Evaluation frame and related keywords (my evolution, based on Bishop 2015)

Dialogue/Acting Together	Consulting
Collaborating	Contributing
Realizing	Discussing
Co-managing	Connecting

Learning Listening Socializing	Sharing Co-decision making Co-designing
Informing	**Involving/Deciding together**
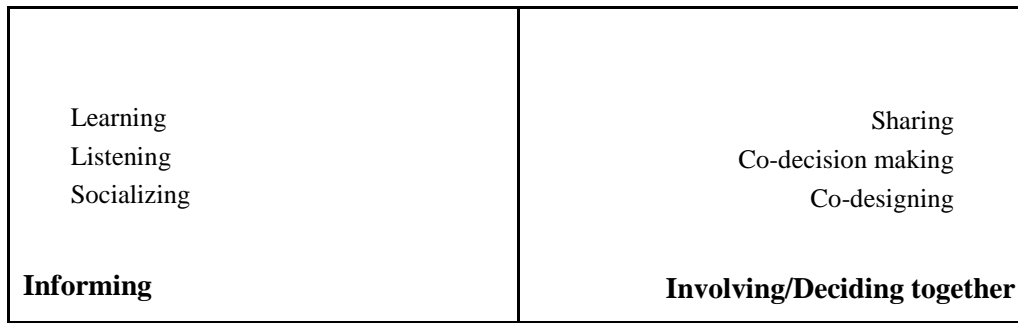
Keywords in the survey were programmed to appear to participants in random position.

The results are expressed in the following charts 29, 30 and 31 for CL, and in the chart 32 for GH. The first kind of visualization (vertical bar chart) allows to appreciate cumulatively the main participatory aspect, as perceived by compilers and experienced during the event, or better said, to identify the main "level(s) of participation" activated within the event/format.

The second kind of visualization (horizontal bar chart, is useful instead to read the weight of the specific activities within the "level of participation" activated, as perceived by compilers, since key work for each level are clearly grouped and presented.

Participation degree Climathon® - Organizer/partner
based on Participation Framework (Bishop 2015)
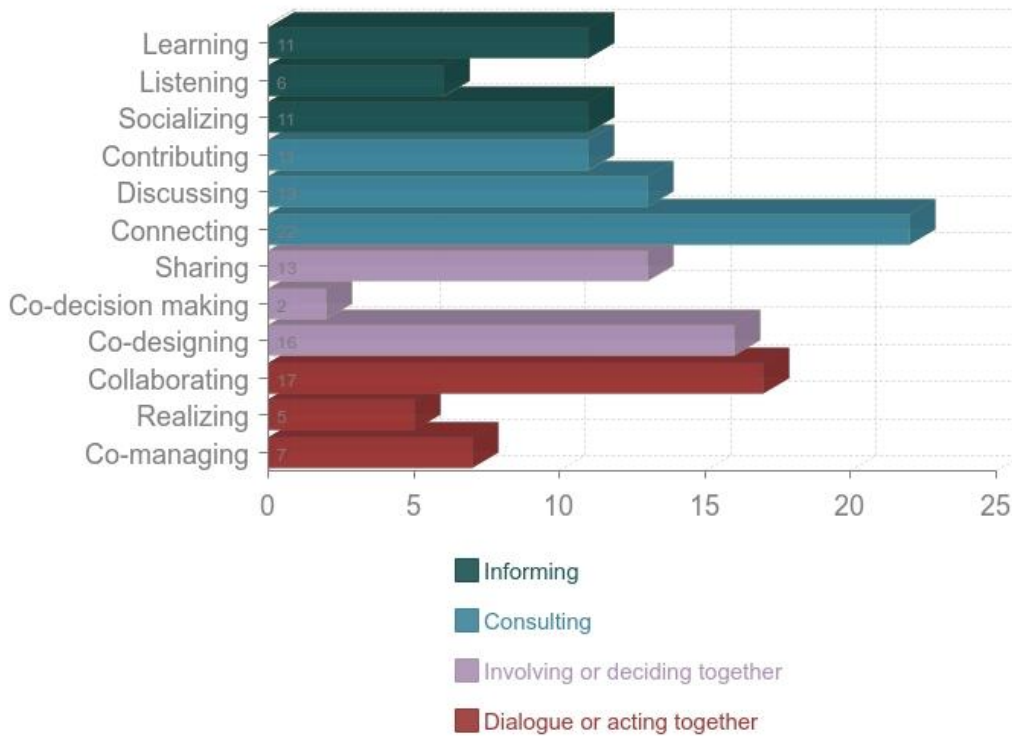
Chart 29: Degree of participation of Climathon event as perceived by organizers, in the two different visualizations

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Participation degree Climathon® - Participant
based on Participation Framework (Bishop 2015)

Participation degree Climathon® - Participant
based on Participation Framework (Bishop 2015)
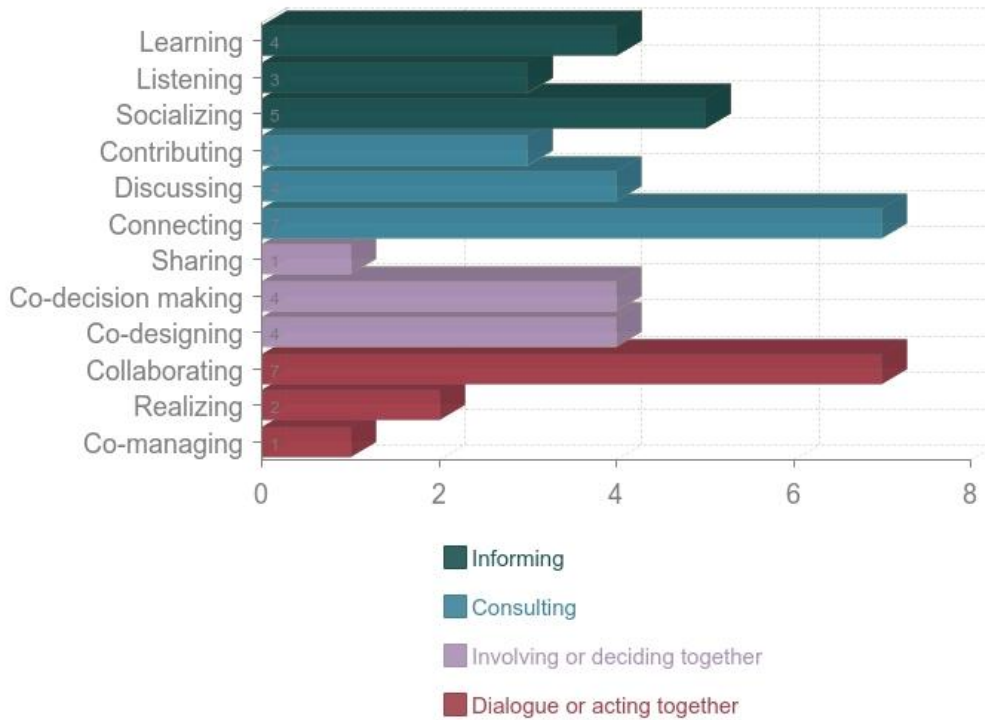
Chart 30: Degree of participation of Climathon event, as perceived by participants, in the two different visualizations

In CL, the combination of the two "perceptions" (which is more an "intention", in the case of the organizers/partners) gives the following result (Chart 31):

Participation degree Climathon®
based on Participation Framework (Bishop 2015)

Participation degree Climathon®
based on Participation Framework (Bishop 2015)
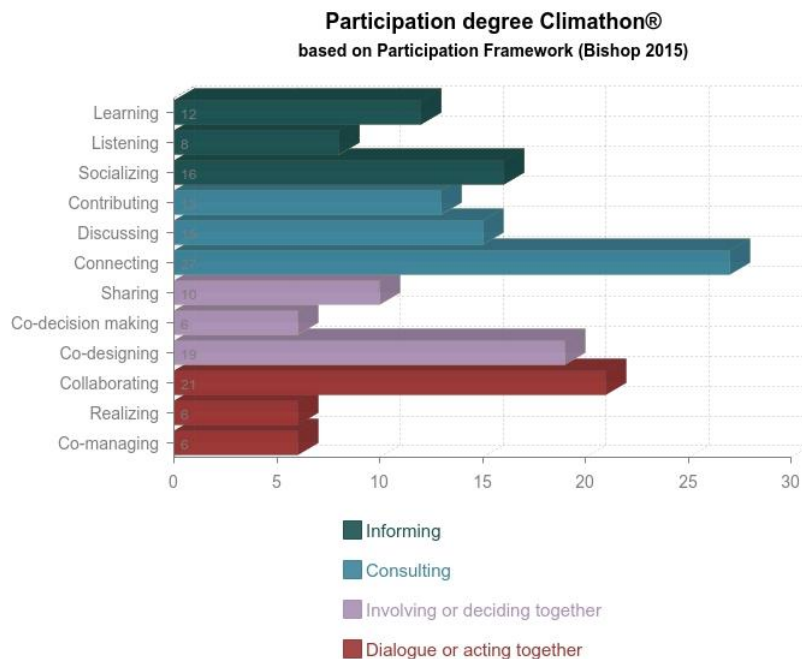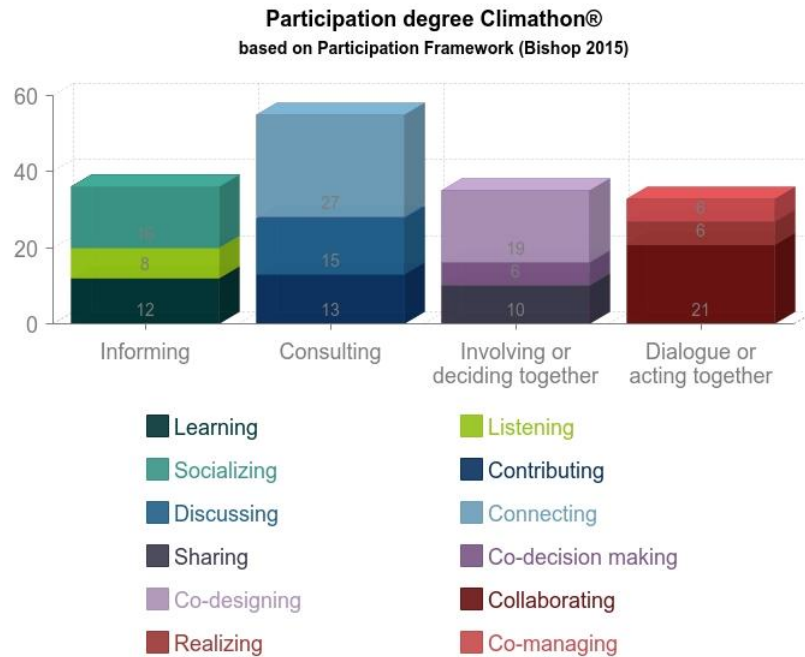
Chart 31: Degree of participation of Climathon event, as perceived by organizers and participants together, in the two different visualizations

The analysis of the answers of CL organizers/partners and participants and of their combination, allowed to draw the following considerations.

Considering the two perceptions (organizers and participants) as combined in Chart 31, for the CL event/format is it possible to say, at a first look, that it is mainly perceived as a "consultation"

event, where to discuss and gather input and to find help (contributing) to solve the challenge. The other three levels "informing", "involving or deciding together" and "dialogue or acting together" appear in fair consideration, denoting that compilers perceive that some "dialogue or acting together" level is activated within the event.

When we analyze the two separated perceptions (Chart 29 and 30), in emerges that, in proportion, it is mainly the organizers/partners that perceive (and conceive) the event as a "consultation" activity. This aspect is connected to the fact that the event could result in a "one-off engagement" activity (cfr. Table 1 A preferred levels framework (Bishop 2015, p.15), contradicting the general aim of CL to reach concrete "solutions".

Deepening the analysis with the second visualization (horizontal) in the two separated perceptions (Chart 29 and 30), we can notice that the single aspects that drive the results are distributed differently in the four levels and among participants and organizers/partners, highlighting the "sharing" and the "co-designing" aspect (for organizers/partners), and the "co-decision making" and "co-designing" (for the participants), in the "involving or deciding together" level; and the "collaborating" aspect for both participants and organizers/partners in the "dialogue or acting together" level. In particular, to be noted that the "co-decision making" level is much higher in proportion among participants, in comparison to organizers/partners.

Both participants and organizers/partners perceive high levels of "connecting" activities, in the "consultation" level. This perception is higher for organizers/partners in proportion that for participants, and this could to indicate that organizers perceive their role in the event, is to "connect" the different actors, possibly across scales ("vertical linking", cfr. Westley et al. 2013. Table 1, as in Par. 3.4) by offering speakers, experts and direct contact with other resources within the Administration and beyond, in the event's program. For participants the "connecting" activities, go hands in hand with the "collaborating" ones, as well as with the "socializing" activities, which denotes that networking activities highly occur within the event, at an horizontal level.

The analysis demonstrates higher numbers for participants in comparison to organizers/partners, in the "information" level (driven by their answers "learning" and "socializing") and in the "dialogue or acting together" level, because of many responses connoting a higher perception of "collaborating" in the event.

This different perception should be taken in high consideration by organizers who seem to underestimate the will of participants to be more active in the "co-decision" process, and therefore in "collaborating" to the outcomes.

For GH (see Chart 32), it was difficult to derive any kind of certain conclusion because of the

small number of surveys completed, all by organizers/partners. It seems that at least for those who completed the survey, that GH events are perceived more as a moment to "co-create", with higher numbers in "sharing" among the "involving or deciding together" level, in "collaborating" and "co-managing" among the "dialogue or acting together" level.

Further research would be necessary in this direction, the only thing I feel to add is that these results are in line with the "hackathon ethic" values, such as the "hands-on imperative" (Levy 1984) at the base of the GH format.
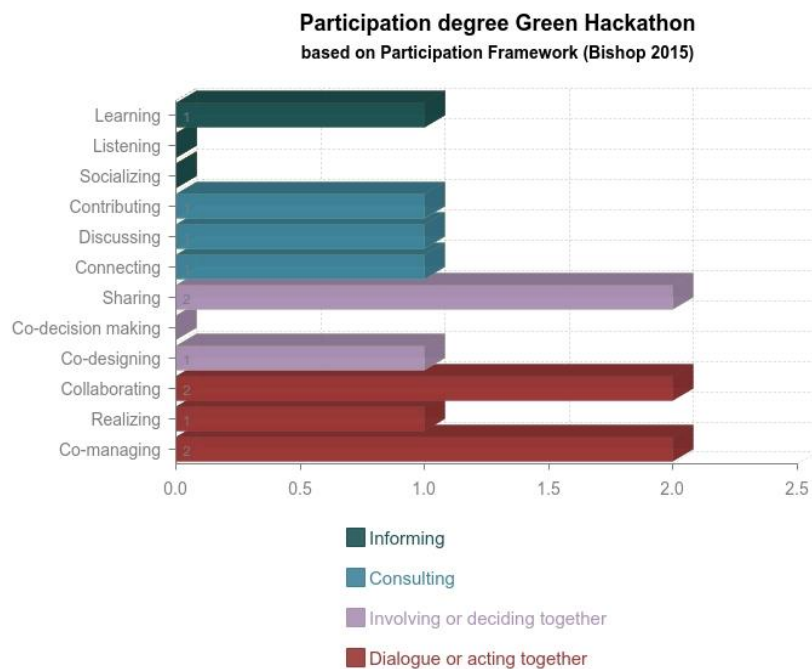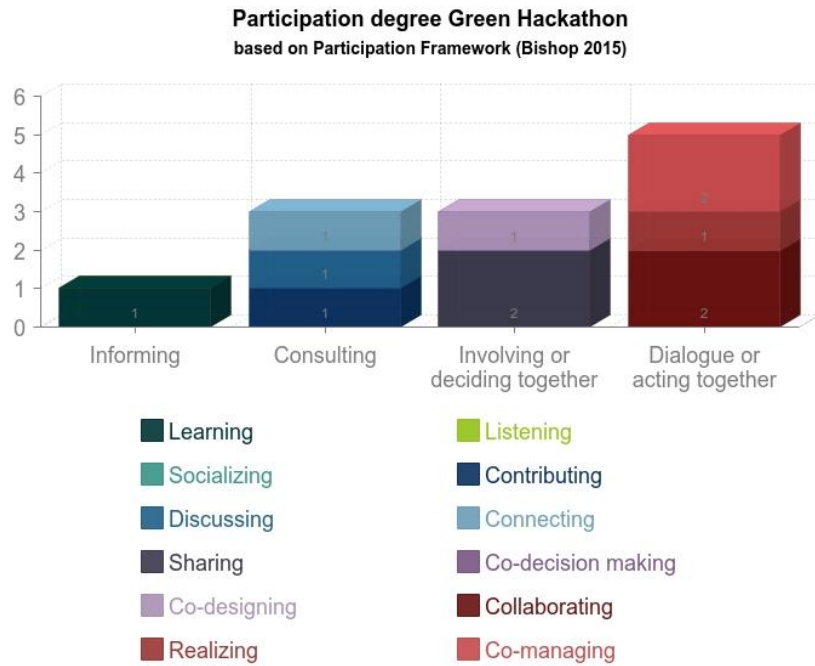
As explained in Chap. 3, the so-called "higher" levels in the ladder, don't necessarily need to be considered "better" (Bishop 2015), while a "good process" could and "even should include opportunities for different people to engage at different levels, in different times and on different aspects"(Bishop 2015, p. 10), to achieve "added value from bringing together skills, knowledge, information, power and so forth from a range of parties" (ibid. p. 13).

This consideration **leads to consider CL format as a positive evolution**, more balanced in terms of "levels of participation" activated, and as perceived by compilers.

P and R Comparative Assessment Table

Results show for CL, a **general activation of all "levels of participation"** (Participation evaluation frame, based on Bishop 2015) resulting in a **more balanced format** if compared to GH.

The difference **of perception** between organizers/partners and participants - organizers/partners conceive the event as a **"consultation"** activity, while participants perceive the event as a more **"collaborative"** format - denotes that organizing partners communicate a **certain level of possible co-decision making** within the event, which is subsequentially expected by participants, but could be deluded since not carefully programmed in the intentions of the organizers/partners.

The analysis of the key words confirms a **low commitment** (on the part of the organizers) towards the outcomes of the process (contradicting point four "Building trust, legitimacy, and social capital" in Westley et al. 2013, Table 1) since partners and organizers see their role mainly as **"connectors"** who create the conditions for actors to meet, **instead of as "facilitators"** who accompany and assist "working towards shared results" according to the overall principles of effective participation (Wikox 1994, Bishop nd., 2015).

The event itself being conceived as consultation activity, results in a "one-off engagement" activity (cfr. Table 1 A preferred levels framework (Bishop 2015, p.15), **hinders the general aim to reach concrete "solutions"** of CL, and therefore, strategically misses point 5 "Facilitating/developing (social) innovations" and 6 "Preparation, mobilization for change" (Westley et al. 2013, Table 1).

On the other hand, the analysis of the key words demonstrates that the event produces **high levels of horizontal networking activities**, in particular among participants, complying point third "Developing social networks" (Westley et al. 2013, Table 1), in particular by horizontally "Bridging, i.e. bring together similar and/or different groups to create momentum, gain support, and to react to various challenges", more than by vertical "Linking, i.e. communicate and engage

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with key individuals in different sectors, and to link across scales" (ibid.) which seems to not happen successfully, but remains an evident goal of organizers.

The analysis of the key words as connected to Seven principles for building resilience in social-ecological systems (Biggs et. al 2012, Stockholm Resilience Centre 2014, cfr. Par. 3.4. Table 7) show for CL some **strong points** and some critical issues. In particular, the overall format performs very well regarding in P5 "Encourage learning" (ibid.) as evidenced by the participants' perceptions of "co-designing" and "collaborating", and regarding P4 "Foster complex adaptive systems thinking" (ibid.) the high perception of "connecting" activities, even if with some limitations as highlighted before (difficulties in "linking" across scales, Westley et al. 2013. Table 1). Furthermore, high levels of perceived "connecting" activities, relate to P2 "Manage connectivity, while the highly perceived "socializing" format, appears to reflect P1 "Maintain diversity and redundancy" (ibid.). On the other hand, low levels in perceived activities of "co-decision making", "realizing" and "co-managing" represent a **critical issue** in the fostering of P7 "Promoting polycentric governance" and P3 "Managing slow variables and feedback". All of the above can possibly undermine P6 "Broaden participation" (ibid.).

Organizers/partners and participants indications to improve CL and GH events

This section presents the results of the "propositive" section that was also submitted to the participants and organizers/partners, to gather their indications on how to improve the effectiveness of the events, in terms of concrete results and progress and also in terms of inclusiveness, democracy, fairness, effectiveness and efficiency of the participatory process (Lorenzo 2002).

The results are meant to inform organizers, partners and in particular the promoting platforms (CL ang GH) with recommendations to improve the actual format, and will be included in the final recommendations given within the present research to urban institutions and Climate KIC, in Chapter 6.

The section was consequently organized in questions regarding factors that could influence inclusiveness, improve effectiveness (through the inclusion in the event process of further stakeholders or other subjects) and fairness (imagining which elements could help to better distribute costs and benefits among all actors). All factors were assessed through a qualitative value scale ("not at all" to "totally", with the option "I do not know").

For CL organizers/partners the factors that could influence a *greater inclusiveness* (see Chart 33) of the Climathon®/Green Hackathon events are tied considerably to a "different timetable" for the event development, possibly "spread over several days", with "more time available", but the

factors that could influence "very much" or "totally" the inclusiveness of the event are "different distribution channels" and the "involvement from the beginning of stakeholders in defining the challenge", and again, with "more time available". For GH it is not possible to give an interpretation.
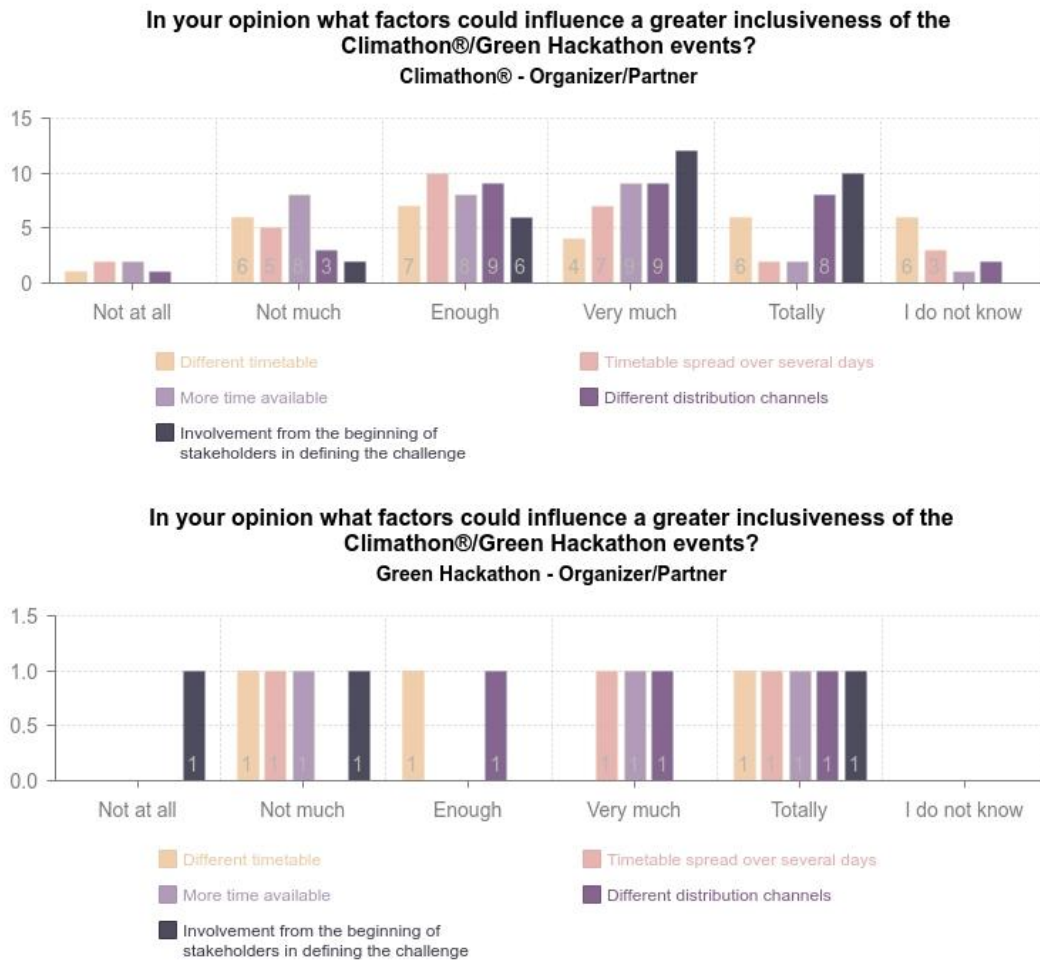
Chart 33: Factors that could improve inclusivity of Climathon (above) and Green Hackathon (under) event, in the opinion of the organizers

Participants instead, do not consider the possibility of a "different timetable" so influent as the "involvement from the beginning of stakeholders in defining the challenge", and suggest the use of "different distribution channels" as enough influent in improving CL events inclusiveness.

In your opinion what factors could influence a greater inclusiveness of the Climathon®/Green Hackathon events?
Climathon® - Participant

Chart 34: Factors that could improve inclusivity of Climathon event, in the opinion of the participants

To the question *"In your opinion, the presence of who or what could make more effective the results of the challenge?"* organizers/partners of CL events have answered: "more time", "more stakeholders" and "more information" which are considered important "enough", while the presence of the "community of reference for the specific challenge" is "very important", and the presence of "authorities in charge", "political decision makers" and "investors" could "totally" make the results of the challenge more effective, together with the prevision of "following meetings". For GH organizers/partners, the presence of "authorities in charge" and "political decision makers" is less important than the one of the "community of reference for the specific challenge" and the possibility of having "following meetings". The presence of "investors" too are seen as very much important, but not "totally".

In your opinion, the presence of who or what could make more effective the results of the challenge?
Climathon® - Organizer/Partner

It is interesting to note in the dataset (see All. Italy and Abroad) that for organizers/partners in cities abroad (12 answers) it is much more ("totally") important that "authorities in charge" are present during the development of the event, than for organizers/partners in Itlay (2 answers); same for "political decision makers" (abroad 13, while for organizers/partners in Italian cities, 2). This could denote that for Italian cities authorities in charge are regularly involved in the event, but could also denote low trust in the fact that the presence of political decision-makers will ensure taking into account the results of the event. I suggest further research in this direction.

For participants on the other hand, while the presence of the "community of reference for the specific challenge" is considered "very important", it is the presence of "political decision makers" and "investors" that could "totally" make more effective the outcomes of the challenge, denoting an entrepreneurship approach to the event.
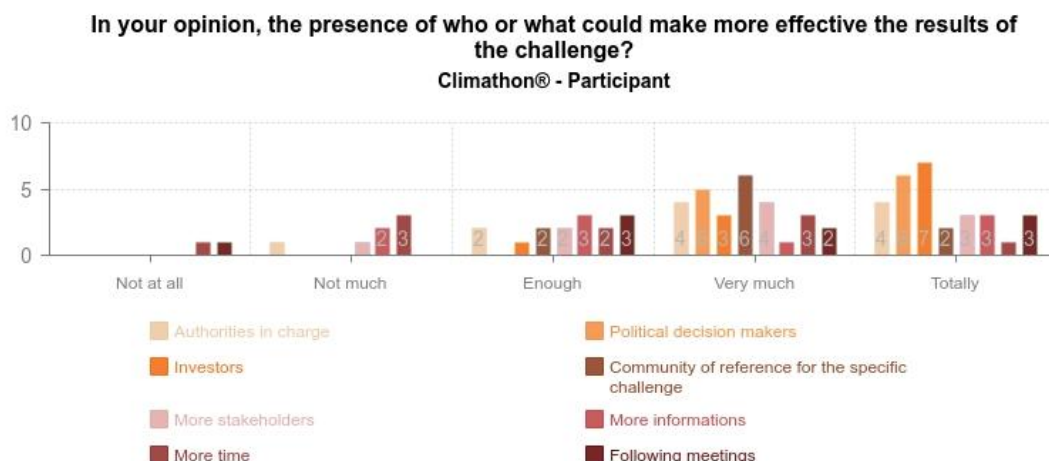
The final question posed to compilers was *"In your opinion, under what conditions would the participants wish to collaborate in the future with the organizer and the partners?"*. For organizers/partners offering "free training" (which many have actually done, but with not much

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final outcome, cfr. interviews in Par. 5.4).
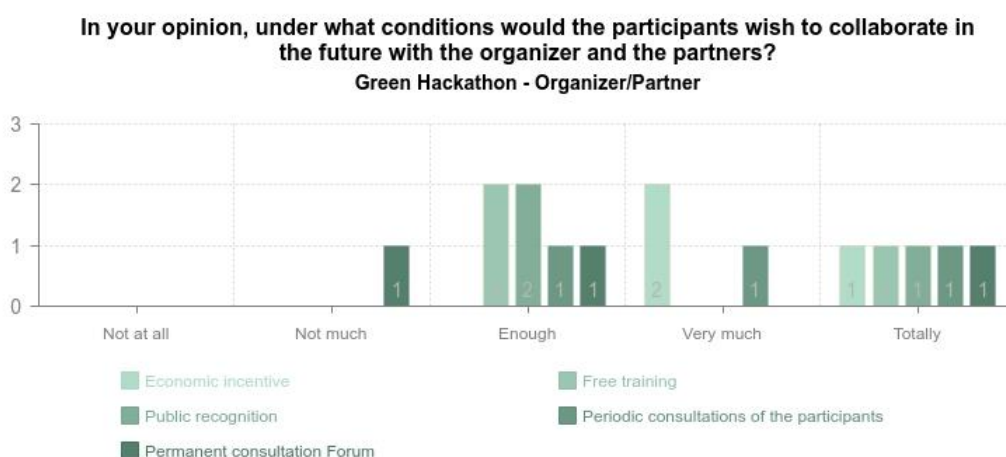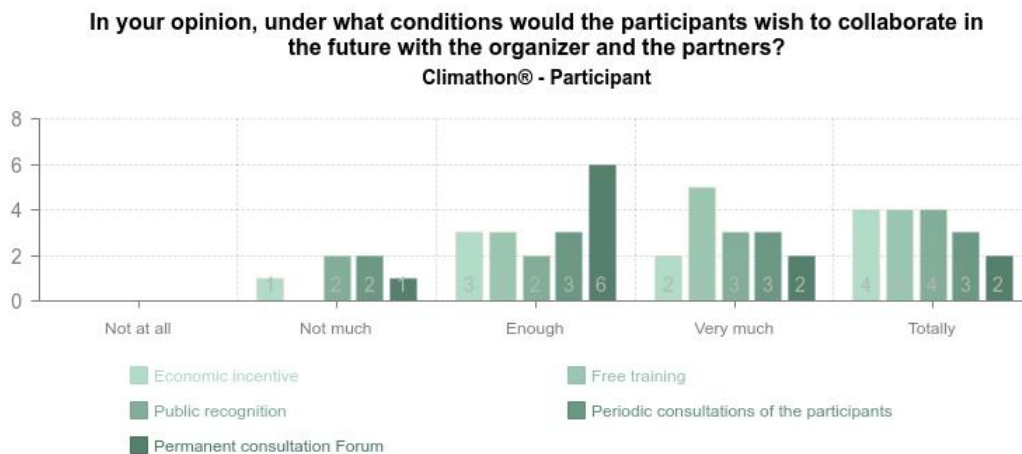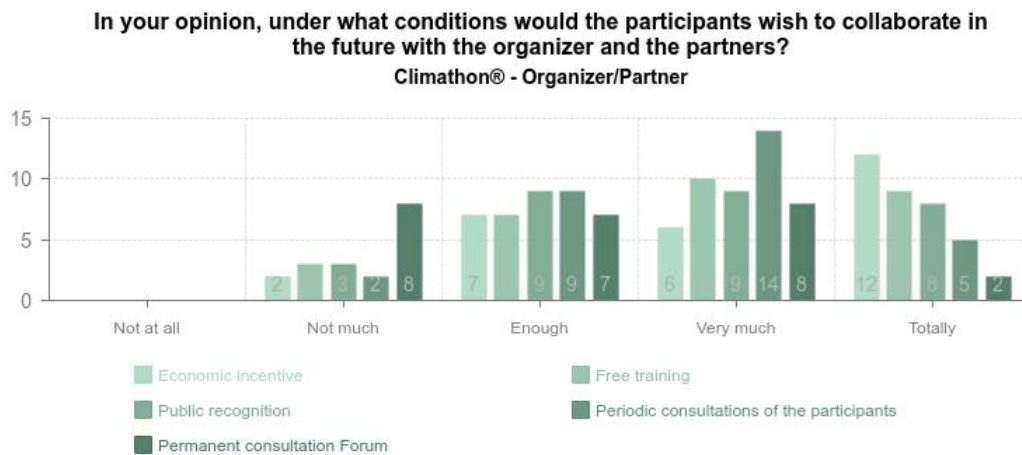
Chart 36: Conditions to participate in future events of Climathon (above, first and second chart) and Green Hackathon (under) event, in the opinion of the organizers and partners

"Other" suggestions from compilers in the propositive section include: "The main factor is more

time to Communicate the Event in the Media which didn't happen in the Climathon® 1st Edition", "I think it would be good for this to happen at the end of university academic years and be aware of various term times to allow for student and parents participation", "Creating it as a weekend event and not 24 hours straight", "People do not want to stay during the night", "I felt the way the event was managed had a huge impact. The moderators have to start the brainstorming. In our case, those who had an idea earlier got the most out of the event. Others didn't have time to develop their ideas (participant)", "Greater synergies with ongoing projects (Climate KIC and others)", "Financial resources guaranteed for the development of the winning idea".

General satisfaction and willingness to participate in future events

The final section of the survey was dedicated to investigate the disposition of the respondents towards the event in general, to better understand the answers to the other parts of the survey.

Compilers were asked to rate (1 to 10) their Climathon® or Green Hackathon experience. The results show general appreciation for the both formats: CH obtained 7.7 among organizers/partners and 7.5 among participants; GH organizers evaluated the event 8.3.

As a final question, compilers were asked if they had the chance, if they would attend in future another Climathon® or Green Hackathon event. The charts show almost an absolute willingness in participating again in this kind of events. Considering that some participants had participated already to 3, 4 and in one case to 5 previous events, the latter shows satisfaction with the events in itself, regardless of the concrete results.
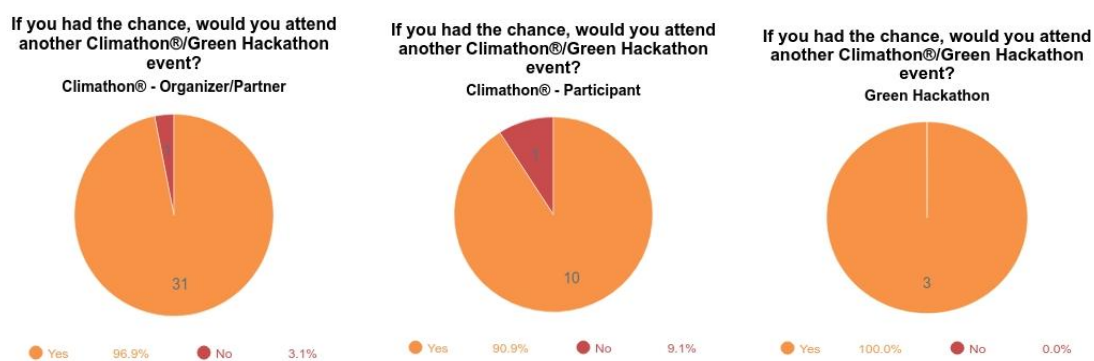
Chart 37: Willingness to participate in future events of Climathon (left, first and second chart) and Green Hackathon (right) event, in the opinion of the organizers and partners

5.3 The case-study of Bologna: an ongoing lab for the Resilient City

The case-study of Bologna has been explored through the interviews to Valentina Orioli, Deputy Mayor for Urban Planning and Environment of the Municipality of Bologna (COBO), Valeria Barbi, Eu Projects, Climate change and Sustainability Coordinator for Bologna Foundation for Urban Innovation (FIU), Mauro Bigi, Sustainability Special Projects for Bologna Foundation for Urban Innovation (FIU), Raffaella Gueze, Sustainability Office Manager in the Environment and Green Sector of the Municipality of Bologna (COBO), Giovanni Fini, Coordinator of the intermediate unit

Environmental Quality of the Municipality of Bologna (COBO), all involved and different levels in the organization of the three Climathon® edition*s organized in Bologna between 2016 and 2018.*

Interviews have been conducted in Bologna and from Lisbon, between May and July 2019, via skype.

The city of Bologna comes from a history (Farinelli 2014) and a tradition, of economic cooperation and civic activism linked to local resources and practices. However, an explicit embracement of the participatory approach in urban policies and development and decision making process, can be dated only starting from the second half of the first decade of this century, most probably in response to the birth of the many citizens' committees claiming public space from degradation and abandonment (Lewanski and Mosca 2003), in delay with respect of the diffusion at the national level of many experiences of participation (Paba 1998), and in general to a growing institutional offer of participation in Italy (Bobbio 2007; Lacconi 2002; Sancassiani 2002).

In an increasingly favorable and more competent Italian socio-political and cultural context with respect to the topic (Lorenzo 2002a), many of these experiences were connected to the three editions of the "Concorso Nazionale di Progettazione Partecipata e Comunicativa"[153] and, curiously, a first selection of experiences during the "II Seminario INU Europolis: Selezioni di esperienze di urbanistica e progettazione partecipata e comunicativa e i Contratti di Quartiere", was presented right in Bologna, on February 25th 1996.

While it is not the objective of the present research to trace the history of participatory planning in Bologna, for which I refer to others that have accurately described it (Ginocchini 2009; Allegrini 2016; Ginocchini and Petrei 2013), what is interesting here, is that starting from 2004 it is possible to distinguish two different "seasons". The first one (2004-2009), that has been rightly called a "season of participation" (Allegrini 2016), starts when the preparation of the new urban plan becomes the occasion for a public confrontation[154] with the citizens to re-discus several redevelopment projects set previously (Ginocchini and Petrei 2013), and many fundamental issues for contemporary urban transformation: reuse, new centralities, mixitè of functions and sustainability (Ginocchini 2009). This integration brought a recognition of citizen's participation as one of the implementing tools (Ginocchini 2009) of the Bologna's first Structural Plan (2009), and then of its first Operational Plan.

The beginning of the "second season of participation" can be reasonably dated in 2014, because

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[153] The first edition (1998) was organized by the Instituto Nazionale di Urbanistica (INU - Commissione Nazionale "Urbanistica partecipata e comunicativa") together with WWF Associazione Italiana per il World Wildlife Fund for Nature, the second and the third (2000-2001, 2005) with ANCI (Associazione Nazionale Comuni Italiani), the Italian Ministero delle Infrastrutture e dei Trasporti and Ministero dell'Ambiente.

[154] Thanks to the fundamental intermediation of Urban Center Bologna, that collaborates to the facilitation of a forum, 7 Strategic tables and participatory workshops at the neighborhood level, related to the so called "Situations" of the plan. For a description of the story and the functions of Urban Center Bologna (UCB), now Fondazione per l'Innovazione Urbana (FIU), see par. 5.3.

of the impetus given in terms of impact and activated processes, with the approval by the Municipality of Bologna of the "Regulation for collaboration between citizens and administration for the care and regeneration of Urban Common Goods". Since then, thanks to the collaboration with Urban Center Bologna (now Fondazione per l'Innovazione Urbana - FIU), the city has been experimenting different forms of interaction with formal and informal groups of citizens, that have contributed to "increase the effectiveness of public action on the territory, promoting a broadened governance" (Evangelisti 2009), and creating the assumptions of what the administration then channeled into the narrative of Bologna *Città Collaborativa*, a holistic view of a collaborative city (Ostanel 2017, Massari 2018). The effectiveness of the strategic choices of this vision, passes through forms of democratic co-management (Allegretti and Herzberg 2004) of public resources, including the Participatory Budget (PB). PB in Bologna has been experimented since 2017. It entails the direct management of a portion of the municipal budget by the citizens[155], to finance a series of projects organized in different neighborhoods, previously defined through a path of co-planning on a territorial scale. The most recent of these spaces for experimentation, the thematic and place-based neighborhood laboratories (Laboratori di Quartiere), places of discussion on central issues for urban transformations (environment, reuse of buildings, welfare, urban regeneration) are the devices through which Bologna is currently aiming to connect the level of the practices, with the macro policies and to the New General Urban Plan (PUG) presently in the deliberative phase.

In parallel to these two "seasons", starting from 2003 the City of Bologna has undertaken several steps to comply with international agreements following the Kyoto Protocol (1997). After adopting the Environmental Budget (2003) as a voluntary monitoring tool of its own environmental targets, in 2006, the adherence to the Aalborg commitments for the implementation of Local Agenda 21, the city integrates its collaborative policies in a framework of sustainable development.

But it is in 2012 that the two stories overlap, and the city begins to consciously interweave environmental action and planning into the narrative of Bologna *Città Collaborativa*, to create a new "vision" (Ginocchini 2018) of the city – Bologna *Città Resiliente* - as a unifying image of urban and environmental issues (Orioli 2018).

The opportunity to put the new approach into practice in the field of sustainable development and climate action, was provided by the preparation of the SEAP - Sustainable Energy Action Plan (2012), a voluntary plan whose actions are based on collaboration between actors, local

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[155] The process foresees the direct selection of the co-designed proposals through an online voting, from which priority projects are elected to be realised in the following year. In 2017, the amount of one million euros of the municipal budget, has been set aside for 2018 and 2019 to be allocated to the Participatory Budget, while for 2020 the figure has been doubled. The process, saw more than 1,800 citizens participating in the co-planning events in both editions and respectively 14,584 and 16,348 people voting on-line for the realization of the projects at neighborhood level.

stakeholders and urban planning. Through the definition of a "Memorandum of Understanding" for the implementation between the Municipality and local stakeholders, the SEAP provides a formal commitment and sharing of objectives for the implementation, and the monitoring of actions. In 2015, Bologna then adopted another voluntary tool, the BLUE AP - Local Climate Change Adaptation Plan (approved in 2016) that defines strategies and objectives, by starting from the current climate situation, and prescribing the actions necessary to achieve them. The two voluntary plans are based on collaboration between actors, involving specific stakeholders on environmental issues, in project-oriented processes. A result of a participatory process itself, the Adaptation Plan is meant to interact with the overall urban planning process, by progressively adapting the existing tools, in which it transfers specific environmental measures, and making them applicable.

Figure 32: Bologna Blue Ap Life+ brochure (source FIU Bologna)

The ability of the administration to promote and convey this approach through different levels of governance, is demonstrated by the subsequent contribution to the drafting of the "Carta di Bologna per l'Ambiente" (2017), the first protocol of this kind, at national level, in the environmental field. The chart defines the eight macro objectives, from waste managment to air and water quality, from the energy transition to sustainable mobility, to be included in the derived Metropolitan Agenda for sustainable development.

In April 2019 the Municipality has made a new commitment, by undersigning the Covenant of

Mayors for Climate and Energy, to reduce emissions and identify projects and initiatives to combat the effects of climate change by 2030, and pledging to prepare a new Sustainable Energy and Climate Action Plan (SECAP), a work of monitoring and drafting that was initiated in June 2020.

All these tools in 2017 were included in the Bologna *Città Resiliente* vision, defined by the Deputy Mayor for Urban Planning and Environment Valentina Orioli as «primarily a slogan, within which we wanted to bring attention to the issues of mitigation and adaptation to climate change, and stress the need to tackle the issues in an increasingly coherent and structural urban planning framework». A «frame and a "place" to give space to the actions of implementation of the adaptation plan» in the words of Giovanni Fini, Coordinator of the intermediate unit Environmental Quality of the Municipality of Bologna, since «the adaptation plan is an action plan based on voluntary actions, and not a plan of rules» and «the heart of the plan is based on consultation with the actors responsible for the various actions».

Figure 33: brochure Poster of Bologna Città Resiliente exhibition inaugurated in June 2017 at Sala Atelier of the Urban Center Bologna (source: FIU Bologna)

The institutional adaptive capacity of the City (ESPON & IRPUD 2011) at the time of the interviews, is well represented also by the high number of officials working on the theme of the environment in the Municipality of Bologna, around 45 people, working of green assets management, environmental impact assessments, soil and hydro geological instability management, as referred by Raffaella Gueze, Sustainability Office Manager in the Environment and Green Sector of the

Municipality of Bologna.

At the time of the interviews the policy Bologna Città Resiliente was on a hold, due to a change in the Municipality's administration, following the local elections of Spring 2019, but, as reported by Giovanni Fini and Valeria Barbi, Eu Projects, Climate change and Sustainability Coordinator for Bologna FIU, «the actions obviously proceeded».

The city had undertaken a clear process of ri-orientation of urban policies towards a resilience perspective, building space for experimentation on environmental issues, moving from an "engineering" (or traditional, cfr. Par. 3.4) approach to urban planning, towards one characterized by social-ecological resilience (Holling 1996), configuring a transition in governance, in the direction of ecosystem stewardship (Chapin III et al. 2010, Olsson et al. 2010, Steffen et al. 2011).

One of these experimentations, locally anchored but transversely oriented towards global issues and adapted to each referring context, is the case of the participation of the Municipality of Bologna to the organization of Climathon®, since 2016.

The 2018 edition of Climathon® that took place on October 26th in the City of Bologna, was the third edition organized by FIU, in partnership with EIT Climate-KIC Italy[156], and the Municipality, and it took place in the headquarters of Urban Center Bologna (former name of FIU) at Sala Borsa.

In the words of Valeria Barbi the decision to participate Climathon®, besides their membership in Climate-KIC, represented the possibility to combine two important issues for the Foundation, such as sustainability and climate change, togetherwith the practice of participation and and citizen engagement, «which are another of our core activities». For the Municipality, as reported by Giovanni Fini, organizing an event such as Climathon® was part of «a common strategy that has different faces and different actors […] because they all contribute to the objectives focused in the Adaptation plan», and that at the time were starting to merge in the development of the new Regulatory Plan of Bologna (PUG 2020) under L.R. 24/17 "Disciplina regionale sulla tutela e l'uso del territorio" of Emilia Romagna.

As referred by Gueze, while the role of the Environment and Green Sector of the Municipality of Bologna, as a main partner of the event, was to involve local stakeholders and other public agencies like ARPAE, CNR, as well as the interested departments within the administration itself, to provide participants' with useful information and contents, it was the FIU that designed the outreach strategy.

FIU's policy for targeting participants in the event was, as Barbi reports, «to leave the participation

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[156] EIT Climate-KIC Italy chapter, is located in the Emilia-Romagna Region with an office in Bologna, at the National Research Council.

very open, we have not identified specific targets (companies or subjects with particular preparation) as often happens in Hackathons addressed to a technological target. Neither have we set any age limits» and this paid off in terms of diversity of participants, with a good gender balance. On the other hand, Gueze, who participated as a tutor during the Climathon®2017 edition stated, that «due to our usual communication problems, we have not been able to intercept a younger age group, outside the institutions, that are those that have a somewhat different innovative vision, which we would need».

The Municipality of Bologna was an active partner of all three editions[157], contributing to the event by setting the challenge thematic and by providing technical content. The challenges concerned issues related to the Local Adaptation Plan BLUE App (Climathon®2016), the use of satellite data from the EU Copernicus project to increase urban resilience (Climathon®2017), while the third year (Climathon®2018) the challenge was linked to an ongoing municipal participatory process, the *Laboratorio Aria* (a special Thematical Lab on the Air quality, initiated in 2018), that provided the main theme, with the explicit request to participants to further develop the App Aria, one of the outcomes of the participatory process, enriching it with more interactive features.

These expectations have not been entirely met, as Mauro Bigi, Manager of Sustainability Special Projects for FIU, reports «probably because the Climathon® was carried out when results had already emerged from LabAria. [...] Expectations with respect to the work to do were different [among organizers and participants], as well as the needs of the participants, more oriented towards putting the idea on the market, something that was disregarded by the event in the end».

For the future, Gueze indicates, in fact, that in would be more effective to «make an open call for the challenges, and then select a topic that is of real interest to the public, or for those who will then have to take it up [in the event], understanding which of the themes go to intercept the tools or planning activity of the moment».

This aspect is underlined also by Deputy Mayor Orioli, which confirms that «the resulting proposals are interesting for the Administration, but in general they need to be deepened to be effectively implemented in policies and public action», and that nevertheless «promoting a synergic approach between actions, processes and events around a key theme, allows to analyze the problems with greater depth, multiplying the points of view and the answers that the administration can put in place, also together with citizens, associations and other stakeholders».

For Fini, the main added value of Climathon®, compared to the other experimentations in act at the time in Bologna, lays in the fact that «we are facing new problems that cannot be addressed

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[157] At the time of the interview. At date the Municipality has organized other two editions, 2019 and 2020, the latter completely on line due to Covid-19 pandemic.

with the tools and solutions we use on a daily basis […], we need to find alternative solutions, so Climathon® goes in this direction looking at innovation not in a "muscular way" but going "somewhere else" to find **new solutions** and make the city more resilient». On the other hand, Barbi indicates the solutions that emerge from Climathon have encountered some obstacles, due to the **lack of a clear follow-up path**, in some cases left to the initiative of individual participants and partners, but also due to the peculiarity of the process and topics that characterize Climathon®. In Barbi's opinion «when we talk about Climathon®, and therefore of issues more closely related to climate change, it can be more difficult because the theme is **very complex**, more easily understandable for experts rather than citizen, who may have an awareness of the problem, but not related immediately to daily life [...] and because the projects that are born [in Climathon®] are also more difficult to achieve [e.g. sustainable mobility] and are complex to be managed immediately by a public administration».

In the experience of Fini, related to how Climathon® is organized in Bologna, the format of intense collaboration among interdisciplinary work groups, actually leads to the production of very good ideas. The problem remains «how **to incubate and take them from the idea of a product or a service, into concrete action.** In Fini's opinion, the key is to "find a home" for the project […]**a space** in which it can develop in terms of **funding and technical support, something that was never actually planned**». One fundamental problem, in the opinion of Fini, lays in the way Climathon® is communicated, which «generates a misunderstanding, because it creates an expectation with respect to the commitment of the City [to the outcomes or solutions]».

Also for Gueze «there is a need to **find a path, beyond the incubation, within the institutional activities typical of the Municipality** […] and probably it requires the involvement of more subjects. In other words, it is good that it starts from the Environmental sector, but then there is a need to create a larger [intersectorial] working group, and to involve also other subjects outside the Municipality, e.g. innovative companies» .

Despite these limits, what Barbi sees as positive in proposing this activity to citizens in Bologna, beyond the realization of the project itself, is «to give life and organize events [...] **that are fundamental from an educational point of view, because they enter the negotiation process on climate change [for which] in the last United Nations conferences, there was a call to the direct participation of citizens, recognizing the fact that the real change comes from below.** And, in my opinion, events like the Climathon® are notably functional for this».

Other valuable aspects of Climathon® are pointed out by Gueze: i) the possibility offered by the event to **meet and share their transversal skills** among the various subjects that before the event did not know each other; ii)Climathon® represents **«a "space" where you can express**

your projects in a very free and unconstrained way, within a very flexible format», a "safe arena for experimentation", as defined in the present research; iii) probably because of the strict timetable and the typical intense situated experience of collaboration in Hackathons (Trainer et al. 2016), for Gueze, participants, partners and organizers are invited to «put into the field what comes to mind with the skills that they have, without doing studies, you are not doing a thesis or a publication, whith no specific preparation, you have to leave all the information channels open as well as your skills, which I find is a very interesting way [to work]».

Finally, in the words of the Deputy Mayor Orioli, the interest and value for the City of Bologna in taking part to the organization of Climathon® «lies in the exemplary value of this event and in its **international resonance**: the Climathon® allows to focus attention on issues related to mitigation and adaptation to climate change and innovation through the use of technologies, for a limited amount of time but in a very intense way, because of its global replication…It is therefore a **"climate experiment" and very useful for the dissemination of knowledge and raising awareness on environmental issues**».

Post Case Study developments relevant to present research

In the last year the Municipality of Bologna has made some further significant steps in its plans to become "*Bologna Città Resiliente*". The slogan itself has been recuperated and used by Valentina Orioli , in presenting the new PUG 2020 (Regulatory Plan of Bologna, that will be adopted within the year), during UrbanPromoGreen[158] on September 2020.

The new General Urban Plan (PUG) in line with the L.R. 2017 Emilia Romagna, that has been adopted on December 7th 2020, confirms and consolidates the Municipality approach (and that of the Region) in the direction of going beyond the traditional "plan of rules" towards a more dynamic and strategic plan for more resilient future, one that builds the management and the evaluation tools, directly into the plan, therefore giving them more strength, since they become mandatory.

The new Sustainable Energy and Climate Action Plan (SECAP 2020), the Urban Sustainable Mobility Plan (PUMS 2018) and the Green Areas management plan (2020), are in fact embedded within the new Plan, as Fini had anticipated in his interview, when the Plan was under construction: «we had made the Adaptation Plan […] and at this point, we had all the elements to give substance to the related issues. […] Now we must keep the reasoning, and especially the evaluation apparatus, inside the plan, [to] move from "building rules" to "building evaluation tools"».

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[158] UrbanPromo is a national cultural event of reference for planning practitioners and experts, on the theme of urban regeneration. (source: https://urbanpromo.it/info/chi-siamo-2/

The process of sharing at a local level the new plan vision and its contents was managed by FIU, and consisted in a series of public workshops ("Laboratori di Quartiere" [n.d.t. neighborhood workshops], public assemblies, and thematic meetings[159]), that were facilitated online[160] at a later date, due to the outbreak of the Covid pandemic in 2020. The outcomes of this process were assumed into the final plan that organizes "objectives, strategies and actions for the City of Bologna of tomorrow"[161] within a strong strategical vision to be implemented in medium period (10/15 years), around three linked themes: Resilience and Environment, Living and Inclusion, Attractiveness and Work (PUG 2020).

The commitment of the administration to subordinate the future of the city to the protection of the environment and to improve its socio-ecological resilience characteristics, therefore in a perspective of Ecosystem stewardship (Chapin III et al. 2010, p. 241), did not go unnoticed by the members of the growing local XR group (Extinction Rebellion Bologna), one of the first to be founded in Italy.

The relationship of XR's activists with Bologna's administration started in a quite conflictual way, "a journey of love and hate" as described by the activists themselves[162] with protests against some of the "major projects"[163] for the city", considered by the group to be in contradiction with its own commitment to ecological sustainability, followed by a succession of moments of tension, alternating with moments of openness and dialogue,

Two distinct hunger strikes were carried out in public in August 2019 and in September 2020[164], by two members of XR, to call into question and convince the City Council to assume XR's "first demand" (cfr. Par. 4.4) which is the "Declaration of Climate and Ecological Emergency" (September 2019) , and successively to give action to the Declaration within one hundred days through a roadmap of decarbonization, to be built through public participation.

The mediation (and confrontation) was managed, from the beginning, by Deputy Mayor Orioli and her department of Environment and Planning, and while it did not meet the deadline, it led to an agreement on a set of initiatives and eventually to the creation of new "spaces" of information, participation and co-action to tackle the climate and ecological crisis in the city.

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[159] See https://www.fondazioneinnovazioneurbana.it/45-uncategorised/2234-verso-il-piano-urbanistico-generale-il-percorso-nel-2019.

[160] Between the 8h to the 24th June 2020, 24 "Zone" digital laboratories took place in the different neighborhoods of the city. See https://www.fondazioneinnovazioneurbana.it/45-uncategorised/2364-piano-urbanistico-generale-materiali-degli-incontri-digitali-di-zona.

[161] Source: https://urbanpromo.it/2020/progetti/il-piano-urbanistico-generale/.

[162] Source: https://www.xrbologna.it/generale/2020/03/18/extinction-rebellion-e-il-comune-di-bologna.html.

[163] E.g. the "Passerby of Bologna", a nationally funded project to enlarge and strengthen the actual highway ring road of the city.

[164] See https://gazzettadibologna.it/costume/lotta-ecologista-nuovo-sciopero-della-fame-di-extinction-rebellion-a-bologna/ for further details.

The new digital space "Chiara.eco", launched in December 2020 and managed by FIU, is meant to be a place to better understand the actual climate and ecological crisis through data and insight ("Conoscere" is the first section of the website) and to represent a "public arena" where collective action can be taken – the "Act" and "Collaborate" sections are dedicated to collecting and showcasing available resources and local actions, and to stimulate new collaboration around environmental action –a fundamental step to activate the transition[165], as seen by the promoters. Two online series of public encounters have been launched to date, and a third one is programmed for the beginning of 2021, on the theme "ACT to realize together the Pact for the Climate".

Figura 34: Digital flyer of Chiara.eco first public online event dedicated to "Conoscere" (source: FIU Bologna)

The digital space is connected to the other, and in the context of the present research of more interest, since the initiative stimulated by XR and accepted by the administration, was successful also due to the mediation of a national expert in participatory democracy processes[166]. With the collaboration of FIU, the administration has in fact undertaken a path to introduce the possibility of holding deliberative "Citizen's Assemblies" on the climate emergency – the "third demand" of the climate action movement (cfr. Par. 4.4.) – and to amend the Municipal Statute which, at present, does not provide for this possibility. At present, two exploratory audiences of the City Council in the Joint Commission for the Environment and Institutional Affairs, have been held on the argument.

The timely opening to XR's demands with the declared intention to realize a local Pact for the

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[165] See https://www.chiara.eco/chi-siamo/.
[166] Prof. Rodolfo Lewanski, teaches the course of Participatory Democracy at the Università of Bologna, and between the 2008 and 2013 has covered the role of Regional Authority for the Participation for the Tuscany region and was responsible for the implementation of the Regional Law 69/07 to promote participation.

Climate through the Citizen's Assemblies – in line with Europe's Green Deal goal of making Europe climate neutral by 2050, and in particular with the Horizon Europe program's "100 Climate-Neutral Cities by 2030 - By and For the Citizens" Mission that supports the opportunity to build a multi-level and co-creative process formalized in a Climate City Contract – demonstrates a clear capacity of the administration of Bologna to identify the right moment at which to act and to invest resources or, better stated, to recognize the "opportunity context" in which they are situated (Westley et al. 2013, based on Dorado 2005) and to enact strategic transformative agency (ibid.).

It also shows that the administration is undergoing a new phase of experimentation (i.e., new rules of engagement and participation around environmental issues). Therefore, it is already shifting from a "hazy to transparent context" in terms of opportunity context (Westley et al. 2013).

The implications of this new shift, and of the role of the administration in the new model of ecosystem stewardship that can be glimpsed, are postponed to future research.

P and R Comparative Assessment Table

While expressing a general satisfaction with experiencing the Climathon event, the interviews in Bologna case study, confirm some **critical issues** already emerged from the One Hunded Database and Online Survey. In particular, the **lack of a overall process and a structured ("planned") path**, to accompany the ideas generated in the event to a concrete realization, impedes an effective participation and appropriation around the results of the process. This aspect relates to the **absence of interested and effective stakeholders**, both within the event and in particular successively, to provide resources and knowledge to winning ideas.

The process falls short in developing Westley et al. 2013, point 3 "Developing social networks", in particular in **"bridging" and "linking"** the useful and potentially interested actors around the ideas emerged in the event (while "bonding" actually happens within the group of participants). The "misunderstanding" pointed out, concerning the commitment of the City to carry forward the project emerged, leads to negatively impacting point 4, missing the ecosystem stewardship skill of "Building trust, legitimacy, and social capital".

On the positive side, interviews highlighted the value in terms of Westley et al. 2013, point 1 "Facilitating knowledge building and utilization" and in the perspective of Biggs et al. 2012, Stockholm Resilience Center 2014) P5 "Encourage learning and experimentation".

Another important aspect for the interviewees, is the opportunity offered the participants to interact in a very free and unconstrained way, and express their ideas within a **flexible format, in a safe space** (Westley et al. 2013, point 3). This "space" represents for actors (institutional, enterprises and individual citizens) a **"safe arenas for experimentation"** in which it is possible to

"play" with complex issues and super wicked problems (Levin 2007) at a scale that allows "safe-fail design"(Holling 1996) in a different perceptive field, especially for the urban institutions involved (Leonardis 2001).

Furthermore, the urgency (ibid and Lanzara 1993) and the importance of the goal (tackling climate change and ecological crisis), united to the awareness of the contemporaneity and global nature of the event, invests the participants of a **sense of commitment and pride** (Lorenzo e Massari, 2019, i.e. Orioli) and allows the unification - in one synoptic view – of the two dimensions of global ecological issues and local participatory action, combining them without compromising their "intricate opposition" (Hester 2007).

Finally, from the history of the evolution of planning in Bologna and from the interviews it appears clearly that the Municipality of Bologna possesses a **high institutional adaptive capacity** (ESPON & IRPUD 2011) and has consciously undertaken steps (the "mutation" of Gabellini, 2018) towards **transforming** conventional planning processes in the optic of the city as a complex adaptive system, aimed towards and **characterized by social-ecological resilience and ecosystem stewardship** (Chapin III et al 2010).

With reference to Westley et al. 2013 and to their use of Dorado's (2005) "opportunity contexts" as explicated in Chap 3, evidence emerges (see for e.g. Fini interview) that Bologna's future plans are no longer governed "by rules" or addressed towards long term stability (Holling 1996), but rather guided by widely shared strategic lines, and **operating through numerous actions evolving in time** (an "Action Plan",, and the new PUG), applied by multiplicity of actors, public and private, in a continuous evaluation process, with respect to their coherence with the overall strategy and to changes in the global and local (urban) context.

Thus, with reference to the Adaptive Cycle of Holling (2001) as modified by Westley et al. 2013, the efforts of Bologna "Città Resiliente" policy and actions, appear to be situated at the end of the back loop ("navigating the transition" phase, Westley et al. 2013) and therefore in a mature moment to **shifts from a "hazy to transparent context"**, or (cfr. Table 2. Westley et al. 2013) in terms of the associated "agency", from a "routine" of good practices that has become institutionalized (a tradition of collaboration and, at this point, of innovation) to a new strategic "launch" (cfr. Table 2., ibid) in the direction of **"sense-making" towards a new "desirable trajectory"** (i.e. sustainable development).

5.4 The case-study of Lisbon: small steps toward a "Green, Smarter and Sustainable City"

The case-study of Lisbon, despite all the attempts to conduct the two case studies with a common methodology, resulted, in the end, different for two reasons.

Firstly, because of the unavailability to be interviewed of one of the research subjects, one representative of the Municipality of Lisbon who was involved in the organization of Lisbon Climathon®2018 edition. This fact prevented my learning of the urban institution's motivations to participate to the event and to explore the transformative agency strategies (Westley et al. 2013) and skills connected, not allowing a complete direct comparison with Bologna.

Secondly, due to this change I had the time and opportunity to expand the scope of the case-study to include the two editions of Green Hackathon in 2016 and 2017, and to interview the organizers. This change has given me more insight on GH, for which I would have in the end less survey compilers, and helped very much to compare the two different formats.

The case-study of Lisbon is therefore twofold: Climathon® 2018 edition has been explored through the interviews to Francesco Rocca - Project Manager of Impact Hub Lisbon, the co-working space that hosted the event, Helena Correia, PhD candidate in Culture Studies at The Lisbon Consortium of Universidade Católica Portuguesa (UCP), the Climathon®2018 "challenge owner"[167], and Catarina Miguel Martins, participant and part of the winning group of Climathon®2018 edition; Green Hachathon 2016 and 2017 edition was explored through the interview to Bernardo Tavares, former student of Faculdade de Ciências da Universidade de Lisboa (FCUL) and active part of Oficina das Energias, the University's hackerspace , that orgianized and hosted the two editions.

Interviews have been conducted during the period of permanence for research purposes at ICS-ULisboa, between May and July 2019, and in August 2019 via skype. Locations of the two events were visited in person.

In 2016 Lisbon was the first capital in Europe to sign the New Covenant of Mayors for Climate and Energy, after achieving a 50% reduction in C02 emissions (2002-14) and reducing energy consumption by 23% and water consumption by 17% from 2007 to 2013, and for these reasons the city will be Europe's Green Capital in 2020[168]. After undergoing a severe economic and social crisis for about twenty years between 1980 and 2001, since 2005 the city finances have been growing mainly thanks to international investments and tourism. Since then, the Municipality initiated a process to regenerate the city "economically, socially and environmentally" though a set of instruments related to land-use and urban green spaces, focusing on biodiversity, connectivity and human well-being (Green Surge Project 2015).

The city has undertaken many stepsin the past decade to become a "Green, Smarter and Sustainable City": from Lisbon's SEAP (2010), managed together with Lisbon E-Nova, local energy agency, that regularly organizes thematic public meeting with stakeholders (municipalities, NGOs, public entities, companies, students of higher education and professionals of the sectors under analysis); to the Lisbon Strategic Charter (2010-2024) which on the basis of the city's major challenges such as depopulation, vulnerability to natural events and loss of biodiversity,

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[167] "Challenge owner" is the way the previous version on Climathon official website referred to the subject that decides to start the process (registering the city in the website) and undertake the organization of the local Climathon edition.
[168] Many informations about Lisbon's steps undertaken to become more sustainable and resilient are drawn by Lisbon's "Application Form for the European Green Capital Award 2020. See Par 5.4

established the three main objectives of 'City regeneration', 'Climate change adaptation' and 'Connectivity of green spaces'; and, the Master Development Plan (PDM) 2010-2022 (2012), a result of a public discussion around 6 key sustainable questions, and that focuses on viable sustainability and local solutions, moving from zoning to block and street planning management; and finally, the Lisbon 2020 Strategy (2013) that highlights the priority area of Low Carbon Lisbon, the Lisbon Climate Adaptation Plan (EMAAC 2017) that was the result of the national project ClimAdaPT-Local (2015-16), the Lisbon Biodiversity Action Plan (2015-2020), and the latest Sustainable Energy and Climate Action Plan (SECAP 2018).

The Lisbon Climate Adaptation Plan (EMAAC) in particular, moves on three strategic lines of action: "Planning for adaptation to Climate Change", "Integrated management for a more resilient city" and "Better Governance to involve the community for participatory citizenship and improve people's capacity to adaptation" (Câmara Municipal de Lisboa 2018), while the newly released Sustainable Energy and Climate Action Plan (SECAP) represents the main operational tool of the Municipal Strategy for Adaptation.
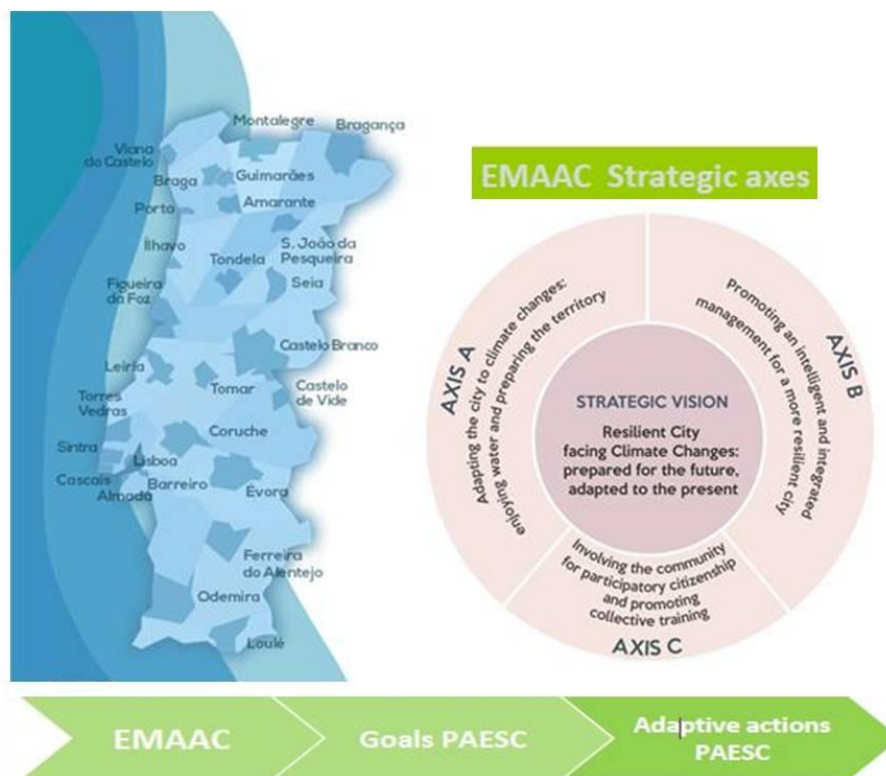
Figure 35 - Image by SECAP 2018 (source: Camara Municipal de Lisboa 2018, re-elaborated)

Lisbon's vision for a "Green Sustainable City" and the development and implementation of its voluntary and mandatory planning tools, are deeply rooted in the great efforts that the Municipality of Lisbon has been putting into participatory governance as a municipal strategy (Green Surge Project 2015).

This strategy has brought forth to several informative and participative actions connected to the *Lisboa Participa* platform portal - such as, *Na Minha Rua Lx*, a portal, and an app to signal the necessity for intervention in green and public spaces; *LisBOAidea*; *Lisboa Debate*, a virtual and physical space of discussion around the city's decisions; *Lisboa Aberta* for accessing the city's open datasets -, and is well represented by the Participatory Budget (Orçamento Participativo Lx) process, one of the most successful experiences of this kind in Europe, so far.

In 2008, Lisbon became the first European Capital to implement the Participatory Budget (PB), and today it represents a central forum for public decisions of the City. Already from its first edition, Lisbon's PB changed the famous original model of Porto Alegre (Brasil) based primarily on consultation, to a process of co-decision making (Allegretti and Antunes 2014). Through the online platform *Lisboa Participa* and during the several assemblies held each year, any citizen or non-governmental actor, can present an idea for the city in the form of a project, that is then submitted to technical evaluation and public consultation, voting and eventual implementation. The city commits 5% of its overall spending budget to the realization of the most voted proposals. During the 2017/2018 PB edition, the city invested 2.5M€ to realize 15 winning projects which were voted by more than 37.000 people. The winner projects were selected among 434 proposals, with had been combined 128 projects during the phase of technical analysis and public consultation.

The second participatory-action tool that the city of Lisbon makes available to its citizens, is the BIP/ZIP program, addressed to urban regeneration in neighborhoods that present critical social-economic, infrastructural or environmental issues (Falanga 2019). Started in 2011, the program has to date funded the activities of local partnerships, to tackle socio-spatial inequalities through engagement of the local communities, in 67 priority intervention areas in Lisbon, chosen through a large participatory consultation process (Falanga 2019).

The Municipality of Lisbon appears to be aware that the two tools already do concur to the environmental strategy of the city (see Application Form for the European Green Capital Award 2020, e.g. indicator 12, in which the city lists some new parks initiated thanks to citizens decision in Participatory Budget process, or the contribution of BIP/ZIP, to small interventions for habitat improvement) and that they could concur more. This integration of different tools addressed to same target, was also probably[169] the intention with Climathon®, as described below.

For Lisbon, the decision to participate to Climathon® for the first time, came from the initiative of a researcher, Helena Correia, a PhD candidate in Culture Studies «with a strong outlook in art and environment», in her words, at The Lisbon Consortium of Universidade Católica Portuguesa

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[169] Unfortunately, this can only be a supposition, due to the fact that, despite several attempts to interview the person in charge for the Municipality to organize the Climathon®, the person resulted unavailable.

(UCP). Helena decided to promote Climathon® «because firstly it had never been done in Lisbon and, [secondly] the urgency of this whole theme of the environment had been growing since the Paris Agreement more intensely», and after a «lot of talk and publications, there haven't been that many initiatives where citizens, who are interested in environment, were engaged».

The Municipality of Lisbon was then involved through the intermediation of the local division of Climate-KIC. The organizing team for Lisbon Climathon®, included Francesco Rocca of Impact HUB Lisbon, a co-working space, part of a larger international network of spaces for entrepreneurs and social innovators. In the words of Rocca, the main reason for Impact Hub to host Climathon®2018, was «a strong alignment between our strategy as agents for sustainability and supporters of environmental and social projects here in Lisbon and Portugal, and the goals of Climathon®, e.g. to work for solutions to local problems, identified by the municipality».

The challenge for 2018 concerned smart management to reduce plastic and food waste in the city of Lisbon, and was proposed by the Municipality.

The outreach strategy to target participants was designed by Climate-KIC, that provided the templates and communication kit (as in all other cities of the global event), and in the end the event was attended by around 35 people, mainly students (including international Erasmus students) from the environmental, social and business field of the Facultade de Ciencias e Tecnologia - Universidade NOVA de Lisboa (seat of Climate-KIC Portugal division). In addition, some people already part the Impact HUB network, and some Portuguese entrepreneurs interested in environmental issues also participated.

The preparation phase for the event was dedicated mainly to contact sponsors for fund raising, and to involve them in the event but with little success, due to a lack of time and, probably, of awareness among local companies. In the opinion of Correia «one never knows if the communication is clear enough […] if we had more time, I think the second edition can be different and people will be more aware».

The event took place in the Impact HUB open space, a shed in the former warehouse of the Lisbon railway company, a fascinating space located under the characteristic Vasco de Gama bridge of the city.

Figura 36: Pictures of Lisbon Impact HUB location (photos: Viviana Lorenzo©2019)

In the words of Rocca, the interaction among participants during the event was facilitated through a mix of activities such as «moments of pure networking when the participants got to know each other, coffee breaks, rounds of presentations alternated with moments of formal lectures, introduction to the general issue (tackling climate change) and the meaning and objectives of Climathon®, presentation of Impact hub and presentation of the problems of the city, that were presented by the Câmara [Municipality]. Then followed the more participatory moments of the events […] a workshop on Design Thinking and systemic thinking […] a pitch[170] formation, one workshop on circular economy, and then moments of group work with a mentor».

In the opinion of Rocca, the success of the event laid in the **flexible format** provided by Climate-KIC, and in the **enabling space** of Impact HUB, «a very large open space where you have an area with some small niches in which the participants worked in groups, some sofa areas, then there is the open auditorium [...] where the formations took place, a large kitchen with a central table […] for networking» and, mostly, in the **relationships of value** that arose among the participants and partners, **rather than in the production of solutions**: «One of members of the winning group, that won the membership here, Catarina, became part of our team of coworkers [and, moreover] establishing relationships with the Câmara [...] and having the possibility to collaborate with them

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[170] A "pitch", in the business field, is a presentation of a business idea to potential investors. In the form of brief speech and some slides, it should give information about the problem or need that the business idea wants to solve, the solution related to the product, the team characteristics and the necessary investments, the possible competitors and the reference market. Source https://www.economyup.it/glossario/pitch-definizione/.

on other projects, was useful. But there was not much follow-up». One critical point for Rocca in Lisbon, was the substantially **voluntary nature of the event** and the **lack of clear commitment and responsibilities of the partners in the follow-up phase**, which prevented continuity in the process after the event.

Another critical point emerged also in the words of Catarina Miguel Martins, participant and winner of the Climathon®2018 Lisbon edition. Startupper, with a master in business specifically in entrepreneurship innovation and a previous experience in a bicycle-sharing enterprise, that she helped develop «from scratch to implementation» for said that the main problem with the Climathon® lays in its **market oriented approach**: «**we keep not questioning the basics** […] we want to solve climate change but we keep doing competitions […] What happens in this kind of interaction, is that after some hours people are trying to not say their ideas to other groups, and instead are trying to see what other groups are doing, to see what they can do better. They start to compete». Martins, that noticed that she could of easily helped other groups by integrating their knowledge with her specialized knowledge, proposes instead that «we could all move around, I mean change groups and gather around ideas […] by the end, we would naturally have already selected one or two ideas that, among all of us, would feel like strong». Her words highlight just how Climathon®s, because of its competitive setting (in contradiction with their collaborative aim), actually do miss one fundamental principle of effective participatory design processes, that typically bring benefits to the project, by creating synergies between different ideas "Working towards shared results" (Bishop nd., 2015), and also benefits to those who participate, as subjects of a process of mutual learning (Lorenzo 1998). For Martins «it would have been useful to have had more openness [in the event]», recalling a fundamental value in "hacker ethic" (Levy 1984, Raymond 2000),and «just one focus», suggesting that perhaps editions with less challenges are more effective.

Nevertheless, Martins appreciated participating in the event saying «it was awesome, to see everyone making an effort for, and playing it by ear» and that it had «a lot of value[for her] I really love it because I took full advantage of it, it changed my life. In more indirect ways than direct, because of the doors it opens, and how it lead eventually to something else». For what concerns the outcomes of Lisbon Climathon®, Rocca reports: «The winners would have the possibility to develop their idea by being incubated here in Impact HUB, for the following three months and to do networking at the Web Summit171. Then the city intention was to implement the idea through the Orçamento Participativo [Participative Budget]. In practice, this did not happen because the projects were all at the ideation stage, and did not go forward because of limited time, or low

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171 Winners of Lisbon Climathon®2018 won also a ticket for Lisbon Web Summit 2018, the largest event in the world relating to the sector of new information technologies and the internet.

interest from participants, mainly international students». For Martins, the lack of commitment by the participants was due instead by the feeling that there wasn't interest on the part of the administration, while in her words « the Municipal lead needs to be very clear and linear».

In her opinion, leaving the realization phase to the entrepreneurial spirit of the participants does not work, indeed «A business partnership is like a marriage, you should get to know each other. It's not that in a hackathon we all meet and then suddenly we create a company or a project. That's not even healthy». What is missing, in her words, is some kind of tool to engage directly with the administration. PB and BIP/ZIP are good instruments, but not enough, she says «because what if I want to engage, I want to build something with the municipality? They don't have actually a tool for that». What she feels is that the administration is trying new paths «I don't know if they are trying but I can see the enquire, they are clearly giving a way out, some way to go around the system…and when they do this it is because their system doesn't contemplate a better solution».

Helena Correia, museologist and art curator, sees much potential in these events from a more cultural artistic prospective, in fact for her the main value of Climathon® lays in the fact that «it is an "action". Regarding environment […] it is important for cities to enact these initiatives. And Climathon® is a way forward, but still not enough».

While this was the first Climathon® for Lisbon, it was not its first Green Hackathon..

The two Green Hackathons events in Lisbon (2016 and 2017) originated in another context and were organized at the Faculdade de Ciências da Universidade de Lisboa (FCUL) by Oficina das Energia[172] (OdE), a student's organization.

Bernardo Tavares, former student of FCUL and active part of Oficina das Energias, was in the organizing team of both editions of Green Hackathon Lisbon 2016 and 2 017.

The Facebook page of Green Hackathon 2016 edition, declares: "You can now sign up for the Lisbon Green Hackathon! On March 11 and 12, hackers will mostly be engineering students with environmental concerns who will dedicate their knowledge to the cause. In an intense 24-hour marathon, participants organized in teams will have to develop a prototype for a sustainable future and present it to a jury. If you have ideas, you are "hands-on" and enthusiastic, one of 40 places available can be yours!" (my translation).

In the words of Tavares Oficina das Energias was an hackerspace: «At the time we had this group of "nerdy people" that liked to build stuff. We would do some solar panels projects with children, like building solar panels over toy cars. And we would do workshops. Then we started to think we

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[172] Oficina das Energias - EEA Students Group - presents itself as a non-profit group from the Faculty of Sciences of the University of Lisbon, representing the student community of the Integrated Master in Energy and Environment Engineering (source: Oficina das Energias official website. Online. http://oficinaenergias.campus.ciencias.ulisboa.pt/)

would like to discover more, to do more complex stuff, so we decided to enter the Maker movement. […] So came the idea of "Oficina", a physical workshop for energy stuff.»

From this premise, the motivation to organize the first Green Hackathon edition came naturally: «We were doing a lot of workshops and a lot of technical learning, we also had a huge support by the University that liked what we were doing and gave us this workspace […] we decided ok, we want this to be bigger and greener, and to have a big event. [So] I contacted the Green Hackathon guy [Jorge Zapico] He was very open, he helped us, he gave us some documentation that we could follow. So we got together as a team […] and that's how it started. It was the first year.»

Figure 37: Oficina das Energia spaces at Faculdade de Ciências da Universidade de Lisboa (FCUL) (photos: Viviana Lorenzo©2019)

The main supporter of the event was the University itself, that provided the group with the location, which was a very large lab located in the campus, and the partners were two students' associations[173]. Tavares was in charge of fund raising and finding sponsors for the event. He remembers that «a lot of places that wouldn't give us money [would give instead] some kind of exchange that they could provide, and help us […] with some experts, with IoT specifically or with some software. The media partners as well would promote [the event] and other partners that, since our hackathon was very "hands on" […] would just give us electronics, stuff we could work on [hardware?], exactly.»

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[173] AEFCL - Associação dos Estudantes da Faculdade de Ciências de Lisboa and CAMIEEA Comisao de Alunos.

The team also tried to involve the Municipality of Lisbon, but without success. As Tavares recalls «it was very hard for us to get there, I remember like "yeah that's cool, that's great but there is a lot of paperwork to deal with, and it wouldn't be on time" and maybe they weren't very pleased because it was a school thing».

For what concerns the event itself, Zapico (Green Hackathon platform) provided OdE with guidelines or, as Tavares recalls «some pages describing rules, time frame, place setting, how we could do pitches etc.», that were used to build their own program. The time set was 24H «but it would be like 24h freestyle, you could do whatever you preferred, you could sleep there, you could spend the entire night there, you could go home. It was pretty much up to you. We would say to people "sure you can go home and do things, but try to stay around and talk to us, and be involved". Because we were very open in a way, people were very open and involved».

The two events did not have a specific theme: «it was very open» as Tavares refers, «there were only two rules: it had to have something to do with a green solution, or better said a solution for something that would be greener otherwise. And the second rule, you had to develop some kind of hardware to present in the end. So we weren't into just software, we wanted something more hands-on.» confirming the "hands-on imperative" of the hackers ethic (Levy 1984, Raymond 2000, Zapico 2013).

Concerning the outreach process, Tavares says «we wanted to target "gifted" people [laughs] people that liked to build, not specifically environmental people, but really anyone that really wanted to build stuff and come up with solutions and innovation». The related keywords to target that online campaign, were "maker movement, arduino, raspberry pi".

For Tavares, this resulted in having participants that were mainly students «all some way into learning, hands-on and being nerd in general, so in that sense it was not very diverse» but, "it was diverse regarding backgrounds, many came from different places, some would come from different initiatives, so it would be sharing experiences, […]their wasn't an age limitation, in fact there was this one team with people in their 60s [from out of the university] these guys that had their own jobs, they were just regular guys […] nothing to do with us, but they were involved in the maker movement». In the end, also the gender balance resulted quite good, with about 40% of women and 60% of men.

The program included short presentations, called "fast–talks", during which in the words of Tavares, «inspiring people», developers or speakers from companies and associations would «say how they could get awesome ideas, and how these companies or communites were created».
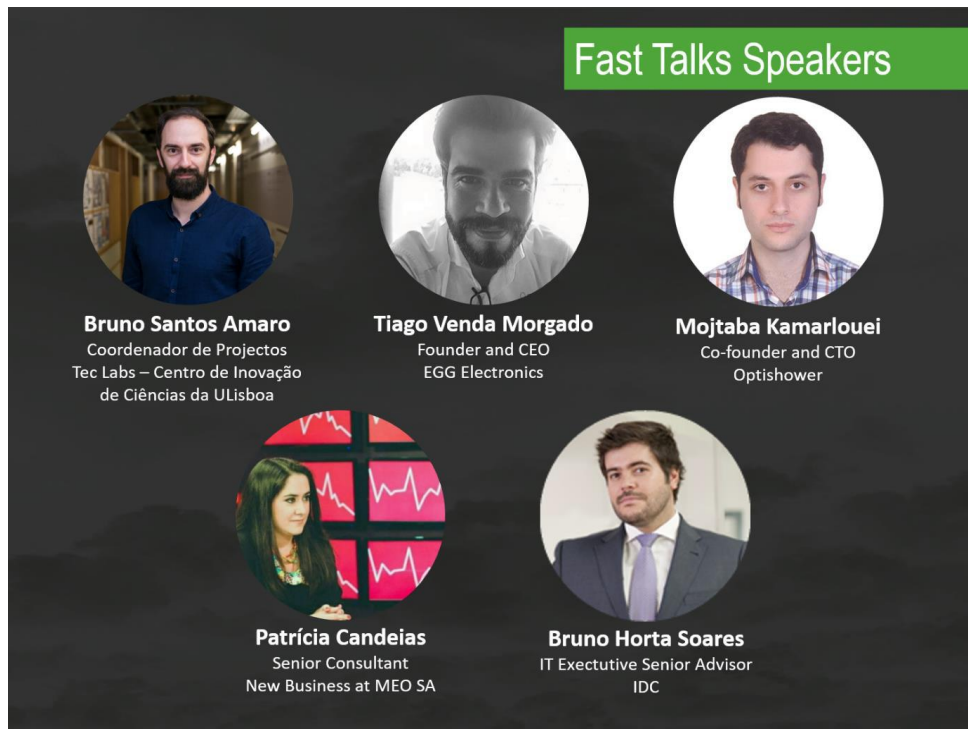
The program of both editions included also a pre-event, "The Green Day", an open preparation workshop to the Lisbon Green Hackathon about 3Dprinting, Arduino and other software and hardware preparation.. «Two weeks previously» recalls Tavares, «we would have this round of workshops, that people could come to if they wanted […] to teach the digital part. […] I remember there were people that knew nothing and that were just open to learning» At the actual Hackathon, they would therefore able to use these the tools and develop something from there.

For both editions the event opened with several forms of "brainstorming" activity to promote networking and the sharing of ideas[174]. During the first edition in 2016, an adaptation of the ideation method entitled "Innovation Relay"[175] was used. The participants, arranged in a circle in random groups of 10 people, debated ideas to achieve sustainability. Afterwards, each member presented a challenge / problem in this direction, writing it on a post-it and pasting it on the top of an A4 sheet. After 1 minute, the 10 sheets rotated in each circle, with the intention of each member contributing to the solution of the challenge / problem presented in the first post-it, in order to create a story for the invention that would come to solve that same problem. In the end, the 4 groups of 10, discussed the created stories among themselves.

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[174] Descriptions of activities are taken from http://oficinaenergias.campus.ciencias.ulisboa.pt/lisbon-green-hackathon-2016/ and the Lisbon Green Hackathon 2017: Relatório Final, document provided to me by the organizers (pdf format).
[175] Cfr. for e.g. "Inspirational Catalogue Matchmaking, knowledge sharing and Idea Creation" Gunhild Brynning and Dorthe Birkedahl Jørgensen 2012, The Danish Agency for Science, Technology and Innovation.

During the 2016 edition, once the groups were formed[176], they were directed to other rooms, where, another activity was performed to help the groups further develop their ideas. An adaptation of the design method entitled "Joe's Journey"[177], it was addressed to development of a product, from its creation to the consumer. Each team was divided into 3 groups (the beginning, the middle and the end of the product development) and without talking to each other, each group filled out its part of the story. In the end, teams checked whether all the elements were in the same line of thought, whether new ideas in the different stages of the idea's life had been created, and even if there were flaws that they had not be previously thought about.

During the second edition in 2017, to each groups was assigned a country. Each group would have to personify the problems of the country that had been assigned to them in the form of a "super villain", draw them and find solutions to them. The solutions were also personified in the form of a Superhero. This "visioning" activity aimed both at shuffling participants (participants joined with members who had the same number, a number that had been assigned randomly at check in) for successive reorganization into groups, and at "waking up" participants by amusing them (OdE 2017). In the end, a pitch was made in which each group presented their heroes and villains. And then the hackathon would go on.

The time to develop the ideas and work on the prototypes, was alternated in both editions with moments of relaxation, or breaks that «would be for anyone that wanted to come up, and because people were actually working very hard, many would join in». During these breaks «we did all kinds of games […] just for relax a little bit, to socialize and to get our heads off the work.» Convivial moments, sharing food or enjoying movies, was also an important moment to do networking and to socialize.

As referred in the 2016 online report[178], "exceeding the expectations of the Organization, the participants stayed all night working on their prototypes in an intensive marathon. The teams were able to count on the support of the Organization's chief mentor for advising projects, and handling in the material provided by technological partners, as well as the specialized support of EoT [one of the technical partners, n.d.r.]. The cooperative spirit between teams was also welcomed, and in the end teams helped each other in the construction of the final product".

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[176] With a very similar methodology to the one I had experienced myself during the Bologna Climathon 2017 edition (cfr. Par. 5.5).
[177] Could be based on JOE Journey of Entrepreneurship, learning method, but it is unclear.
[178] http://oficinaenergias.campus.ciencias.ulisboa.pt/lisbon-green-hackathon-2016/. My translation.

Figure 39 - Lisbon Green Hackathon 2017 Edition program (source: Lisbon Green Hackathon official Facebook page)

Both editions resulted to be quite successful in terms of participants. The 2016 was participated by 40 participants, organized in 10 teams; the 2017 edition by 48 participants organized in 12 groups.

Figure 40 - Lisbon Green Hackathon 2017 Edition participants (source: Lisbon Green Hackathon official Facebook page)

Both editions had prizes for the best three teams, one for each of three categories: Best Green Hack Award, Best Environmental Hack Award, and Best Business Idea Hack Award.

Biggest Environmental Impact Hack
Melhor pontuação na métrica "Impacto Ambiental"

Best Green Hack
Melhor pontuação total

Best Bussiness Idea
Melhor pontuação na métrica "Ideia de Negócio"

Figure 41 Lisbon Green Hackathon Award's categories (source: Lisbon Green Hackathon official Facebook page)

The prizes for the winning teams, were monetary [179] or in the form of gadgets and vouchers for fun activities and electronic materials (ESP8266 Modules, Solar chargers), and in the form of free training for the Best Business Idea Hack Award - which consisted of 20 hours of mentoring and incubation, at the the Tec Labs of ULisboa Science Innovation Center.

Unfortunately, there was no follow-up in both the two editions. Tavares recalls «it didn't work very well in that sense. We tried, but if the people don't want to, they just don't. […] The idea was, winners have a free incubation period and they would meet again with people in Tec Labs, to pursue the idea and get some startup or enterprise. But it didn't really take off. Some of continued to have meetings after, but in the end the thing pretty much died. I think these kind of people wanted just to have fun building things, and not really getting serious.»

Another aspect that Tavares underlines in this sence is that the format is conceived, as organized on a voluntary basis, while «if people wore extract value from the project, it would need funding or some sort of integrative support. Some people want to do it for 24h, others for 1 o 2 years, it is very different.» For Tavares both models, voluntary and financed, could work: «We were an academic institution and we tried to do everything for free, or paid for. […] I believe there other people who would agree: for example students, to get some experience, to learn things. »

In the opinion of Tavares the event even when «it doesn't have directly [value] on startups or careers, […] it has instead great indirect value for the things you learn, for the things you experience,. Some of them [the participants], I know, ended up having jobs in green [sectors] and doing their own startups, even if it was related specifically to the team's idea on which they had worked during the hackathon». For Tavares this «has value in a sense of personal development, and of generating and sharing ideas, more than in the event itself, or ending up with some specific solutions.»

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[179] The Students Association of the Faculty of Sciences of the University of Lisbon, main sponsor of the 2017 edition, provided the € 500 prize for the Best Green Hack category.

The "indirect educational value" is important, in the opinion of Tavares, also for the organizers, as the preparation of the event itself «was very hard work, to call companies, to recruit them, try to convince them […] I learned a lot of things, even soft skills regarding going to companies. I think for we organizers it was hard work, but if you have an open mind, you can learn a lot. And even for participants, it was the same thing.»

P and R Comparative Assessment Table

Despite the history of environmental and resilience planning in Lisbon, which evidences considerable institutional adaptive capacity (ESPON & IRPUD 2011) on the part of the Administration, the Lisbon case study reveals that the Municipality's intention to connect the first Lisbon Climathon outcomes to other local participatory processes (e.g., the PB and BIP/ZIP), did not have the expected success.

The reasons are connected, to a **lack of a clear commitment and leadership** by the partners, in particular of the Municipality in the follow-up phase, which led to missing an opportunity to realize the solutions proposed. This aspect undermines, according to Westley et al. (2013) strategies in support of successful ecosystem stewardship, point 3 the need of "Developing social networks" by "linking […] actors and stakeholders across and within organizational hierarchies", and misses completely, point 6 "Preparation, mobilization for change" by "building vertical social capital to influence policy decisions" and "linking innovative ideas to resource opportunities ("management up-down")" (cfr. ibid., Table 1).

Furthermore, in the case of CL the respondents highlight some failings with regard to the overall principles of effective participation (Wilkox 1994, Bishop nd., 2015), tied mainly to the **competitive format**, based on the business-oriented mind set of the organizing platform, which **impeded open collaboration and learning exchange** among participants, revealing a **contradiction** with CL mission, which is to enact collective solutions to tackle climate change.

On the other hand, for CL the case study confirmed an appreciation for the **flexible format** provided, and the importance of performing the events in **enabling spaces**, as well as the positive evaluation among organizers and participants, of the format characterized (by them) as an **action-oriented framework**.

For GH, the case study and the interviews gave substance to the research, confirming the underlying hackers' ethical values in the designed, which appear in the interviews, to comply almost fully with most of the overall principles and outcomes of effective participatory processes (Wilkox 1994, Bishop nd., 2015). The event was carefully designed in its variety of engagement activities, demonstrating that GH applied a **more transparent, collaborative and open format**

oriented towards shared results (e.g. brainstorming ideas in group, providing preparatory meetings to share skills, sharing knowledge between working groups), which resulted in a well-managed internal connectivity, which reflects P2 "Manage connectivity" (Biggs et al. 2012, Stockholm Research Center 2014).

While both formats used competitive prizes as a stimulus for participants, in GH their competition was performed in a **"playful" way**, coherently with hacker ethic (Levy 1984, Raymond 2000), producing – according to them – more collaborative results.

Finally, respondents resulted highly satisfied with GH's **indirect educational value**, that favored personal development (often in the areas related to sustainable development or resilience) and increased social learning, coherently with Biggs et al. 2012, Stockholm Resilience Center 2014, P5 "Encourage learning and experimentation", and related principles of effective participation (cfr. Table 1, Par. 3.4), and pointed out the generation of spin offs without institutional support.

Both formats in this sense can be considered, full "urban climate change experiments" (Castan Broto and Bulkeley 2013) or as I propose, **collaborative environmental-action workout sessions** to tackle climate change and the ecological crisis that involve multiple levels (Walker et al., 2004) of knowledge, institutions, resources and actors.

5.5 A personal experience: Stay Cool, a climate service for the city of Bologna

The field research was conducted in the form of a "participant observation" (Semi 2010), through my direct participation in the Bologna Climathon®2017 edition, and to the ideation, development and incubation of the "Stay Cool" climate service, one of the two winning projects. The experience was guided by a qualitative approach, and especially in the first part, it would be more correct to identify it as a "direct, personal experience" situated somewhere between "active participation" and "participant observation".

The documentation of the experience was reconstructed, successively, through a combination of information/data gathered before, during and after the event, such as: materials provided by the organizers, my notes and memories of the event re-elaborated with the aid of interviews[180] (in particular with the interview of Laura Donato, one of the members of my team during the event), and informal discussions with other participants in my working group, during the later "business incubation" phase between September 2018 and January 2019.

My position within the process of observation could be considered that of a "reflective practitioner/professional" (Schon, 1993) since form the late 1990's, I worked as a professional facilitator of participatory processes since, often as a consultant to Public Administrations and

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[180] For the drafting of this chapter, I would like to thank Laura Donato and F., who were participants during the Climathon, and then took part with me in the following business incubation process. My colleagues have helped me with discussions and comments, to supplement my notes and memories. In fact, the idea of concentrating the thesis research work on Climathon®, emerged several months after the event, forcing a painstaking work of mending the memory of the events, since the notes at the time had been taken with another purpose.

other subjects. A background that allowed me to observe several aspects within the event without having necessarily to pre-delineate them in a research plan.

The event

On October 27th-28th 2017, for two days, I participated in the first person, in the Bologna Climathon®2017 edition *Copernicus Climathon. Copernicus per lo sviluppo di reti verdi e blu in città: i dati satellitari per Bologna resiliente*, organized by the Urban Center of Bologna (now FIU), together with the Municipality of Bologna (COBO) and EIT Climate-KIC Italy, in partnership with the EU program *Copernicus Europe's eyes on earth[181]*.

The "challenge" that Climathon® posed to the participants, was to make use of the satellite data of the EU Copernicus Program, to develop ideas for increasing the City of Bologna's resilience, with a specific focus on *Green and Blue Infrastructures*.

My original motivation for participating in the event, was to better understand the opportunities offered by Copernicus Program to gather technical information (geographic and climate data) relative to the experimental area of the EU Project "ROCK"[182] in Bologna, in which I was involved together with the Department of Architecture of the University of Bologna, FIU and the Municipality itself, and that was tied to my original thesis proposal. News regarding the "marathon of ideas", was channeled through the University newsletter and was inserted and suggested as an extracurricular activity in the PhD program.

The participation to the event was subordinated to, and approved on the basis of, the compilation of my personal data in an on-line form and my willingness to, eventually, "spend the night" at the event. I was also asked whether I would be participating alone or in a group, and whether I already had any ideas concerning the event's challenge.

The wording of the on-line form had immediately stimulated my thinking and creativity. I had the idea of combining the theme of "culture heritage" and "participation" (which were central to my original Thesis proposal) with that of "resilience", all in line with the ROCK Project. I began to

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[181] The flagship EU program "Copernicus Eyes", launched as a Manifesto in 2005 with the title "Global Monitoring for Environment and Security (GMES), assumed its present name in 2013 and in 2014 began its operative program, with six series of satellite types ("Sentinels") continually monitoring the Earth's environment and ecosystems, functionally combining satellite data and on-site data from research infrastructures. With its policy of "complete, free and accessible" data (source: https://www.copernicus.eu/en/about-copernicus) Copernicus – besides guaranteeing a "substantial independence (source: www.asi.it) in the detection of the state of health of the planet – aims to represent, also, an instrument of economic development, in particular with regard to the Digital Economy. Copernicus provides elaborated data through its, so-called, "services" which are divided into six thematic areas: soil, sea, atmosphere, climate changes, emergency management and safety.

[182] ROCK - Regeneration and Optimization of Cultural heritage in creative and Knowledge cities, presented by the Municipality of Bologna, in collaboration with the University of Bologna and funded in the 2016-2017 HORIZON 2020 Program (Climate action, environment, resource efficiency and raw materials - Call Greening the economy - Topic SC5-21 Cultural heritage as a driver for Sustainable growth), which actively involves the Department of Architecture (DA), the Department of Civil, Chemical, Environmental and Materials Engineering (DICAM) and the PhD in Architecture and Project Cultures.

imagine the possibility of combining some reflections from Jane Jacobs about the heat wave which hit Chicago in 1995 (Jacobs 2004), with the map of the "cultural density" of the City of Bologna[183], and the opportunities offered by the Copernicus Program.

What I did not know at the time, is that the **powerful stimulus** of the Climathon's informal atmosphere, and of all the information that I assimilated, united to the strong group feeling created, during the event made it so that the experience – which started with a totally different objective on my part – became a new path of learning and research which, after all, is still ongoing!

In the promotional materials, it had been specified that participation at the event was free, and was open to "all persons interested in the proposed theme: citizens, students from various fields of study, professionals and developers, experts and "appassionati" [passionate people] from the areas of ICT, marketing, design, communications, etc.".

It was also declared that the winning team would be offered the possibility to benefit from a "path of business incubation" at the Green Office of the University of Bologna. "In addition, the winner or the representative of the First-Placed team, would be invited to present their project at the 2017 edition of Ecomondo[184]".
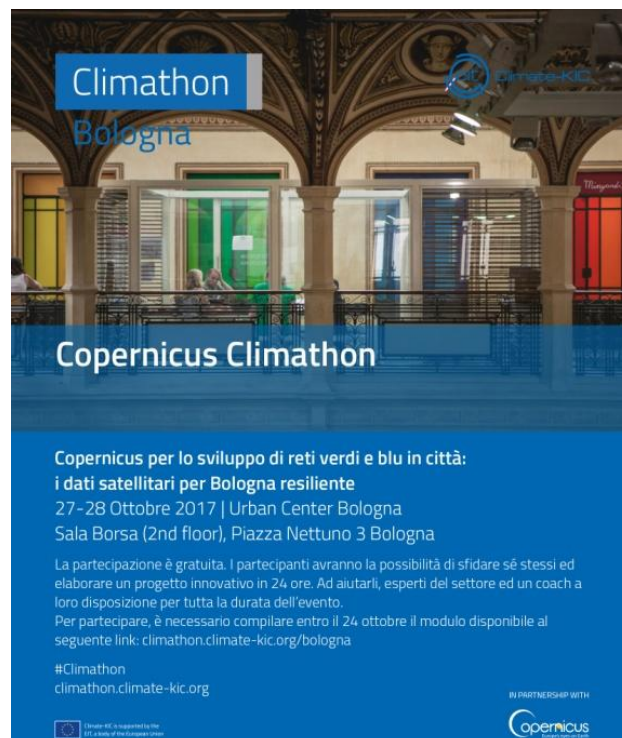
Figura 42: Bologna Climathon 2017 Edition flyer (source: FIU Bologna)

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[183] Which had been presented on October 19, 2017 in the Enzo Biagi auditorium of the same Sala Borsa where the Climathon was to be held, only a few days later.
[184] Ecomondo, is an international fair for technological and industrial innovation of the circular economy, held in Rimini (Italy) every year.

Before the event, all participants were provided with a dossier of preparatory materials which included: the "Piano di Adattamento Città di Bologna: strategia di adattamento locale" (based on the EU BlueAp Project, funded by LIFE+ 2015 Program); the publication "Bologna Città Resiliente. Sostenibilità energetica e adattamento ai cambiamenti climatici" from the series I Quaderni dell'Urban Center (n.d.), and the "European Strategy for Adaptation to Climate Changes (COM(2013) 216 final)".

The 24 hour Bologna Climathon®2017 began at 11 AM on October 27th, in the *Sala Atelier* of the Urban Center Bologna which was located at the time, at the top floor of the city's Sala Borsa (Stock Exchange). The Sala Borsa, which also houses the main Public Library of Bologna, is a particular architectural space transformed from its original functional layout, into a covered "public plaza", surrounded, entirely, by three-stories of balconies, which offer a spectacular view of the plaza below. The top floor balcony, from 2008 to 2017, has been the home of the Urban Center Bologna[185] (now renamed Foundation for Urban Innovation FIU) - a place which houses, recounts and participates the history and the future of Urban Planning in Bologna.

The *Sala Atelier* that hosted the event it is a fully-furnished, flexible open space, with moveable chairs, three large and adaptable work tables, ample vertical expositional panels, and AV projectors, all predisposed for the effective organization of participatory design workshops and other forms of public meetings.

The 21 registered participants of the 2017 CL Edition were greeted by the staff of the UC at 11 AM and were, first, invited to take their place in the room for coffee and pastries.

Since I was registered as an individual, upon arrival I realized that I knew none of the other participants. Shortly afterwards, F. arrived, a doctoral student in Agricultural Sciences, with whom I had collaborated on the ROCK Project that involved our respective Departments, and then I was no longer "alone".

After the opening greetings and two brief introductory statements from the local representatives of EIT Climate-KIC Italy (the Education coordinator and the Director), the coach G., an engineer from

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[185] The Urban Center Bologna (UCB) was founded in 2003 with the name EBo or Esposizione Bologna (Ginocchini and Petrei 2013), originally as an informative expositional space for the communication of the city's major infrastructural projects. Over the years, it has become the primary place for the promotion of Bologna's transformative processes and of citizen participation in the Administration's decisions. In 2018, the (name of a) committee composed of the Municipality, the University of Bologna, the Metropolitan Area, Hera, the Bologna Trade Fair and a plurality of other actors was changed into the Fondazione per l'Innovazione Urbana (FIU). The FIU is "a center for the analysis, communication, elaboration and co-production of Urban Transformation(s) to confront social, environmental and technological challenges. The Foundation continues to house the Urban Center with its "activities of information and promotion of the city's territory and its culture" in addition to the Office of Civic Imagination which is central to the city's "activation of processes of participation and co-production" and to map on-going "Analysis and Documentation of Urban transformations" (source: http://www.fondazioneinnovazioneurbana.it/chisiamo).

nearby Modena, and one of the winners of Climate-KICs' program "Pioneers into Practice"[186], involved the participants in a small group activity, to "break the ice".

The onlookers were first asked to form a line on the basis of their respective ages, then on the basis of their years of professional activity and, successively, on the basis of other personal data. This activity served to bring the participants to reflect on the importance of the manner in which one *organizes data*, and to understand how different schemes of organization can *change the results,* while at the same time it served to let participants "socialize" for a moment, and get to know each other a little bit, before starting the competition.

Next, Eng. Giovanni Fini, at the time an external consultant of the Environmental Sector of COBO, presented the territorial context of Bologna and its vulnerabilities with regard to climate change, and then illustrated the Local Adaptation Plan to Climate Change which the administration of Bologna had recently adopted, in a presentation entitled "New Green and Blue Ideas".

Successively, the keynote speech of Stephane Ourevitch (Copernicus Support Office) introduced the central theme of Climathon2017 Bologna, the European Program "Copernicus" and its ample functionalities and potentialities, with a focus on the Climate Changes Service (C3S) of its platform of satellite data.

Next, there were a few short presentation sessions dedicated to Urban Design and data use, by researchers (Centro Euro-Mediterraneo sui Cambiamenti Climatici CMCC and Green Office, UniBO), professionals (MEEO and Dedagroup) and digital entrepreneurs (StudioMapp) – with a break for a buffet lunch which was the first real opportunity for the participants to get to know each other. I started to chat with Laura Donato, a young lively Management Engineer, with a curious mind, during that lunch, and later we were part of same team. At 2:30 PM the participants were finally introduced to the operative methods of the event, and the first working session began.

The facilitator invited the participants to stand up and take positions around the three work tables. In turn, we all presented ourselves and our professional backgrounds.

It emerged that the participants' group was quite diverse in terms of aging (17 to 65 years old), nationality (Italian, French, Spanish, Mexican, among the others), educational level (high school students, University level and Post graduate students, professionals, one person was a retired professional) and fields of studies (Architecture, Engineering, Business, Environmental and Social Sciences, ICT).

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[186] Climate-KIC "Pionieers into practice" is a 4-6 week placement program, that connects climate change organizations and professionals from different backgrounds, levels of experience and skill sets, to learn practical skills in systems innovation. (source: https://pioneers.climate-kic.org/).

The facilitator then asked the group whether anyone already had some ideas in response to the challenge.

On the basis of my knowledge and experience of participatory processes, I took note mentally that the event has started without providing any preliminary activity of brainstorming[187] or visioning[188] (as, for example, was done in the two editions of Green Hackathon in Lisbon, cfr. Par. 5.4, and represented the "critic phase" and the "fantasy phase" in Jungk's "Future Workshops" (1987), cfr. Par. 4.4). This fact, represented in terms of overall principles for effective participation (Wilkox 1994, Bishop nd., 2015) a missed opportunity for the emergence of probably better, more original and definitely more shared ideas or "solutions", through group dialogue dynamics (e.g. Wates 2000).

Those within the group who had already imagined something (or had a concrete idea) responded, with a bit of embarrassment, as in my case. In the end, four hypotheses emerged, including my proposal of mapping "cool places" in which to find shelter, during heat waves. All those who had not expressed any idea, were requested to select one the four ideas, and to adhere to that group. The four groups were then requested to invent a name for the "idea". In our case, my project's name, "Be Cool", was changed into "Stay Cool".

As Laura recalls «the group was formed in a very spontaneous way,[…] some of you had made some interesting proposals […] but actually before the proposals, we were already talking, and more or less we found ourselves with the same people».

My working group was composed of five people, of different ages and backgrounds: myself, a professional architect and facilitator, 40 years old at the time, in my second year of PhD program; Laura Donato, as said, an Italian Management Engineer, 35 years old, with previous experience in and a Master's in International Cooperation, and a strong interest in working in the Environmental field; G., 29 years old, French, an Telecommunications Engineer and previous experience in the experimentation of a technical prototype for the production of green energy, enrolled in the International Master Business Program at the University of Bologna; A., a young Mexican woman, also enrolled in the same International Master Business Program, with an interest to apply her experience in Economic studies in the "green" field; K., 19 years old, a computer programmer and student of a professional high school in Bologna.

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[187] A "brainstorming" is an open "vigorous discussion to generate ideas in which all possibilities are considered. Widely used first step in generating solutions to problems" (source: http://www.communityplanning.net/glossary/)
[188] "Thinking collectively about what the future could be. Term used to describe group working processes which help a community to develop imaginative shared visions for the future of a site, area or organization. Approach often adopted by local authorities at an early stage in the plan-making process." (source: http://www.communityplanning.net/glossary/)

For Laura, motivations to participate were related to her interest in the topics of risk assessment and climate change that she was familiar with, however «the motivation goal in itself to participate in the Climathon was to learn, to feel a little bit the ground, to see a bit how it worked and to get to know someone [in the field]. And maybe just to absorb knowledge in a bit passive way, because I had little time, since I was working. In short, to get inside, to put my finger on it».

She had learned about the event at another international fair, and opted for Bologna Climathon® because it «had a wider scope», and while the other two more easily reachable events, Ferrara «was very academic […] you could tell that it was a thing proposed for university students», and Venice, had a more artistic imprint, and «instead, data collection, data reorganization is a little more part of me, and Bologna fit me». Concerning the outreach process, she recalls «I found it because I searched for it, because I was looking for something about climate change […] if you don't look for it, you hardly hit your nose».

Following our coach's brief introduction, concerning the "Business Model Canvas" method, the group immediately began to work and to review all the resources which had been made available (geographical information systems web sites, open data banks, and the satellite, geographic, urban planning and climate data, which had been illustrated during the morning's presentations). Our own knowledge and competencies were quickly shared among the group, also to know each other better. In Laura's words «I remember that the group was well formed, we were close-knit […] I was afraid of arriving in a group that was too academic, instead I found myself with people similar to me, I felt comfortable in it».

The morning speakers, those who had been invited to remain the whole time, were available as "resource" persons. They moved between the four groups − reflecting the principles of "open innovation" (Chesbrough et al. 2006) − listening to the ideas, and enriching and criticizing these on the basis of their own knowledge. As Laura remembers, the "resource persons" « were there with us, they talked to us and gave us some practical advice also for a possible continuation, like "contact this person, look at this site, refer to this". […] The people at our disposal were highly qualified». In addition, we had free, high-speed wi-fi access (COBO) to search notions and information useful to the development and support of our project design hypothesis.

«I remember», says Laura «that we were slowly drawing up the project, and then we would confront with [the experts], to understand how it could work better, "if I need this data how do I get it out, should we go better in this direction?, it makes sense like that, it makes less sense like this" and they were always at our disposal».

By 6:30PM, which was the time set for the "first pitch", all the groups had already drafted an adequately delineated first idea of their "solution" for Bologna. Each group proposal was

presented in a plenary session, and the idea underwent a first round of questions and answers which served to test its, likely, sustainability and economic feasibility.

At that point, dinner time arrived (once again, offered by the organizers). During dinner participants were requested to reserve their sleeping quarters for the night. However, all of the present decided not to stay for the night. This surprise response created some initial nervousness on the part of the organizers, who had expected the work to continue through the night. In fact, they informed us that they had planned interesting nocturnal social activities, such as film screenings and a yoga session, and that had also employed an overnight security guard. Nevertheless, they kindly gave us all the possibility to leave for the night, after our having agreed on a precise, early re-entry time for the next morning.

Our group exchanged "goodnights" with the solemn promise to work further during the night on specific, assigned parts of the idea, in order to arrive in the morning with a presentable draft in the form of a power-point summary, on which we would work together (the next day) in view of the "second pitch", - and towards the final presentation to the jury.

After dinner with friends, I actually worked on the project idea until 2 AM, sharpening the original draft with the observations and suggestions of the "resource persons" (e.g. further refine our needs and service target analyses, identify other local actors and knowledge partners to involve, render the idea more 'scalable and replicable', etc.). I then shared via email the new draft with the members of our group, for their comments and modifications. The next morning, before returning to the Climathon venue, I discovered that my original email had been "bounced" several times during the night, and that our idea-proposal had been improved, and now appeared satisfactory for final re-elaboration and communication. In effect, we had worked all night!!

At that time, before I learned about Hackathons and their origins (in my thesis efforts), I had not noticed that, in reality, in all of our reasoning and creative efforts, we had not even touched the area of computer programming, if not only, in prospective, our having imagined that our idea would be eventually concretized in some sort of application or GIS platform or web site. To all effects, our proposals remained anchored in meta-design and urban design. None of us, not even the young "ICT geek" in our group, had yet attempted to "write a code". Perhaps, the only aspect of our efforts which could be considered "hacking", was our bringing together diversified "known materials" in a highly creative and original manner.

After a very healthy dose of strong coffee, we dedicated the first part of the morning to defining our project's advantages to eventual clients and users, and its realization costs, while the youngest member of the group was busy creating "Stay Cool"'s first logo.

At 10:00 o'clock, the each of the four groups made its "second pitch", which was barraged with questions and suggestions from the coaches, especially regarding the improvement of the "value proposition"[189] and communication strategies.

Successively, participants returned to their working groups to adjust the power-point presentations, and rewrite their final "pitch".

The final presentation of the solutions took place in the Sala Atelier room. Shortly afterwards, a jury composed of Eng. Giovanni Fini (Comune di Bologna), Angela Corbari (StudioMapp – Copernicus Academy), Valeria Barbi (Urban Center Bologna) and Prof. Alessandra Bonoli (Green Office, Università di Bologna DICAM), declared the two winning projects: "Stay Cool" and "Zefiro".

"Stay Cool", my team's project, was the co-winner of the competition, in equal merit with another project, "Zefiro". As stated earlier, our original project idea was inspired by the intuitions of Jane Jacobs concerning the causes of deaths during the Chicago heat wave of 1995 (Jacobs, 2004) and took the final form of a climate service which makes use of the climatic and geographic data available in the "Copernicus Europe Eyes of Earth" and in other data bases, in order to identify, map and communicate the locations of the city's "cool places": in particular, the parks, museums and other cultural settings, where one could find shelter during a heat wave. In addition, the service would aid, proactively, to improve the city's response to heat waves, through a pre-emptive identification of the high-risk urban areas in which to focus public investments and, therefore, to augment the presence of such "cool shelters". "Stay Cool" was conceived to be addressed, principally, to fragile and/or socially marginalized populations.

The Municipality of Bologna, which was part of the jury, expressed interest in helping to further develop the two winning projects in tandem, and proposed their inclusion in the "incubation program" of ROCK's Project "Green Office" within the University of Bologna, managed by the then partner of ROCK Project, Eco4Climate, together with the winners' of the Hackathon which was planned to be organized within the ROCK Project.

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[189] "A value proposition is a statement that answers the 'why' someone should do business with you. It should convince a potential customer why your service or product will be of more value to them than similar offerings from your competition. You know why your company is great, but do your potential customers know what sets your brand apart?" (source: https://www.kunocreative.com/blog/good-value-proposition-examples).

Figura 43 - Image from "StayCool" presentation to the Jury (Lorenzo V., Donato L., Flores A., Denver K., Chicco G.)

One of the "incentives" offered to the Climathon participants was the possibility given to the winning group to participate in the Rimini Ecomondo fair, scheduled for the following 7-10 November. Since our group had merged with the Zefiro one, F. that was part of it, participated in representation of us all. In Ecomondo, the aim was to show to a different audience the ideas that emerged during the Italian edition of Climathon 2017. There were no further follow-ups.

In the meantime, the idea was presented during a radio broadcast by a local radio station of Bologna. On that occasion, the other interviewee was Giovanni Fini (COBO) who reiterated the interest of the Bologna administration to develop/our ideas in tandem.

The fact that these follow-ups had occurred within a few weeks had created a certain expectation in the group (which had become smaller in the meantime), myself included. But then the situation froze, and almost a year passed before the promised business incubation period within the Green Office of the University of Bologna, took place.

The incubation program in the end consisted in 8 training webinars by Eco4Climate[190], once a week for about an hour according to our availability, and in a one day face-to-face meeting in Bologna, to interview some of the "stakeholders" we had identified for the success of our project. The training period began in September 2018 and then, quite suddenly, it ended[191].

The quality of the mentoring was high, as Laura recalls «the incubation was what I expected, J. [of Eco4Climate] was precious at any level […] the path that he made us do is very useful in any area, not just climate», and we started the program enthusiastically, as I reported myself in my

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[190] ECO4Climate are eco-entrepreneurs with seat in Spain (source: http://ecopreneurs4climate.org/). Their activities ended in January 2019.

[191] Their activities ended in January 2019 for internal issues.

field notes for the participatory observation: «the atmosphere is friendly, everyone seems eager to get involved (including me)». (Field note 1, Mon 10-09-2018, Session I Incubation Program).

But the long span of time that passed between the Climathon event and the incubation program, had produced several effects.

The group had become much smaller at that point, we had remained in three[192], and once we had (re)elaborated our idea in a more valid "value proposition", and finally got to (re)present it to our "stakeholders" in Bologna during the face-to-face session (the Municipality *in primis*, but also the possibility to interview on the phone an insurance company and several NGOs involved in Bologna's Extreme heat wave Prevention Plan), we discovered that our idea, for several aspects, was already covered by the subjects in charge of the local heat wave Prevention Plan.

From my field notes, «the interview was a bit tense, the person was on the defensive - according to Jesus, because of the medium (the telephone). I believe instead that it was because I had talked about the characteristics of our idea, and the person had immediately understood that it was overlapping their service, and therefore was in competition. In this I see a problem with this kind of stakeholder engagement modality, that happens only at the end of the design process [e.g. for a climate service]. If we had got to know the related subjects at the beginning of the incubation, we would have taken them into account and sought a complementary idea with their help. Now, this is much more difficult because the subject has closed up, the language we used [n.d.r. and that is fostered in incubation programs] is that of business', the idea seems completely defined and the subject believes that we want to compete with their service (which seems also very well organized) (Field note 10_ Fri 9-11-2018 _Session V Incubation Program, 11.30 am at Fondazione Rusconi, Via Petroni 9, Bologna).

For Laura after all, «what I liked most [in the Climathon] was the confront with the experts, the fact of having them available. [Since] we were the winners, a session immediately after the event would of been be useful to give a more precise frame to the project in short. It could simply be a subsequent confrontation, like a week later not 8 months later [laughs] during which the jury could give the winners a feedback».

These two considerations highlight how the possibility of meeting a network of local stakeholders with interest and knowledge – that could be selected by the local administration, based on the project's first proposal – immediately after the Climathon's event, could allow the winning groups to develop their idea without overlapping services already present in the area, and also to focus on the aspects considered most useful and innovative for the selected stakeholders.

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[192] Four actually, with A. at a distance from Mexico, where she had made return in the meantime. But when the program got to stall in January, we lost her also.

Nevertheless, the Municipality seemed very interested in our idea for some features not contemplated in the Prevention Plan, such as the possibility to refine the microclimatic map of the city in view of the development of the new master plan (PUG), so we went on.

The main issue from the beginning of our dialogue/collaboration with the Municipality, consisted in "how" the city could help us finalize the development of the App and of the related climate service, which required an economic investment. Since it was impossible for the Municipality to directly fund our idea, but they were willing to promote our "cause" because it was coherent with the objectives of the PUG and the PAESC, they proposed us to use the form of the public-private partnership once we had found other subjects (local enterprises or else) that could be interested in financing it.

The problem with this, was that our idea while interesting for the city of Bologna it was not economically attractive for businesses or, as the Climate KIC platform stated (by phone) to us, when we tried to ask for funding from their side, the idea was «more a "project" for Bologna in particular, than an immediately marketable and scalable idea, of the type that they would finance».

Another contradiction within the Climathon format was emerging: the project-idea generated within the event was considered valuable and relevant for the city's objectives (coherently with Climathon's mission to support cities in takling climate change effects), but not easily marketable, making it impossible for the group to develop it further and for the city to obtain some kind of advantage from investing time and resources in Cliamthon's event.

Nonetheless, the group whose motivations were only partially economical (each of us had a "higher" motivation, inspired by our personal political or entrepreneurial idea of performing environmental activism), was willing to move forward, and so we started to look for knowledge partners.

Our research eventually led to putting the city's technical offices in contact with a very valuable and more easily employable resource (since part of a public body) by the Municipality - a Copernicus Academy reference person and structure that, after stipulating a specific contract with the administration, helped the city to develop the necessary microclimatic map.

Laura's considerations about how things went, are «Something should fall back in the city […] Sure we had gave them an assist, because we gave them XX [n.d.r. the Copernicus reference person], so in my opinion the relapse is there, we made it relapse. However, the relapse was random, like in a brainstorm where something can come out of one thing or another. Then it was up to the Municipality to actually use it. The problem for the Municipality was that they needed something, but in this case they could not pay for it». [n.d.r. were an informal group of private

citizens, neither an association or some other kind public organization, that was possible to formally appoint].

As Laura recalls, «from there we were alone trying to continue to develop our idea, with the core business still shaky and with our main interlocutor who seemed to have no way of collaborating with us, except in the proposed formula of the partnership for mutual benefit but without money».

Finding the "right tool" (cfr. with Catarina Martin's interview in Par. 5.4) to help the ideas and solutions that emerge within the Climathon's "safe arena for experimentation" to find a full realization, and to sustain the work of the proposing groups, remains an unexplored area for future research.

P and R Comparative Assessment Table

The first-person experience of an event of Climathon in Bologna, and the successive participant observation of the business incubation path and further developments, helped the researcher better understand and focus specific aspects of the format, and of its "fitness" in the overall local resilience planning context.

Regarding the venue and the "collocated intensive collaboration" (Trainer et al. 2016), the space offered by the organization resulted **very effective in enabling group work** at different scales, from the plenary sharing moments, to the individual and collective research work, thanks to the fast internet connection and to the nearby and accessible public library.

For what concerns the format, the information provided during the event (through materials and "resource persons") was of **high quality and easily communicated**, considering the complexity of the issues usually inaccessible to non experts. This aspect strongly complies with Biggs et al. 2012 P4 "Foster complex adaptive systems thing", helping to build more systemic solutions and projects within the event, facilitated by the **continuous feedback** provided by the "resource persons".

It also helped in creating awareness of the **urgency** of the question (tackling climate change) and, united to the simultaneity of a global happening and the competition, invested participants with a sense of commitment and pride to contribute in finding the "best" solutions, unifying the participants design efforts, by **embracing global and local knowledge** (Hester 2007).

On the other hand, the methodologies of engagement experienced during the event, show a lack of planning and an effective diversity in the use of techniques and methods, according to the overall principles of effective participation (Wilkox 1994, Bishop nd., Bishop 2015).

It appears in particular that the **idea generating and brainstorming phase is inadequate** and

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reductive, as groups are formed around ideas instead of letting ideas emerge from group dynamics, with the consequence of missing P3 of Biggs (P3) "Manage slow variables and feedbacks", and in relation to overall principles of effective participation (Wilkox 1994, Bishop nd., Bishop 2015), it represents a missed opportunity, to draw shared ideas and proposals.

Regarding the follow up, the **lack of a carefully planned successive path towards realization** of the ideas emerged, in particular the absence of successive meetings in the short term with "resource persons", institutional subjects or other stakeholders identified on the base of the winning projects, resulted in actors' having learned about the project limits or non feasibility after excessively long time, with the result of undermining Westley et al. (2013) point 5 "Facilitating/developing (social) innovation", and point 6 "Preparation, mobilization for change" in particular by having lost the opportunity of "linking innovative ideas to resource opportunities".

Furthermore, the overall business oriented mind set of the promoting platform (EIT Climate KIC), which does not take in consideration that "solutions" at an urban level, might not be immediately "commerciable", but can still result of high interest for cities, and therefore need to **identify alternative sources of support, financial and non,** and of **new forms of partnership among institutional and informal subjects**, to foster Westley et al. (2013) point 6, in particular to "Prepare the system to be able to effectively take advantage of forthcoming opportunities for change (windows of opportunity)" (ibid.)

This aspect, which is connected to the necessity for urban institutions to address successful ecosystem stewardship, to "Recognize or create and seize windows of opportunity", and to clearly identify "Timing when to connect and mobilize others, i.e. creating the right links at the right time around the right issues", is held to be one of the main points that this research intends to address within Chapter 6, with the *proposal for a new adaptive co-design framework for urban resilience and ecological transition*.

Chapter conclusions

The following Table represents the **Comparative Assessment Table** in which the findings for the two formats, that of Climathon® and of Green Hackathon, are summarized in the light of the main theories and evaluative frameworks assumed within this research, i.e. the two pair of lenses, that of *social-ecological resilience*, and of *participation*.

The scheme allows synoptic comparative vision of the main features and characteristics of the Climathon (in light blue) and Green Hackathon (in light green) as analyzed through categories related to the **six assessment criteria areas**, as derived from the theories of *participation* and *social-ecological resilience*.

The features **represent strong points (or potentialities) or critical issues (or limits) , able to foster or alternatively to reduce resilience and hinder ecosystem stewardship** (Chapin III et al. 2010), **and future trajectories towards desirable pathways** (e.g. sustainable development).

For reasons of space and readability, in the Comparative Assessment Table, only the main or most characterizing features are listed for each format, please refer to the P and R Comparative Assessment Table boxes, that contain specifications of each aspect analyzed.

In the scheme, the position and characterization of the features represents the synthesis of all the data analysis, and is functional to the **three outcomes** of the present research:

i) to feed the **Recommendations** to urban institutions and organizing platform, **for improving Climathon**[193] in the prospective of fostering Ecosystem stewardship in a collective manner;

ii) to **develop and understand the position and role of Climathon** and of the other independent global climate action movements (as described in Par. 4.4.) together with the in an combined "Ladder of Participation", able to expand social-ecological resilience;

iii) to provide urban institution with a pragmatic tool to assist urban institutions in better coordinating, integrating, and consolidating bottom-up and third party local contribution towards the achievement of the global targets of social-ecological resilience and sustainability, a **new adaptive co-design framework for urban resilience and ecological transition**.

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[193] Since Green Hackathon is no longer in activity.

Participation | Resilience

Assessment criteria areas							Assessment criteria areas
General observational analysis (De Leonardis 2001, Francis 2005, Semi 2010)	**Timing** ▪ 24h ▪ global resonance ▪ single event ▪ recurring `100D`	**Geo distribution** ▪ European International ▪ density in Mediterranean area `100D`	**Venue** ▪ appealing, flexible and well equipped spaces ▪ hubs and coworking spaces `CS`	**Institutional Adaptive Capacity** ▪ attempt to develop funding or continuation ▪ build awareness	**Skills for Eco Stewardship** ▪ facilitating knowledge and utilization ▪ bridging & linking ▪ safe arena for exp `INT`	**Opportunity contest** ▪ hazy to transparent (Dorado 2005) ▪ fails to seize opportunity window ▪ little or no change	Transformative agency (Westley et al. 2013)
	▪ episodic ▪ variable format (7-35h) `100D`	▪ mainly North Europe `100D`	▪ appealing, flexible and well equipped spaces `CS`	▪ low or none relationship with urban institutions	▪ highly exploratory and experimental ▪ bonding `INT`	▪ non applicable `INT`	
Effective participation principles (Wilcox 1994, Bishop nd., 2015)	**Diversity of methods** ▪ good variety of methods ▪ flexibility `100D`	**Inclusive process** ▪ broader and more balanced (age and gender) ▪ few stakeholders	**Proper links with planning** ▪ no clear follow up ▪ low political commitment `P.O.`	**P1 redundancy** ▪ multiple points of view and answers `INT`	**P4 understanding SES as CAS** ▪ easily communicated complex issues	**P7 polycentric governance** ▪ networking through multiple levels of actors	Seven Principles for building Resilience in SESs (Biggs et al. 2012, Stockholm Resilience Center 2014)
	▪ good variety of methods ▪ tailored ▪ independence `100D`	▪ the "gifted" ▪ no stakeholders ▪ transparency `INT`	▪ no overall process ▪ some feedback `INT`	**P2 connectivity** ▪ facilitate collaboration and communication	**P3 slow variables** ▪ mediation of conflicts for shared ideas/proposals `INT`	**P5 learning & exp** ▪ high educational value `INT`	
Degree of participation (Partnership LTD 1999, Bishop 2015)	**Appropriate knowledge base** ▪ diversity among partners (innovation, educational etc.) `100D`	**Decision-making process** ▪ challenges are relevant for actors ▪ no vision building or sharing `SUR`	**Participation level** ▪ all four levels of participation activated ▪ more consulting than involving `SUR`	**Main objective** ▪ determine "best" solution ▪ marketability `P.O.`	**Design character** ▪ business oriented ▪ competitive setting ▪ action oriented format `P.O.`	**Conditions** ▪ face-to-face activities ▪ open innovation but "proprietary" format `100D`	Eco-Resilience vs. Eng-Resilience (Holling 1996)
	▪ pre events ▪ technology partners `SUR`	▪ challenges are relevant for actors ▪ shared results `SUR`	▪ main level activated: dialogue or acting together `SUR`	▪ hands-on imperative ▪ ideas incommon	▪ collaborative setting ▪ tinker & play `INT`	▪ proximity ▪ openness ▪ hacker ethic `INT`	

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Sitography

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Copernicus Eyes on Earth EU Program https://www.copernicus.eu/en

ECO4Climate. Official website http://ecopreneurs4climate.org/

EU BLUE Ap Project. Official website http://www.blueap.eu/site/

EU ROCK Project. Official website https://rockproject.eu/

FIU Fondazione per l'Innovazione Urbana. Official website http://www.fondazioneinnovazioneurbana.it

Urban Promo. Official website https://urbanpromo.it/

6. Urban Co-Action. Introducing new dimensions of adaptive co-design for urban resilience and ecological transition

Based on the analytical results of the present research, carried out through the multiple tools and methodologies, and in the proposed double theoretical perspective of social-ecological resilience and participation, this final Chapter presents the answers to the five research questions, posed at the beginning of this thesis work.

These answers are also functional to the three main outcomes of the present research:

- *Recommendations to urban institutions and the organizing platform, for improving Climathon® in the prospective of fostering Ecosystem stewardship in a collective manner;*

- *a clear understanding of the position and role of Climathon® and of the other independent global climate action movements as described in the present research, in a new combined Ladder of Participation, capable of overcoming Hester's "intricate opposition" between the ecological and participatory dimensions, and to expand social-ecological resilience;*

- *the development of a new adaptive co-design framework for urban resilience and ecological transition - a heuristic model meant to assist Urban Institutions in better coordinating, integrating, and consolidating bottom-up and third-party local contributions, towards the achievement of the global targets of social-ecological resilience and sustainability.*

This Chapter describes the functioning of the proposed framework, as a pragmatic tool addressed primarily to urban institutions that have undertaken a path of resilience and ecological transition to assist them in assessing, planning and managing participatory processes more adaptively, and into recognizing windows of opportunity to address change towards trajectories of desired sustainable development.

In its final part, the Chapter points out the need to test the heuristic model in real applications, and for the development of further lines of research.

6.1 Improving Climathon® for Ecosystem co-stewardship: recommendations to urban institutions and organizing platform

The results of the analysis through the multiple tools employed and in the dual theoretical perspective proposed, as developed in Chapter 5 and presented synthetically in its Comparative Assessment Table (Cfr. Chapter 5), are fundamental to answering to the **first two research questions** that guide the present research, or: - (1) *Since (cfr. Par 4.4) Green Hackathon and Climathon® are participatory activities, do they provide adequate degrees (and levels) of participation? And, (2) what are their potentials and limits in orienting and innovating current planning procedures and methods towards ecological stewardship?*

As anticipated in Chapter 4, since the organizing platform of Green Hackathon is no longer in activity (cfr. Par 4.3), the following reasoning and recommendations included in **this final Chapter**

will focus on Climathon® format, which is still running and actually a growing global movement.

Nevertheless, I have decided intentionally to include elements drawn by the analysis of the GH format in the research, because **some specific features of GH that judged positive, with regard to the research parameters, and missing or lacking in CL** will be **addressed to improving Climathon® format**.

This said, the answer to the first research question was already partially satisfied in Chapter 4 (Par. 4.4), for what concerns the possibility to ascribe issue-oriented Civic Hackathons to participatory activities, and the final results in Chapter 5, demonstrate that **Climathon®** format can be considered as positive evolution with regard to Civic/Green Hackathons, resulting **in general in a more balanced format, able to create some opportunities for active participation in all "levels of participation"** (Participation evaluation frame, based on Partnership LTD 1999, Bishop 2015) - even if with differences in the perceptions of organizers and participants, of a more "consulting" or "involving" format -, than **Green Hackathon**, for which the **main level activated, is that of "dialogue" or "acting together"**, coherently with underlying hands-on, open and collaborative values of "hackers ethic" (Zapico et al. 2013).

Several other features (cfr. Chapter 5 conclusions, Comparative Assessment Table) improve the degree of participation of Climathon® such a **greater diversity in participants, knowledge partners, challenges and outcomes**, and the fact they are based on a **lose but common format**, and therefore **easily comparable,** and **lead towards an improved learning process**.

The CL **independent process**, **clear objectives and inclusive process** (at least in the confront of organizers and partners), is thus coherent with overall principles of effective participation (Wilkox 1994, Bishop nd., Bishop 2015).

The fact that Climathon® events, are a **recurrent (annual) event** with **global resonance** able to **create a sense of urgency and raise awareness**, and that they **target specifically cities** in an **action-oriented framework** to help them be more resilient and sustainable, are positive aspects in itself, considering the premises of the present research (i.e. climate change and ecological crisis).

On the other hand, both formats in their concrete development as inferable from Chapter 5, and in particular Climathon®, **present some fundamental *limits* in addressing overall principles of effective participation** (Wilkox 1994, Bishop nd., Bishop 2020) that should be improved to improve their inclusiveness and democracy, fairness, effectiveness and efficiency (Lorenzo 2002a).

According to the theoretical framework of this research work and its two pairs of lenses – that of

participation and *social-ecological resilience* - the **strong points (or potentialities) or** regarding the "degree of participation" listed above and to the **critical issues (limits)** included in the Comparative Assessment Table, (cfr. Chapter 5 conclusions), do represent *potentials* or alternatively concrete *limits* for these formats *in orienting and innovating current planning procedures and methods towards ecological stewardship*.

The features and characteristics listed and synthesized in the Comparative Assessment Table synoptic scheme, **represent in fact the *potentials* or *limits* of these practices, in fostering or alternatively reducing resilience and hindering ecosystem stewardship** (Chapin III et al. 2010), **and therefore shifting future trajectories towards desirable pathways of development** (e.g. sustainable development) **of the coupled SESs in which the specific urban climate change experiments** (Castan Broto and Bulkeley 2013) **are enacted**.

In a perspective of ecosystem stewardship as proactive governance strategy (Chapin III et al. 2010), *adaptive collaborative management* or better *adaptive co-design*, *co-planning and co-governance*, in the case of cities as CASs embedded in far reaching SESs, are fundamental "to respond to and shape social–ecological systems under conditions of uncertainty and change" and "to sustain the supply and opportunities for use of ecosystem services to support human well-being" (*ibid*., p. 241).

To facilitate the understanding of the potentials and limits of Climathon® in orienting and innovating current planning procedures and methods towards ecological stewardship, and therefore of the Recommendations to organizing platforms, these have been organized in the following Scheme (Table 15) and related to the specific pair of theoretical lenses assumed within the research.

Table 19: Climathon potentialities and limits in fostering ecological stewardship with regard to participation and social-eco resilience principles.

	Limits	Potentiality
Participation	▪ single event ▪ few or no pre and follow-up events	▪ global resonance and communication ▪ recurring annual event
	▪ very few stakeholders within the event	▪ broader and more balanced target participants (age, background and gender)
		▪ appealing, flexible and well equipped spaces for face-to-face activity
	▪ no vision building or sharing	▪ good variety of methods, mainly for implementation ▪ flexible format
	▪ lack of transparency	▪ independence
	▪ lack of organizers/partners with expertise of participation	▪ great diversity among partners (innovation, educational etc.)
Social ecological	▪ competitive setting (business oriented) to determine "best" solution	

resilience		
	▪ open innovation but "proprietary" format	
		▪ awareness raising ▪ an action-oriented framework.
	▪ P2 connectivity (low, fails in facilitating collaboration and sharing)	▪ P1 redundancy and diversity (good) ▪ proximity ▪ multiple points of view and answers
	▪ P3 slow variables (low, no orientation towards shared ideas/proposals, no management of feedbacks)	▪ P4 understanding SES as CAS (high) ▪ easily communicates complex issues
	▪ P6 broaden participation (low, lack of mediation between the organization and a broader local context)	▪ P5 "Encourage learning and experimentation" (high performance)
	▪ P7 polycentric governance (low, networking through multiple levels of actors - beyond and after the event)	▪ P7 polycentric governance (high, networking through multiple levels of actors - during the event)
Both	▪ no overall process ▪ no clear follow up ▪ low political commitment	▪ a wide, rich variety of resources given to participants ▪ high educational value
	▪ fails to seize opportunity windows ▪ produces little or no change	

The above scheme is functional to **identifying weaknesses and limits to overcome and potentialities to take advantage of**, to improve the Climathon® **internally**, and therefore with Recommendations to address to EIT Climate-KIC Platform (PL) with regard to format, communication development etc., and **externally** addressing Recommendations to organizers and partners, Urban Institutions (UI) in particular, with regard to outreach, vertical networking and linking to other local resilience planning and participatory processes, and to both for strategies to facilitate and control the realization of "solutions".

The objective of the Recommendations, is to **maintain actual** features that facilitate **resilience building and ecosystem stewardship**, **reinforce or change (improve)** those that present unexpressed potentialities, and avoid or eliminate those which reduce and hinder it, impeding therefore desirable future pathways of sustainable development of the coupled SESs as CASs in which the Climathon® is enacted: cities, but also regions or larger scale areas, depending on the dimension of the challenge connected to the experiment, and the solutions proposed.

Recommendations to **EIT Climate KIC organizing platform (PL)**, **for improving Climathon®** in the prospective of fostering Ecosystem stewardship in a collective manner (Ecosystem Co-Stewardship), therefore, are:

Maintain

- The global hacking marathon format, as conceived in the form of **recurring simultaneous annual event** targeting **cities** around the world, represents a strong motivational factor for participants and organizers investing actors with a **sense of commitment and pride**, thanks to **global resonance and communication** of the event;

- The **common but flexible format and the face-to-face activity, performed** in **appealing and well equipped spaces**, which **provides ideal "safe arena for experimentation"** and to **"play" with highly complex issues**;

- The average **number of participants, which** results **adequate for a productive workshop**, and is functional to **exercise creative intense collocated collaboration**;

- The **wide array of challenges** that fosters **complex adaptive systems thinking, fosters greater awareness and understanding of the systemic nature** of climate and ecological crisis producing **high educational value among all actors**, and stimulates participants in finding environmental-economic-socially sound and creative solutions, **calling into question global and local scales** in a **framework for environmental action,** combining them without compromising their "intricate opposition" (Hester 2007).

Improve

- To **improve inclusivity**, consider the prevision of more **flexible time table** for the event itself, instead of 24h straight on the example of the 7-35 hours "drop in and out" events, of Green Hackathon platform;

- in an optic of improving these events as **collaborative environmental-action workout sessions** (cfr. Chap. 6), **citizenship (or in general, a wider public) must be better involved in climate action** through making the result of such urban experiments **more transparent and accessible,** giving account of the events through **detailed public reports, on the example of GH platform.** This united to the fact that CL is recurring annual event could also represent an **opportunity for progressive social learning and format improvement** over time.

Avoid

- the imposition of too **strict guidelines and or proprietary formats**, in an optic of spreading the format in a more inclusive and open way to create a **global community of practice** of Climathon®, on the example of Green Hackathon platform, recuperating the underlying values of Hacker spirit (Levy 1984, Raymond 2000).

Recommendations to **Urban Institutions (UI) and local organizers and partners**, **for improving Climathon®** in the prospective of fostering Ecosystem stewardship in a collective manner (*Ecosystem Co-Stewardship*) are:

Maintain

- The **rich variety of resources** technical, economic and social in the form of **data and information and resource persons**, provided during the event concerning the challenge

themes, and which represents a **wide knowledge base that facilitates knowledge building and utilization**, about complex and systemic issues such as climate change and ecological crisis, and to find possible solutions to tackle them;

- The **presence and collaboration of different (urban and beyond) institutions** during the events, that provides for participants **access and recognition of management initiatives** (local resilience planning efforts and programming) **by diverse formal authorities at different levels**, and represents the possibility potentially to share responsibility and build trust and legitimacy through transparency, and to "promote polycentric governance" within the event (horizontal bridging and social capital);

- The **great diversity** and **heterogeneity of different knowledge fields involved**, in the composition of partnerships that organize CI at a local level;

- The **good independence** demonstrated with respect to Climathon® platform, by proposing challenges and topics tied to local political choices or needs.

Improve

- The **dissemination of the variety of resources offered within the event** (appropriate knowledge base), through the **organization of a preparatory event or meeting** in which such information can be **presented and shared** with a wider public and interested parties, as done at times in GH;

- The **diversity** among target participants by **diversifying outreach and broadening communication channels at a local level**, keeping in mind that the target remain to involve experts, professional, creative people etc.;

- The democratic participation and awareness of "participants as *citizens*", could be improved in an ideal process by **opening the possibility for participants and citizens to be consulted upon** and/**or to propose challenges** before the event, to mediate with a wider public and base priorities of local needs and context, in an optic of better combining without compromise global ecological issues and local participatory dimensions **(Hester 2007).**

- The **idea generating and brainstorming phase which appears inadequate** and reductive, since the variety of **engagement methods used** in the event **are mainly directed towards the implementation of ideas through business oriented tools,** and lack completely of the thinking and sharing phases and activities (brainstorming, visioning, charettes) which could lead to **more original and shared solutions**, an aspect that should adequately designed and provided;

- The substantial **lack of organizers/partners with expertise in participatory processes**, must be addressed to **improve engagement management and process through carefully planned and tailored co-design activities,** managed by experts, even taking into consideration the possibility of involving local actors form other "urban climate experiments" among the growing climate actions movements (Tactical urbanism, Placemaking or XR, activists);

- The **management of results and outcomes ("solutions")**, which results in the research as **the most weak aspect** of the "climate change experiment", by including **in and after the event more interested stakeholders effectively related to the challenge**, and **in follow-up meetings** to give participants (at least, the winners) an opportunity to discuss their proposals more in depth and receive **feedback** by the same actors (experts, institutions and stakeholders) present at the events, and also by other interested stakeholders selected by the organizers or by the platform, on the basis of the project itself.

This last point in particular, for what concerns improving the outcomes of Climathon to produce effective environmental change, is connected to necessity to *strongly improve*:

- the **lack of a clear commitment and leadership** by the partners, to accompany the ideas generated in the event to a concrete local realization (beside the possibility of developing a marketable idea, within the incubation process), which **results one of the main issues that limits or impedes an effective appropriation** around the results of the process by the Urban Institutions in the follow-up phase, and which lead to **missing an opportunity to realize the solutions proposed**.

This fundamental limit must be addressed and improved, adequately inserting Climathon® within the local **overall resilience planning process, by carefully imagining a structured ("planned") path that identifies "when" to perform the event, "how" to** eventually facilitate the realization of the solutions through financial and non support, and new forms of partnership among institutional and informal subjects (for those solutions that are of interest of the UI, but not marketable), and in relation to "which" other ongoing local participatory or resilience planning processes, the urban climate change experiments should be connected, helping in this way to also "bridge" and "link" the "solutions" vertically (Westley et al. 2013) for concrete realization.

A **pragmatic tool to assist urban institutions in this task** and therefore help them in taking better advantage by coordinating, integrating, and consolidating bottom-up and third party contribution (such as the one generated by Climathon® events) towards the achievement of the global targets of social-ecological resilience and sustainability, will be introduced in the following

paragraph and described in detail in its functioning, in the heuristic model presented in the last paragraph of this thesis work: a *new adaptive co-design framework for urban resilience and ecological transition*.

Finally, as a general recommendation for both EIT Climate-KIC platform and Urban Institutions and organizers and partners of local Climathon, to improve Climathon format it is necessary to *avoid or strongly mitigate*:

The **competitive setting**, represented oddly enough by relatively "small prizes", and the **primarily business oriented-approach**, that compromises the principles of collaboration towards a common goal or "working towards shared result" (Bishop 2015) and denotes the **fundamentally "engineeristic resilience"** (Holling 1996) **mind set** of the format**,** which poses greater importance on efficiency of productivity and "single stable state possibility" (one winning solution) than on a "multiple stable states possibility" (more solutions that would better comply with ecological resilience (Holling 1996) safe-to-fail design characteristic), and that could undermine Climate-KIC's general mission of tackling climate change trough collective solutions, and definitely hinder the potentiality of these urban change experiments in contributing to move the local system towards ecosystem stewardship.

6.2 Ladders of participation and adaptive cycles: the role of Climathon® and other independent global climate action movements in a combined ladder to expand social-ecological resilience

Based on the considerations included in the previous Par. 6.1 and on the results of the present research, the second paragraph of the final chapter of this research work, is dedicated to answering the **second two research questions** that guide the present research, or: - (3) *Can Green/Climate Hackathons, together with other forms of small, creative co-design moments such as Placemaking and Tactical urbanism, and the emergence of spontaneous global environmental direct-action movements, represent for cities in the ongoing process of building resilience, an opportunity to experiment new forms of resilient "collaborative" planning or ecosystem co-stewardship?*, and *(4) How could they help overcome the "intricate opposition"* (Hester 2007) *between the ecological and participatory dimensions, and what is their possible role?*

In Par. 4.4. of present the research, I have delineated the characteristics of Tactical Urbanism and Placemaking and of global environmental direct-action movements, such as XR, that make these practices of creative experimentation and participative interaction with the city environment, - situated between "co-design" and "co-action" –, "urban climate change experiments" (Castàn Broto and Bulkeley 2013) as well as the issue-oriented Civic Hackathons, and Climathon® in particular.

As in Jacob's "little vital plans" (1981, in Jacobs 2016), these mainly self-organized interventions (Silva 2016) are, in effect, *glocal* experimentations that intersect different planning dimensions - from the micro scale of urban design to the macro scale of global environmental issues – and are actually characterized by little connectedness to overall planning processes (in the case of Green Hackathons and Climathon®), by temporariness (as for Tactical Urbanism and Placemaking) and by little or no legitimacy (as in the case of environmental direct-action movements such as XR).

Recalling Westley et al. (2013), that describes the strategies and methods connected to successful ecosystem stewardship (Table 1. Westley et al. 2013), a more careful assessment of the range of skills *enacted* and *not enacted* by each these three kinds of "urban climate change experiments" in connection to their characteristics in Table 16, can help to draw reasoning to answer positively also to the third of the guiding questions of the present research.

Table 20: Assessment of skills involved in successful ecosystem stewardship as enacted by *glocal* climate action movements (developed starting from Table 1. In Westley et al. 2013)

Strategies and methods (Westley et al. 2013)	*Description* (Westley et al. 2013)	*Strategies and skills involved in Urban Climate Change Experiments*		
		CL/GH	**TU/PM**	**XR**
1) Facilitating knowledge building and utilization	Building/enhancing knowledge of the ecological resources.	√	√	√
	Generate and integrate a diversity of ideas, viewpoints, and solutions.		√	
	Promote and steward experimentation at smaller scales (cf. active adaptive management).	√	√	
	Catalyze community awareness and social learning.		√	√
	Conduct research, spread alternative ideas and knowledge		√	√
2) Vision building	Provide a common vision that attracts a diversity of supporters upon which all can agree.		√	√
	Creating new "social imaginaries" / create community cohesion across a set of macro level shared aspirations.	√		√
3) Developing social networks	Bridge different and similar actors and stakeholders across and within organizational hierarchies and types. This could be divided into three subcategories: • Bonding, i.e., link with similar others. For example, establish local fishing organizations, knowledge exchange among local villagers, etc. • Bridging, i.e., bring together similar and/or different groups to create momentum, gain support, and to react to various challenges. This could be called horizontal linking. • Linking, i.e., communicate and engage with key individuals in different sectors, and to link across scales.	√ Bridging and Linking	√ Bonding and Bridging	√ Bonding and Bridging
	Create and protect safe spaces for interaction.	√	√	
	Seek ways to bring all parties to respect the perspectives of all sides.*			
	Create opportunities for stakeholder involvement in management and research.		√	

4) Building trust, legitimacy, and social capital	Building multiactor and multilayered coalitions with a borad range of social organizations.	√		
	Developing networks (bonding/bridging/linking social capital).	√	√	√
	Recognition of management initiatives by formal authorities.	√		√
	Building consensus on rule compliance and representing stakeholder heterogeneity.**			
	Mediating between organizations and the broader 'public.'***			
5) Facilitating / developing (social) innovations	Identification and introduction of new alternatives, processes, products, and options, and of new ways to conduct businesses.	√	√	
	Fostering knowledge building and innovations by bringing together different kinds of thinking.	√	√	
6) Preparation, mobilization for change	Prepare the system to be able to effectively take advantage of forthcoming opportunities for change (windows of opportunity), including: • raising awareness of a resource challenge • leveraging limited resources and find new sources of funding • building vertical social capital to influence policy decisions • linking innovative ideas to resource opportunities ("management up-down")	√	√	√
7) Recognize or create and seize windows of opportunity	Timing when to connect and mobilize others, i.e. creating the right links at the right time around the right issues.****			
	Willingness to take risks and convince others to take risks.		√	√
	Venue shopping: pitching right idea to right organization.	√		
8) Identifying and communicating opportunities for "small wins"?	Ability and capacity to identify (often small) projects upon which actors involved can agree.		√	
	Reconceptualize issues. Able to take a whole system perspective, find leverage points in system.			√
9) Facilitate conflict resolution and negotiations	Fair and low cost conflict resolution.		√	

*This strategy actually is non applicable to none of the three practices of urban climate change experiments, if not GH, because Climathon® is mainly competitive, and TU/PM and XR are at the moment independent movements, and in some cases (XR) antagonist movements to local institutions in charge of resilience planning.**, ***, **** are relative to the Urban Institutions skills and strategies, and not to the independent movements, as it will better discussed in Chap. 6.

The assessment of the range of skills *enacted* and *not enacted*, demonstrates that the three kinds of "urban climate change experiments", cover several of the skills and methodologies involved in successful ecosystem stewardship according to Westley et al. (2013), in some cases overlapping, and in other remaining a feature of a specific *glocal* climate action movement. The assessment shows also that the "missing" skills, could be covered by urban institutions that are already undergoing a path of resilience planning and ecological transition.

To answer to the third research question, the "institutional entrepreneurship" (Dorado 2005, in Westley et al. 2013) that Green/Climate Hackathons and the other glocal climate action movements collectively enact through their "urban climate experiments", in helping the overall system to progress while realizing particular goals of their own (ibid,), can be considered in terms of Westley et al. (2013) as collective transformative *agency* (ibid.) addressed towards successful

ecosystem stewardship, and represents a huge opportunity of urban institutions to accelerate their efforts in resilience planning and ecological transition, and in prospective to achieve more quickly and effectively global targets of resilience and sustainability, if *appropriately integrated*.

According to theories of *transformative capacity* towards ecosystem stewardship in social-ecological systems (e.g. Olsson et al. 2010) this integration must be necessarily based on a new form of governance, *collaborative* and *adaptive*, able to govern this multiplicity of actions and actors *for ecological stewardship*, as "managers", or better yet "stewards", of the protection and enhancement of ecosystem services (ibid., and Westley et al. 2013), and take full advantage of this opportunity, without the risk of compromising such practices, that base their activity also in the fact of their being independent and self-determined.

In search of strategies to expand resilience in linked and Complex Social-ecological Systems (Holling 1973, 1996, 2001, Gunderson and Holling 2002, Walker 2004), the path that the present research proposes to help Urban Institutions in this task, is to develop a new "tool", a framework, able to identify and integrate effectively these experiments, in a timely manner, by "creating the right links at the right time around the right issues" (point 7 "Recognize or create and seize windows of opportunity", Table 1 Westley et al. 2013) within ongoing resilience and ecological transition planning.

By finding and situating the role of Climathon® and the other *glocal* climate action movements, *within this proposed new adaptive co-design framework for urban resilience and ecological transition*, I will attempt also to answer to my fourth and leading research question, or Hester's dilemma**:** how to overcome the "intricate opposition" (Hester 2007) between the ecological and participatory dimensions?

Drawing from the tools we have in social ecological resilience and participatory action fields (see Figure 23), and that have been thoroughly explored within this research work, I propose that the answer to Hester's dilemma, lays in the possibility to go beyond the known and classical tools used to design, govern and assess participatory processes, the so called Ladders of participation (e.g. Arnstein 1969), by "recombining, while not compromising" (Hester 2007, p.3) tools, principles and underlying concepts, inferred from the two theoretical frameworks of *social ecological resilience* and participation, in a **new combined ladder to expand social-ecological resilience**, that will support the *proposed new adaptive co-design framework for urban resilience and ecological transition.*
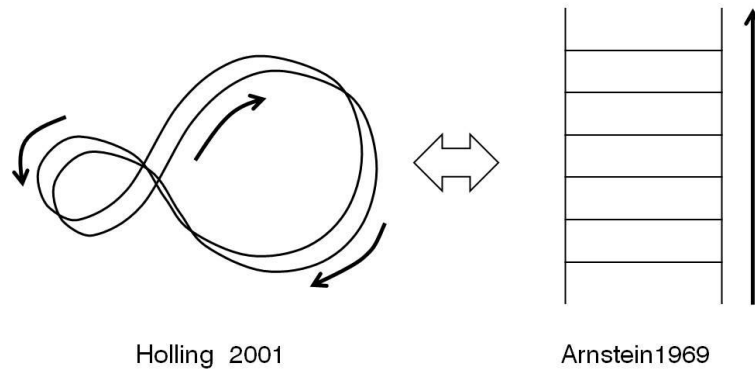
Holling 2001 Arnstein1969

To materially overcome the intrinsically "linear" nature of the Ladder of participation, also in its latest evolutions of Bishop's "preferred levels framework" (2015), that overcome the "hierarchy" of Arstein's ladder (1969) (see Figure 45),
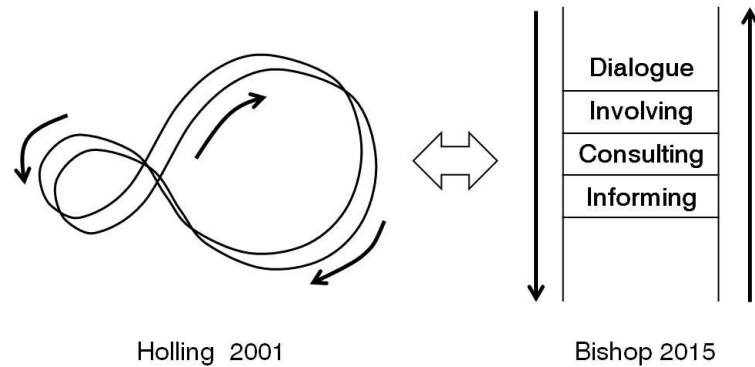
Holling 2001 Bishop 2015

the Ladder *must be changed further* to be able to "embrace the contrasting dimensions" of leading actors, scale, time and different levels of knowledge and values involved between ecological and participatory action, and represents a concrete, effective tool to assist Urban Institutions to better govern and integrate "scattered" experimental practices, within their local efforts of resilience planning and ecological transition.

In Chapter 3, was described the proposal of further transforming the Ladder in the "Participation Evaluation frame" (cfr. Table 8), a non-hierarchical quadripartite disposition of the different forms of participation activated in a process, riproposed in the following Table 21.

Dialogue/Acting Together	Consulting
Collaborating Realizing Co-managing	Contributing Discussing Connecting
Learning Listening Socializing	Sharing Co-decision making Co-designing
Informing	**Involving/Deciding together**

Based on Westley et al. (2013) that introduces Dorado's (2005) "opportunity contexts" from the earlier Holling's Adaptive Cycle (1996, 2001; Holling and Gunderson 2002), and in recombination with the Participation Evaluation frame I developed from Bishop (2015), the final step I propose in this research work, is to introduce a new "Ladder of participation", one that *reverses* our vision of the ladder as something linear and vertical to reach an objective, changing the framework into a ribbon that *extends over time* and then *wraps around itself to return to the starting point, at different scales*.
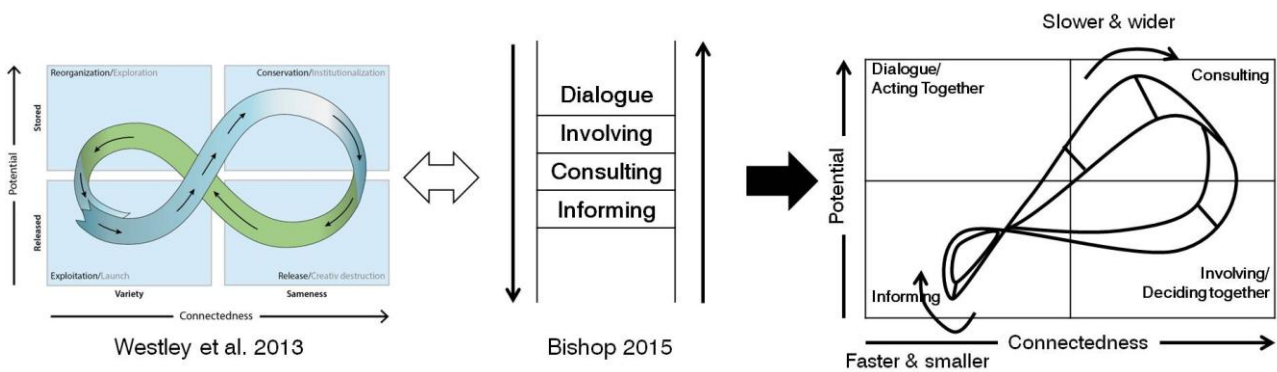
Figure 46: The proposed *new adaptive co-design framework* that combines social and ecological dimensions over different time scales and in different opportunity contexts.

In this proposed new ladder of participation, or better in the *new adaptive co-design framework*, the different forms of participation activated in a process – informing, consulting, involving and acting together (dialogue) – become the as many different *phases* that can be overrun in time.

Time here represents, in fact a new "dimension" introduced within the framework, to overcome the contrasting dimension between the ecological and participatory action. The speed and the extent of the ribbon change over time (and in loops), and once one has assessed the *phase* in which a

determined context is situated, it could be a useful tool to decide the *kind*, the *intensity* and the *scale* of participatory activities to be enacted.

As in Holling's Adaptive Cycle, the *new adaptive co-design framework hides another dimension*, the dynamic characteristic of "resilience" (and its counterpart "vulnerability") that, together with other two fundamental dimensions "potential" and "connectedness", can influence or inhibit the transformation of the whole system towards a desirable trajectory (e.g. of sustainable development),

The *degree (or width) of the "resilience" dimension* in the *new adaptive co-design framework*, is represented by *the number and variety of independent glocal climate action movements'* - such as Place-making and Tactical urbanism actions, local charters of FFF or XR Citizen assemblies, and of course Civic/Green Hackathons and Climathon®'s - initiatives and "urban climate change experiments", that they enact at local level (in CASs embedded in SESs), but significantly address or involve global scales of action (far-reach SESs).

How *glocal climate action movements* exercise this role within the scheme and how the scheme itself assists and can contribute to increasing the "fitness" of these "experiments", within the systems with which they interface, namely the urban system and the ongoing resilience planning process, will be described in the following and final Chapter 6 of the present research.

The final Chapter contains in fact the answer to the last research question of the present thesis: - *how can these co-design forms be included in ongoing urban resilience planning to help cities contribute to the achievement of the global targets of resilience and sustainability (UN Agenda 2030, in particular SDG11 and SDG13, Sendai Framework for Disaster Risk Reduction 2015-2030, Paris Agreement COP21 2015, and outcomes of Katowice COP24 2018, with regard of the limit of 1.5 ° of the IPCC Special Report "Global Warming of 1.5 °) as well as to support them in achieving the objectives of the European Green Deal, and in particular, by responding to Horizon Europe program's Mission "100 Climate-Neutral Cities by 2030 - By and For the Citizens"?*

6.3 Urban Co-Action. A proposal for a new adaptive co-design framework for urban resilience and ecological transition

The new **adaptive co-design framework for urban resilience and ecological transition** is a heuristic model intended to assist **Urban Institutions (UI),** in better coordinating, integrating, and consolidating bottom-up and third parties local contributions towards the achievement of the global targets of social-ecological resilience and sustainability, and to guide its implementation and replication in other regulatory contexts and decision-making processes within the field of urban resilience planning (see Figure 47).
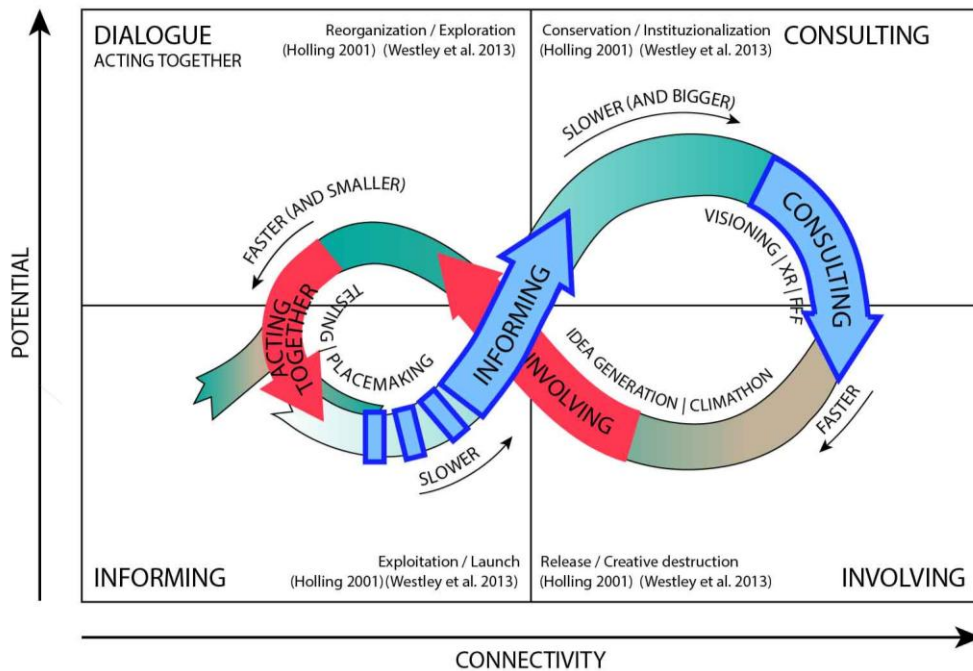
Figure 47: A new adaptive co-design framework for urban resilience and ecological transition

Since the context and the subject of the action of my research work is the city, the framework is **addressed primarily to UI** that have undertaken a path of resilience planning and ecological transition and are grappling with adaptive management in the face of uncertainty and change, but it also could be useful for other Institutional Entrepreneurs (IE) such as the independent glocal climate action movements or third parties described in this thesis, to understand in which phase of their development process their actions are situated, and when and how it would be more effective to interact with urban institutions.

The framework represents, in fact, a flexible, adaptable methodology which is replicable throughout the entire decision-making and planning process, that could be applied to different contexts and scales, based on the active participation of local communities to global targets of resilience and sustainability.

The framework is held to be, also, a useful contribution to the realization of the European Green Deal, addressing the objectives of the connected new Horizon Europe Funding Program, and in particular of the "100 Climate-Neutral Cities by 2030 - by and for the Citizens" Mission. In fact, by helping to "promote citizens to become agents of change through bottom-up initiatives and innovation and through new forms of governance", the framework complies to the development of "New forms of participative governance" and "An 'integrated urban planning' model" that in perspective could represent the right framework to assist UI, in "Build[ing] a multi-level and co-creative process formalized in a Climate City Contract that, while adjusted to the realities of each city, will aim at the shared goal of the mission" (EU 2020).

The **objective** of the adaptive co-design framework **is to assist UI in assessing, planning and managing participatory processes more adaptively** (and therefore in a more resilient way, to respond to uncertainty and change) in the context of urban resilience planning and co-design for ecological transition.

The *four quadrants* represent the *four phases of adaptive cycles* in SESs (as CASs, such as cities), as described by Holling and Gunderson (2002) and re-proposed in Wesley et al. (2013) overlaid by Dorado's "opportunity contexts" (2005, in Wesley et al. 2013).

Within the framework the **different levels of participation – informing, consulting, involving and dialogue (or better acting together)** – can or could happen more easily (and more effectively) in the quadrants, **and intensify in the "shifts"** between the phases.

How can the framework expand resilience?

The framework **is both descriptive and prescriptive** (as Holling recommends, 2001; or as Bishop would say "proactive", 2015) and it is **not meant to control** the system. UI can instead, use it to better "read" in which phase of a specific planning (design, policy, etc.) process they are "positioned" (or will be in near future), and, therefore, "decide" when to use, enhance or intensify a certain level (or form) of participation as led by the UI.

The framework is **iterative and cyclic. That is, it can be run over again and again (annually, monthly, daily), according to the scale and complexity of the process.** It can also be used to read and assess **past processes**.

The framework, in addition, offers gives indications on **when** it is more effective to support other (independent) forms of self-organized participation, and regarding **which kind** of general level of participatory activity is more indicated in that phase (i.e. visioning, idea generation, decision-making, action-making).

The framework is meant to help UI and other IE read and decide or address **when, and indicatively what**, but **not how**. Regarding the "how", it is useful - as has been done in the present research, to follow the overall principles of effective participation (Wilkox 1994, Bishop nd., 2015) and the "Seven principles for building resilience in social-ecological systems" (Biggs et al. 2012, Stockholm Resilience Centre 2014).

As anticipated in Par. 6.2, the *third dimension of the framework*, or the "degree of resilience" (and its opposite, the "vulnerability" of the overall system), is represented by the **number and variety of independent glocal climate action movements and participatory initiatives**, such as Place-making and Tactical urbanism initiatives, Citizen assemblies or local charters of FFF or XR, and

Civic/Green Hackathons like Climathon®s events, that are *active in the specific CAS context*, as embedded in far-reaching SESs, in the case of urban systems.

The role of these movements and of the "urban climate change experiments" they enact **is to animate, generate, test and discuss ideas, projects and planning proposals**, in **safe arenas for experimentation** through **collaborative environmental-action workout sessions** addressed to tackling global issues of climate change and the ecological crisis from a local and place-based perspective, and by activating and involving multiple levels (Walker et al. 2004) of knowledge, institutions, resources and actors, for which codified planning and design tools result inadequate.

How can the framework help manage uncertainty and address change towards desired trajectories (e.g. sustainable development)?

The framework can give some useful and interesting indications in this sense.

The "fore loop", as based on Holling (2001) is when the system is slowly accumulating and sequestrating resources (skills, networks, knowledge, new services etc.) and therefore growing. In this phase, the process of **informing and consulting about all progresses** must be wide, transparent and inclusive to the most extent. This phase ideally is good for imagining **large participatory and deliberatory processes** such as the **Citizens assemblies envisioned by XR** (but also the "Debat public" or other forms of large scale deliberative processes) to assess actual "directions", plans, programs or projects of the UI, and eventually reorient the pathway.

The "back loop" (Berkes at al. 2003) is when resources are stirred through rapid reorganization and novel recombination (and the system is losing connectivity). It is, when innovation and novelty is more likely to happen. In the back loop, the **involving (deciding together) and acting together participation level** must grow through intensity (i.e. many processes of idea generation in small groups) and variety (diversity). This is the phase when appears more convenient to enact **Civic**/**Green Hackathon and Climathon®**, in particular (cfr. Figure 47).

Another consideration is that, the best phase when to **concretely test ideas** in Tactical urbanism and Place-making practices, is in the **"shift" between the reorganization (exploration) phase and the exploitation (launch) phase**, because connectivity at that point is at its lowest and potential is average, so "the system-wide cost of failure are relatively low", thus creating the perfect conditions for "creative experimentation" and testing.

How can the framework help (in particular in the field of "collaborative design") to overcome Hester's "dilemma"?

As anticipated in Par. 6.2, by "recombining, while not compromising", the different geometries across disciplines (Hester 2007), the framework introduces **two novel dimensions** within the non

hierarchic and more dynamic, while still linear, "Preferred levels of participation" framework of Bishop (2015).

These two novel dimensions are "**time**" and the "**interplay between resilience/vulnerability**" and they represent the two complementary dimensions of the framework.

Time means speed, frequency and intensity, but also implies acting at the right moment, in a timely way.

The interplay between resilience/vulnerability is based on the **openness of the system to external independent processes** (and to the **number and variety of these "urban climate change experiments"),** and on the **adaptive capacity of UI to invest resources into the better/more shared** ideas, tests etc. **at the right moment**.

The following Table 22 represents a combined criteria to analyze the adaptive cycle within the framework, and gives useful indications about "when" is the right moment to test novel ideas (opportunity) and when it is not (vulnerability phase). It also offers indications on when to "push" the system further its actual equilibrium **addressing change towards desired trajectories (e.g. sustainable development).**

Table 22: Combined criteria to assess "when" to seize opportunity to test novel ideas.

Connectivity	↗	Potential	↗	= Vulnerability
Connectivity	↘	Potential	↗	= Resilience
Connectivity	↘	Potential	↘	= Opportunity
Connectivity	↗	Potential	↘	= Collapse

Where does the framework lead?

To escape systems' collapse, and eventual traps (Holling 2001), that occur when connectivity is high and potential is low, **UI can help the whole system move to a higher, more structured and different level** (as from Gunderson and Holling 2002, nested Panarchies) **by investing in the better, or most shared and tested ideas,** through different channels according to the scale of the proposed ideas/plans or projects, as for example, through:

- Participatory Budgeting (as was attempted in Lisbon case-study within the present research, cfr. Par. 5.4) and other forms of subsidizing relatively small innovative projects with social impact;
- Private investments for small/medium innovative projects with social and environmental economic impact;

- Public planning and programming for larger efforts with social environ economic impact (e.g. as was attempted in Bologna case-study, with the new PUG and the efforts in environmental communication and action w the Municipality is enacting);
- Public EU funding (e.g. Horizon Europe and the 100 Climate-Neutral Cities by 2030 - by and for the Citizens Mission) for major efforts with social environ economic impact.
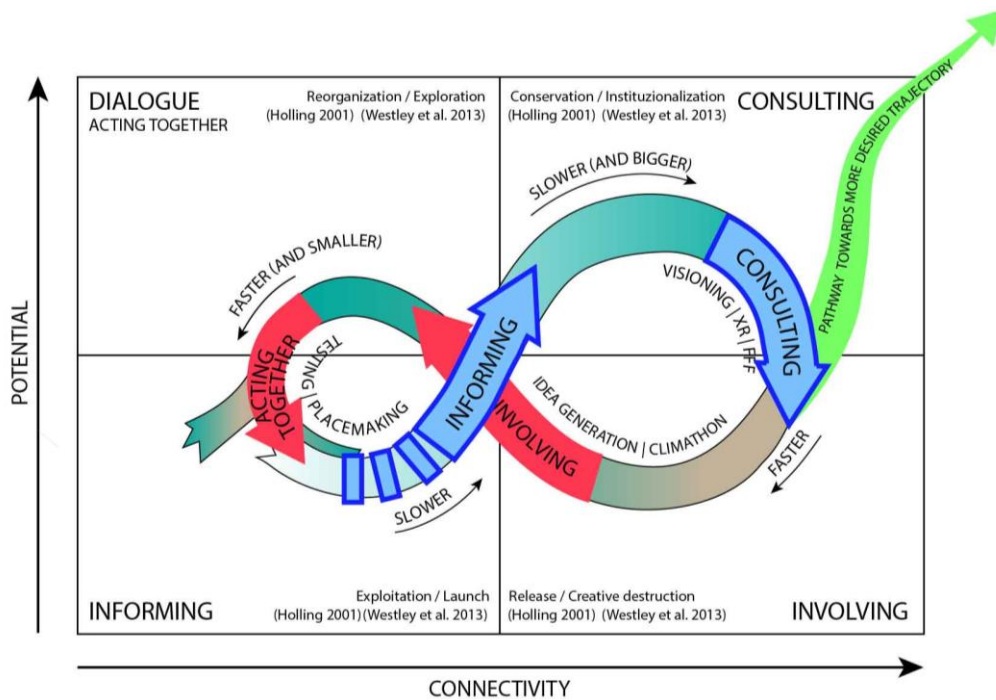
Figure 48: The "escape" or "revolt" path towards a more desirable trajectory (e.g. sustainable development) in new adaptive co-design framework for urban resilience and ecological transition

The application of the new *adaptive co-design framework for urban resilience and ecological transition*, to a s**pecific context of local and regional planning oriented to resilience and ecological transition**, is delegated to future research.

However, by way of a final example, if assumed as a stable tool by an administration with high adaptive capacity, such as the city of Bologna has demonstrated over the years, I believe that the tool could be proven useful both for *assessing* the phase in which the city is going through (as I attempt to do in Par. 5.3) and for *monitoring* progress and effectiveness of policies, strategies and actions in favor of resilience and ecological transition, and for *improving* democracy in terms of inclusion of third parties and active citizens, in the Ecosystem co-stewardship *for urban resilience and ecological transition* of cities.

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Appendix I Database One Hundred Events of Climathon® and Green Hackathon

accessible at the following link:

https://drive.google.com/file/d/15jY3xs6pwTFlSq61gw-ywguA4YasF-rd/view?usp=sharing

Appendix II Survey online protocol

Survey on Climathon®/Green Hackathon: Co-action for resilience

SURVEY FILL IN TIME 5 minutes

The following survey is aimed at knowing the opinions of participants, organizers and partners of the global event and growing phenomenon of Climathon® and other Green Hackathon. These are expressively collaborative events aimed at developing solutions to tackle climate change effects at the urban level and to increase urban resilience, fostering the ecological transition of cities.

The research, conducted by Viviana Lorenzo, PhD student in Architecture and Design Cultures at the Department of Architecture of the University of Bologna, intends to analyze the process, from the genesis of the challenge to the outcomes, to evaluate the degree of participation of these events, highlighting the critical issues and factors that could improve their inclusiveness and democracy, as well as exploring their potential and limits in innovating urban planning.

*Campo obbligatorio

General data

1. **Role:** *
   Contrassegna solo un ovale.

   ( ) Participant

   ( ) Organizer/Partner   *Passa alla domanda 7.*

"Participant" data

2. **Gender** *
   Contrassegna solo un ovale.

   ( ) Male

   ( ) Female

   ( ) Altro: _____

3. **Age** *
   Contrassegna solo un ovale.

   ( ) under 18

   ( ) 18-30

   ( ) 31-45

   ( ) 45-60

   ( ) over 60

4. **Educational level** *
   Contrassegna solo un ovale.

   ( ) Diploma

   ( ) University degree

   ( ) Postgraduate

   ( ) Altro: _____

5. **Main occupation** *

   _____

6. **Main field of activity**

Seleziona tutte le voci applicabili.

Environment	
Social	
Technological	
Economy	
Educational	
Culture	
Health	
Manufacturing	
Services	
Finance	
Other	

Passa alla domanda 35.

"Organizer/partner" data

7. **Type of organization**

Seleziona tutte le voci applicabili.

Public body	
Private body	
Urban level	
Supraurban level	
National level	
International level	
NGO	
Company	
Association	
No profit	
Profit	
Other	

8. **Main field of activity**

Seleziona tutte le voci applicabili.

Environment	
Social	
Technological	
Economy	
Educational	
Culture	
Health	
Manufacturing	
Services	
Finance	
Other	

9. **Role in the Climathon®/Green Hackathon** *

Contrassegna solo un ovale.

( ) Hosting city

( ) Organizer

( ) Partner

( ) Altro: _____

Event data

10. **Event name** *

    Contrassegna solo un ovale.

    ◯ Climathon®2018

    ◯ Altro: _____

11. **Date** *

    _____

    Esempio: 15 dicembre 2012

12. **City of the event** *

    _____

13. **Challenge description** *

    _____

14. **How was the Climathon®/Green Hackathon event managed?** *

    Contrassegna solo un ovale.

    ◯ The event was organized by our organization with the support of Climate-KIC or of Green Hackathon platform

    ◯ The event was organized by Climate-KIC or by Green Hackathon platform, while our organization provided the location, contents and/or stakeholder and network

15. **Has your organization arranged a preparatory event or provided preparatory materials to the participants before the Climathon®/Green Hackathon?** *

    Contrassegna solo un ovale.

    ◯ No

    ◯ Yes, we organized a preparatory event for the participants

    ◯ Yes, we have provided participants with preparatory material

    ◯ Yes, both

16. **Main motivation for organizing the Climathon®/Green Hackathon event**

    Seleziona tutte le voci applicabili.

To raise awareness and to educate on the topic	☐
To find solutions to unresolved urban problems	☐
To find innovative ideas	☐
To create opportunity for discussion among various stakeholders	☐
To find potential local partners	☐
Other	☐

17. **Other (description)**

    _____

18. **Has your organization been able to continue to collaborate or develop the winning idea?** *
Contrassegna solo un ovale.

    ◯ Yes

    ◯ No

19. **How did the development of the winning idea continue?**
Seleziona tutte le voci applicabili.

Independent development	
Business incubation programme	
Opening of a discussion table	
Public Private Partnership	
Public management	
Another event of Climathon®/Green Hackathon	
Other	

20. **Other (description)**

    _____

21. **With what results was the winning idea implemented? Describe briefly**

    _____

    _____

    _____

    _____

    _____

22. **Had your organization already participated in other Climathon®/Green Hackathon events? If yes, please fill in the section Event data (2)** *
Contrassegna solo un ovale.

    ◯ Sì

    ◯ No   *Passa alla domanda 55.*

Event data (2)

23. **Event name** *
Contrassegna solo un ovale.

    ◯ Climathon®2017

    ◯ Altro: _____

24. **Date** *

    _____

    Esempio: 15 dicembre 2012

25. **City of the event** *

    _____

26. **Challenge description** *

    _____

27. **How was the Climathon®/Green Hackathon event managed?** *

Contrassegna solo un ovale.

( ) The event was organized by our organization with the support of Climate-KIC or of Green Hackathon platform

( ) The event was organized by Climate-KIC or by Green Hackathon platform, while our organization provided the location, contents and/or stakeholder and network

28. **Has your organization arranged a preparatory event or provided any preparatory material to the participants before the Climathon®/Green Hackathon?** *

Contrassegna solo un ovale.

( ) No

( ) Yes, we organized a preparatory event for the participants

( ) Yes, we have provided participants with preparatory material

( ) Yes, both

29. **Main motivation for organizing the Climathon®/Green Hackathon event**

Seleziona tutte le voci applicabili.

To raise awareness and to educate on the topic	☐
To find solutions to unresolved urban problems	☐
To find innovative ideas	☐
To create opportunity for discussion among various stakeholders	☐
To find potential local partners	☐
Other	☐

30. **Other (description)**

_____

31. **Has your organization been able to continue to collaborate or develop the winning idea?** *

Contrassegna solo un ovale.

( ) Yes

( ) No

32. **How did the development of the winning idea continue?**

Seleziona tutte le voci applicabili.

Independent development	☐
Business incubation programme	☐
Opening of a discussion table	☐
Public Private Partnership	☐
Public management	☐
Another event of Climathon®/Green Hackathon	☐
Other	☐

33. **Other (description)**

_____

34. **With what results was the winning idea implemented? Describe briefly**

_____

_____

_____

_____

_____

Passa alla domanda 55.

Event data

35. **Event name** *

Contrassegna solo un ovale.

⊙ Climathon®2018

⊙ Altro: _____

36. **Date** *

_____

Esempio: 15 dicembre 2012

37. **City of the event** *

_____

38. **Challenge description** *

_____

39. **How were you informed of the event?**

Seleziona tutte le voci applicabili.

Internet	☐
Social network	☐
Direct invitation by organizators and institutions	☐
Website newsletter or online magazine	☐
Press	☐
Radio	☐
TV channels	☐
Word of mouth	☐
Other	☐

40. **Other (description)**

_____

41. **Did you attend a preparatory event or did you receive any preparatory material from the organization before the Climathon®/Green Hackathon?** *

Contrassegna solo un ovale.

⊙ No

⊙ Yes, I attended the preparatory event

⊙ Yes, I received preparatory material

⊙ Yes, both

42. **Main motivation for attending the Climathon®/Green Hackathon event**
Seleziona tutte le voci applicabili.

To increase my knowledge about the topic	☐
To help find solutions to unresolved urban problems	☐
To innovative ideas	☐
To find opportunity for discussion among various stakeholders	☐
To find potential local partners	☐
Other	☐

43. **Other (description)**

_____

44. **Have you already attended such events?** *
Contrassegna solo un ovale.

◯ Yes

◯ No

45. **If yes, how many total**
Contrassegna solo un ovale.

1	2	3	4	5
◯	◯	◯	◯	◯

46. **Have you ever been a winner or part of the group that won at least one event?** *
Contrassegna solo un ovale.

◯ Yes

◯ No

47. **If yes, did you have the chance to continue collaborating or developing the winning idea?**
Contrassegna solo un ovale.

◯ Yes

◯ No

48. **How did the development of the winning idea continue?**
Seleziona tutte le voci applicabili.

Independent development	☐
Business incubation programme	☐
Opening of a discussion table	☐
Public Private Partnership	☐
Public management	☐
Another event of Climathon®/Green Hackathon	☐
Other	☐

49. **Other (description)**

_____

50. **With what results was the winning idea implemented? Describe briefly**

_____

_____

_____

_____

_____

Passa alla domanda 51.

"Participants" evaluation section

51. **Please choose between the following words, maximum 4 words that best describe your Climathon®/Green Hackathon experience**
   Seleziona tutte le voci applicabili.

Socializing	☐
Contributing	☐
Realizing	☐
Learning	☐
Collaborating	☐
Sharing	☐
Co-managing	☐
Co-decision making	☐
Listening	☐
Co-designing	☐
Discussing	☐
Connecting	☐

52. **Please evaluate the following statements**
   Seleziona tutte le voci applicabili.

	I have been informed of the initiatives and ideas of the organization about the theme of the event/challenge	My personal or group opinions have been collected regarding the theme of the event / challenge	I was involved in proposing and defining the theme of this challenge or future challenges	I have actively collaborated to the development and outcomes of the event/challenge
Not at all	☐	☐	☐	☐
Not much	☐	☐	☐	☐
Enough	☐	☐	☐	☐
Very much	☐	☐	☐	☐

53. **Please evaluate the following statements**
   Seleziona tutte le voci applicabili.

	I was provided by the organizer with all the necessary information to understand the topic and objectives of the event/challenge	The management methods of the event allowed me to fully express my ideas and positions within the group	The proposed challenge is relevant to my interests	The proposed challenge is a priority for the context (environmental, social, cultural) in which it is inserted
Not at all	☐	☐	☐	☐
Not much	☐	☐	☐	☐
Enough	☐	☐	☐	☐
Very much	☐	☐	☐	☐

54. **I have been informed of the possibility and how the outcomes of the event/challenge will be used by the organizer or the partners** *

Contrassegna solo un ovale.

◯ Yes

◯ No

Passa alla domanda 59.

"Organizer/partner" evaluation section

55. **Please choose between the following words, maximum 4 words that best describe your Climathon®/Green Hackathon experience**

Seleziona tutte le voci applicabili.

Listening	☐
Collaborating	☐
Sharing	☐
Co-decision making	☐
Co-managing	☐
Co-designing	☐
Connecting	☐
Realizing	☐
Socializing	☐
Discussing	☐
Contributing	☐
Learning	☐

56. **Please evaluate the following statements**

Seleziona tutte le voci applicabili.

	My organization has been informed of the promoter's initiatives and ideas regarding the topic of the event/challenge	My organization has been consulted about the topic of the event/challenge	My organization was involved in proposing and defining the theme of the challenge	My organization has collaborated to the development and outcomes of the event/challenge
Not at all	☐	☐	☐	☐
Not much	☐	☐	☐	☐
Enough	☐	☐	☐	☐
Very much	☐	☐	☐	☐

57. **If your organization has contributed to define the topic/challenge of the event, based on what priority the topic was chosen** *

Contrassegna solo un ovale.

◯ Political choice

◯ Company choice

◯ Previous participatory process with citizens and stakeholders

◯ Implementation of directives

◯ Experimentation

◯ My organization has not helped to define the theme of the event/challenge

◯ Altro: _____

58. **Please evaluate the following statements**

Seleziona tutte le voci applicabili.

	My organization has helped providing the participants with the necessary and sufficient information to understand the topic and objectives of the event/challenge	The organization of the event/challenge made it possible to fully express the ideas and positions of my organization	The proposed challenge is relevant to my organization	The proposed challenge is a priority for the context (environmental, social, cultural) in which it is inserted
Not at all	☐	☐	☐	☐
Poco	☐	☐	☐	☐
Enough	☐	☐	☐	☐
Very much	☐	☐	☐	☐

Propositive section

59. **In your opinion, what factors could influence a greater inclusiveness of the Climathon®/Green Hackathon events?**

Seleziona tutte le voci applicabili.

	Different timetable	Timetable spread over several days	More time available	Different distribution channels	Involvement from the beginning of stakeholders in defining the challenge
Not at all	☐	☐	☐	☐	☐
Not much	☐	☐	☐	☐	☐
Enough	☐	☐	☐	☐	☐
Very much	☐	☐	☐	☐	☐
Totally	☐	☐	☐	☐	☐
I do not know	☐	☐	☐	☐	☐

60. **Other**

_____

61. **In your opinion, the presence of who or what could make more effective the results of the challenge?**

Seleziona tutte le voci applicabili.

	Authorities in charge	Political decision makers	Investors	Community of reference for the specific challenge	More stakeholders	More informations	More time	Following meetings
Not at all	☐	☐	☐	☐	☐	☐	☐	☐
Not much	☐	☐	☐	☐	☐	☐	☐	☐
Enough	☐	☐	☐	☐	☐	☐	☐	☐
Very much	☐	☐	☐	☐	☐	☐	☐	☐
Totally	☐	☐	☐	☐	☐	☐	☐	☐
I do not know	☐	☐	☐	☐	☐	☐	☐	☐

62. **Other**

_____

63. **In your opinion, under what conditions would the participants wish to collaborate in the future with the organizer and the partners?**

Seleziona tutte le voci applicabili.

	Economic incentive	Free training	Public recognition	Periodic consultations of the participants	Permanent consultation Forum
Not at all	☐	☐	☐	☐	☐
Not much	☐	☐	☐	☐	☐
Enough	☐	☐	☐	☐	☐
Very much	☐	☐	☐	☐	☐
Totally	☐	☐	☐	☐	☐
I do not know	☐	☐	☐	☐	☐

64. **Other**

_____

65. **In general, how do you rate your Climathon®/Green Hackathon experience?** *

Contrassegna solo un ovale.

	0	1	2	3	4	5	6	7	8	9	10	
Very bad	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Excellent

66. **If you had the chance, would you attend another Climathon®/Green Hackathon event?** *

Contrassegna solo un ovale.

◯ Yes

◯ No

Conclusions

Thank you for participating in this survey. The survey and the related online form are part of a research conducted by Viviana Lorenzo, PhD student in Architecture and Design Cultures at the Department of Architecture of the University of Bologna, all rights are reserved.

If you are interested in receiving the survey results or in being contacted for an in-depth interview, you can write to viviana.lorenzo2@unibo.it

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Appendix III Semi-structured interview protocol at key actors and research subjects

Interview protocol

_____ **Climathon®|Green Hackathon case study**

Subject interviewed (_____): _____

Where: _____

When: _____

Interview outline

1. General information's

    a. Name, surname, occupation, affiliation or organization, main activity

    b. Place and year of the event?

    c. Role of the subject with respect to Climathon®|Green Hackathon?

      o Organizator
      o Stakeholder
      o Knowledge partner
      o Policy maker

    d. Other partners and key roles?

    e. Who financed the event and the awards if any?

2. Premises of the event

    a. Why did your organization decide to host or organize the Climathon® | Green Hackathon?

    b. Who proposed the themes of the challenges?

    c. Which target participants were involved and how were they engaged?

    d. How was the relationship with the Climathon®|Green Hackathon platform? Who materially organized the event (program, location, contents, network) and what did the platform provide?

    e. Has your organization acted in synergy with other ongoing initiatives in the city? And with other local or regional institutions? How would you define the collaboration: sharing ideas, feedback, sharing intentions and goals?

    f. Critical issues and potential found in the organization.

3. Development of the event

   a. What kind of resources have been mobilized to manage the event (networks, human resources, data)? How did the interaction with the various partners and participants take place?

   b. Which interaction tools were most used during the event (communications, participatory techniques, business oriented tools, open innovation strategies)?

   c. Critical issues and potential found in the interaction with participants, partners and stakeholders

   d. Critical issues and potential found in the format (organization and timetable)

   e. What would you change?

4. Results of the event

   a. Among the winning and non-winning solutions, which have had a following, with which subjects and what means? Critical issues and potential found in the solutions developed and in the results

   b. How did your organization make use the results of the Climathon®|Green Hackathon?

   c. Only for policy makers and stakeholders. Have the results and benefits of the process been disseminated and distributed locally? How? What forms of partnership or planning tools were put in place to "use" the results of the Climathon®|Green Hackathon? How did they differ from typical ways?

   d. Relationship with the ClimateKIC or Green Hackathon platform after the event?

   e. Evaluation of the global process and future developments. Satisfaction or less with respect to the outcomes and development of the event. What would you change? Would you organize other Climathon®|Green Hackathon events?

Interview protocol

_____ **Climathon®|Green Hackathon case study**

Subject interviewed (_____): _____

Where: _____

When: _____

Interview outline

1. General information's

   a. Name, surname, age, occupation, affiliation or organization, main activity

   b. Place and year of the event

   c. Did your group win the Climathon® | Green Hackathon challenge?

2. Premises of the event

   a. Why did you decide to participate to the Climathon® | Green Hackathon?

   b. Were you familiar to climate change issues before the Climathon® | Green Hackathon? And to the challenge theme?

   c. Did you bring an idea, join a group with an idea or did your group develop an idea during the Climathon® | Green Hackathon?

   d. How were you engaged in the Climathon® | Green Hackathon and what did the platform provide you before the event?

   e. Critical issues and potential found in the communication and outreach phase.

3. Development of the event

   a. Composition of your workgroup during the Climathon® | Green Hackathon (gender, age, educational level, expertise or background)

   b. How did the interaction with the other participants, take place? Describe how the workgroup was formed and which interaction tools were used during the event (communication, participatory techniques, business oriented tools, open innovation strategies)

   c. How did the ideas arisen, who decided which ones were to be developed in "solutions" during the Climathon® | Green Hackathon?

d. Critical issues and potential found in the format (organization and timetable) and in the interaction with participants, organizers, experts and stakeholders. What would you change?

4. Results of the event

a. Among the winning and non-winning solutions, which have had a following, with which subjects and what means? Critical issues and potential found in the solutions developed and in the results.

b. How did your workgroup make use of the results of Climathon® | Green Hackathon?

c. What forms of partnership or planning tools were put in place to "use" the results of the Climathon® | Green Hackathon?

d. Relationship with the ClimateKIC or Green Hackathon platform after the event?

e. Evaluation of the global process and future developments. Satisfaction or less with respect to the outcomes and development of the event. What would you change? Would you participate in other Climathon® | Green Hackathon events?

A Carla

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