

Green Energy and Technology

Adriano Bisello
Daniele Vettorato
Richard Stephens
Pietro Elisei *Editors*



Smart and Sustainable Planning for Cities and Regions

Results of SSPCR 2015



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Editors

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Foreword

Beyond Urban Liveability: Terrestrial Habitability and the Rise of Intelligent Environments

Cities are lived-in technology. Like swallows, termites, and other fellow species of the global fauna, the human animal *Homo sapiens*, too, constructs her own habitat. The original Paleolithic caves and Neolithic huts evolved into ubiquitous products of a massive global industry, and merged into one of the most fascinating phenomena of this planet: cities. Throughout their histories, cities have morphed from communal shelter clusters into time-management machines, sources and objects of war, mass work houses, places of despair and suffering for some, and settings of liberation and liberty for others.

The medieval adage, *Stadtluft macht frei* meant that the city offered hope to liberated serfs but also served as a great equalizer, stripping away previous personal burdens. But the liberating city air soon also emerged as a focus of medical concern: cities were also massive waste machines, air polluters, and cesspools, dead ends for the poor, burgeoning squats, and, consequently, places of often-misguided ideas about social, ethnic, spatial, and environmental cleansing, of political reform, and of revolution.

But cities also evolved into complex and connected systems of movement, communication, culture, control, and command—their political economies are inseparably intertwined with technological change. Over the ages and across different levels of wealth, cities epitomized Gordon McGranahan's thesis of the cycles of environmental stress: from escaping local pollution hot spots to becoming trapped in a global carbon bubble, in the greatest Faustian dilemma of all times, i.e., heavenly progress bought through hellish energy sources such as uranium and coal, oil, and gas. The global fossil fuel supply chains and hydrocarbon-combustion-based development helped turbocharge rising megacities and global urbanization worldwide.

Each year, urban liveability indices rank cities and their lifestyle valuations. This important conference and its wonderful documentation begin pointing in the

direction that is so desperately needed to avoid the rise of an urban *habitability* index, as cities, one by one, become uninhabitable, due to heat, drought, and inundation. Unthinkable? Think again. Fossil fuel and climate wars, historically interlinked with religious strife, political domination, and state terror, have already led to the elimination of urban communities across entire nations from the list of habitable, let alone, liveable cities: Aleppo, Bagdad, Basra, Benghazi, Erbil, Falluja, Gaza City, Damascus, Homs, Mosul, Sirte, and Tripoli. The list goes on.

Cities are both our own worst enemies and greatest hope for redemption. Buckminster Fuller's Spaceship Earth referred to the only habitable place we have ever known and yet the so-called smart money—the founders of Tesla, Amazon, and Virgin—has joined the growing ranks of governments (from China, France, Germany, India, Iran, Italy, Japan, and Russia to the United States) as well as the brilliant European Space Agency in the grotesque paradox of seeking to escape Spaceship Earth by investing massive capital extracted from its demolition, into deep-space exploration for the purpose of building extraterrestrial colonies, presumably to flee the very rampage that funded the escape, to fulfill the madcap destiny prescribed for humankind in the science fiction genre.

However, the actual task at hand is more immediate, more urgent, less glamorous, but equally heroic. The most important challenge of space exploration and planetary habitability is right here under our feet: to build cities as spatial, technical, financial, and societal systems so that they not only sustain themselves in the short term, but, more importantly, they protect and heal natural planetary systems through the very acts of smart and sustainable building, undoing harm and regenerating environments. Nurturing civil harmony, health, access, prosperity, and community vitality by: strengthening the existential essentials of renewable energy proliferation; greenhouse-gas sequestration in soils, wetlands, wood, and biochar; biodiversity protection; and organic food production. In this way, we pursue the most essential criterion for good urban design—specified by Christopher Alexander—but with a far more profound meaning for species' resilience and survival: to leave places better off than we found them.

This important conference volume brings together leading scientific minds and practitioners from around the world, all working today on the “smart and sustainable” cities of tomorrow, experts in renewable energy, information technology, water, urban agriculture, climate change mitigation, community health, social and cultural connectedness, peace, demilitarization, the political economy of sustainability, and regenerative infrastructure. Together, their messages provide the tools to help build *intelligent cities*: intelligent enough to halt and reverse the dramatic decline in terrestrial habitability.

Prof. Peter Droege
Liechtenstein Institute for Strategic Development
Berlin, Vaduz

Preface

Why do We Need a Smart and Sustainable Planning for Cities and Regions?

In an increasingly urbanized world, with over 50 % of the global population living in cities, smart and sustainable city planning represents an emerging topic both in the scientific and in the more general cultural debate.

The need for smart planning arises from our constant acceleration towards an information-mediated world experience and is driven by factors such as the current global financial crisis, global climate change, global population growth, and cultural globalization.

Smart and sustainable planning makes our cities and regions more liveable and competitive places, consistent with both our inspirations and our aspirations.

Transforming existing settlements into smart cities, *de facto*, means to couple their ICT potential with human factors—innovation in building and energy technology, people’s engagement in participatory processes, environmental resources preservation, and the exploitation of new business models.

A uniquely coherent definition of the meaning of smart city has still to be established: academics, decision makers, and industries approach this topic from different perspectives, delivering multiple solutions often hard to replicate. Nonetheless, smart city projects are currently spreading worldwide, comprising a more diverse, and so far relatively unexplored, galaxy.

Therefore, a discussion on smart and sustainable cities and regional planning should, first of all, have the effect of providing guidance to all experts—researchers, politicians, public officials, and managers—entering into this innovative field. Spatial planning is traditionally a complex discipline, founded on multidisciplinary knowledge, requiring various skills, and pursuing multi-objective goals. Nowadays, it is clear that for tackling “smart and sustainable planning” challenges a holistic approach—going beyond solutions to single technicalities—is required.

The aim of this work is to provide a comprehensive outlook on the latest research paths taken by various branches of science in the field of smart and

sustainable planning, stimulating a proactive dialogue and engendering a broad knowledge exchange. Some relevant theoretical findings are gathered here, together with already implemented lighthouse projects, to show how research results may be translated into real-world applications.

Lessons from pioneering practical implementations offer a great opportunity for follower cities and regions to improve their forthcoming plans and to researchers to define new technical procedures and methods. In these works, the various research themes are explored by adopting a crosscutting approach, mixing the contributions of authors from various fields under a few selected umbrella topics, trying to establish a shared baseline onto which to graft innovative development ideas.

The opportunity to gather a wide number of scientists and practitioners in the field of urban planning was offered by the first occurrence of the international conference on Smart and Sustainable Planning for Cities and Regions. This conference, shortly SSPCR 2015, took place during November 19–20, 2015, in Bolzano (Italy), organized by the Institute for Renewable Energy of the European Academy of Bolzano/Bozen (EURAC), with the support of the International Society of City and Regional Planners (ISOCARP). The SSPCR 2015 (<http://sspcr2015.eurac.edu>) focused on innovative planning methodologies, tools, and experiences aimed at supporting the transition of our cities and regions towards smarter and more sustainable dimensions, by touching on diverse scales, environments, and perspectives. EURAC and ISOCARP decided to couple the two words “smart” and “sustainable” in the conference title specifically to highlight that, only through the combination of the two concepts, it would be possible to achieve a better quality of life and well-balanced low-carbon development. To offer a comprehensive overview of this topic, the SSPCR 2015 was designed around four thematic sessions, flanked by a fifth session on real and practical experiences, as well as some plenary sessions introducing and synthesizing the debate.

Among our keynote speakers, we hosted: Prof. Peter Droge (University of Lichtenstein) with his contribution on intelligent and regenerative city regions; Prof. Jürgen Breuste (Paris, Lodron, University of Salzburg) discussing urban green areas and climate change; Prof. Ezio Micelli (University IUAV of Venice) suggesting innovative ways to recycle the cities’ building stocks; Dr. Nora Mzavanadze (University of Manchester) presenting the EC Horizon 2020 project COMBI on operationalizing the multiple benefits of energy efficiency in Europe; Pietro Elisei (ISOCARP) presenting participatory governance approaches for urban decision-making; and, finally, former ISOCARP President Milica Bajic Brkovic asking delegates the question “will planning save the cities?”.

Both EURAC and ISOCARP representatives provided productive topics for the discussions: Dr. Wolfram Sparber, Head of the EURAC Institute for Renewable Energy, introduced participants to new heating and cooling systems for smart cities, and Dr. Richard Stephens, ISOCARP President, discussed megatrends, black swans, and game changers, employing examples also from U.S. planning approaches.

The volume replicates the structure of SSPCR 2015: Part I presents the papers discussed under the topic “Energy and Climate”, Part II those under “Governance”, Part III concerns “Costs and Benefits”, while Part IV treats “Technologies”. The last part, Part V, takes a closer look at “Demonstration and cooperation projects” in the field of smart and sustainable planning.

Part I concerns “energy planning for cities and regions” and investigates in four papers how to couple energy–climate goals with the development or renovation of energy infrastructures and how to tackle vulnerabilities due to climate change. An integrated approach beyond sectorial infrastructure management is suggested, as well as the integration of renewable sources in existing networks. The relevance of energy issues also emerges in developing a renovation scenario on the urban scale, as well as a collaboration scheme to undertake energy efficiency development at regional scale.

In Part II, three meaningful examples are given on how “smart and sustainable technologies” involve challenges and opportunities for urban and regional planning. Applications are broad: buildings and other architectural features may act as environmental displays; mobility management may become more on-demand; and geospatial tools may help predict and prevent sprawl phenomena.

Within Part III, “benefits, costs, and opportunities of urban transition”, toward a more smart and sustainable dimension, are explored and discussed. Four different contributions report case studies or methodological approaches to assess values and trade-offs within decision-making processes. The topic is investigated looking at co-benefits of large-scale smart-district projects, urban-regeneration experiences, urban-transport projects, and spatial-planning methods. This section also includes an invited paper by Prof. Ezio Micelli (University IUAV of Venice) on innovative financial schemes in the construction sector to facilitate the refurbishment of existing buildings.

Part IV explores new ways to deal with an effective “governance for smart and sustainable growth” with five contributions fostering place-based policy-making, active and effective stakeholders’ participation, collaboration in development-path design, and public-private partnerships. This section also includes an invited paper by Prof. Ekaterina Domorenok (University of Padua) focusing on new governance tools for innovation and sustainable development in EU cities.

Part V embraces “cooperation and demonstration projects” that play an essential role in enabling the adoption of new approaches and technologies towards the development of win-win solutions. Six different reports on cutting-edge smart energy initiatives, currently under development or already achieving outstanding results, are presented. The section provides examples at various scales, from small rural villages to large urban communities. It also analyzes various contexts, from industrial clusters and SMEs to a metropolitan aviation hub. Finally, this section offers some relevant figures on European funding allocation on the smart city topic.

We would like to thank all the SSPCR 2015 speakers for their brilliant research contributions, inspiring a multidisciplinary debate among delegates. During the two conference days, we had 42 oral presentations and a poster session from academics, researchers, and experts coming from various countries such as Austria, Egypt,

Finland, Germany, Greece, Italy, Kenya, Nederland, Poland, Saudi Arabia, Serbia, Sweden, and Switzerland. As a result, the SSPCR 2015 constructively merged theoretical insights and findings with empirical evidence from case studies to deliver the worldwide context. Only conference papers that successfully passed the peer-review process have been collected in this volume. Thus, we are grateful to all the reviewers and the members of the scientific committee for their efforts in helping us to achieve such a high level of scientific output. We also wish to thank the EURAC Meeting Management team for contributing to the successful organization of the SSPCR 2015 conference. We hope that this event was instrumental in sustaining peer-to-peer knowledge exchange and in strengthening mutual learning among cities and communities.

Bolzano/Bozen, Italy
Bolzano/Bozen, Italy
The Hague, The Netherlands
The Hague, The Netherlands

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Daniele Vettorato
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Pietro Elisei

Invited Talks

Milica Bajic Brkovic—ISOCARP

Architect and urban planner, Milica Bajić-Brković, has dedicated her professional life to the built environment. A former Full Professor of Urban Planning and Design at the University of Belgrade and BPTT Chair in Planning and Development at the University of the West Indies, she has also taught at other universities in her home country and abroad. Her recent research is in the area of climate change with respect to planning theory and methodology. Milica served as President of ISOCARP 2012–2015 and is a member of the UN SG HLAG on Sustainable Transport 2014–2016. Professor Bajić-Brković delivered the presentation “Will planning save the cities? Managing responses to climate change”: “planning will likely bear the bulk of responsibilities in coping with climate change and making cities resilient and liveable. As the conventional planning interventions appear limited and often weak to meet these objectives, there is a need for a shift that will reinforce the capability of planning and make it climate-change responsive.”

Jürgen Breuste—University of Salzburg

Jürgen Breuste holds a professorship for Urban Ecology at Paris-Lodron-University Salzburg, Austria, and at East China Normal University, Shanghai, China, and is an honorary professor at Capital Normal University, Beijing, China. He is member of several scientific boards and president of the International Society of Urban Ecology (SURE). Professor Breuste’s presentation focused on “How can urban green help to adopt to climate change? The example of Linz, Austria”: “The increase of the summer air temperatures will be most notable in urban areas, where the heat island effect emerges. Due to their climatic ecosystem services, urban green areas can play an important role in this process. Therefore, urban planning departments have to develop adaption strategies in order to be able to limit negative effects of the climate change on their citizens.”

Ekaterina Domorenok—University of Padua

Ekaterina Domorenok is an associate professor of Political Science at the University of Padua, where she holds lectureships in European public policies and governance

of local development. She has been involved in several research projects on EU regional policies, multi-level governance, territorial development, environmental sustainability, and climate change. She focused on “New governance tools for innovation and sustainable development in EU cities”: “Community Led Local Development (CLLD) and Integrated Territorial Investments (ITIs,) have been designed to encourage an integrated use of the EU Structural Funds for territorial development at national, regional, and sub-regional level. These tools are particularly relevant for the implementation of integrated actions for sustainable urban development that is among core priorities of the EU Territorial Agenda.”

Peter Droege—University of Lichtenstein

Peter Droege is an international expert on advanced urban design, planning, and renewable infrastructure development. Professor Droege holds the first Chair for Sustainable Spatial Development at the University of Liechtenstein, and a Conjoint Professorship at the University of Newcastle’s School of Architecture and Built Environment. He spoke about “Intelligent and regenerative city regions (IRCRs)—a research, development and action mandate”: “Cities, regions and city regions are undergoing a renaissance in this globalized world, re-emerging as vital domains of collective life and sources of cultural identity. In this new world of information, communication, and energy technologies (ICET), resilient renewable-energy systems can evolve, supporting community health and security—and producing substantial value-added benefits.”

Pietro Elisei—ISOCARP, Urbansofia

Pietro Elisei, Town and Regional Planner, is currently working in Bucharest as an independent researcher in Urban Policies and Managing Director of USPACE (<http://www.urbasofia.eu>), a company providing services and consultancy in strategic planning. He is external research collaborator at Dipartimento di Management e Diritto (Università degli Studi di Roma ‘Tor Vergata’, Roma) on topics related to Urban Regeneration (Urbact Project Re-Block). Currently consultant for the Croatian Ministry of Regional Development (Regeneration of Small Towns). He is co-author of the UNECE regional report contributing to the HIII Global Report (Quito, 2017). He edited in 2014 the book *Strategic Territorial Agendas for Small and Middle-Sized Towns and Urban Systems*. Pietro Elisei’s presentation focused on “Consistent Decision-Making in Urban and Metropolitan Areas Based on Participatory and Multi-actor Governance”: “Strategic tools for towns and cities in transition, especially developed and applied at the local level, have to provide operative, efficient, and effective solutions for counteracting problems related to market labor, social inclusion, cultural activities and heritage, environmental and landscape protection and valorization, use and design of public space, and mobility.”

Ezio Micelli—University IUAV of Venice

Ezio Micelli is currently Associate Professor in real estate valuation at the University IUAV of Venice. His research focuses on the economic feasibility of real-estate projects and on the public/private partnership at the urban scale. He has

been member of the “Urban Regeneration” team of the Italian Ministry of Infrastructures and Transportations (2014). Professor Micelli focused on the theme “Recycling the City”: “It is necessary to recognize the structural social and economic changes occurring and the necessity of a major shift in order to hold together, within a new perspective, profitability and sustainability, consensus and development. For instance considering low—or absent—economic growth, the existing real-estate stock enables an interesting convergence between economy and ecology.”

Nora Mzavanadze—University of Manchester

Nora Mzavanadze is a research associate at the Center for Urban Resilience and Energy (CURE), the University of Manchester, UK. She is an economist and environmental scientist and is responsible for the assessment of air pollution and the social-welfare-related co-benefits of energy efficiency in the Horizon 2020 sponsored project “COMBI”. Nora has been part of the Global Environment Outlook-5 (GEO-5) authors’ team and will be contributing to the GEO-6 report. Nora Mzavanadze will talk about “The H2020 COMBI project”: “COMBI stands for Calculating and Operationalising the Multiple Benefits of Energy Efficiency in Europe. It is funded by European Union’s Horizon 2020 research and innovation program, and it aims at quantifying the multiple non-energy benefits of energy efficiency in the EU-28 area.”

Wolfram Sparber—EURAC Research

Wolfram Sparber is heading the Institute for Renewable Energy at EURAC Research since its foundation in 2005. He is Vice President of the Board of the European Technology Platform for Renewable Heating and Cooling (ETP RHC), and, since 2011, he is Chairman of the Executive Board of ALPERIA, a regional energy utility group including over 30 companies active among others in the fields of renewable-electricity production and district heating. Mr. Sparber focused his talk on “Heating and Cooling for Smart Cities”: “Heating and cooling is responsible for nearly 50 % of the final energy consumption in Europe. While electricity markets and developments are mainly a national competence, the energy consumption for heating and cooling depends in a relevant way on the development of our cities. In order to reach a more sustainable thermal energy consumption, massive building-refurbishment actions and heat-provision strategies have to go hand in hand.”

Richard Stephens—ISOCARP

Richard Stephens is an educator, consultant, and civic advisor helping to create meaningful and memorable places in over 25 countries. He is currently an adjunct instructor at Marylhurst University, Portland State University, and the University of Oregon. He is the president-elect of ISOCARP. Mr. Stephens introduced concepts such as “Megatrends, Black Swans and Game changers”: “We are at the crest of an information tidal wave in which data is ubiquitous and omnipresent. Information everywhere all the time offers unique challenges and opportunities for urban planning as the environment, economy, and society search for a new equilibrium.”

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A Critical Reflection on Smart Governance in Italy: Definition and Challenges for a Sustainable Urban Regeneration

Chiara Garau, Ginevra Balletto and Luigi Mundula

*Coming together is the beginning.
Keeping together is progress.
Working together is success.*
Henry Ford (1863–1947).

Abstract The aim of this work is to analyze the projects carried out by public institutions in the field of smartness, in order to reflect on the most effective mechanisms of governance. To this end, the paper is organized into two main sections. The first section provides a literature analysis of theoretical frameworks as they pertain to the role of political bodies, the policies, and their impacts on local communities in relation to the governance of smart cities. The second section explores the ongoing implementation of “smart city” projects in Italy, in order to understand how cities address their development perspectives from a conceptual framework to the construction of an actual urban space, faced with divergent politics, messy social systems, and different scales of urban governance. In this framework, disparities between urban governance scales and ideologies encompassing smart cities seem linked to the relational systems that local administrations can develop between neighboring cities. The final section summarizes the authors’ conclusions, giving particular attention to how networked urban systems are programmed, because they have been found to be key to strategic and transformative planning.

Keywords Smart urban governance · Governance · Urban policies · Italian smart projects · Smart cities

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1 Introduction

The complexities that characterize today's urban dynamics make it difficult to describe, apply, or even to approach the concept of "smart cities".¹ For example, there is no agreement on what the administrative, functional, or social boundaries of a city should be. Consequently, identifying the optimum spatial unit for purposes of analysis is not always easy. Moreover, the urban context, when associated with the idea of "smartness"—a synonym for growth, sustainability, efficiency, inclusiveness, and technology—must necessarily refer to a territory that exceeds the strictly administrative boundaries of a city, because the entire location-based system is affected by changes emanating from the urban enter. In other words, urban dynamism produces a complex territorial geography, irreducible to traditional political, administrative, and hierarchical partitions, where local institutions serve as a complex network interlinked with the central city and even the nation. Since it is difficult to generalize—because of the different characteristics of individual urban contexts—the authors hypothesize that national urban policies must be integrated with good local governance in order to create smart, effective, sustainable cities. Without this integration, a long-term vision is not possible. Instead, the outcome will be weak, fragmented leadership, incapable of developing strategies and objectives in line with the European policies on smart cities (Donolo and Federico 2013; Mistretta and Garau 2013).

To this end, the European Union (EU) has for years promoted the use of several governance tools to facilitate the development of European cities into smart cities. These include policy documents and guidance (such as the Europe 2020 Strategy); specific forms of direct and indirect funding (direct-management funding is being provided in the case of Horizon 2020, and indirect EU funding includes the structural funds provided under the European Regional Development Fund [ERDF]); and policies aimed at creating partnerships between member states (such as the European Innovation Partnership on Smart Cities and Communities [EIP SCC]). In Italy, a process aimed at transforming cities into smart cities began in recent years, and national governing bodies have implemented specific governance tools that are in line with the latest European trends. In 2012, the Italian government approved a decree titled "Urgent measures for innovation and growth: The digital agenda and start-up."² This decree established the Digital Agenda for Europe (DAE), coordination and networking tools (the EIP SCC European initiative is

¹The literature seems rather discordant in framing the "smart city" concept. Some authors define it as a paradigm (Kunzmann 2014; Lombardi et al. 2015); others as a fashionable trend of the moment (Lu et al. 2015); others simply as a label (Caragliu et al. 2011).

²The Italian Digital Agenda (ADI), i.e., a steering committee, and makes reference to a decree dated October 18, 2012 to further urgent measures for the growth of the country and has established a process for implementing ADE. (The Dynamics of Broadband Markets in Europe: Realizing the 2020 Digital Agenda.)

being implemented in Italy through the establishment of a Smart City National Observatory), and funding mechanisms.

These initiatives provide the scope needed to orient public action towards new local governance models, thereby enabling adaptation to urban changes and transforming the processes of urban development in an innovative way (Puppim de Oliveira et al. 2013). This innovation obviously embraces technological progress that leads to improved local economies and greater productivity (Meijer and Bolívar 2015). It also requires the involvement of authorized leadership and the participation of all stakeholders. From this perspective, Information Communication Technology (ICT) can be a powerful tool for triggering the interactive, participatory, and information-based urban environments, that are supported by the policies and subsequent actions of local authorities and communities (Garau 2013). In a nutshell, this represents the creation of what we call “smart communities.”

In the current urban scenario—characterized by the pervasiveness of concepts such as ICT, smartness, flows, and territorial aggregations—good urban planning and the optimal management of a city’s resources are possible, when environmental, social, and economic aspects are closely integrated in a medium- and long-term framework for action.

Having framed the role of policies and government institutions in Italy, this paper now analyzes the effects of Italy’s current smart governance tools (policies and evolving laws) and highlights how local public bodies have implemented the “smart city” concept in their territories. This analysis has been conducted by studying publicly-funded projects that have been completed by Italy’s community, national, regional, or local institutions, and cataloged in the *Italiansmartcity* platform. The data collected during this part of the study was then compared with the data provided on the iCity Rate platform. This platform was created to assess the smart performance of Italian cities.

2 Smart Governance: The Role of Policies and Government Institutions in Italy

The DAE is one of the initiatives under the EU 2020 strategy that defined member states’ 2020 growth objectives. A common goal is the enhancement of social and economic benefits, related to environmental sustainability, the computerization of public agencies, and improved productivity and social cohesion, as a consequence of the optimal use of information and communications technologies.

In order to achieve its stated objectives, the EU DAE was translated into national initiatives, to be activated at the local level. The Italian Digital Agenda (*Agenda Digitale Italiana* [ADI]), established in 2012, is Italy’s national initiative. Its main objective has been to advance Italy’s progress toward a networked society as quickly as possible, and more specifically, to achieve a level comparable to that of other European countries. The objective has been to ensure that Italy would not be

excluded from competing in global online networks. Once achieved, this goal will enhance the use and management of ICT technologies, as well as those of sectors emerging in the domains of public administration and other enterprises.

To this end, Italy established the Agency for Digital Italy (*Agenzia per l'Italia digitale* [AgID]), which has accelerated the process of digitization through legislative, regulatory, and programming measures, as well as through the implementation of initiatives, proposals, and projects (AgID 2015). In other words, the AgID formulated a series of strategic priorities related to infrastructure and architectures; public administration; open data; digital competence; smart cities and communities; projects and international programs; and the innovations market). The objective of doing so was to ensure that the ADI's objectives were in line with the DAE's objectives (Neirotti et al. 2013; AGID 2015).

The smart perspective has provided an opportunity for growth, and in some ways entrusts governments with a great responsibility for promoting and facilitating investments in larger individual territories. According to Healey (2007), urban-planning activities—such as identifying framing dimensions, setting realistic timeline, and coordinating the implementation of policies/strategies and the activities of actors—represent only some aspects of the urban planning field. In fact, they must necessarily be integrated with the paradigms of smart cities, increasingly focused on European regulatory and financial parameters.

Although this perspective assumes a reticular approach, the planning restrictions, urban prescriptions, and building interventions necessary to urban regeneration are based on traditional approval and implementation mechanisms. On the one hand, they protect and re-qualify the built urban fabric, reconnecting central and peripheral areas, and thereby creating a broader balance between urban services, public spaces, and housing. On the other hand, everything happens according to rather long timelines, and long timelines are contrary to the philosophy of smart cities.

In this regard, the municipality appears to be the public entity most likely to be at the center of a process that identifies active-resolutive strategies. Because of its size and access to local administrative tools, the municipality can operate on the social fabric, and foster the integration of programming logic and individual public policies with relative ease (Maurasse 2015).

Obviously, considering each city as an isolated “island” bordered by administrative boundaries will not lead to this integration. Instead, it has to be pursued by defining partnerships and conducting negotiations, primarily between the various neighboring municipalities. It must be based on an understanding of a diversity of interests and objectives, and be geared toward the paradigm of a Smart Territory³ rather than a Smart City. Within this framework, Italy's recent adoption of the law

³The authors intend the term Smart Territory to mean a wide area identified by specific characteristics that make it unique. In this regard, the literature is varied. However, in the literature, this definition is translated in different ways, depending on the field (geography, urban planning, or regional economy) and on the nationality of the authors. Besides the Smart Territory terminology (Louman et al. 2015; Carroll et al. 2014), we can find similar terms such as Smart Region (Roth et al. 2013; Morandi et al. 2015) and Smart Land (Bonomi et al. 2014).

56/2014 (also known as Delrio law⁴) is of particular interest. This law 56/2014 has prompted reflections on the new institutional architecture of metropolitan cities: they appear to be complex organisms that exceed the strictly administrative boundaries and define continuous relations with neighboring areas even if these are managed by different administrations.

Therefore, this law has led local governments to define their own administrative boundaries, at different levels of scale, and to establish or strengthen renovated aggregative modalities, especially among neighboring municipalities. Based on this reasoning, if public authorities are asked to reflect on economic and social development, in a way that requires going beyond their administrative mandates, the community has to be more active in assuming new responsibilities with respect to balancing the social system and environmental sustainability over the long run. It is a *cives-civitas* (between the citizen and the city) “agreement” that includes everyone—individuals in local administrative organizations, including municipalities, unions of municipalities, and metropolitan cities.

These public actors, therefore, play a key role in the development and consolidation of a smart city, particularly with regard to integrating various dimensions of urban development, such as their sustainability, resilience, and smartness, and thereby fostering “smart governance.”

To avoid repeating failures that occur all too often, it is necessary to build shared perspectives on desirable scenarios. However, they have to be accompanied by assessments of the feasibility and effectiveness of the actions proposed and foster cooperation and coordination between different sectors in the same local administration.

This does not necessarily imply a loss of centrality in politics and a more “progressive” administration, but rather, it implies a re-design of leadership, and the creation of a systemic vision. These objectives are not limited to producing and protecting common goods and services, but include governing the dense urban network of relationships and the place-based system that includes the smart city. In this sense, a close relationship between the city (*strictu sensu*) and the territory constitutes the basis for establishing new leadership and new social responsibilities.

To achieve this goal, the administration should create new structures and/or introduce new functions dedicated to consolidating the network of relationships, in order to become a reference point for citizens. This process is also crucial to the formation of a shared understanding among the different stakeholders: it is not possible to establish common lines of action without a shared awareness of issues and needs, agreement on cultural values, and reliable, constructive approaches to providing public goods.

When engaged in decision-making processes, authorities rely on having access to data that represent the context in which they are working. That said, it is necessary to emphasize that, where there are strong communities, there are strong

⁴The name of this law comes from the name of the Minister of Infrastructures and Transport, Graziano Delrio.

institutions. Fragile institutional visions are the result of weaknesses in the community, which in turn feed a vicious circle that leads to disaffection and a gradual decrease in the provision of urban common goods.

Having the necessary skills, taking responsibility, and strong community relations are the factors that must “draw” the new citizenship. A strong concept of social capital is important to having real, smart, sustainable, and inclusive growth. It requires having the courage to envision outcomes beyond those defined in the agreement and focusing on citizenship and institutional trust, while supporting and promoting forms of active citizenship.

This reasoning leads to the interpretation of smart governance as a coordinated, integrated, distributed, and hybrid process⁵ (Meijer 2015), in which local cooperative knowledge is linked with the most appropriate technologies to the quality of the urban environment, planning tools, and the existing programming. This creates the ability to solve problems in a systematic way.

In other words, smart governance becomes a wider urban strategy, aimed at improving the quality of life in urban areas where technological innovation enhances the development of social capital. As Deaton (2010) has emphasized, technological innovation facilitates all types of trade, and enables one to measure all the micro and macro phenomena and their correlations, thereby creating a “snapshot” of the processes that are to be monitored, measured, and evaluated.

Numerous studies have attempted to use this line of thinking to conduct research in order to monitor, measure, and evaluate urban processes and smart governance, though they have not always been able to analyze the dynamics at the micro- and macro-levels simultaneously. The most recent studies (Toppeta 2010; Caragliu et al. 2011; Huggins and Clifton 2011; Dodgson and Gann 2011; Abdulrahman et al. 2012; Between 2013; Mundula et al. 2015; Marsal-Llacuna 2015) have used as a starting point the measurements conducted by Giffinger et al. (2007) of smart cities. Other studies are based on concepts that address the urban debate (UNCHS 1999; Kaufmann et al. 2005; Rosales 2011; Shen et al. 2013). Some studies are focused on more sectoral and specification analysis (Cox and Mari 1988, 1991; Peck 2005; Doel and Hubbard 2002; Garau et al. 2015), and still others focus on the quality of urban life (Marans 2003; Lazauskaitė et al. 2015; Fulford et al. 2015). The level of confidence that has emerged from these studies’ use of measurements, evaluations, comparisons, and classifications, has contributed to transforming the role of city governance. In addition, these studies have revealed that the determining factors for

⁵In particular, Meijer argues: “the idea of smart city governance as concentrated intelligence stresses that new technologies—big data, data warehousing, monitoring tools—enable central steering actors to strengthen their intelligence, provide more integrated services, develop better policies, and steer other actors in the city more effectively. [...] The idea of distributed intelligence highlights that new technologies—social media, Internet, open data—enable the various actors in the city to collaborate more effectively and produce better solutions for the city. [...] The two modes of smart city governance are ideal types and should be seen as extremes on a scale of smart in other word, city governance. Intermediate forms are modes of hybrid smart city governance. Hybrids may lean towards one of the extremes or form a balanced combination of concentrated and distributed forms of governance” (Meijer 2015: 77–78).

smart governance assessment are: the network between neighboring cities; the amount of funded projects; and the amount of funding. For this reason, in the next section, the authors analyze them and apply the system to these factors.

3 Italian Projects in Support of Smart Urban Governance

It is apparent that governing urban complexity, which includes understanding all its political, social, and territorial implications, and embracing the evolutionary process that leads to smart cities, is a particularly sensitive topic, because it requires a collective effort by planning and management agencies from the EU to local levels. In Italy, this task is further complicated by the national context, which is characterized by some metropolitan hubs that are in opposition to prevailing small, and often contiguous, centers. The first of these, despite being the most problematic in terms of economic and social conflicts and environmental impacts, are more likely to be internationally competitive. The latter are likely to be the victims of provincialism, at the edge of a renewal process that presupposes a greater effort to remove traditional governance, and is too closely bound to previous administrative boundaries and sectoral policies.

Italian cities have disparate urban governance scales, and their objectives vary by city. These factors have significant impacts on how actors frame their work and priorities. To provide an overview of the Italian situation, the Smart Cities platform—organized and promoted by the National Association of Italian Municipalities (*Associazione Nazionale dei Comuni italiani*, [ANCI])—documents project experiences that have a smart perspective. The platform is currently being implemented by 158 Italian municipalities (<http://www.italiansmartcity.it>).

As shown in Table 1, “government” has seen less investment (only 3 % of the total) than any other sector (environment 8 %; economy 10 %; people 5 %; living 8 %; mobility 22 %; planning 27 %; energy 17 %). The municipalities that have implemented the highest number of projects on the theme of government are Milan (13.5 %, 11 of 81 projects in total); Lecce (35.7 %, 10 of 28 projects); Turin (12.8 %, 10 of 78 projects); Pordenone (30 %, 9 of 30 projects); Bergamo (27 %, 6 of 22 projects); Rieti (26 %, 6 of 23 projects); Cagliari (12.5 %, 6 of 48 projects); and Palermo (42.8 %, 6 of 14 projects). The projects listed deal primarily with the following sub-themes: open data; eGovernment; managing public spaces and commons; and transparency and e-democracy. Twenty-three other projects related to planning were added to this list, in a subsector called governance. Of these, twelve have been implemented without any funding (Table 1).

These data summarize the already initiated, ongoing, and completed projects at the local level, while also providing an assessment of the same in relation to the ability to impact the three dimensions of sustainable development: (1) economic, or the ability to generate income and employment for the population, and to influence the territory’s levels of economic growth; (2) social, meaning the ability to guarantee that human welfare conditions are equally distributed among all classes; and

Table 1 Funding levels and numbers of municipalities involved in smart initiatives by sector (Adapted from the Italian Smart Cities platform. Accessed March 30, 2016)

Sectors	Euro	Budget %	Projects's number	Municipalities involved	Municipalities involved %
Environment	€ 289.981.711	8 %	191	83	53 %
Economy	€ 376.906.091	10 %	113	53	34 %
People	€ 171.416.226	5 %	181	58	37 %
Living	€ 283.099.247	8 %	168	76	48 %
Mobility	€ 820.513.992	22 %	245	80	51 %
Planning	€ 1.012.075.377	27 %	103	45	28 %
Planning-Governance	€ 8.276.688,90	1 % (of planning)	23	17	38 % (of planning)
Energy	€ 642.492.459	17 %	139	55	35 %
Government	€ 113.673.883	3 %	169	54	34 %
Total	€ 3.710.158.986	100 %	1308	158	100 %

(3) environmental, meaning the ability to maintain the quality and continual availability of natural resources. However, this dataset give us no idea of the cities' performance in absolute terms—a city's performance relative to its own targets or "internal performance"—or in relative terms—a city's performance relative to that of other cities or "external performance." This assessment is provided in the iCity Rate dataset (<http://www.icitylab.com/the-relationship-icityrate/edition-2015/data-2015/>) using a composite index of smartness.

This index is comprised of the values for seven dimensions (economy, living, environment, mobility, people, governance, and legality), each of which is based on twelve indicators. It includes the values from all provincial capitals from 2012 to 2015. The first problem that arises is comparing these datasets with those in the Italiansmartcities' platform database, which analyzes the projects of 158 cities on eight dimensions (environment, energy, economy, people, living, mobility, government, and planning). A two-step solution has been used to resolve this problem. Firstly, the definitions of the dimensions in each of the two datasets were compared. From this analysis, it was possible to confirm the following: four areas were perfectly matched (economy, living, mobility, and people); environment and energy dimensions of the Italiansmartcities platform matched the environment dimension in the iCity rate; and, the government and planning dimensions matched the governance sector in the iCity rate. The legalities are not comparable, but these data are only available for 2015. Once correspondence had been established between the dimensions, only those cities represented in both datasets were selected for this study, for a total of 53 cities.

Even though it is not possible to assert that the projects documented in the Italiansmartcities platform (ranging from 2012 to 2015, of which most are not concluded) had influenced the values of the indicators of the respective cities (ranging from 2012 and 2015), it is possible to assess those dimensions in which the cities had made investments between 2012 and 2015, and stated each city's

performance against each dimension in 2012 (even though we do not know if the administrators knew the indexes' values).

To conduct this assessment, we proceeded in two steps. Firstly, for each city, we ranked the performances of the projects implemented between 2012 and 2015 by (a) their different dimensions in 2012 (r_1), (b) the number of projects undertaken (r_2), and (c) their amounts (r_3). Secondly, we built two indexes that ranged between -1 and 1 (correlation between r_1 and r_2 , correlation between r_1 and r_3), and displayed them on a Cartesian graph as coordinates (Fig. 1).

This analysis highlighted four types of cities, which we categorized as smart, follower, start-up, or, as usual:

- (1) Smart Cities: these were cities that have funded few projects at low levels, in the dimensions for which their performance was higher, and many projects at high levels, for which their performance was lower
- (2) Follower Cities: these were cities that have funded many projects at a low level, in dimensions for which their performance was higher, and few projects at a high amount for which the performance was lower



Fig. 1 Investments and the numbers of city projects initiated, relative to their performance (Source Adapted from the Italian smart cities and iCity Rate platforms.)

- (3) Start-up Cities: these cities funded few projects at a high level, in the dimensions for which their performance was higher, and many projects at a low amount for which their performance was lower;
- (4) As usual Cities: these cities funded many projects at a high level, in the dimensions for which their performance was higher, and a few projects at a low level for which their performance was lower

These results show that most of the cities (18) tended to invest in the dimensions for which their performance was higher, and quite a large number (14) tended to invest in dimensions for which their performance was lower. Thirteen of the cities analyzed were either follower cities (six) or start-up cities (seven). Finally there were five cities (Grosseto, Palermo, Pesaro, Rimini, and Salerno) in which the projects had been developed at no cost, so it is not possible to calculate correlations between the variables, and three cities (Cagliari, Pavia, and Rieti) that showed no correlation between their performance in the different dimensions in 2012 and the number of projects undertaken. Looking in detail at the performance of the same 53 cities in terms of smart governance, it is apparent that cities with good value in terms of smart governance are among the best (except in the case of Trieste) (Table 2 and Fig. 2).

At first, this result might appear to suggest that “smart governance” is very significant in generating urban smartness. It is true, however, that the definition of smart governance used to classify projects in the iCity Rate platform does not correspond with the one we think is most appropriate: smart governance is a process capable of activating relations and synergies between local actors within a broader context than that of the city’s administrative border. The definition used in the iCity Rate platform instead adopts a quantitative approach, in which smartness is defined by the process of implementing urban growth through technological solutions, rather than through triggering forms of relational networks, and providing support to the development of smart communities.

Table 2 I City ranking 2014–2015 (I City Ranking 2015)

Cities	Ranking 2014	Ranking 2015	Ranking smart governance 2014	Ranking smart governance 2015
Milan	1	1	10	12
Bologna	2	2	3	2
Florence	3	3	1	1
Modena	4	4	4	4
Venice	6	5	7	8
Parma	10	6	11	9
Reggio Emilia	8	7	12	10
Trento	13	8	10	9
Padua	5	9	6	11
Trieste	9	10	47	56

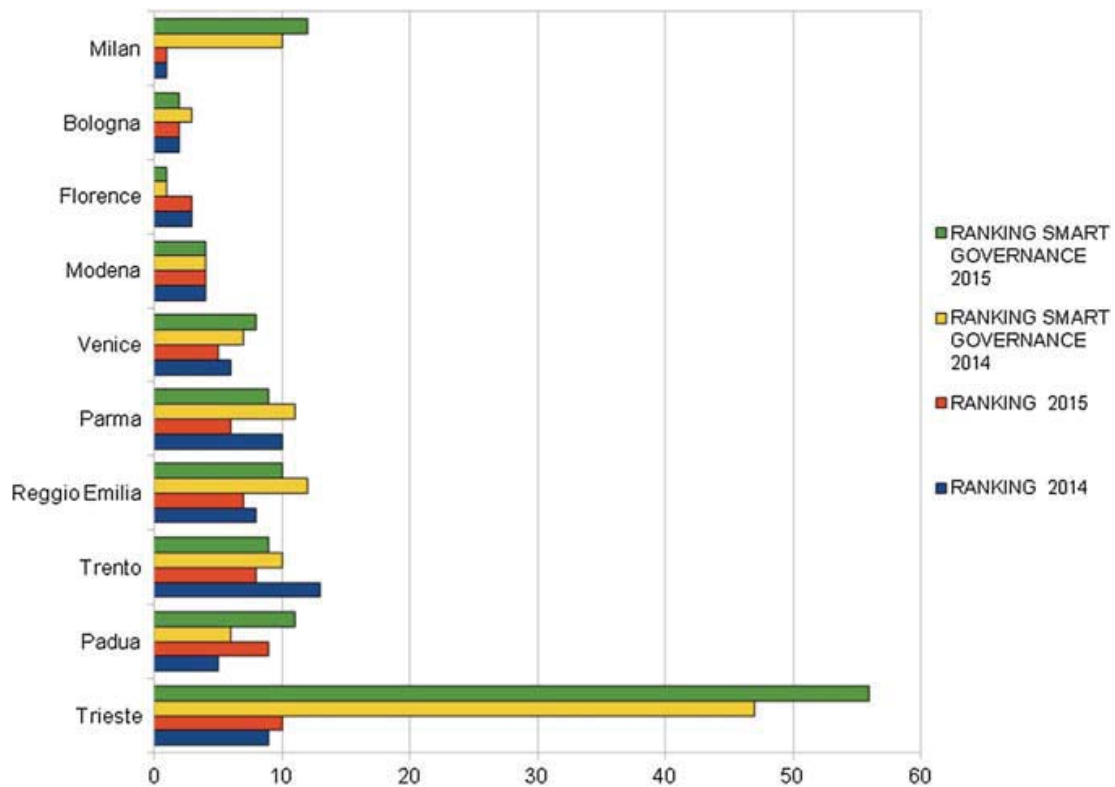


Fig. 2 I City Ranking 2014–2015 (I City Ranking 2015)

Looking at the ranking of the projects' smart governance dimensions (Italiansmart platform), it is apparent that there is an inverse correlation in terms of ranking: the best-performing cities are those with lower investment values. The explanation for this can be addressed through a new generation of smart governance. In fact, the framing of all dimensions (environment, economy, people, living, mobility, planning, energy, and government) contributes to the construction of those relational processes, the virtuous dynamics necessary to the development of a smart city, and to the emergence of smart communities. In other words, to initiate the needed change that will enable and empower strategic and transformative planning, changing the usual way of programming urban-networked systems may be all that is needed.

4 Strategic Vision and Smart Governance for Sustainable Urban Regeneration

Based on this study's findings, building a smart region is a matter of governance, which is understood as a concept that embraces all sub-sectors in which smartness has been structured, based on a shared vision that is consistent with, and feasible in, the domain of declared smart projects.

To this end, as a first step, the authors examined whether the same 53 cities previously analyzed, and in particular the top ten smart cities in the ranking based on iCity Rate data (Table 2), had spatial strategic plans. Of the 53 cities, 26 have a strategic plan, and of the top ten, only five cities (Milan, Bologna, Florence, Venice and Trento) have a spatial strategic plan. Although the number is partial, this result may suggest that having a spatial strategic plan—namely, an urban planning tool stating a declared vision—may be a necessary but not a sufficient condition for stating that a city has the basis for a smart city. This is also apparent among cities that have a strategic spatial plan but are ranked lowest in the 2015 ranking, such as Cagliari, which is in 60th place, and which also has a metropolitan spatial strategic plan, and Messina, in 93rd place, or Reggio Calabria, in 102nd place. Secondly, this result depends on a city's performance, rather than on its endowments (Mundula and Auci 2015).

How did a city without a spatial strategic plan emerge as a smart city? Why are cities with strategic plans not among the top cities in the smart cities ranking? With reference to the second question, a possible answer is that the planning choices were not coherent, or had not matured enough to demonstrate their effects and their impacts.

In addition, the survey indicates that some top-ranked cities have been leaders in some sectors for years—for example, Bologna is recognized as a university city, and Florence and Venice as tourist cities. This suggests that, over the years, they have developed an approach aimed at promoting their brands. They have urban strategies that “embrace” their cities, each recognizing a style that feels like its own, and, because of it, is recognized by all others.

City branding is a marketing-sector concept, and has as its first purpose the development of destinations—primarily tourism destinations. Nonetheless, the capacity of these cities to recognize shared objectives and to systematize their own resources for achieving them actually enables the coincidence of brand and vision. This coincidence is confirmed in the recent literature on this subject (Merrilees et al. 2009) which tends to shift the focus from non-resident stakeholders (tourists) to resident stakeholders, because they not only have a longer time horizon, but also a perspective that extends from the city to the region (Olins 2003). This approach is based on people's perceptions and images and places them at the center of the activities designed to shape smart regions and their futures. Choosing and managing the brand or the vision, and recalling the idea of the place's identity, becomes an attempt to influence and treat the mental maps of city stakeholders in a way that is coherent with present circumstances and the future needs of the city.

For all these reasons, the logical next step to evaluating the smartness of cities involves analyzing their resource allocations, in relation to the measurement of their urban performance, i.e., evaluating how cities transform their branding and developing planning statements that put into play the relational processes between neighboring cities (referred to by descriptors such as strategic plans, or health) that are ultimately expressed as coherent administrative acts (Fig. 3).

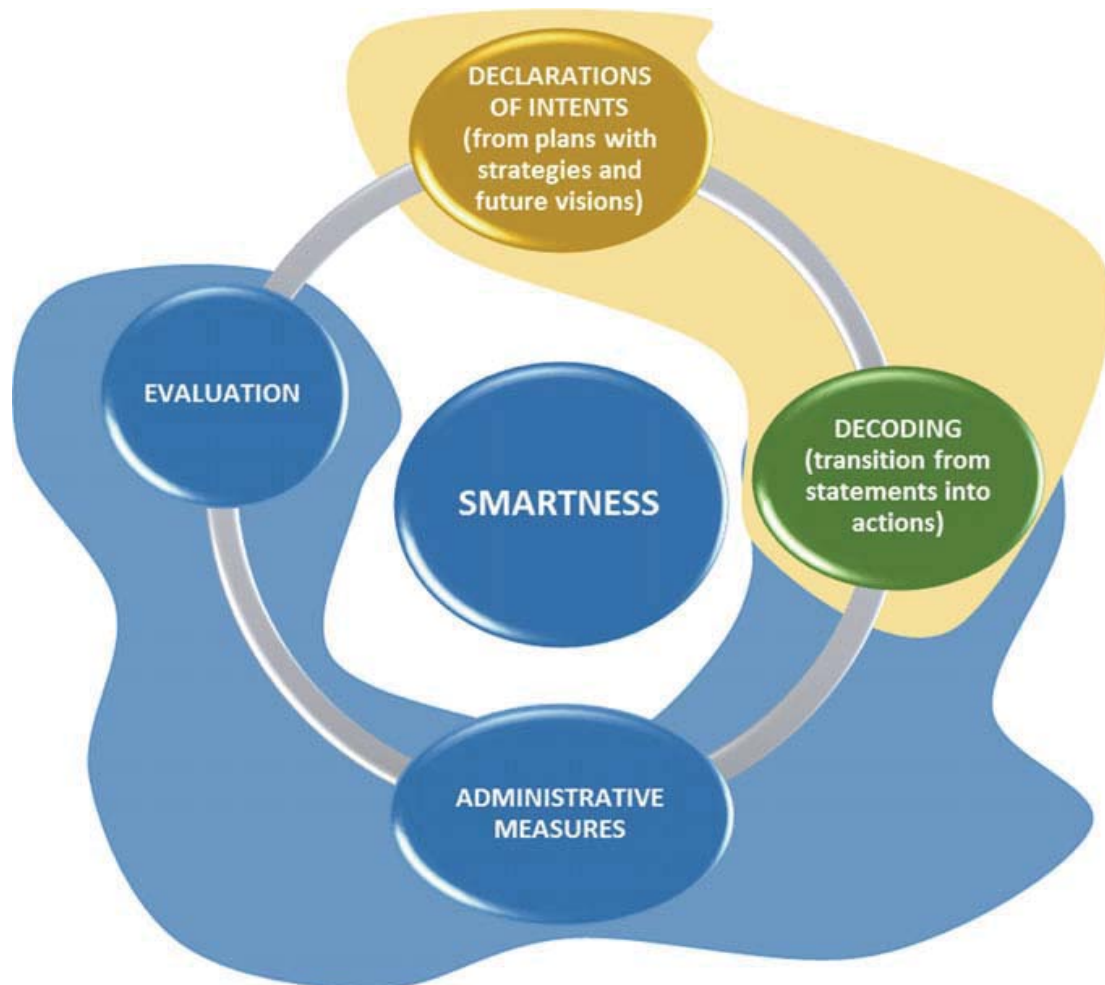


Fig. 3 Evaluation of the cities performance

By adopting this approach, the process of developing strategic plans, in a broad sense, can become a condition that is not only necessary, but also sufficient, for building a smart region.

5 Conclusions

This work has enabled us to identify and reflect on some needed and essential aspects of achieving sustainable urban regeneration in a smart key: managing policies with dedicated responsibilities; focusing on relational components between cities; engaging actors in a “common direction” with regard to the organization of collective action; and mobilizing resources in a cohesive and closer way. The comparison of the 53 cities conducted in this study has shown that the majority of the cities (18) tend to invest in those dimensions in which their performance is higher, and quite a number (14) tend to invest in the dimensions in which their performance is lower.

In relation to these results, we must be aware of what all this means, not so much in terms of technical feasibility, but rather in terms of political and human capital, by taking a multidisciplinary approach, and fostering “visionary leadership,” capable of governing, but also capable of sharing values, concerted actions, mobilizing resources, and looking towards the future of community.

Finally, the projects that have been analyzed provide evidence from which can emerge new stimuli, in order to create a reshaped leadership within a specific urban context. In other words, there is not one strategy that is appropriate for all cities, but certainly there is a best strategy for each city. It is to be found by sharing and extrapolating the successes of other cities, as part of a healthy competition between cities, city branding (Lucarelli and Berg 2011) and big-city urban events such as Expo 2016, the Olympics in Turin 2006, international trade fairs such as Colombiadi of Genoa, and the Olympics in Rome 2020 (Balletto 2003).

In relation to these results, we must be aware of what all this means, not so much in terms of technical feasibility, but rather in terms of political and human capital, by taking a multidisciplinary approach, and fostering “visionary leadership,” capable of governing, but also capable of sharing values, concerted actions, mobilizing resources, and looking towards the future of community.

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