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IMAGINING THE CITY OF TOMORROW THROUGH FORESIGHT AND INNOVATIVE DESIGN:

TOWARDS THE REGENERATION OF URBAN PLANNING ROUTINES?

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Abstract

Ecological and digital transitions alongside concerns over social inequalities have signalled the advent of complex new challenges for contemporary cities. These challenges raise issues pertaining to the dynamic capability of urban planners: more specifically, their ability to revise their tools and planning routines in urban projects. New paradigms of collective action for the transition towards innovative cities have been developed in large organisations. European companies, especially in public transportation, have developed such tools based on innovative design theories. One of these methodological tools, the Definition-Knowledge-Concept-Proposition (DKCP) process, was used to generate a new range of planning options for an urban district in Montreal, Canada. For many municipal organisations, the formulation of innovative ideas only concerns one stage of the process, represented by the 'P' phase. However, innovative routines should rather include the earlier phases of identifying the scope of possible innovations, the search for intriguing knowledge and disruptive design activities. The desire to tackle the complex challenges of 21st century cities has led to a new professional identity: the 'innovative urban planner'.

Keywords

Urban futures, strategic foresight, routines, rule-based design, innovative design

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1. Introduction: The Necessary Paradigm Shift in Urban Planning as a Design Activity

Can urban planners be creative and innovative professionals? Can municipal organisations and their urban planners benefit from disruptive design approaches?

The increasing complexity of urban challenges raises questions about the capacity of municipal organisations to properly equip themselves to define innovative public policies. In many Canadian and US cities, innovation processes often consist of supporting the emergence of bottom-up solutions by, and for, stakeholders. In this context, municipal organisations can facilitate the development of new experimental spaces, such as living laboratories; these facilitate the co-construction with citizens of solutions to real problems (Mulder, 2012; Nevens et al., 2013; Lehmann et al., 2015; Nesti, 2017). In order to properly read and understand the implications of these bottom-up solutions, and also ensure municipal organisations' 'absorptive capacities' (Cohen and Levinthal, 1990), the latter must also develop their own innovation initiatives. New urban labs have recently flourished in Canadian and US cities (e.g. *Laboratoire d'innovation urbaine de Montréal*, New Urban Mechanics in Boston, City Studio in Vancouver). However, their processes and methods are still in the research and experimentation realms.

Several radical transformations are likely to affect Western cities in the coming years. These transformations will not only be complex, but they are also wicked and difficult to unravel (Rittel and Webber, 1973). They may require seeing traditional urban activities in a new perspective:

- The world of work will face strong mutations: it will be influenced by an explosion of different forms of work and workplaces including, for instance, open innovations and the emergence of innovation communities, alongside robotics and experiential work. However, our cities are structured under the logic of daily home-to-work commuting and highly segregated activities. The redeployment of activities in cities is also likely to create social tensions between certain groups, for example between very agile young people, who accept precarious jobs for short periods, and older employees who are loyal to traditional jobs in large organisations.
- Leisure time faces challenges with regards to issues of of social inclusion and sustainability, whilst also needing to resist pressures of algorithmic standardisation. The frenzied development of digital and immersive technologies may lead to new experiences which no organisation (city, museum, or theatre) is currently capable of hosting.
- Current environmental crises (for instance, climate, or local atmospheric pollution) require municipal organisations to urgently reinvent their mobility systems. The constant desire to be close to as many urban activities as possible may require the relocation of all activities within the urban fabric, or making commuting more pleasant. Changes in the nature of the activities set out here should also bring about new forms of mobility that, whilst more flexible and experiential, are also likely to be less predictable.
- Climate change is a 'super wicked problem' (Lazarus, 2010) that is difficult to unravel using traditional urban planning instruments. Human activities are responsible for sustained increase in greenhouse gases; especially those related to mobility and industrial activities in the context of urban sprawl. Urban densification and better functional mixity appear to be two solutions since they bring a large number of services closer to a multitude of users. The issue of housing will be transformed by the search for new living patterns based on flexibility and affordability of housing. Perhaps there will be an incentive to enrich certain notions; the notion of density for example could be approached through unfamiliar terms, such as the idea of seeking a 'pleasant density'. These new models are not only poorly adapted to current typologies, but may also exacerbate tensions between permanent and temporary neighbourhood residents. Moreover, they may ultimately raise spatial justice concerns by unfairly concentrating the negative effects of climate change, such as heat islands, in certain neighbourhoods while creating oases of greenery for the wealthy. Three of the challenges are to find the right scale of density and the right mix of services and clienteles, while generating positive effects from a climate perspective. With regard to this latter point, zoning tools seem to offer only a narrow and insufficiently contextualized assessment of urban activities.

Many cities are translating these challenges into policy statements that take the form of real utopias: the 'carboneutral city', the 'circular city', or the 'smart city'. In addition, cities must ensure that the necessary living conditions are in place to ensure the social integration of all populations, as well as economic prosperity.

These challenges, as well as the complexity of implementing effective responses to them, raise questions about the practices, tools, and intervention methods that need to be used in urban planning. The present practice of urban planning takes the form of a 'rule-based design activity'. This notion assumes the consideration of two postulates. The first is that urban planning constitutes a 'design activity', a formulation already used by Schön (1980, 1993) and Simon (1969). The goal of urban planning is to 'conceive' the right sequence of problem solving, exploration, informed decisions and experimentation to produce, in the long term, the greatest collective satisfaction. The second postulate assumes that this rule-based activity frames collective action to make it effective in a given context, according to rules that ensure predictability in a stable world. However, rule and design-base urban planning is less convincing as a way to guide change in an uncertain and changing world.

In recent years, municipal organisations have trialled new practices and approaches to renew their processes and instruments. For example, the City of Copenhagen has encouraged the networking of urban planners, citizens and designers. The Create Your City project helped shift the perspective of its city planners towards the less technical and more humane aspects of planning (Munthe-Kaas, 2014). Several Canadian and US cities have developed new planning tools - the form-based code in particular - which aims to integrate the user experience and its visual environment as a principle of development of the city (Duany and Talen, 2007). This enriched conception of rule-based urban design may have resulted in new directions for the work of urban planners, but it remains insufficient as a mechanism to reinforce their capacity to innovate. It avoids revisiting the identity of design objects (what is a public square, urban density, or smart and sustainable mobility?) and instead capitalises on and disseminates good practice.

To ensure that urban planning is fully able to respond to these challenges, this paper focuses on the practices, references, and paradigms that structure the routines of urban planners. This concept of routine has been used to characterize the optimal activities that one must follow in an organization in order to produce goods or services under the best conditions. It is therefore a mechanism by which we can think the genealogy of performance models and the learning dynamics within organisations (Coriat and Weinstein, 1995; Nelson and Winter, 1982; Brem et al., 2017).

How an innovative design routine can take hold is one of the possible responses to challenges facing municipal urban planners. A first reading of the legal and educational frameworks suggests that this has not yet occurred in the practices of urban planners in Canada in general, and in Quebec in particular. Legal and regulatory tools favour normative or prescriptive considerations and ignore the activity of design. On the professional development side, university urban planning programmes focus on learning, and applying a variety of regulatory audit tools. Barring a few exceptions (Scherrer et al., 2017), there is no training in Quebec on how to innovate, just as there is none in most architectural or design training programmes.

However, methods that make it possible to revisit the identity of routines can be found in private organisations that are facing rapidly changing technological or social contexts (Arnoux and Béjean, 2015; Potier et al., 2015). To anticipate these changes and force adaptation, they intentionally introduce elements of disruption. For example, they may create new roles for actors, explore new identities for objects, or enable the regeneration of tasks and jobs (Le Masson et al., 2017). The transposition of these methods to the public sector is currently limited to a few organisations with specific missions: development of the complementarity of modes of active and collective transport in urban areas (Amar and Michaud, 2009); or, rethinking services in regions despite a rationalization of railway activities (Laousse and Hooge, 2015). By associating with prospective methods (Durance, 2010; Durance and Godet, 2010), new methods may be applicable in municipal organisations.

Given the increasingly complex context of cities, the routines of future planners may need to be redefined. We hypothesise that an existing set of innovative routines developed in the private sector could inspire public organisations to redefine actual urban planners' routines. This set of innovative design routines is understood as four successive activities called DKCP (where 'D' is a common definition of desired explorations, 'K' is an

assessment of known and unknown knowledge, 'C' is the generation of concepts, and 'P' is their transformation into proposals or initiatives) (Hatchuel et al., 2009; Le Masson et al., 2011; David and Scheffer, 2017). Innovative design routines in private enterprise and their transposition to urban public organisations have been the subject of research by, amongst others, Georg et al. (2011) and Pinheiro-Croisel (2014). However, these routines are far from being systematised at this time.

Addressing this existing gap, we first propose focusing on the value of routines as a way to better understand design activities in urban planning. Thereafter, we explain the usefulness of intervention research as a methodology for framing scientific approaches to be used in urban planning when exploring the unknown. Thirdly, we present a case of conducting an innovative design approach in a Montreal district. Finally, we present a sketch of a set of routines that employ the four activities (D-K-C-P). We conclude by specifying the usefulness of these activities for future town planning practices

2. Professional Routines for Creativity

In our opinion, the concept of professional routine possesses indispensable virtues for the members of organisations, both private and public, who wish to implement responses to social and technological changes. It is also useful for understanding the work of urban planners.

2.1. Professional Routines to Understand Organisational Learning

In general, a routine refers to a series of habits which, repeated daily, structure the life of a given individual. In organisations, individual habits are transposed into routines that formalise behaviours shared by colleagues, and forge standardised behaviours (Hodgson, 2008). The most effective of these behaviours eventually become rules which are followed by all. The word routine also refers to the repetitiveness, disenchantment, and lack of surprise in day-to-day life. As such, a routine can become a form of enslavement that results in alienation from individual desires (Juan, 2015) because it prevents workers from trying out new tasks or services. Routine may also refer to the favouring of ready-made solutions that are not always adapted to changing social or environmental contexts (Knudsen, 2008).

Routines can also be considered for their positive effects on organisations. The actions and processes in various sectors can eventually make an organisation very efficient. This efficiency contributes to forge the particular identity of the company. It can be compared to the role played by genes in the human body, where each gene plays a particular role; it is the combination of all the genes that makes the body perfectly operational (Nelson and Winter, 1982). The strength of an organisation then lies in its ability to continually adapt routines to new challenges.

2.2. Turning Design Routines into Innovative Design Routines in Urban Planning

We should not see professional routines as ways to freeze an organisation in an immutable space-time, because routines adapt and evolve in response to the new tools, methods, and processes adopted by employees (Coriat and Weinstein, 1995). They also help support a learning dynamic within organisations by empowering employees, and allow them to see problems from different angles (Miner et al., 2008). At the same time, and especially within large public organisations such as cities, routines can create path dependencies (Teece et al., 1997). Routines optimise past structures rather than favouring disruption and demand changes in how they are implemented. However, Labatut et al. (2012) have shown that the techniques and methods used can produce unsuspected generative effects that completely change the practices of organisations and generate new actors. The effects of innovation are not only felt on the objects themselves, but also on those who produce them.

It is our opinion that the above discussion of professional routines highlights the particular challenges faced by urban planners' practices in municipal organisations. On the one hand, the empowerment dimension of urban

planners highlights the rigour with which they use their various instruments to solve the problems presented to them. On the other hand, the dimension of path dependencies is illustrated by planners' reflex to reproduce, in new projects or approaches, what worked well in the past, without enriching it in any particular way. In order to obtain the disruptive effects of innovation, it is useful to place urban planners from the outset, in a position where they can generate unexpected effects.

2.3. Exploring an Original Model for Conceptualising Urban Planners' Routines

It is also necessary to question the professional identity of urban planners by having them ask themselves how they can regenerate regulated routines. Rampa et al. (2017) formulated another set of criteria to evaluate the impacts of training for innovative design on organizational creativity in a study conducted within a public administration (an energy producer and supplier in Quebec): the ability to identify knowledge missing from the dominant design of an object; the ability to extend knowledge to enhance the initial functions of the dominant design; and enthusiasm and excitement about the creative process.

In order to characterise the design regimes of urban planners working in municipal organisations and their attempts at enrichment, we propose an original model of analysis. The model (as illustrated in Figure 1) combines the relationship between the objects being designed with the type of professional routine being followed:

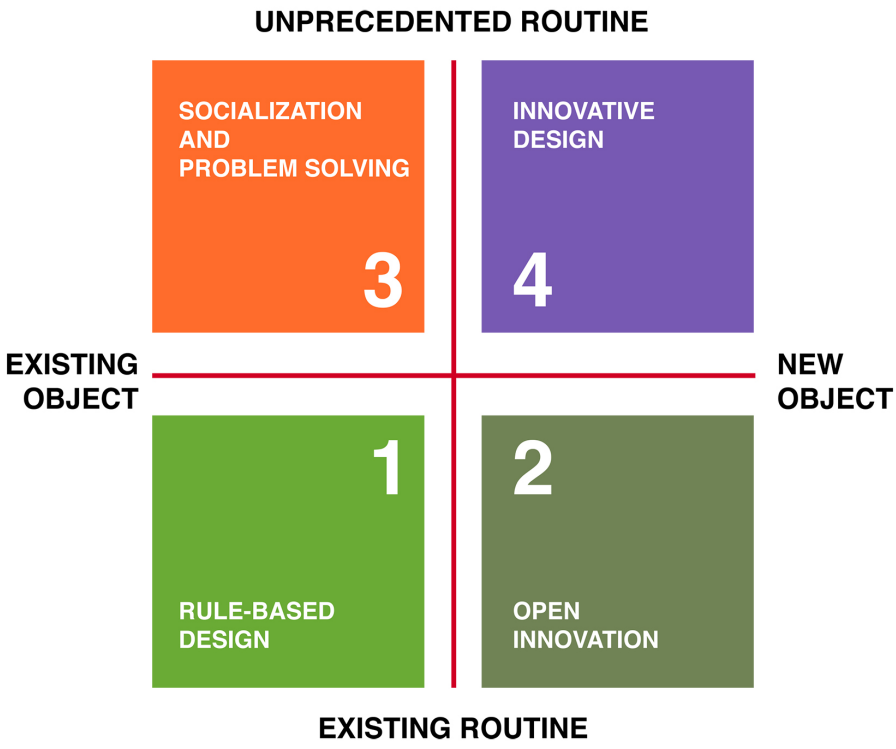

Figure 1 - An Original Model of Design Regimes in Territorial and Municipal Organisations

Each of the four quadrants deserves some explanation in relation to the description of what happens there, its advantages and its limitations:

- Quadrant 1 (existing routine, existing object). We find here the traditional practices well mastered by urban planners, strongly marked by a very fine knowledge of the objects and marked by previous learning. It is also caracterised by the tools of regulatory, legal or legislative framework, budgets, best practices, etc. The benefits are that this regime makes it possible to ensure consistency and common

identity within the profession. But there is a risk of not being up to the challenges that arise over time. The possibility of limiting oneself to path dependencies is also present.

- Quadrant 2 (existing routine, new object). This consists of open innovation practices. These are often carried out by a consultant who has a method that is applied consistently, regardless of the context. Standardised processes (architectural or design competitions) encourage urban innovation – for example, eco-neighbourhood projects (Georg et al., 2011) belong in this category. In France, the *marché de définition* (exploration study agreement) was an excellent way to enrich the traditional call for tenders. However, these approaches do not allow municipal organisations to learn about the innovation process, since they rely on the invisible routines of others (the consultant or those who are competing). The benefit of this method is an ability to quickly recognise a contribution of new knowledge. The limit is that the learning ability may be low. The municipal organisation may also be able to steer the content. Finally, there is a risk of the 'black box' effect, i.e., participants only share part of their content. The process itself remains hidden. As for the design competition, the reports of a jury constitute a vector for the socialisation of knowledge. However, these reports are more concerned with an appreciation of the results than with the design processes.
- Quadrant 3 (unprecedented routine, existing object). This is defined by creative tools that play with the (re)organisation of forms, activities and actors. Typically, these are knowledge-sharing activities (Lehman et al., 2015) that foster new routines such as hackathons or brainstorming. Nonetheless, these positions remain in the existing paradigm. They favour the sharing of existing ideas, without questioning their foundations (Agogué et al., 2014). This is an enriched public participation formula. It encourages better contributions from everyone involved in the thinking process. However, it generally proposes an original reorganisation of the existing routine, but one that is thought about and discussed within the same parameters.
- Quadrant 4 (unprecedented routine, new object). This is composed of tools or methods used to facilitate the process of disruption in the design of urban *dispositifs* (devices). It also calls into question the identities of objects or actors. The challenge lies in whether these innovative ideas can be reintroduced in projects. These kinds of products are more common in private companies (Arnoux et al., 2015) and parastatal organisations in France (Hooge et al., 2018). It may be considered as an opportunity to identify new spaces of values, new actor networks and the resulting practices. However, this approach may be very creative, but can neglect the important task of transforming the current set of organisational routines. Hence, the ultimate goal of innovative design routines is to recast and update the rule-based routines of an organisation (i.e. quadrant 1). One can also stay too close to the design brief, thereby limiting the expansion of knowledge.

Currently, urban planning routines are essentially confined to the first quadrant of the diagram, with some attempts to enrich them by moving towards quadrants 2 and 3. What is learned remains the property of the designers, and the participants remain confined to their usual practices. However, it is only in the fourth quadrant that planners can truly attribute new identities to those objects which will eventually condition creative professional routines (Le Masson et al., 2017). The fourth quadrant therefore represents a new space of innovation, and our hypothesis is that this innovative design routine can be generated by a set of four activities and their interrelationships.

3. Methodological Relevance of the Intervention - Research and its DKCP Formalisation Tool

To illustrate how this model can be used to understand the transition from regulated design to innovative design, we intend to present a real case of application that took place in Montreal, one of the major Canadian cities. This field experiment required the adoption of a research methodology appropriate to this particular context.

Our proposal to generate unprecedented routines for urban planners requires the identification of new forms of reasoning which describe and explain new realities – such as new routines, new urban objects, and the relationships that are established between them. Since we are in the field of building the cities of the future, these new reasonings must be based on observations of real situations.

3.1. Methodology

In this context, the data must be produced within organisations that possess real urban problems. This requires robust and consistent methods of investigation that allow the research questions themselves to be discussed and tested during the course of the research between the municipal organisation and a research team. For all these reasons, we believe that methodologies inspired by action research and its derivatives, particularly intervention-research or experimentation-research, deserve greater attention. Action-research is concerned with scientific knowledge that explains the actions taken by individuals and the rules and perceptions that enable divergent or convergent points of view to be discussed (Lewin, 1947). For Argyris and Schön (1978), it adopts a militant position which targets a better autonomy and critical reflexivity amongst actors in organisations.

Intervention-research differs from action-research (Hatchuel, 2000; David, 2013; David and Hatchuel, 2014; Radaelli et al., 2014). As Aggeri (2016) points out:

> The concept of intervention-research (IR) has been forged to designate the forms of research where the intervention of researchers with actors is explicitly claimed. It is a form of collaborative research, in the strong sense of the term, in that the research questions are themselves discussed and tested in the course of the research. This type of research is based on reciprocal commitments from both parties on the type of investigation to be conducted, the nature of the renderings and the type of objective sought [...] The intervention-research does not aim to test theoretical hypotheses that have been identified upstream, but rather to initiate an exploration in order to better characterize the problem at hand and to identify avenues for reflection or instrumentation (Aggeri, 2016, p.4-5).

In intervention-research, the identification of these points of view is modeled by the formulation of a rational myth which is intended to trigger a situated exploration. The research questions formulated on the basis of a wicked problem, the potential scenarios for reaching this rational myth, the co-construction of questions and solutions with representative actors, and their implementation and evaluation are each carried out in turn so as to form a complete sequential process. David (1999), following the work of Hatchuel and Molet (1986), identifies five stages of successful intervention-research (Table 1). We also establish a link between each stage in our intervention case of strategic foresight for a Montreal district in 2037.

Table 1: Stages of Successful Intervention-Research in Theory and Practice

	Description	**Transposition to our case of strategic foresight for a Montreal district in 2037**
Phase 1	Feeling of discomfort	Interactive discussion between urban planners and researchers on the description of the wicked problem (Phase D of DKCP)
Phase 2	Building a rational myth	Formulation of a rational myth combining two differents narratives: a coordination narrative for collective action (DKCP process, agreed-on Phase D), and foresight narratives of possible futures (four contrasted scenarios for the district in 2037). These scenarios are imagined at the end of Phase K, during a research seminar with actors from the municipal administration and external experts.
Phase 3	Intervention and interaction	A full day codesign workshop with a variety of stakeholders (Phase C): enrichment of the trigger scenarios for 2037 and discussion of potential pathways from 2017 to 2037.
Phase 4	Portrayal of a set of logics in the system of collective action	Clarification of the consequences of the codesign wokshop outputs and outcomes for municipal public policies, the urban planning process and potential collaborations with external actors.
Phase 5	The change process: transformation of the organisation	Assessment of the effects generated by the process. Drafting of propositions (Phase P) for the implementation of solutions and enrichment of the urban planners' routines (e.g. creation of an urban innovation lab for the district).

Source: Authors, adapted from Hatchuel and Molet (1986)

3.2. Mobilisation of a Tool for an Innovative Design Process: DKCP

To clarify the nature of these innovative design routines, we took this model as our hypothesis. To identify the richness of its disruptiveness, we used a methodological tool inspired by the theory of innovative design (Hatchuel and Weil, 2003). This tool, called 'DKCP' (Amar and Michaud, 2009, Hatchuel et al., 2009), favours the formalisation of creative ideas in response to a particular problem formulated in neutral terms. The tool takes its name from the four main activities of an innovation strategy (Abramovici et al., 2016):

- A definition and initial framing of possible innovation fields (Phase D);
- A pooling of knowledge useful for reflection, with important work to identify out-of-the-box knowledge (Phase K);
- An expansion of the knowledge translated into new concepts with highly disruptive potential (Phase C);
- The translation of these disruptive scenarios into concrete projects (Phase P).

This strategy relies on the formulation of stimulating briefs[1]. By adding new attributes, drawn from a knowledge disjunction, it is possible to partition this brief, thereby opening new avenues of exploration (Le Masson et al., 2010). The process of expanding knowledge and concepts leads, after a few steps, to the creation of a hierarchy of new functions, as well as uses and designs, which may unexpectedly lead to one or more unprecedented prototypes.

4. Results: An Application of DKCP to the Montreal Territory

The first experiment conducted with the DKCP method was carried out in the Rosemont-La Petite-Patrie Borough (hereinafter the Borough), one of the 19 boroughs of Montreal[2]. This municipal organisation asked the team at 'Lab Ville prospective' to initiate a debate on how to encourage new ways of living, collaborating or experiencing the city in the coming 20 years (Abrassart et al., 2018). The Borough expressed its initial vision in the brief: Live, Work and Play within Walking Distance in 2037. Over the next twenty years, the Borough will be strongly transformed by social, economic and technological changes (such as digital revolution, new mobilities, new ways of working, e-commerce, climate change, etc.). These changes will have impacts on the routines and aspirations practised by urban planners and could also generate new needs, inspire new lifestyles, and generate new forms of governance that might be more responsive and forward-looking. The municipal entity wanted to better identify these potential developments, that will have consequences on how services will need to be provided. The four DKCP phases were applied continuously over a period of about five months (as shown in Table 2).

1 A brief is a bold formulation of a problem, an original description of a way to solve it. At first glance, it does not have a logical status (Hatchuel and Weil, 2002), so it is considered prima facie neither true nor false. An example of a brief: design a boat that flies. In appearance, a boat floats but does not fly. By applying principles specific to aviation, it was possible to design the hydrofoil (Agogué et al., 2014).

2 Montreal, along the St. Lawrence River, is the second largest city in Canada in terms of population (3.4 million). It is a metropolitan area and an island (2 million inhabitants) composed of 16 cities, including Montreal (1.8 million inhabitants), itself divided into administrative units called 'boroughs' whose individual sizes and areas vary.

Table 2: Description of DKCP phases

	Phase	Description	
Pre-project	D	Conducted by the Université de Montréal team in close collaboration with a 'project team' made up of professionals and executives (half of whom came from the planning world). This phase ended with the establishment of a schedule of exploration activities. Deliverables: a calendar of activities and a roadmap specifying the desired learning.	Seminar[3]
	K	This knowledge was produced by the Université de Montréal team in close collaboration with three contributors. Their presentations focused on experiential mobility, the city and aging, as well as 'third places'[4]. The exploration of current trends and their extrapolation into the future allowed the team to imagine four evolution scenarios by variables, called in this case 'evolution hypothesis'. Each of these hypotheses was briefly described to the project team in order to transparently share the thinking behind the development of these so-called 'evolution hypotheses'. These trends have relied on identifying 'non-knowledge' that would potentially be crucial to innovation. This phase concluded with the formulation of projector concepts (which can be understood as new spaces of values) or triggers (which prepare the design activity of the next phase). Deliverable: disruptive projector concepts.	
	C	This phase began with the organisation and hosting of a prospective codesign workshop with borough stakeholders. The codesign workshop encouraged reflection on the transformations expected by the borough over the coming years in order to better address them. This phase ended with the formulation of a new prospective scenario, a narrative of fictitious characters in 2037 and the illustration of these scenarios by cartoonists. Deliverables: enriched scenarios and generative concepts rooted in the territory, and suggestions of possible action plans.	
Pre-project and projects	P	Some suggestions were made during the course of the codesign workshop. This pre-project stage would make it possible to propose a variety of projects that the Borough will be able to propose in the coming years as a way to respond to the new issues identified at the outset. This phase produced a report outlining ten (10) possible paths to carry out the ideas generated. Deliverable: an action plan to transform the municipal organisation.	

Four briefs were proposed to various stakeholders, including planners working within the municipal organisation. Among these briefs, two of them were particularly full of unknowns:

- Circular environments with positive energy: This first scenario proposes dividing the Borough into 26 sustainable living environments (or ecovillages) in which citizens can engage in most of their activities: working, living, entertaining and shopping; all within walking distance. These living environments generate 'positive social energy' because the inhabitants will be encouraged to participate in the social life of their community through accessing daily services. Two ways of living tend to collide. On the one hand, there is collaborative private housing (with grandparents, children, etc.) where one wants to stay in one's house for life. On the other hand, as access to housing has become expensive, 'the micro-habitat' (as seen in Japan) becomes a solution for 20 year old residents in 2037. They live in intimate spaces of small dimensions, basically intended for sleeping. They live their urban life outside of their homes. In this scenario, people work several jobs in a day or a week and they participate in the production of goods and services through their productive 'hobbies': it is the era of multi-work-leisure. Entertainment is serious, residents want to become effective human beings, and games/competitions between communities are regularly organised. In addition, residents are invited to travel to other ecovillages, whilst staying within the Borough.
- E-care zones with companion robots: In this scenario, inhabitants live away from their 'homes'. During the day, they are separated from their loved ones because they work elsewhere, but with the help of the new technologies, it is possible to provide support and care to loved ones remotely. The borough has set up 12 'e-care zones' (screens, gardens equipped with the Internet of Things, 'companion

3 This seminar took the form of eight meetings spread over five months, with meetings every three weeks. It was punctuated with preparatory exercises for the discussions, creative exercises, conferences, and disruptive activities.

4 Oldenburg (1989) has proposed the concept of third places to identify those spaces that are neither places of work nor places of employment (cafes, bars, restaurants), where one goes for entertainment or to work. These places may, however, become new friendly spaces as found in all urban fabrics.

robots' that can be activated remotely, and so on) near areas where their fragile or less autonomous loved ones are (schools, nursing homes). The habitat is individualised, digital (with remotely controlled home automation) and the inhabitants can stay in their house, if possible, for life. To include all inhabitants in these accelerated technological changes, the Borough has set up ongoing training for citizens ('robotic literacy') in public libraries. Permanent commercial entertainment dominates, and the robots are the good facilitators of 'e-care' in public spaces. They are also companions who let inhabitants travel in their minds by telling them stories from around the world.

The participants were then invited to participate in a working group led by facilitators previously trained by the research team. Three activities were proposed to them:

- In the first exercise, participants were asked to present the elements of the scenario and comment on their interest (assent) or disinterest (dissent).
- The second exercise was aimed at enriching the triggering scenarios presented in the introduction. Each participant had to imagine the logic of starting the scenario through an ideal family day in 2037 (which agenda, what life, work and entertainment experiences?).
- The last exercise, backcasting, was aimed at developing guides and possible scenarios to guide the Borough between 2017 and 2037 towards desirable futures.

Using the DKCP approach, participants were able to imagine new disruptive scenarios by moving away from local or current problems. The proposals also ventured well beyond the confines of traditional planning tools. Ideas emerged on how to better integrate the activities of certain institutions into the urban fabric. In many respects, travelling within the city was more understood as an activity unto itself, a source of fortuitous encounters, and a constraint that is experienced with difficulty by citizens. Some concrete ideas were proposed.

- A need to recognise and value social involvement in living environments: most people contribute to their community with daily actions which help their fellow citizens. Inspired by the idea of the 'Carbon Pass' and local currency proposals, this 'Social Pass' draws on good deeds performed by citizens in their neighbourhood in terms of social and community investments. In exchange for good deeds, points are accumulated which could become marketable at the Borough level since they contribute to its influence and also improve living conditions for citizens. Value would be attributed to points in order to motivate good actions.
- A need to consider the proliferation of 'circular' third places; inspired by the concept of the circular economy as a principle of local economic development, circular third places could be developed to encourage the development of innovative entrepreneurial initiatives in every living environment (e.g., repair cafes, tool libraries, textile micro-enterprises, urban agriculture, and so on). Some of these circular economy activities could be grouped into third places of various sizes to allow for economies of scale and to enable greater capacity for investment in specialised equipment (e.g. specialised Fab-Labs with 3D printing of spare parts, or highly productive and sustainable urban farms). In addition, third places registered in urban areas could be part of a network of specialised skills at the metropolitan level.
- A need to talk in terms of 'movement in the city' and experiential mobility, rather than transport or travel. Following Amar (2010, 2015), the 'speed-distance' paradigm, in which journeys between origin and destination are considered lost time, was discussed and criticised throughout the process. It was then picked up and supported by stakeholders during the codesign. The discussions often returned to the idea of promoting 'time-substance', i.e. transport time thus becomes a usable transition time, a resource to be exploited by users (take a pleasant walk, stopping along a route to work or play, meet with other people). This idea recognises the emergence of a population that seeks connection and experiential mobility, a form of everyday nomadism within cities. This drift is supported, even encouraged, by new technologies (and defines a way of thinking about 'intelligent mobility'). This trend could bring vitality to living environments (new passers-by creating surprises, an opening, meetings, bringing customers and users to the economic activities of communities and so on). It could also cause tension when there are conflicts of use, a new form of NIMBYism (e.g. when ephemeral nomadic gatherings occur in a living environment at a late hour or at the weekend).

5. Discussion: Tackling Future Urban Issues from the Perspective of a Set of Routines

For the majority of municipal organisations, the process of formulating creative ideas only focuses on one step in the process; represented by professional routine 'C'. An innovative process involves a much more complex path. Innovative design in large organisations (the 4th quadrant in Figure 1) is more of a succession of activities that predispose planners to discover a new set of routines. This new innovation process consists, in turn, of routines that are intertwined; as represented by the DKCP steps. They must be well coordinated to avoid the pitfalls that would either prevent discovery or prevent participants from moving into the other quadrants too quickly.

The first routine is that of definition: the 'D' routine. This is a necessary first step to fully understand opportunities available and imagine new spinoffs. It was at this stage that the team of researchers met with borough planners to identify various paths for exploring ideas.

The second routine is that of knowledge: the 'K' routine. Disciplinary decompartmentalisation is used to bring diversity of knowledge and disciplines (engineering, health sciences, arts, agribusiness, etc.) into the process so that the identity of planners' routines can be reimagined. This routine also involves identifying where a particular municipal organisation lacks expertise. More specifically, it involves seeing how other knowledge can help reopen pockets of knowledge that have been identified. For example, the notion of mobility does not only refer to the distance covered between two points, but by considering this distance as a moment to live a particular experience (Amar, 2010). Other new opportunities may arise if these two points are constantly in motion. Within the K routine it is also necessary to invite non-experts and to imagine cities through their future stakeholders.

The third routine is a design activity: the 'C' routine. This is a delicate and complex step. The urban planners were both surprised by the formulations of these scenarios and somewhat confused - they did not imagine being able to formulate them with such originality. Projector concepts must be formulated in terms which are sufficiently open to allow for the expansion of knowledge, and they must use relevant approaches for communication: scenario writing, representation through maps, illustrations in comics and so on. In the Montreal project, imagining the 'e-care zone' was a completely new, disruptive idea for the urban planners and citizens (and several participants also disagreed with the scenario). Projector concepts must also be described in understandable terms, otherwise citizen participation will be ineffective. Moreover, participant casting becomes a crucial issue. The time required to complete a proposed territorial project requires participants to set aside their short-term expectations. It follows, that individual paticipants must also be chosen according to their ability to 'expand' the knowledge mobilised in the urban project, not only on the basis of their representativeness.

These first three routines, D-K-C, also have a dimension that is specific to urban planning. Starting with the definition phase there is a need to deterritorialise knowledge (Scherrer et al., 2017). This does not suggest that we should ignore spatial or technical constraints, but instead suggests that we should move away from them temporarily, to better explore the 'field of breaks and possibilities' (Debarbieux, 2009; Klauser, 2012; Raffestin and Butler, 2012). If this is not done, spatial constraints can limit expansive thinking when they act as cognitive fixations (Hatchuel et al., 2011). These ideas are then recontextualised later in the process. In the case of the Montreal project, this recontextualisation step was an important part of the codesign project, but it only occurred once the participants had responded to the initial scenarios.

The fourth step is 'P', the routine of propositions. This is possibly the most important, underrated, forgotten, and complex step for urban planners. This is when it is determined what actions should be taken and their sequencing. It is the aspect that works to ensure that the most desirable scenario can be realised. This step of backcasting can, however, impede important changes that may occur along the way. In the Montreal project, participants had a mandate to imagine a major and potential event in 10 years' time that would require a reorientation of the scenario.

The last routine could be considered to be as binding as it is transversal to the process. In the case discussed here, it took the form of a seminar (held over several successive sessions, with each iteration enhancing previously generated knowledge). This stage allowed members of the project team to build their own knowledge, and they learned how to let themselves get caught up in the search for the unknown; even if it raised doubts about the predictability of their methods.

There are several ways to enrich existing routines:

- By improving the initial training of town planners, so that they learn how to use new methods or tools such as strategic foresight and innovative design (Scherrer et al., 2017). However, this type of process can take a number of years before the benefits become apparent.
- Providing continuous training for planners. This training could be provided in the form of courses or integrated into organizational routines. The seminar we organized in the municipal organization is an example of the latter.
- Establishing permanent soft infrastructures and places that host and manage ambiguous issues, explore unknowns and serve as an interdisciplinary platform. Examples of this include an urban laboratory within the municipal organisation.
- Using new and targeted methods, such as tactical urban planning (Mould, 2014; Silva, 2016), as a vehicle for experimentation and iteration. While iterations normally occur over very long cycles in urban planning, they can be accelerated through using such methods. The issue of referentials and tools for the evaluation of urban policies becomes key in this regard.

These new devices, and particularly tools such as seminars and tactical urban planning, can enable municipal organizations to develop much-needed endogenous organizational dynamics as a way to adapt to the rapid changes taking place in society. In addition, infrastructure, such as the urban innovation laboratory, makes it possible to ensure absorptive capacity (Cohen and Levinthal, 1990) whilst also further fostering urban planners' dynamic capabilities (Teece et al., 1997).

6. Conclusion: Implementing Disruptive Planning Routines

Urban planning is a discipline within the social sciences that is in constant turmoil. There is a need for municipal organisations and urban planners to renew their methods and develop their organisational functions.

Since Weber, municipal organisations have often been encouraged to assimilate the instruments and methods used in the private sector into their processes (Lascoumes and Le Galès, 2007). Such instruments exist, but learning how to exploit them in a municipal organisation may require support from a research group that can accompany this transition from public to private organisation.

The example presented here is only an experiment which was established in a particular context. It proved its usefulness by generating ideas that are at odds with the way urban planners usually approach urban planning. While the DKCP set of routines proved useful in regenerating urban planners' practices, the real ability of urban planners to implement each of the steps has yet to be demonstrated. Routines for defining innovation fields are easy to implement, but it is difficult to transform the disruptive scenarios inspired by these projector concepts into concrete projects. Urban planners still have difficulties mastering the design processes that would be necessary to bring these disruptive ideas forward.

Unlike private companies, a municipal organisation must demonstrate public accountability for the time and resources that it invests in innovation activities. A disinclination to take risks, the rigidity of organisations, and the challenges inherent in controlling the long time spans involved in urban projects are all obstacles that need to be overcome. The most effective way to reform would be for a municipal organisation, through its urban planners in particular, to promote innovative design approaches. The Montreal project is a first step in this direction.

The potential for scaling, i.e. transposing an experiment within a borough to the city as a whole, has yet to be validated. There is no guarantee that the scenarios presented in the framework of a smaller territorial unit could be applied on a metropolitan scale. Nevertheless, while they may need to be defined in broader terms, their effects in terms of regenerating the identities of objects will be just as effective.

We believe that innovative design approaches must be thought out and activated at all scales, including at the local scale. This step, which we started by activating actors at the neighbourhood scale, increases the chances that the proposed innovations can be more quickly adopted by citizens.

We must now move onto the next step and implement disruptive processes at various scales. We must accept that these projects are invaluable sources of learning for meeting current and future urban challenges. The integration of these divergent approaches could also lead to the emergence of a new professional identity for planners: the 'innovative planner', as opposed to the 'traditional rule-based planner'.

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