

# Embracing Complexity Theory for Effective Transition to Socially Integrative Cities

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## 1. Introduction

Though creating socially integrative and sustainable cities is of great interest to many policy makers, urban authorities, public service providers and researchers, how to harness the city population in order to foster such social cohesion, an indispensable part of the process, is a challenge that has yet to be solved. In this chapter, the authors offer a possible solution from the field of natural sciences, viewing cities as living organisms, and demonstrating the use of this principle in a case study of building an online platform, Community of Communities, and how the latter can contribute to the transition towards digital, sustainable, and socially integrative cities in China and Europe.

Socially integrative cities are defined as:

socially mixed, cohesive, liveable and vibrant. Compactness, functional mix, and intra-urban connectivity as well as equal rights regarding the access to municipal services play an important role. Environmental quality, the quality of public spaces and the quality of life contribute to the well-being of the population, strengthening a sense of community and fostering a sense of place as well as preserving cultural heritage, shape the city's in-ward and outward-bound image. Investments into neighborhood improvement, service delivery, infrastructure and the quality of housing are important supportive measures. Empowerment and participation of the population, as well as social capital, are indispensable. (Müller et al. 2019, p. 1)

Jane Jacobs (Martin 2006) inspired us to acknowledge the fact that cities are about people, and particularly about bringing people together. Cities fulfil the social needs of their residents for physical venues to provide them with interactions that generate innovation, art, culture, and economic activity. In order to keep pace with the modern world, or to catch up with it, a city must focus first and foremost on learning and understanding the needs of its residents, and only then attempt to provide them with appropriate services through a variety of platforms, one of which is technological media. However, as indicated by Müller et al. (2019), the participation and engagement of citizens in such transitions is essential.

In our view, technology can serve as a platform for open innovation (Pasher et al. 2018). Open innovation is a distributed innovation process based on purposely

managed knowledge flows across organizational boundaries (such as city boundaries), using tangible and intangible mechanisms. The technology used in open innovation serves the needs of citizens because it focuses on user-centered design. According to a statement generally attributed to Jack Welch, the legendary former CEO of General Electric, “people support what they help create” (Krames 2001).

From the background theory we have learned and the professional experience we have received through working with cities over the years, we know that engagement of all the stakeholders, including the citizens, creates commitment to achieving the goals that the decision-makers defined. The essential elements for people’s engagement include a shared vision, passion, altruism, and creativity Pasher et al. (2017). Belief in senior management is considered the driving force behind people’s motivation and engagement in collective processes (Smith and Tushman 2005). Leadership that encourages conversations creates civic engagement, collective wisdom, and smart activities. All stakeholders are engaged in addressing the essential issues of the city and are partners in shaping the vision, goals, and strategies used to achieve them.

Engaged citizens will cooperate willingly to contribute to the sustainability of the city, both by raising and prioritizing problems, and through direct involvement in the preparation, planning, implementation, and evaluation of new urban developmental projects (see Lami and Moroni 2020). In addition, citizens can help professionals understand and frame the problems in question more accurately, help to judge the ethical or material trade-offs needed to make a decision, and provide important information for building solutions and assessing possible intervention scenarios (Fung 2015).

Their degree of collaboration will be affected by their level of engagement; when decision makers help them to find, generate or cooperate in new ideas for products, solutions and processes with which they are eager to engage, this will lead to entrepreneurship and innovation in the city, because entrepreneurs and collaborators work with passion (Goldberg et al. 2006). This passion will drive them to connect to other people with whom they share a common bond or interest, and together, they can innovate things that help the city to be sustainable and attractive (Pasher et al. 2018).

In order to nurture a culture of entrepreneurship and innovation in the city, it is useful to consider the Pyramid of Human Capabilities offered by the innovation expert Gary Hamel. Hamel (2007) claims that at the top of the scale are the characteristics of initiative, creativity, and passion. People with these characteristics are those who lead innovation. They are the “soul players” of the city, who are constantly improving and trying new processes, and are eager to develop new ideas and lead the city to success.

Drucker (1994) identifies knowledge as the only meaningful resource, and suggests that the role of leaders in managing people is not to control and command, but rather to enable knowledge-sharing and to define what new knowledge is needed

and how it can be used. The future belongs to cities in which leaders are not afraid to “loosen the leash” and allow their citizens and other stakeholders to be engaged and daring. To encourage such an environment, there is a toolbox that replaces the old mechanisms of control and command. It includes “liberating tools” such as “communities of practice”, “knowledge cafes”, “open spaces”, and “online platforms”. Those tools help to create a city that speaks, learns, mixes, and renews itself for the wellbeing and happiness of its citizens and its leaders, who promise the sustainability of the city (Pasher and Ronen 2011).

Ultimately, smart innovative cities are fundamentally about talented passionate people, and the creation of opportunities for such people to interact in communities, co-create and share new knowledge (Dvir and Pasher 2004). Passionate people enable open innovation because of their motivation to learn, explore, influence and help. If we continuously validate our plans against this key observation, we can do much to make cities smarter and help them to be sustainable and address important national and global challenges (Pasher et al. 2018).

## **2. Conceptual Framework**

Still, attracting innovative and passionate people, and creating the right atmosphere for such innovation to happen, may become labyrinthine. To increase our understanding and ability to make cities digital, sustainable, and socially integrative, we look for inspiration in the natural sciences—specifically, we look to complexity theory (Mitleton-Kelly 2003). According to this theory, the city is a living organism, an ecosystem in which there are close relationships among streams of resources, knowledge, and people, reciprocally influencing each other. It is a system in which, as in nature, a line of co-evolution occurs—the emergence of processes and the self-organization of all individuals in the system—that allows the creation of a new order in a natural evolutionary process. Inspired by this view, there are principles that can be embraced by decision makers in order to manage the system.

According to complexity theory, the system is dynamic and full of uncertainty at its core, making it almost impossible to completely anticipate and control changes and strategies (Taleb 2005; Marion 2015). Moreover, a single optimal strategy is not possible and is undesirable, as any strategy can become optimal under circumstances and maladaptive under others. In a dynamic world, any entity that wishes to prosper has to encourage diversity and explore its full breadth of opportunities and possibilities, creating as many solutions and methods of operation as possible. Stemming from this view are the principles of exploration and experimentation. Those principles favour exploration of all possibilities, simultaneously conducting as many small “experiments” as possible, each with a bearable small cost and risk, drawing conclusions from each experiment and updating the larger strategy. Those

principles emphasize the benefits of experimentation and the way it positively affects the whole system (Mitleton-Kelly 2003).

In addition, the self-organization principle, allowing the processes, stream, and the elements of the system to organize by themselves, is vital. As each element in the system is affecting and affected by the other elements, prearranging the elements of the system is doomed to failure. According to complexity theory, self-organization enables the emergence of a fertile ground for raising ideas and sharing new and innovative knowledge (Mitleton-Kelly 2003).

In this chapter, we present one case study of a technological open-innovation process characterized by the engagement of all stakeholders, who were motivated by passion, altruism, and the desire to cooperate. The case study presents how building an online Community of Communities can contribute to the transition towards digital, sustainable, and socially integrative cities by enabling better communication among all stakeholders in the context of a complex urban environment.

Technology needs to help the decision makers and other stakeholders to achieve their goals, engage the citizens and make the city more attractive and sustainable for everyone. Many of our current social connections are based on a virtual space that enables us to make conversations, share knowledge, stay in touch, and easily reach almost everyone very quickly (Pasher et al. 2017). In big countries, China, for instance, an online platform can be a great solution to overcome the limitations of distance, disabilities and language and enable every citizen to participate in the online discussion and become involved in the main topics and issues that concern the decision makers, thus fostering social integration throughout the decision process.

Today's young people care about the future of the earth. They do not want to continue to pollute the environment and they want to conserve polluting energy. In addition, they look for human contact as they multitask using social media and electronic screens, which they use to share information and knowledge (Augusto et al. 2010).

All the smart cities in the future will use advanced technologies to make the city green, healthy, sustainable, and socially integrative. This combination of the needs of young people, their technological habits and their advantages for the city will help the decision makers achieve it, with the help of communities, engagement, and technology (Pasher et al. 2017).

### **3. Methodological Framework**

In order to establish an online platform, it is desirable to decide on a methodological framework. The methodological framework of Urban Living Labs provides a proper infrastructure for developing effective and flexible online communities.

The concept of Living Lab is a user-driven, open innovation ecosystem based on a business–citizens–government partnership, which enables users to take an active role in the research, development, and innovation process (ENoLL 2006). It was first used to describe R&D processes focused on the user-centered design (UCD) methodology, in which end-users are engaged in the development process from the very beginning. Urban Living Labs (ULLs) constitute a methodology (Eriksson et al. 2005), environment (Ballon et al. 2005; Schaffers et al. 2007), system (CoreLabs 2007), and a governance approach (Bulkeley et al. 2016), whereby urban stakeholders develop and test new technologies, products, services and ways of living to produce innovative solutions to a range of challenges (Marvin and Silver 2016), including new technology, building retrofit, food production, urban landscape, sustainability, knowledge production and economic growth (for a more comprehensive review, see Steen and van Bueren 2017).

The overall aim of ULLs is to learn and experiment by integrating processes of research and innovation (ASC 2016; van Bijsterveldt 2016; ENoLL 2006). Importantly, the aim is not only to learn from experiences in the particular lab environment, but also to replicate the innovation elsewhere, in real life, or to further future innovation (ASC 2016; van Bijsterveldt 2016; Franz et al. 2015; Juujärvi and Lund 2016). ULLs emphasize experimental approaches to governing cities, allowing experimentation before detailed planning is applied (European Commission 2009). Thus, applying the exploration and experimentation principles and testing out new technologies and policies under real-world conditions in highly visible ways can prompt radical social and technical changes aimed at transforming urban governance and foster the transition into socially integrative cities (Baccarne et al. 2014).

Another key element in this development process is co-creation (van Bijsterveldt 2016; ENoLL 2006; Feurstein et al. 2008; Franz et al. 2015; Pascu and van Lieshout 2009; van der Heijden 2016). The essence of a ULL is that they provide a platform for participation and user involvement. Rather than just applying a fixed solution and involving the citizens only in testing, a solution is sought together with all stakeholders, and the direct participation of all stakeholders appears in all stages of the ULL approach—from identifying stakeholder needs, deciding upon ULL goals and visions, planning, designing, developing, implementing and evaluating ULL actions, and updating ULL ambitions. To qualify as co-creation, not only do the targeted users not need to be involved, they should have real decision-making power throughout the phases (Prahalad and Ramaswamy 2004). Furthermore, the development process of living labs is iterative, which implies that, after being designed, the prototype product is used and evaluated by the stakeholders. The feedback and evaluation gathered from these steps are used to further develop and improve the product (Feurstein et al. 2008; Pallot and Pawar 2012; Pierson and Lievens

2005). Thus, ULLs also support the co-evolution, co-emergence, and self-organization principles of complexity theory.

The online Community of Communities (CoC) and the creation process is based on the main principles mentioned above. The CoC is an online platform that is meant to serve all stakeholders in the ULLs and to support the activities that evolve. In accordance with the complexity theory, the CoC is a supportive platform for self-organization, emergence, co-evolution, and the creation of a new order by enabling the users to open their own chat groups, leave comments on every topic, fill polls and chat with each other, without any defined division or close topics. In this way, every community member can react to all ULL activities, watch interviews with different experts from different countries and initiate new online activities (Anthopoulos and Fitsilis 2009).

The platform enables its users to share and create knowledge with citizens, experts, researchers, academia, professionals, and anyone who is interested in participating, from all over the world. The platform enables the collection, integration, and analysis of data of transformative knowledge, which represent fundamental issues that emerge in new and existing cities with respect to governance of urban planning of the urban growth processes. The knowledge created and shared serves all stakeholders, self-organized communities, and each special interest group.

Cities that want to encourage the creation of the vital knowledge that comes from the different interactions among community members should produce appropriate socio-cultural and technical conditions to support this (Pasher et al. 2017). In addition, in order to create an innovative and evolving environment, as in nature, the stakeholders should allow some degree of flexibility. If the new order is over-designed, the people will not be able to organize themselves, but will depend on the help and guidance of designers of the new order (Mitleton-Kelly 2003).

The CoC has evolved to foster this exact environment, providing the link and connecting framework between people, decision-makers, and the community; therefore, a new reality, one that enables innovation, cooperation and creativity, can be created. It is an online platform, accessible and open to all stakeholders and is supported by open source code. On the other hand, this is a flexible self-organizing platform where every user can open discussions, edit contributions, and comment on the different categories.

Another significant advantage of the CoC, is that it is an online platform and every action, initiation, exploration, and discussion is documented. This bottom-up approach is established to collect transformative knowledge from all stakeholders, and especially current and potential citizens. The collection, integration, and analysis of these data through Natural Language Analysis of people's contributions, including emotion recognition, pave the way for a quantitative-based approach, a "digital transition" to urban planning. Hence, it collects and creates data for Artificial

Intelligence analysis, and the insights are fed into the next stage of the urban-planning process, enabling evidence-based governance for urban-planning processes. The data analysis can be done in order to assess the best practices in place-making, quality of public space, public engagement, social cohesion, and cultural heritage, and to identify major themes that play a significant role in the transition of the community into a necessarily “urban” one.

This platform can support the transition towards socially integrative cities by enabling all stakeholders to create and exchange knowledge regarding city planning and development (Otto 2020; Denters and Klok 2010), such as infrastructure, regulations, taxation, health, education and culture, which have a bearing on the framework conditions and which shape the living conditions of residents.

In order to deal with objections and motivate the stakeholders to participate and take an active role in the platform, the engagement must be a win-win situation, as in the Tel Aviv municipality case study.

#### **4. Case Study—The Digital Transformation of Tel Aviv Municipality**

In the 1980s, Tel Aviv suffered from a decline in the number of young families due to the aging of the city’s population. Through the development of a comprehensive strategic plan, the city attempted to overcome this trend. To formulate this plan, it gathered specialists from a wide spectrum. The plan was successfully implemented, and the city now enjoys immigration that includes many young families (Pasher et al. 2017).

In order to stay relevant, the city must be flexible and able to adjust to rapid change, and so the system must embrace new ways of communicating with its residents, moving away from the traditional, municipal, one-to-many methods and attempting to create a platform that will support openness, equality, trade, tourism and culture (Pasher et al. 2017). This is very much in line with the current global vision of municipalities, which are expected to deliver much more than efficiency and excellence in services for residents. The new vision prioritizes deeper engagement with the community, involving an open dialogue with and between residents, the creation of new models for trading and sharing goods and services, and, most importantly, making cities livable and equitable (Pasher et al. 2018).

Digital transportation enables municipalities to communicate with the citizens through supporting systems that help to create high engagement, and this is how Tel Aviv has approached the objectives of becoming a smart city, developing a new online platform to enable citizens to co-create the future of the city, together with the municipality (Pasher et al. 2017).

One of the best examples of Tel Aviv’s actions in digital transportation is the development of the DigiTel Residents Club. This club is a personalized web and

mobile communication platform that facilitates a direct and holistic connection between the city and its residents.

This smart application for online public participation brings value to both the residents and the municipality, a smart win-win solution. The residents share their personal data voluntarily in order to obtain individually tailored, location-specific information and services (Tel Aviv 2020).

DigiTel was developed as a robust platform that could be scaled to fit the world's largest cities. The aim was to develop a system that would be more advanced and complex than any other city engagement tool in the world and, for this achievement, Tel Aviv won the world's smartest city award at the Barcelona smart city expo in 2014 (Morag 2014). In addition, Tel Aviv was ranked the second-best innovation ecosystem globally by the start-up ecosystem report (2012). Tel Aviv's population that is well known for its open-minded and technology-driven citizens, and the ability of the municipality to build systems to support a new way of communicating with its residents created a platform that supports openness, innovation and a move away from the traditional one-to-many methods (Pasher et al. 2017).

The benefits of the DigiTel application, as mentioned on the Tel Aviv municipality website, are:

- discounts at Tel-Aviv's numerous culture, sport, art, and recreation facilities;
- live updates about what is happening in the city, adapted to the users' personal interests: culture, music and or/art events, health and lifestyle, sports, children's activities and much more;
- live updates about what is going on in the vicinity of the user's address, and announcements about community events, and the blocking, restoration and construction of streets/areas.

During the Covid-19 crisis, Liora Shechter, the Chief Information Officer of Tel Aviv municipality, was interviewed (Shechter 2020) for the Community of Communities. In this interview, she explained that the municipality needed to adapt to new ways to give added value to its residents and support them, while it also needed to obey the rules and prevent infections. In order to achieve this goal, Tel Aviv uses the familiar DigiTel platform, which the residents already know, to add more relevant information and features. One of the examples is given in the section where residents can report blocking scooters; they now can report on the need for aid for elderly.

Tel Aviv also embraces the innovation and start-up community to help solve the coronavirus issues. One of the applications that was adapted by the department of education in Tel Aviv activated 1000 volunteers using the app to try to help others.

Another community activity is the International Virtual Hackathon that continued for 72 h and invited solutions to support SMEs in Tel-Aviv. All the



solutions became accessible by every country that participated in the Hackathon and all the start-ups got the chance to make connections and receive feedback from experts from all over the world.

## 5. Conclusions

Embracing complexity theory allows us to better and faster manage the transition to socially integrative cities. According to the complexity theory (Mitleton-Kelly 2003), we live in a world of uncertainty and must be reconciled with having no definitive answers or one way of success. In addition, reality is dynamic and, therefore, an entity that wants to survive and thrive should explore its scope, and consistently continue to try different experiments and create diversity. This means that, from this perspective, the search for a single optimal strategy may not be possible and may be undesirable; any strategy can be optimal under certain conditions. Therefore, the ultimate strategy is to work in parallel on several experiments that have low costs and low risk, draw conclusions from each experiment, and upgrade the strategy (Mitleton-Kelly 2003).

One of the main goals of online platforms is to create engagement. The engagement on the platform will maximize itself through a combination of offline and online activities. (Anthopoulos and Fitsilis 2009). According to the concept of ULLs and the complexity theory, the best way to create engagement is to experiment with the different possibilities (Mitleton-Kelly 2003) that exist in the platform, learn what works and what actions have the potential to last over the long term, and adapt the experiments and prototypes to the dynamic reality (European Commission 2009). User engagement can be done by creating an enabling infrastructure for a fruitful discourse. The city of Tel Aviv engages the citizens by creating an infrastructure that challenges the status quo for constant improvement (Tel Aviv 2020). In the complex postmodern world, there are no right answers, and there is not one truth. We live in an uncertain environment, subject to rapid changes which force us to adjust. Tel Aviv does this by a deeper engagement with the community, involving an open dialogue with and between residents (Pasher et al. 2017).

The experiments can also conclude different kinds of technology tools that will help to prevent technical problems and increase the number of users.

One of the ways to engage experts and people who want to learn from them in the same activity is to establish regular designated events in different topics and invite them to join. A different way of harnessing new members to register with an online platform is to do online workshops for groups of people that knew each other before. The workshops can integrate a variety of forms, such as hybrid, frontal and online, and can also offer different kinds of topics, like global issues and leading questions that the participants are passionate about, as well as guiding the participants on what to do on the platform. The results of this kind of activity are original content

uploaded to the CoC by the community members, attracting new people to register, open discussions that can lead to actions, and innovative ideas that can make a great contribution to decision-makers.

There are many different ways of succeeding with digital platforms (Anthopoulos and Fitsilis 2009). The role of the community manager is to collect the data and information in a systematic way, analyze it using relevant analysis tools and professionals, and present it to decision-makers in a practical way by using forms, reports, or specific conclusions. The decision-makers can easily use this information to generate citizen engagement, support a culture of entrepreneurship and innovation, and draw valuable insights for the benefit of a sustainable and socially integrative city, as in Tel Aviv's case study (Pasher et al. 2017).

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