The Death and Life
of Local Building Traditions

Typomorphological Analysis as a Basis
for Urban Design in Montreal

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À Dodo.
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Introduction

The production of built form in North America underwent sweeping changes during the 20th century. That the urban landscapes produced in the postwar years differ vastly from their prewar counterparts is well documented (e.g. Harris, 2004; Hayden 2003; Relph, 1987; Relph 1976). Up until the 1920s or 1930s, built form was mostly produced by artisanal means. Most places across the continent had their own local, idiosyncratic building traditions. From the 1880s to the 1930s, the production of built form switched increasingly to industrial means of production and local idiosyncrasies gave way to generic standards dictated by industry, by central governments, and by an increasingly institutionalized urban planning profession (Wolfe, 1994).

There can be little argument that the transformations in the production of built form of the 20th century have contributed to the improvement of standards of living in urban environments. Many of the transformations came as part of the pan-North American 'Urban Reform Movement' that sought to improve the deplorable sanitary conditions present in most industrializing cities at the end of the 19th and beginning of the 20th century (Wolfe, 1994). Yet these changes occurred much to the detriment of the experiential diversity offered by urban landscapes (Relph, 1976). Urban landscapes within cities and between cities – even cities at opposite ends of the continent – came to be increasingly
indistinguishable. Critics began to lament the absence of distinctive places within these new landscapes (Webber, 1964; Norberg-Schulz, 1969, Relph 1976; Tuan, 1977) and expressed concerns about its sociological consequences. Various authors have linked the weakening of the sense of place in the urban landscape with weakening of neighbourly relations, the deterioration of a sense of community, and a general decline in civility among urban populations in North America (e.g. Augé, 1995; Duany et al. 2000; Kunstler, 1993).

Concern over the sustainability has come to the forefront of public debate and, along with the concerns about sense of place, has contributed to a renewed attention to the quality of urban environments. Specifically, there is mounting concern that the generic built form produced today is not always a good fit with the local environment – not just the natural environment, but equally the social and cultural environment (Bentley et al., 1985; Luka and Lister, 2000; Van der Ryn and Cowan, 1996). In contrast, the localized, idiosyncratic ways of building in the past produced built form that was generally well-suited for the local environment in the same broad sense of the word (e.g.; Oliver, 1990; Oliver, 1997; Turan, 1990; Moholy-Nagy, 1957; Schoenauer, 2000). Widespread standardization has ultimately led to the production of new built form that is less optimized to the local environment than the older built form that it superceded. Thus, important questions are being asked not only about sense of place, but also about ecological, social, and cultural appropriateness of postwar built form.

A sophisticated set of intellectual responses to the problems of modern built form emerged in the mid-20th century, mainly in Europe. Troubled by the dramatic changes that they were observing in urban landscapes, many of which mirrored those that were occurring in North America, researchers in different parts of Europe developed an acute interest in studying urban form and tracking its change over time. Highly systematic and rigorous approaches to the analysis of urban form, today widely referred to as ‘typomorphological’ approaches, emerged independently in Italy, Britain, and France. Although the so-called three schools of typomorphological analysis (TMA) all emerged in a
context of concern about contemporary changes in the urban landscape, each school was founded by researchers working in different fields. As a result, the work produced by each school would have a different focus. Whereas the British and French schools produced work primarily seeking to broaden the understanding of the relationship between built form and various social, cultural, and economic phenomena, the Italian school has been consistently focused on the design of new built form as its ultimate goal. Adherents of the Italian School believed that the changes in the production of built form that occurred in the 20th century had caused a rupture with long-standing city building traditions (Moudon, 1994). To them, the way of escaping the problems caused by the new ways of producing built form was to reconnect the production of built form to these past traditions – in other words, to restore the historical continuity of built form. As the new methods of producing built form had killed the traditional, un-self-conscious know how responsible for the production of built form in the past, it was now necessary to engage in a self-conscious, deliberate effort to reconnect with pre-modern city building traditions (Caniggia and Maffei, 2001). It was proposed that the way to do this was to systematically analyze traditional urban fabrics and to use this information as the basis for the design of new built form. Thus, to the Italians, TMA was to be a basis for urban design.

So far, TMA has primarily been used to assist the design of infill or building renovation projects in heritage areas (e.g. Maretto, 2005). TMA is used to assess the essential morphological characteristics of the urban form surrounding an infill or renovation site. The assessment informs and constrains the design of new infill buildings or of renovation interventions on existing buildings, ensuring that the resulting built form is continuous with its context. Nevertheless, TMA has also been used for other types of projects, such as for large brownfield redevelopments (e.g. Nigrelli, 1999).

The implications of using TMA as a basis for design go much deeper than merely enabling the contextualization of new built form. Any type of built form is intrinsically associated with a set of social practices. By enabling the extension of the morphological
characteristics of existing built form into new built form, typomorphology-based design also enables the extension of the social practices associated with the existing built form. The combination of morphological characteristics and social practices specific to a given built form has an important psychological dimension: it is tied to the *sense of place* instilled by the built form. By extending the morphological characteristics and the social practices specific to an existing built form, typomorphology-based design should also have the capacity to extend the sense of place associated with that built form. Thus, typomorphology-based design could be seen as a means of *placemaking*.

Typomorphology-based design could also be seen as a form of *sustainable design*. In ecological terms, contemporary built form and the social practices that it affords are likely to be more energy intensive than older built form and its associated social practices, especially if the latter predates the era of cheap, convenient energy and motorization. The advent of new energy systems, based on electricity and fossil fuels, reduced built form's dependence on ambient energy sources (sunlight, wind, convection) for basic amenities, such as light, heat, and ventilation, and a made a slew of new, energy consuming amenities possible. The advent of motorized transportation, closely related to the proliferation of the aforementioned energy systems, removed the constraints on built form imposed by limited mobility. These factors contributed to the evolution of new built form and new social practices that were considerably more energy intensive. Typomorphology-based design can be seen as a way of reenacting the ecological advantages of older built form and of the social practices related to it, thereby creating new built form that is more sustainable.

This study explores a paradigm for the design of new built form different from the one that prevails in Montreal today – one that consists of informing the design of the new built form on TMA of existing built form. The study examines the motivations and the potential benefits of adopting this paradigm in light of the main preoccupations of contemporary urban planning and urban design. Three such preoccupations are examined: (1) the conservation of built heritage; (2) the restoration of a sense of place to urban
landscapes; and (3) the creation of more sustainable built form. As these three preoccupations are highly relevant in Montreal, the study investigates how readily the proposed design paradigm can be applied in this city. This investigation takes two main directions: (1) it looks at the current state of knowledge on TMA among academics and professionals in urban planning and architecture; (2) it looks at the potential constraints on the practice of a typomorphology-based design paradigm. The conclusions drawn from this study have bearing both on future research and on the future practice of TMA as a basis for urban design in Montreal.

In terms of methodology, the assessment of the current state of knowledge on TMA in the academic realm is based on a survey of academic work employing the TMA approach carried out in urban planning and architecture departments in Quebec universities. The assessment of the state of knowledge in the professional realm is based on three case studies. The case studies examine three different projects commissioned by the City of Montreal and executed by three different private firms that claimed to employ TMA as part of their methodology. Constraints on the practice of typomorphology-based design are examined through a series of interviews. The interviewees are individuals who have studied urban form in Montreal through the lens of TMA, as part of academic or professional work. Among the interviewees are authors of each of the three works reviewed in the case studies.

The study unfolds in three phases. The first phase (Chapters 1 and 2) provides a theoretical background for the remainder of the study. Chapter 1 examines TMA itself, surveying the work of the three schools that have espoused this approach to the study of urban form. Chapter 2 examines the changes in the production of built form that occurred in the 20th century and the resulting problems, including the loss of heritage, the weakening of sense of place in the urban landscape, and the weakening of the ties between built form and its natural, social, and cultural environment. The second phase (Chapter 3) explores how typomorphology-based urban design can address the problems of contemporary
production of built form that were exposed in Chapter 2. Three key preoccupations of contemporary urban planning and urban design are addressed: heritage conservation, placemaking, and sustainable design. In the third phase (Chapters 4 and 5), the study turns to possibility for practicing typomorphology-based urban design in Montreal. Chapter 4 tackles the state of knowledge on TMA in the academic and professional realms of urban planning and architecture in Montreal. It contains a survey of research on urban form in Quebec that employed TMA to expose the state of knowledge in academia. It also contains the three case studies which are intended to shed light on the state of knowledge among practicing professionals. Chapter 5, which synthesizes information obtained from the abovementioned interviews, is an examination of the obstacles and constraints that could prevent typomorphology-based design from being practiced more widely in Montreal. Finally, Chapter 6 recaps the main conclusions drawn from the previous chapters and recommends directions for future research and for administrative initiatives that would enable wider practice of TMA as a basis for urban design in Montreal.
The Schools of Typomorphological Analysis

Systematic approaches towards the analysis of urban form, or so-called typomorphological approaches, emerged independently in continental Europe and in Great Britain during the second half of the 20th century. There appears to be a consensus among several observers that three main schools of typomorphological analysis (TMA) have emerged: the Italian or Muratorian School, the British or Conzenian School, and the French or Versailles School (Moudon, 1997; Moudon, 1994; Whitehand and Larkham, 1992; Choay and Merlin, 1986). Virtually all work on TMA from other countries is considered derivative of or closely related to the work of these three main schools (Gauthier and Gilliland, 2006). The Italian and British schools emerged earlier than the French School. Interestingly, they began to develop simultaneously but completely independently in 1950s, with almost no formal contact between adherents of the two schools before the 1980s. The French School emerged in the early 1970s, influenced by the Italian School, but with its own distinct approach to the study of urban form. Like the Italian School, it was completely isolated from the British School during its early years.

The following is an overview of each school's history and its distinct approach towards the analysis of urban form. The different preoccupations of each the three schools reflect the different academic environments in which they developed. The founders of the
Italian school were all architects; their work is oriented towards informing the design of urban form. The founders of the British School were geographers, oriented towards seeking an understanding of urban morphogenetic processes; for them, the design of new urban form was not an important preoccupation. The founders of the French school were a mixed batch of architects and social scientists from different disciplines, including sociology, history, and anthropology among others (Moudon, 1994). The French school preoccupied with understanding the relationship between urban form and various social phenomena but also, like the Italian School, with the design of new urban form. As this study is chiefly concerned with the design of new urban form, more attention is given to the more design-oriented French and Italian schools.

1.1> The Italian School

In the 1940s, architect Saverio Muratori, disturbed by the effects that modernist architecture and city planning were having on Italian cities, undertook the first systematic studies of the pre-modern urban form in Italy (Cataldi et al., 2002; Moudon, 1994). Muratori believed that modernist architecture and city planning had instilled a crisis in the production of urban form. It did so by disrupting a long-standing tradition of city building that had governed the production of urban form since antiquity. By blatantly ignoring this ancient tradition, the modernist approach was inflicting great damage on the built landscape. Muratori believed that this crisis could only be ended by reconnecting the production of urban from to the traditions of the past. This was to be accomplished by basing the design development for new urban form on a thorough analysis of pre-modernist urban form. To this end, Muratori and his collaborators began elaborating a methodology for systematically analyzing urban form. They demonstrated the methodology by applying
it to pre-20th century urban fabric in Venice (Muratori, 1959; Maretto, 1960) and later in Rome (Muratori et al., 1963).

Muratori died in 1973 and his star pupil, Gianfranco Caniggia, took on the mantle of further developing his master’s analytical approach. Muratori’s own writings are described as somewhat inaccessible (Cataldi et al, 2002). Caniggia is credited not only significantly advancing the work initiated by his mentor, but also making it considerably more accessible. The method that was distilled by Caniggia consisted of “reading” the urban landscape at four basic scales: the building, the building fabric, the city, and the region. The first scale does not consist merely of ‘edificio’ – the building – but rather of ‘edilizia’ – the building and the spaces in its immediate vicinity with which it has a functional relationship. The four scales imply a hierarchy of the urban landscape: buildings are the units that make up building fabrics, building fabrics in turn are the units that make up cities and, finally, cities are the units that make up regions. At all four scales, instances of the modules can be grouped into types on the basis of certain shared characteristics. In effect, the methodology consists of defining a typology of the units that make up the built landscape at each of the four scales of spatial resolution (See Figure 1).

Caniggia’s work culminated in the publication of “Composizione architettonica e tipologia edilizia” (Caniggia and Maffei, 1979; English translation: “Architectural Composition and Building Typology”, Caniggia and Maffei, 2001), a treatise intended to be ‘a manual’ on the method reading urban form. The authors explicitly state urban form must not be treated as an object but rather as a process. They focused therefore on the forces that shape urban form over time – the inner logics within processes of slow, incremental change that govern the sedimentation of new elements of urban form upon the old (see Figure 2). The reading of the urban landscape does not merely consist of classifying different elements of the built form by type; it consists also of reconstructing the transformation of these types over time to shed light on morphogenetic processes.

Figure 1 – Scales of Spatial Resolution
(Source: Moudon, 1986)
Caniggia believed that the study of urban form should go beyond the definition of static building typologies to the definition of dynamic ‘process typologies’. In principle, these are to be defined at all four scales of spatial resolution of the urban landscape. A type, at any one of the scales, is defined first in physical terms, then in terms of its relation to the scales of spatial resolution above and below, and finally in terms of its evolution over time (Moudon, 1994). In practice, however, most work from the Italian School has focused on the scale of edilizia, perhaps because the majority of adherents of the school were architects. Therefore, in practice, the method consisted of defining ‘base types’ of buildings in terms of volumetric characteristics, relationship to the lot and to the street, and solar orientation (Moudon, 1994). Once a type has been defined, the task is then to consult historical records in order to track how the aforementioned physical characteristics have changed over time. In effect, the method consists of constructing an evolutionary genealogy of building types, analogous to evolutionary genealogies of animal species.

Beyond illustrating the process typology method, “Composizione architettonica e tipologia edilizia” contains a discussion of its theoretical grounding. At the heart of this discussion is the idea that built form and the society that inhabits it are engaged in a dialectic relationship. The dialectic is one between “human action and environmental reaction” (Caniggia and Maffei, 2001, p. 49) in which all human action, including the production of built form, is driven either by spontaneous consciousness or critical consciousness. The former is an immediate, unreflective understanding of how to build, conditioned directly yet unselfconsciously by cultural heritage. The exercise of spontaneous consciousness results in the continuation of an established building tradition. The continuation of tradition does not mean that there is no evolution; spontaneous consciousness allows for adaptation, but only of a very slow, incremental sort. In contrast,

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1 Interestingly, Caniggia referred to himself not as a ‘morphologist’ but rather as a “tipologo”, or typologist. He did not refer to his methodology as ‘typomorphological analysis’ but rather as “tipologia processuale”, which has been translated as both process typology (Caniggia and Maffei, 2001) and procedural typology (Moudon, 1994). It seems that the former translation is more appropriate as it more directly captures Caniggia’s concern with the processes – specifically, the processes by which typologies evolve over time.
critical consciousness is an intentional and self-conscious thought process. It usually entails a departure from an established way of doing things. Whereas spontaneous consciousness exists in periods of historical and societal stability, critical consciousness takes over in periods of crisis or instability. More precisely, the latter becomes essential when the former is no longer adequate to respond to the changes in the social or physical environment – when the common heritage of knowledge can literally not cope with a new set of circumstances. By engaging critical consciousness, a society can generate new knowledge that helps it adapt to the new situation. Usually, the new knowledge is eventually assimilated into the common heritage of knowledge and is passed on, once again unselfconsciously, to future generations. In other words, critical consciousness is disengaged and spontaneous consciousness takes over again.

The production of built form is in a conundrum today because, according to Caniggia and Maffei (2001), we are forever trapped in a state of critical consciousness. We have become aware of the existence of spontaneous consciousness and we are therefore no longer able to return to it. Building as an act of spontaneous consciousness is dead and we have no choice now but to rely on critical consciousness for the production of built form. The best thing we can do, argue Caniggia and Maffei, is to use critical consciousness to draw as much knowledge as possible from the heritage of buildings created by acts of spontaneous consciousness. We should “recuperate what we would do if we had continued to operate through [spontaneous consciousness]” (Caniggia and Maffei, 2001, p. 46).

It is useful to contrast the so-called \textit{a posteriori} approach to architecture championed by Caniggia and the adherents of the Italian School with the typical approach to design of modernist architecture and urban planning. The \textit{a posteriori} approach consists in considering existing built form as a model for new built form. In effect, the approach seeks to continue existing building paradigms. In contrast, the continuation of existing paradigms was not a preoccupation of modernist architecture and urban planning; rather, the essence of modernism was to shift away from traditional paradigms and to invent new ones.
Caniggia disdainfully regarded the products of modernist architecture and urban planning as arrogant and arbitrary inventions (Moudon, 1994). By ignoring the traditional built form that resulted from the exercise of spontaneous consciousness, modernism disrupted the traditional relationship between buildings and the urban fabric. In the traditional city, buildings were ‘servants’ of the urban form in the sense that they collectively defined the urban form; in the modern city, in contrast, buildings became largely independent from the urban form (Aymonino, 1976; Moudon, 1994; Relph, 1976). For adherents of the Italian School, the restoration of the traditional relationship between building and urban form was essential. According to Caniggia, this could only be achieved by basing the design of new buildings on a thorough understanding of traditional urban form – in other words, by employing the a posteriori approach. This implies a very different role for the architect than that implied by modernist architecture. In Caniggia’s view, the architect’s role is not that of an inventor but rather that of a humble technician. An architect must above all understand the processes that shape built form and, crucially, must understand the dialectic relationship between the building being designed and the built form that will surround it (Moudon, 1994). To Caniggia, the design of built form is more an act of interpretation than an act of artistic creation.

Although process typology is now taught in architecture schools throughout Italy, it is still seldom used as more than a pre-design exercise to help designers understand the spatial logic and the tradition of a site (Moudon, 1994). The rejection of Muratori and Caniggia’s stance by such notable architects as Carlo Aymonino and Aldo Rossi is perhaps one of the factors that has prevented process typology from being widely applied as a design tool. The strict, disciplinarian approach professed by Muratori and Caniggia has thus far been applied in the design of only a few projects. The most recent of the rare examples is a design for a development on the Isola dei Cantieri, in Chioggia – a small island in the Venetian Lagoon, some 25 km south of Venice (Maretto, 2005). Another rare “applicazione felice dell'analisi tipomorfologica all'urbanistica” (successful application of TMA to
urbanism) (Nigrelli, 1999, p. 60) is in Bologna, where the approach was used for the design of an important brownfield project and a few smaller redevelopment projects. Even though the Muratorian approach has become a part of architectural education in Italy, the paucity of built projects that have used the approach suggests that it is still be far from being a mainstream practice.

1.2> The British School

At roughly the same time that Muratori began developing his system of TMA, German-born geographer M.R.G. Conzen independently began elaborating his own, distinct methodology at the University of Newcastle, in England. Much like Muratori, Conzen was troubled by the effects of modernist town planning and architecture on pre-modern urban landscapes. The aim of Conzen’s analyses and the methodology that he developed were quite distinct from those of either the Italian or the French schools. As a human geographer, Conzen was not initially concerned with developing a theory of design. Rather, he was interested strictly in describing and explaining how urban landscapes evolve. Conzen’s methodology consisted of three main analytical components: the *town plan*, a cartographic representation of a town’s physical layout; the *building fabric*, made up of the town’s buildings and the open spaces between them; and *land and building utilization, which is basically land use viewed at a small scale* (Conzen, 1968). Although he claimed that a thorough analysis should examine all three of these interrelated components, his work focused almost exclusively on analysis of town plans. In fact, he referred to his methodology as *town-plan analysis*. In spite of being a two-dimensional representation, Conzen claimed that the town plan reflected all of the essential characteristics of urban form (Moudon, 2004).

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2 'Plan’ here strictly means a two-dimensional cartographic representation of a town, not a ‘plan’ in the sense a detailed proposal for doing something or achieving something.
The Conzenian method of town-plan analysis consists of surveying the change of town plans over time. Town plans are analyzed in terms of three basic components: streets, plots, and buildings. A town plan is considered to be a composite entity that can be subdivided into several plan units. Plan units are areas distinguished from one another by a combination of characteristics, including the configuration of its street grid, the configuration of lots, and the size and shape of buildings. Plan units are thought to arise due to changes in building practices as well as changes in socioeconomic conditions over time. Thus, a boundary between plan units corresponds to an important change in building practices. Implied in the Conzenian approach is the idea that there exists a dialectic relationship between built form and the society that inhabits it, mirroring the views of Muratori, Caniggia, and their followers in the Italian School.

Moudon (1994) and Whitehand (2003) both point out that there is a certain complementarity between the Caniggian and Conzenian methodologies. The Caniggian methodology is especially oriented towards defining typologies of edilizia (buildings and the spaces in their vicinity) and urban fabrics, examining the transformation of these over time. Caniggia identifies higher scales of spatial resolution at which urban can be studied (i.e. cities or city districts and regions) but does not thoroughly develop his methodology at these scales. The Conzenian methodology, in contrast, essentially ignores the scale of individual buildings focusing instead on a scale more or less equivalent to Caniggia’s second scale of spatial resolution – that of ‘building fabrics’ – and the higher scales. Thus, the two approaches really only overlap at the scale of spatial resolution of building fabrics but are otherwise complimentary. Nevertheless, at the scale of building fabrics, Conzen’s and Caniggia’s methods for categorizing types of building fabrics differ significantly. This reflects the difference in Conzen’s and Caniggia’s basic motives for analyzing built form and, as a result, the different ways in which they conceive of the forces that shape built form. These differences will be discussed in Section 1.4 below, which examines the epistemological stances of the three schools of TMA.
1.3> The French School

Interest in TMA emerged in France somewhat later than it did in Italy and in Great Britain. The aftermath of civil unrest of 1968 left a fertile ground for the emergence of a new approach to built form. Firstly, it precipitated major institutional reform, which among other things allowed the formation of the Versailles School of Architecture, a new school that was receptive to alternative approaches to architecture. Secondly, and more fundamentally, the events of 1968 reinforced the feeling there was a profound crisis of modernism – not just affecting architecture and city planning, but rather affecting society at large. This climate led to an approach to TMA that was considerably more interdisciplinary than that of either the Italian School or the British School – architects dominated the former and geographers dominated the latter. The French School took on members of both of the aforementioned professions but also sociologists, historians, and thinkers from other fields in the humanities and the social sciences.

The early inspiration for the work of the Versailles school is attributed to the influential sociologist and philosopher Henri Lefebvre. An ardent critic of the postwar housing projects in France that were inspired by modernist planning principles, Lefebvre saw the construction of hundreds of high-rise housing estates in the banlieues (suburbs) of larger French cities a destructive social practice. A population living in high-rise buildings in a city's periphery, with few services and amenities available nearby, and with poor access to the central city was bound develop problems. The recent violent riots that occurred in the banlieues of Paris and other cities can be said to confirm the Lefebvre's warnings, made four decades earlier. According to Lefebvre, due to its form and its scale, the type of high rise housing that was being produced in France in the postwar period was incompatible with people's innate instinct to appropriate material space - to feel as if they had some
degree of control over their physical environment. The inhabitants of these postwar housing projects developed much weaker relationships with their daily environment than most people did in pre-modern urban spaces, resulting in a variety of social ills.

A core group consisting of architect Jean Castex, architect and urbanist Phillipe Panerai, and sociologist Jean-Charles Depaule were integral to the new Versailles School of Architecture. Influenced by Lefebvre, they believed that contemporary architecture and urban planning should turn to the pre-modern city for theoretical inspiration (Moudon, 1994). While sharing its focus on pre-modern built form as a source of inspiration, the research program that emerged at the French School is considerably more diverse than the one pursued by the Italian School. Muratori and his followers were primarily concerned with built form itself; the Versailles School was equally interested in the built form but also much more on its relationship with social phenomena, such as the use and meanings of urban space.

The French School explicitly borrows methodological ideas from the Italian School. The methodology for "analyse urbaine" (urban analysis) outlined in Panerai et al. (1999) echoes the basic concepts of the Italian School. Like the Italian School, it holds that there is a hierarchy of scales of spatial resolution at which the built landscape can be analyzed; typologies are to be defined for the relevant objects at the chosen scale of spatial resolution; the development of these typologies over time is then to be reconstructed. A key difference between Panerai and associates' methodology and that of Caniggia and Maffei (2001) lies in the way that they define typologies. They propose a much less rigid system of typological classification than that stipulated by the Italians. In their system, typologies can be defined according to a varying range of criteria; the criteria that are chosen depend on the aims of the analysis at hand. A crucial part of their methodology is the selection of appropriate criteria. Criteria are chosen on a trial and error basis. A necessary step in the analysis is to compare various classification systems and to determine which one is best suited for the analysis at hand.
The Versailles School proposes a different way of interpreting morphogenetic processes, in ways that go beyond the methodological differences outlined above. The Italians seek to illuminate the internal logics that guide the evolution of the built form while largely ignoring the influence of external forces, even if they do acknowledge their existence. The French School, in contrast, is interested in both the internal logics and the external forces that shape the built form. Like the Italians, the French morphologists consider the built space to be conceptually independent from social space. However, they stress the dialectical relationship between built space and social space much more than the Italians do – in effect, they take a more balanced approach. In many cases, they deal explicitly with the interaction between social forces and built form. They see TMA as a way to reveal these forces at work (Moudon, 1994).

Contrary to the Italians, the French tend not to see contemporary production of built form as ahistorical and do not claim that a return to historical paradigms is particularly urgent. The underlying assumption in Muratori and Caniggia’s work is that modernist architecture and urban planning have caused a rupture with the long-standing building traditions. To them, modernist architecture and planning are ahistorical, an aberration that needs to remedied as soon as possible. In the Versailles School’s view, modernist architecture did not arise as suddenly as the Italians would claim. Rather, it is the result of a series of gradual changes in architectural and building practices that began after the French Revolution (Moudon, 1994). Even before the beginning of the 20th century, French architecture had been shifting away from *consecrated types* (*a posteriori* designs) towards *typical plans* (*a priori* designs). Consecrated types consist of well-established building paradigms, for both vernacular and ‘high-style’ buildings whereas typical plans are novel building paradigms. While observing the fundamental differences between consecrated types and typical plans, adherents of the French School do not privilege either paradigm. Both are seen as valid paradigms of built form that are equally worthy of critical evaluation.
Ultimately, both can potentially be sources of inspiration for future design – not just traditional built form, as adherents of the Italian School believe.

### 1.4 Discussion

The three schools of TMA developed in different academic contexts, not to mention different languages, resulting in several distinct conceptual frameworks and, consequently, several different vocabularies pertaining to the study of built form (Gauthier and Gilliland, 2006; Merlin and Choay, 2005). Dominated by architects, the Italian School has been chiefly concerned with developing an approach for design. The French School was founded by architects and urbanists together with various social scientists and has been focused on developing approaches to design based on both the physical and the social dimensions of urban form. The British School has been dominated by geographers and primarily interested in understanding urban morphogenetic processes; only recently it has begun developing more of an orientation towards design. There have also been various contributions to the study of urban form from beyond the three schools, with their own distinct conceptions of the urban form and vocabularies.

Given the conceptual differences among the three schools, it is not entirely straightforward to compare their contributions to study of built form. Likewise, situating the contributions from beyond the three schools is potentially confusing. Gauthier and Gilliland (2006) propose a straightforward, two-category system for classifying the contributions to the study of urban form. The system allowed them to map the major treatises of the three schools on a Cartesian plane, thereby graphically representing their relationships with respect to each other and with respect to other independent contributions (see Figure 3).

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**Figure 3 – Map of contributions to the study of urban form** (Source: Gauthier and Gilliland, 2006)
In Gauthier and Gilliland’s classification system, first level of classification pertains to the primary purpose of the contribution. Levy (2005) proposed that contributions to study of urban from fall into one of two broad categories: cognitive or normative. The cognitive category includes all work that seeks to explain or to develop explanatory frameworks while the normative category includes works that seek to develop prescriptions for future practice. Ideally, cognitive contributions should serve as the basis for normative approaches. This has been the case, for example, with certain contributions from the Italian School: normative pieces such as Caniggia and Marconi (1986) are grounded in earlier cognitive studies such as Muratori (1959) and Caniggia and Maffei (1979). Similarly, from the British School, Conzen’s normative work (Conzen, 1975) is grounded in the ideas established in his earlier cognitive work (e.g. Conzen, 1960).

The second level of classification pertains to a contribution’s epistemological stance with respect to urban form. Works are grouped according to whether they entail an internalist or externalist stance. An internalist stance is one in which urban form is considered to be a relatively autonomous system whose behaviour is largely governed by a set of internal rules. This stance does not imply that the built form does not interact with external forces; indeed, it does interact with external forces and these forces can drive change in the built form. However, the way in which the built form changes is dictated by a presumed set of internal rules. Internalist works will tend to focus on revealing the nature of these internal rules. An externalist stance, in contrast, is one that assumes that there are no particular internal rules governing the behaviour of urban form in a given context. Rather, this stance considers urban form to be largely determined by external forces.

The system of classification proposed by Gauthier and Gilliland (2006) suggests that there is common ground between the three schools, at least where their fundamental contributions are concerned. In their early developmental stages, all three schools produced work of cognitive nature – work that established their conceptual frameworks for the study of urban form (e.g. Muratori, 1960; Conzen, 1960; Panerai, 1980). The frameworks
developed in these early works all implied an internalist stance. The Italians, focusing almost exclusively on the internal logics that dictate the evolution of urban form, exhibit a strongly internalist stance. The early works of the French and British schools, which treat the urban form as an autonomous system, albeit one that is in dialectic relationship with socioeconomic phenomena, exhibit a more tacit but nevertheless clearly internalist stance. In sum, the fundamental contributions of each school all share a cognitive purpose and an internalist epistemic stance.

As the present study, being focused on the use of TMA for the design of new urban form, is more interested in normative contributions based on a TMA approach. Of the three schools of TMA, the Italian School has produced the greatest number of works with a clearly normative purpose. Since the 1980s, a number of urban design oriented works based on Caniggia's process typology have been published (Spigai, 1980; Cervallati et al., 1981; Davoli and Zaffagnini, 1993; Maretto, 2005). The British School has produced some normative works, although they have generally been more concerned with the preservation of old townscapes more than with the design and production of new built form (e.g. Conzen, 1975; Whitehand, 1981). Only very recently has a new generation of researchers working in the Conzenian tradition has produced normative works with a design orientation (e.g. Chapman, 2006; Hall, 2000; Hall, 1997). The French School, despite having architects and urban planners among its ranks, has thus far produced very few normative works. Among the few examples of normative work from France is a report prepared for the Ministère de l'Équipement du Logement et des Transports (Ministry of Housing Infrastructure and Transportation) (Levy and Spigai, 1992). In fact, this report is partly cognitive and partly normative. The cognitive part of the report describes an analytical framework for the study of urban form, one based on TMA, and elaborates on its theoretical groundings while the normative sections consist of recommendations for implementation of the previously
described framework, particularly as a means of informing the design of new built form.\(^3\) Also, it should be noted that, although published in France, the report was co-authored by an Italian process typologist, Vittorio Spigai. Spigai was in fact responsible for the much of the design-oriented (i.e. normative) material in the report.

Of the three schools of TMA, the Italian School has consistently been more design-oriented than the other schools. Most of the cognitive works produced by the Italian School are concerned with devising a new approach to architecture and urban design, based on rigorous analysis of existing, pre-modern urban fabrics; the normative works seek to demonstrate how this approach should be applied to real design problems. The British School has, until recently, produced virtually no works directly exploring the design applications of its brand of TMA, with Conzen’s (1975) being a rare exception. The school’s cognitive works sought to shed light on morphogenetic processes, but did not really explored how an understanding of these could inform design. The few normative works that emerged from the school were concerned more with conservation of old urban landscapes than with creation of new ones (case in point: Conzen, 1975). Despite the recent interest in urban design among the inheritors of the Conzenian tradition, there are no contributions that clearly demonstrate how the Conzenian methodology for TMA can be operationalized for design purposes. The French School, for its part, has at least produced numerous works arguing for the use of TMA to inform design. Nevertheless, similarly to the British School, it has produced few works demonstrating how its analytical approach might actually be operationalized for design purposes.

Academics and environmental design professionals seeking to find out how TMA can be applied to urban design problems are likely to find more relevant material in the work of the Italian School than in that of the other schools. The consistent focus on design has allowed the Italian School to go much further than the other schools in devising an

\(^3\) Due to this dual cognitive-normative nature, Gauthier and Gilliland place this work on the line between the cognitive and normative sides of their graph (see Figure 1).
operational methodology for TMA, geared towards design applications. Furthermore, the Italian works focus mostly on smaller scales of spatial resolution (buildings and building fabrics) and not on the more macro scale (cities and regions). Thus, they are focused on the scale of spatial resolution at which urban design typically operates. It is perhaps no coincidence that the work of the Italian School has gained much more traction in architecture departments in Quebec than the work of either the French or British schools (see Section 3.1 for more details). Still, the Italian School’s ideas should not be borrowed uncritically. The Italians have remained largely agnostic to issues about the use and the meaning of urban space. Also, given their dismissal of modernist architecture, they have not entertained the idea of creating useful hybrids of pre-modern and modern built form – an idea explored by the French School.

The methodologies developed by the three schools should be applicable in the North American context. The changes in production of built form that occurred in Europe observed by the three schools of TMA largely mirror those that occurred in North America in the 20th century. The following chapter takes a closer changes in the production of built form that occurred in North America, exploring their underlying causes and discussing their effects. The chapter that follows looks at how the TMA methods discussed above can help us deal with some of the negative effects of the contemporary mode of production of built form in North America.
Production of Built Form and the Urban Landscape

This chapter explores how the production of built form underwent sweeping changes during the 20th century, illuminating the motivations for switching to design based on typomorphological analysis (TMA) of existing built form. At the beginning of the 20th century, the production of built form was still largely a local affair. Most cities across North America were producing built form according to unique, local building traditions. Urban landscapes were fairly heterogeneous; they varied not only from city to city, but also within individual cities. In Canada much like in the US, as the century progressed, local building traditions began to ebb and a more generic, non-regional system of producing built form emerged. The urban landscapes yielded by this new system of production lacked the heterogeneity of the older urban landscapes. Today, we find almost indistinguishable urban landscapes on opposite sides of the continent, in places differing vastly in terms of history, culture, natural environment, etc. Various questions have been raised about these new urban landscapes’ ability to instill a sense of place. There are also important questions about the appropriateness of the more generic built form produced today with respect to its context, be it ecological, cultural, or social.
There are several factors that have contributed to downfall of local building traditions and, therefore, to the homogenization of urban landscapes. Three such homogenizing factors are explored in this chapter. These include: the shift from a largely artisanal mode of production of built form to one that is largely industrial; the growth of central governments' involvement in the production of built form; and the influence of modernist thought on urban planning and architecture.

2.1> Industrialization

Less than a century ago, in all of North America, built form was produced incrementally on an artisanal basis. While industrialization swept the continent in the late 19th and early 20th century, the construction sector remained largely immune to it, leaving the production of built form in the hands of skilled tradespeople. A massive shift towards industrial production of built form would not take hold until the postwar period. In Canada, this shift is generally held to have begun in the 1950s (Harris, 2004). The shift towards industrial production is generally attributed to rapid population growth following the end of the Second World War, which resulted in staggering demand for housing (Bourne and Bunting, 1993). Arguably, traditional means of housing production were insufficient to meet such a large and sudden demand. The industrialization of the construction sector was also a convenient way of redirecting the huge industrial capacity that been built up during the war and which was no longer needed for the production of military equipment (Piore and Sabel, 1984).

The shift to industrial production spelled doom for the various skilled trades that were previously responsible for producing built form. A first wave of industrialization brought standardized, mass-produced building materials. These included, for instance, mass-produced bricks and cement blocks, siding, roofing, flooring and so on, all of which
were previously supplied on a small scale by local tradespeople. A second wave of industrialization brought large, preassembled building components, such as entire walls with pre-installed windows and doors. Pre-assembly allowed for the rapid construction with minimized labour inputs. Combined together, mass production of building materials and factory pre-assembly rendered much of the manual labour that happened on and off of the construction site obsolete. Erecting a house, an undertaking that involved numerous skilled workers and craftspeople working in a variety of different trades at the beginning of the century, became one that could be carried out by a mere handful of relatively unskilled workers.

Unlike industrial production, artisanal production of built form, especially vernacular built form, was intrinsically highly localized in terms of the materials that were used in the know-how was employed. Local builders knew how to make effective use out of whatever the building materials the local environment had to offer (Oliver, 1997; Oliver, 1990; Rappaport, 1969; Moholy-Nagy, 1957). They would build structures according to an established local paradigm – a paradigm adapted to the local climate and other environmental constraints and responsive to the social, cultural, and economic needs of the local population. In other words, they would be furthering a specifically local building tradition. Industrialization completely delocalized the production of built form. With industrialization, much of the production process could occur in a remote location, making local know-how irrelevant; regional know-how and building traditions were incompatible with the modularization of building components and the standardization that industrial production demanded. In places that previously had distinct ways of building before industrialization ended up having a very similar way of building. Built form thus became less locally specific and urban landscapes that were previously distinct began to increasingly resemble one another across North America.

Beyond being steeped in local tradition, artisanal production has an intrinsic tendency for uniqueness. Two objects of the same type produced by two different
craftspeople will tend to be distinct, as each one will be imbued with the idiosyncrasies of its maker. For that matter, even two objects of the same type made by the same craftspeople will tend to be distinct. Artisanally produced buildings were complex assemblages of the fruits of the labour of not one but many craftspeople; as each component of a building tended to be unique, a building as a whole all the more tended to be unique. Thus, no two buildings of the same type would be identical. Industrial production, in stark contrast, produces objects that are precisely identical. Buildings of the same type assembled of precisely identical modular components tend to be precisely identical. Even when buildings were not of the same type, they could nonetheless contain numerous components that were precisely identical.

One all-important result of artisanal production was that the urban landscape of any given town tended to have a unique local identity, giving the town a sense of place. Furthermore, each individual building that made up the urban landscape inherently also tended to have a unique identity. With industrial production, local building traditions were replaced by a ubiquitous way of producing built form. Newly produced urban landscapes became far less distinguishable, as did the individual buildings within them.

2.2> Growing Role of the Federal Government

In Canada, much like in the United States, the spread of ubiquitous landscapes throughout the continent has much to do with the federal governments’ larger role in the production of urban housing, which was previously a mostly local affair. The Canadian government’s involvement in urban housing began during the Depression, with the passing of the Dominion Housing Act (DHA) of 1935 and the subsequent National Housing Act (NHA) of 1938. The NHA (a slightly improved DHA) was intended to make mortgages more widely available by providing government funded loan insurance, thereby stimulating
private housing construction. In order to qualify for a loan guarantee from the federal government, a house had to meet certain standards laid out in the NHA. This put pressure on builders everywhere to provide houses compliant with the NHA standards, which pertained, among other things, to a house’s volumetric characteristics and its relationship to the lot and to the street. In effect, the NHA gave preference to certain building types; as the same types were being built in different places across Canada, the NHA standards had a homogenizing effect.

By the end of the Second World War, there was a general consensus that the construction sector in Canada was backward and inefficient (Harris, 2004, p. 121). Housing experts urged the governments to promote the development of larger builders that would use more industrial production methods, since these would generate economies of scale in the construction sector. But before building companies could grow much larger, a stable system of housing finance had to be established. The government thus setup the Central (now Canada) Mortgage and Housing Corporation (CMHC). In 1946, the CMHC initiated the Integrated Housing Plan (IHP), under which developers would agree to build houses according to NHA standards and sell them at a fixed price (negotiated with the CMHC), while the CMHC would agree to buy any houses that were not promptly sold, reducing the developer’s risk. The IHP was highly successful – across Canada, large, corporate developers began building vast residential projects, and all according to the same standards set by the federal government.

Not only did the entire housing construction sector fall in line with the national standards, but so did municipal bylaws. Municipalities across Canada were keen on attracting large, CMHC-financed housing development projects. Zoning by-laws and local building codes that were incompatible with the NHA standards were potential impediments for CMHC-financing of development projects. Idiosyncratic building codes and zoning by-laws, which had emerged to reflect and in many cases to codify characteristically local building types, were replaced with regulations that were compliant with the NHA
standards. As locally specific regulations gave way to ubiquitous regulations, the production of locally specific building types gave way to generic building types. The federal government's involvement in housing production thus contributed greatly to the homogenization of urban landscapes across the country.

2.3> Modernism

Modernism, as an intellectual movement, took root long before the dawn of 20th century. It consisted of a questioning and, in many cases, a rejection of established traditions. Modernism first manifested itself in the arts, particularly in the visual arts, but eventually began gaining traction in many academic disciplines. By the mid-20th century, modernist ideologies had taken a firm hold of the disciplines that oversee the production of built form: architecture and urban planning. The two disciplines took it upon themselves to reinvent the long-standing traditions of city building of Europe and North America, which were seen as incompatible with the demands of the modern economy and of contemporary urban life.

Modernism introduced a new, functionalist way of looking at built form. Functionalism essentially means treating the built form as it were a machine designed to fulfill certain narrowly-defined functions. Under this view, ‘good’ built form is that which performs its designated functions well. Like the performance of a machine, the performance of the built form is measured in terms of quantitative performance dimensions. The urban planning profession, which had risen after the Second World War, enthusiastically embraced the functionalist approach. Planning departments across North America began thinking of built form in terms of the same small set of functions that it was supposed to perform. Qualitative dimensions were, for the most part, ignored.
The functional definitions that planners and architects developed were simplistic, particularly when compared to the fine-grained mix of activities that actually occurred in urban landscapes, especially traditional ones (Jacobs, 1961). This is well illustrated by contrasting the typical activities occurring on a late 19th century street with the modern functionalist view of what activities belong on the street. A typical 19th century city street in most cities in North America was generally a richly multi-functional public space. A traditional street is, on one hand, a circulation corridor for vehicles (in some cases, vehicles of different types) and pedestrians. On the other hand, it is also a space for a slew of activities not related to mobility – including a variety of social and commercial activities. In the modernist conception, a ‘street’ effectively has but one main function: circulation, prioritizing vehicular movement. Influential modernist thinkers, such as Le Corbusier, had a vision in which all forms of circulation were neatly separated – car, rail, and foot traffic were all to run in spatially distinct streams. Commercial activities were to occur not on the street but rather away from it, inside huge building structures. Similarly, social activities were also to occur off the street, in places specially designated for social functions.

This functionalist vision is manifested in the stereotypical postwar suburb. Streets, not unlike the specialized highways in Le Corbusier’s vision, are essentially exclusively for cars. If there are sidewalks, they are almost invariably an afterthought – they are built because the law requires it; compared with the volume of car traffic, pedestrian traffic is negligible. Even if it used, the sidewalk is good for only one function: to let pedestrians walk from one place to another. The other activities that are directly connected with the sidewalk on the traditional street, namely the various social and commercial activities, are all moved away from the street. Instead, these activities are performed off-street, in specialized buildings or public spaces. Functionally specified zoning by-laws, which pervade postwar suburban areas, eliminate the possibility that different types of activities overlap spatially on the land straddling the street. Whereas the traditional street would often have commercial and residential functions occurring within the same building, the
stereotypical suburban street will be lined with buildings all performing only one particular function. Thus, a street would exclusively be lined with residential-only buildings, or commercial-only buildings. As a result, the stereotypical suburban street, a signature product of functionalist urban planning, is a functionally monotonous space in comparison to the traditional street.

While so much attention was being lavished on function, much less attention was given to architectural composition – the relationship of one building to another, and of a set of buildings with the street. At some point, architects main focus became the functions that occurred within the building and the experience of interior spaces; comparatively little attention was paid to anything that lay outside the building, namely its urban context. In essence, architects began conceiving of buildings as structures existing in isolation from all other structures. Planners were equally unconcerned with the integration of buildings to their surroundings. Partly, this is because they were trapped in “the two-dimensional cognitive space of maps and plans” (Relph, 1976, p. 23). Their main preoccupation were the structuring of social and economic functions in two-dimensional map space (Wingo, 1963, p. 7); how their designs would actually be structured in three-dimensional space was beyond their mandate. Hence, the composition of buildings and the spaces between them was essentially forsaken by the two professions overseeing the production of built form. The urban landscape is littered with something that has been dubbed *Space Left Over In Planning* (SLOIP) (Brett, 1970, p. 117) or ‘lost space’ (Trancik, 1986) – undefined, no-man’s lands between roadways and buildings.

Decreasing compositional coherence combined with increasing functional monotony has diminished urban landscapes’ ability to foster a sense of place. Whether a particular space can engender a sense of place depends crucially on the quality and the uniqueness of the experiences that it offers. The increasing functional monotony of urban

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4 The emerging field of urban design might be seen as an attempt to fill the void between the conceptual spaces of architecture and planning.
spaces decreases the diversity of experiences that they can offer while the decreasing compositional coherence limits the quality of these experiences. (See discussion on sense of place in Section 3.2 for a more detailed discussion of the sense of place.)

### 2.4> Consequences

Local vernacular building traditions can be seen as complex systems of knowledge about a particular environment and particular society and about building in a way that was responsive to both. It is however an informal and decentralized system of knowledge. It exists not in a book or in a library but is rather distributed through the minds of the members of a given society – in effect, it is an example of distributed cognition (Hutchins, 2000). In particular, the building tradition resides in the minds of the members of society who are engaged in the production and the use of built form. In other words, it resides not only in the minds of the builders and all craftspeople that contribute to the construction of built form, but also in the minds of all members of the society who occupy and use the built form. The continuity of this system of knowledge depends crucially on the ongoing transmission of the building crafts and the associated social practices from one generation to the next. The knowledge implied in a building tradition and in its associated social practices is largely non-semantic – it cannot be transmitted merely by verbal or written instruction. Rather, it is learned through a process of seeing and doing – by ‘osmosis’. If the chain of transmission from generation to generation is interrupted, the accumulated body of distributed system of knowledge implied in a building tradition and its associated set of social practices is lost. The combination of industrialization and nationwide standardization ultimately disrupted the long standing chains of transmission of knowledge implied in the many regional building traditions that formerly existed throughout North
America. The system of knowledge associated with the production and use of a locally-specific built form was lost.

The demise of a local building tradition is no small loss. Most vernacular building traditions were based on a system knowledge that had accumulated over centuries. By a slow, incremental learning process, vernacular builders discover how to make use of the materials available in their direct environment to build shelters that the specific social, cultural, and economic needs of their society. The development of a building tradition is in effect an evolutionary process. From time to time, an individual craftsman might deliberately or accidentally introduce an innovation – analogous to a mutation in a life form. If the innovation did not provide any advantages, or worse still, caused disadvantages in the given physical and socio-cultural environment, it probably not be copied by other builder or passed to the next generation. On the other hand, an innovation that provided advantages would be copied by other builders; they, in turn, would pass the knowledge down to the next generation. A local building tradition could be seen as the sum product of thousands upon thousands of little innovations – just as any living creature is the some product of thousands of little genetic mutations. Vernacular buildings, like animals, would through this slow process mutation and environmental selection becoming optimized to their environment. By allowing building crafts to die, modern society lost what is undoubtedly a treasure trove of knowledge. Indeed, the notion that vernacular built form contains many forgotten ‘secrets’ worth rediscovering is gaining considerable traction.

2.5> Summary

The rise of industrial production and fall of building crafts, the federal government’s involvement in housing finance, and the rise of modernist planning and architectural principles have had a profound effect on urban landscapes throughout North America.
Urban landscapes and the built form within them have become less place-specific than before. This has arguably diminished their capacity for engendering a sense of place. Moreover, contemporary built form is less tailored to its given natural, cultural, and social environment than the earlier, more traditional built form that it superceded.

Built form and the urban landscapes in Montreal have followed the continental trend. Here, like elsewhere, the built form produced through the postwar period until today is devoid of most of the place-specific characteristics that are for the most part present in older built form. The older urban landscapes in the inner city exhibit a definite ‘Montrealness’ – they invoke a definite sense of place (Charney, 1980). In contrast, a clear sense of place is largely absent in the vast, postwar urban landscapes in Montreal’s periphery. They look much like urban landscapes created contemporaneously elsewhere in most of North America.

The changes in the production of built form observed here in Montreal and in most of North America mirror those the founders of the three schools of TMA had observed in Europe. Like in Europe, local, unselfconscious building crafts have faded. We appear to have fallen into the same cognitive trap as the one described by Caniggia and Maffei (2001) – we are stuck in a self-conscious mode of producing built form. Perhaps we can deal with this problem in the ways that have been suggested in Europe, particularly by the Italian School – to use ‘critical consciousness’ to recover as much as possible from old built form that was produced through ‘spontaneous consciousness’. Following the example of the Italian School, perhaps we too can employ TMA to ‘reconnect’ with our own vestiges of spontaneous consciousness. This in turn might help us restore a sense of place to our built form and increase its ecological, cultural, and social specificity. The next chapter explores these ideas in greater detail.
3> Typomorphology-based Urban Design

Is it possible for cities to return to their local building traditions without returning to an artisanal mode of production of built form? It seems rather unlikely that local construction artisanry could be resurrected on a large scale. Even if building crafts could somehow be revived, widespread artisanal production of built form would be untenable in the present economic conditions in industrialized countries – the labour costs would be prohibitive. Rather than recreating building crafts, a return to tradition implies above all the development of a new understanding of the morphological properties that characterize local, traditional built form. With such an understanding, it might be possible to reconcile traditional form with the use of modern production methods. It is suggested here that a potential strategy for ‘reconnecting’ with local building traditions would be to base urban design on TMA of existing urban form.

This chapter explores the potential utility of basing urban design on TMA under three main themes. The first theme is conservation of the integrity of existing urban fabrics – particularly those that have great heritage value. The design of new built form to be inserted into an existing urban fabric could be based on TMA to ensure continuity between
the new and the old. The second explored theme is placemaking. New urban form whose design is based on TMA of an existing urban fabric that invokes a clear sense of place might also invoke the same sense of place. The third theme is sustainability. Vernacular built form is likely to be embedded with a certain ecological wisdom; by reproducing the ecological wisdom of older built form, urban design based on TMA of older forms could constitute a form of ecological design.

### 3.1 Heritage Conservation

Through the 1950s and 1960s, most North American cities underwent intense development. Most of this was greenfield development – cities grew outward, covering vast land areas with a new ubiquitous type of urban form, as discussed earlier. But there was also a considerable amount of brownfield development – existing built form, in many cases under the guise of slum clearance, was demolished and replaced with new built form. It was during this period that Montreal, Toronto, and other Canadian cities razed many older commercial and residential buildings in their centres to make way for the skyscrapers and freeways that today define their urban form. Whether it was on the city's periphery or in its centre, the new urban form generally had little in common with the city's traditional urban form.

In demolishing old urban form and replacing it with new, unrelated urban form, many cities deprived themselves of a significant portion of their built heritage. Yet, in the early postwar period, there was generally little opposition to the demolition of older built form. Following the spirit of the times, planners and politicians alike dismissed older urban fabrics as obsolete, dysfunctional, or simply decrepit and in need of replacement. The imperatives of the postwar economy demanded that older fabrics be torn down or severely altered to make room for the furniture of the modern city – high-rise buildings, wide streets
and freeways. Widespread opposition to the destruction of older urban form did not arise until the 1970s. By that time, however, the older built form of many cities had already been severely scarred. Today, whatever was not destroyed in the name of modernization in the postwar period tends to be venerated. Old city quarters are, in many cases, very strictly protected against even minor physical alterations. In some cases, the protection of built heritage might even be excessive – buildings are conserved simply on the merit of being old. Goldberger (1980), for one, has suggested that many buildings are not being conserved so much for the sake of heritage protection as they are for fear of what will replace them.

The alteration of existing buildings or insertion of new buildings has become severely restricted or almost impossible in certain heritage urban districts. As a result, these cease to be living urban fabrics; they stop evolving and become socially and economically disjointed from the surrounding urban context. Many authors have stressed the importance of incremental change and mixing of old and new buildings (Alexander, 1977; Fitch, 1990; Habraken, 1998; Jacobs, 1961). The alteration of existing buildings and the insertion of new buildings are normal, if not essential processes that all urban fabrics have always undergone and should continue to undergo. Alteration and insertion, if done sensitively, need not corrupt the continuity of the urban fabric. TMA has already proven itself as a methodology that can assist the design of sensitive interventions for heritage districts (see Maretto, 2005).

In the currently dominant approach, built heritage is considered to be something physical – built heritage means old buildings. What if we were to consider built heritage not merely as buildings but also as a local way of building? Rather than just conserving existing buildings, we could also conserve the local way of building by continuously producing built form with a characteristic, local morphology. The local way of building would be present both in old urban form and new urban form – it would act as a unifying thread, tying past, present, and future together. In principal, this kind of approach to heritage should assuage fears about replacing old buildings. Any new building produced according to this approach
should intrinsically ‘fit in’ with the surroundings – it should not disrupt the specific identity of the urban fabric.

### 3.2 Placemaking

The sentiment that much of the urban form produced by industrialized societies lacks the local specificity of the urban form produced by pre-industrial societies is widespread. Already at the end of the 1960s, architectural theorist Christian Norberg-Schulz (1969) was referring to the new urban landscape as a ‘flatscape’ – a landscape in which it is difficult to distinguish one part of from another. The existence of placeless landscapes is attributed, above all, to the demise of local handicraft building cultures (Caniggia and Maffei, 2001; Hough, 1990; Relph, 1976). Such cultures tended to unselfconsciously produce distinctive urban landscapes. Industrialized societies, in contrast, seem to have a strong tendency to produce undifferentiated urban landscapes. A conscious effort must be made to produce an urban landscape that has distinct place properties. This type of conscious effort is the essence of what is called ‘placemaking’.

In what is acknowledged as the seminal work on place, Relph (1976) proposed that a sense of place depends on three basic elements: physical form, activities, and meanings. A well-defined place is one that is distinguished from other points in space by a unique combination of these three properties. As discussed in Chapter 2, modern urban landscapes tend to be less differentiated in terms of physical form and activities then traditional urban landscapes (see discussion of the modern street versus the traditional street in Section 2.4). Furthermore, North American society has perhaps become much more culturally homogenous, at least in the sense that its perceptions of the world are shaped by the same mass media. As a result, two geographically distinct spaces that have the same physical form and that afford the same activities might also have a similar meaning to the people
who occupy each one. As modern urban landscapes tend to be undifferentiated in terms of Relph’s (1976) basic elements of place – physical form, activities, and meanings – they can be said to be ‘placeless’.

To create urban landscapes that are place-specific, an effort must be made to produce new built form that is unique in terms of physical form, the activities it affords, and the meaning it has for people. Rather than arbitrarily assigning a particular physical form, activities, and meanings to new built form, these could be instead taken from existing built form. In this case, a rigorous TMA could be used to help design new built form that recaptures the *genius loci* of the existing built form. TMA will help to reproduce the essential characteristics of the physical form of the old fabric, but it will also indirectly help to reproduce the functional affordances and the meanings of the old fabric – in other words, the social practices associated with the old fabric.

Borrowing from older built form is by no means a new idea. In North America and the United Kingdom, this concept manifests itself in the present fad for neo-historicism, particularly in residential architecture. However, in the absence of a rigorous methodology enabling meaningful borrowing, there is a risk of producing built form that exhibits an inauthentic historicism – in other words, which is not truly linked to the building traditions of the past. Peter Larkham (1996), a British conservationist-planner, laments that the designers of many of the neo-historical developments in the UK generally make no substantive attempts to understand the characteristics of true, local vernaculars. These false vernaculars, he argues, are as undesirable as the modernist styles they are supposed to replace because they lack *genius loci*, or ‘spirit of a place’. Larkham’s criticisms seem to be applicable to neo-historical developments in Canada as well. For example, echoing Larkham’s complaints, Relph (2004) comments on the tendency to put a thin “veneer of history” on otherwise modern buildings recently built in Toronto (see Box 1 for more details).
The problem with many of the attempts to create historicized built form is that there is an excessive focus on stylistic detail and insufficient focus on coarser morphological features (Hobson, 2004, p. 12; McGlynn and Samuels, 2000). Designers and regulators have a tendency to focus largely on external, ornamental aspects, specifying such things as exterior cladding materials, window and door dimensions, and ornamental motifs. As Brand (1994, p. 133) eloquently warns us, “Paint color and trim vary with fashions in style. The heart of vernacular design is about form, not style. Style is time’s fool. *Form is time’s student.*” (Emphasis added.) Even in pre-modern times, it was not uncommon to replace a building’s façade in order to update it to a currently fashionable style; the façade would change, but the underlying typomorphology would remain the same. The way out of this trend of inauthentic historicism is to reverse the focus: pay more attention to the typomorphology, the most temporally and spatially persistent structural aspects of vernacular buildings, and less attention to external stylistic elements, which are historically unstable (McGlynn and Samuels, 2000). Rigorous TMA of historic vernacular built form is suggested as a basis for the design of genuine neo-historic built form, engendering a true sense of place.
In North America, an influential urban planning movement with strong neo-historical tendency is New Urbanism. The intention of the New Urbanists is, in a nutshell, to produce built form that recaptures the essence of pedestrian-oriented environments that exists in neighbourhoods built before the car era. The New Urbanist developments that have been built thus far have morphological features common to many older pre-car era urban fabrics throughout North America: narrower streets, smaller setbacks, rectilinear street grid with shorter blocks, laneways and so on. It is unclear, however, whether the morphology of any New Urbanist development was explicitly based on that of any particular urban fabric in the same city region. Rather, it seems that the morphology of New Urbanist developments is based on an abstraction – an idealized, generic morphology of an older, North American neighbourhood.

A Canadian example is the recent Cornell development in Toronto. Designed in collaboration with two of the preeminent champions of New Urbanism, Andres Duany and Elizabeth Plater-Zyberg, Cornell has many of the hallmark morphological features of a New Urbanist development. In addition to coarse features such as narrow streets and short blocks and garages on laneways behind the houses, it also has finer-grained features such as porches at the front of houses and architectural detailing vaguely inspired by Toronto Victorian architecture (Relph, 2004). However, it is questionable whether Cornell truly reproduces the morphological characteristics of any existing, older urban fabric in Toronto—either at the level of street geometry and at the level of architectural detailing. Cornell appears thus more a caricature than an actual reproduction of the past.

Here in Montreal, there are a few developments that are not New Urbanist per se but nonetheless that have many of the features of one, including pseudo-historic architectural styling. An example is the Bois-Franc project in Ville Saint-Laurent, a recent residential development built over a decommissioned airstrip. The architectural styling of the buildings seems to invoke the early 20th century, though it does not appear to be related to
anything built in that era in Montreal (see Figure 4). For example, no early 20th century urban fabric in Montreal has single-family row houses – or houses of any type, for that matter – which face into small square parks, as is the case in Bois Franc. So, while Bois Franc has historicized visual qualities, it is not any sense a continuation of any vernacular building tradition specific to Montreal.

As Bois-Franc is not adjacent to any traditional Montreal urban fabric, the imperative for continuity with Montreal tradition is perhaps weak. That is not case however for another recent development, Angus Park, also noted for having some characteristics consistent with New Urbanism. The Angus Park site is adjacent to residential urban form dating from the prewar era; the site itself was formerly a train yard and locomotive shop. In contrast to Bois-Franc, the buildings in Angus Park have a decidedly modern styling. At the same time, also unlike Bois-Franc, the development at least partially recaptures the morphological characteristics of a traditional, Montreal urban fabric – in this case, the neighbourhood to the north of Angus Park. Most notably, the street grid of the older neighbourhood to the north was extended into the site. Near the interface between Angus and the older neighbourhood, the buildings straddling the extended streets have widths, heights, and setbacks resembling the stacked-duplex typology that is quite prevalent in the latter. However, the morphological resemblances end there. While stacked duplexes dominated the neighbourhood north of Angus Park, they are not the only typology. The streets are in fact lined with a mix of typologies; the duplexes are interspersed with taller triplexes and sixplexes and the shorter one-story cottages. The visual rhythm produced by these varying building heights is absent in Angus Park. Laneways running down the long axis of block, a hallmark of virtually every older city block in Montreal are also absent. To be fair, perfect continuity with the adjacent urban fabric was probably not Angus Park’s designer’s intention. It is commendable that at least some effort was made to create a smooth transition between the old urban fabric and the new urban fabric in Angus Park.
3.3> Sustainable Design

It is worth exploring the potential of older, vernacular built form as a source of inspiration for sustainable design. This is premised on two assumptions: (1) that older, pre-industrial vernacular urban fabrics were structurally much more responsive to their environment than contemporary urban fabrics; and (2) that the social practices associated with older urban fabric had a smaller ecological footprint. The technological advances made since the beginning of the industrial era have removed many environmental constraints on built form and on social practices. As a result, the tight relationship that formerly existed between built form, social practices, and the environment has weakened considerably. Contemporary built form is much less responsive to the local natural environment and affords social practices that have much greater ecological impacts. The two biggest factors that have diminished environmental responsiveness and have bred ecologically taxing social practices are the proliferation of cheap, convenient energy and the advent of mechanized transportation.

Vernacular building methods were optimized by an evolutionary process (see Section 2.5) to make efficient use of locally available resources while responding to environmental constraints and social, economic, and cultural imperatives. At least part of this optimization is manifested in the morphology of vernacular built form. Some of the most obvious morphological adaptations, for example, pertain to climate. In rainy climates, such as the northern coast of France, buildings have sloping roofs and wide eaves to deflect water away from the building. In hot, dry climates, such as that of the Persian Gulf, cities have very narrow streets lined with fairly tall buildings, providing a cool, shady environment at street level (Schoenauer, 2000). There is panoply of such examples in works on vernacular building traditions (Schoenauer, 2000; Oliver, 1997; Oliver, 1990; Turan, 1990; Moholy-Nagy, 1957). Technological advancements of the 20th century freed
building design from many of environmental constraints and made many of the adaptation displayed by vernacular buildings irrelevant.

The advent of cheap and convenient energy technologies, based on the use of electricity, oil, and natural gas, has had a tremendous impact on urban morphologies. Most basically, pre-industrial societies relied on their immediate environment for a supply of fuel for heating their dwellings and cooking. The new energy technologies removed the dependence on fuel sources in the immediate environment. Energy sources could now be located far away and energy could be transmitted directly to a dwelling via a wire in the case of electricity or via a pipe in the case of fossil fuels – the hassle of physically bringing fuel to the dwelling was eliminated. Wide access to inexpensive and hassle-free energy removed many of the imperatives for energy efficiency that existed earlier. Furthermore, aside from making heating and cooking easier and cleaner, the new energy technologies, especially electricity, made several new energy consuming amenities possible. These include most notably mechanical ventilation and electric lighting. It was no longer necessary to rely on wind and convection for ventilation and on the sun for heat and lighting – morphologies were further unconstrained. But beyond the basic amenities, the new energy technologies also made a whole gamut of other energy-consuming amenities possible. The end result was that built form and social practices became less responsive to the local environment. At the same time, their ecological impact increased considerably given that the new way of building and the new social practices were more energy intensive than those that they superseded.

The advent of mechanized transport, related to proliferation of cheap energy, has also had a very profound impact on urban morphologies. First, it made the movement of building materials over long distances feasible. In the absence of mechanized transport, cities depended on their nearby hinterlands for building materials. With mechanized transport, this dependence was greatly reduced; materials could be brought from much more remote locations. As a result, new construction materials not present in the city’s own
hinterland became available and new types of structures became possible. Secondly, mechanized transportation enabled the movement of passengers over longer distances, both horizontal and vertical. Like the availability of new materials, this had an unconstraining effect on urban morphologies. In the absence of mechanized transport, walking was the main mode of transportation for most of the urban population. There was thus pressure to limit the horizontal expansion of cities so as to keep most things accessible by foot. At the same time, it was not possible to build very tall buildings, partly because of structural constraints imposed by materials, but partly also for the simple reason that there is a limit to how many floors most humans can scale on foot. Paradoxically, mechanized transportation allowed both a sharp increase and sharp decrease in urban population densities. Combined with the advent of iron and, subsequently, steel building structures, mechanized vertical transportation in the form of the elevator made urban morphologies supporting extremely high population densities possible; buildings could rise well beyond the five or six story walkup limit. At the same time, horizontal mechanized transportation in the form of streetcars, railroads and, later, automobiles made low-density urban growth possible. Activities could be spread well beyond walkable distances – accessibility became dependent more on high mobility than on geographic proximity. The social practices linked to urban form dependent on energy-intensive mechanized transport, whether vertical or horizontal, are liable to have much greater ecological impacts than those linked to urban form that predates mechanized transport.

Vernacular built form that predates cheap energy and mechanized transportation can serve as a model for new built form. Such built form is likely to be well optimized to the local natural environment and to foster social practices that are less ecologically taxing. Designing built form on the basis TMA of older built form could be a way of recapturing the environmental advantages implied in the old morphology itself and in the social practices connected to it. Nevertheless, no older vernacular built form should blindly be assumed eco-friendly. While many authors have expounded on how well vernacular built forms tend
to be adapted to the local environment, few have provided rigorous scientific evidence to back up these claims. As Meir and Roaf (2006) caution in an article entitled “The future of vernacular design”, there are ‘performance stereotypes’ surrounding vernacular built form. The ecological merits of any given vernacular built form should be subjected to critical inquiry. If a vernacular form demonstrates many environmental advantages, it could be subjected to TMA to serve as a model for the design of new, presumably more sustainable built form.

3.4> Summary

Whereas the effectiveness of typomorphology-based design for the sake of conserving the integrity of heritage fabrics has already been demonstrated, its effectiveness as a means of placemaking and sustainable design has yet to be proven. For the time being, there are few examples of built form designed on the basis of TMA. In effect, it might be necessary to undertake experimental building projects with the explicit purpose of testing the capacities of typomorphology-based design for reproducing a particular sense of place or the particular ecological, social, and cultural adaptations embedded in existing built form.

There is a great potential for using TMA as a substantive basis for urban design in Montreal. The city has a wealth of older neighbourhoods of great value, the integrity of which it wishes to conserve. Certain recent conservation efforts have already employed techniques of TMA, as discussed in the case studies in the following chapter. In its recent Master Plan, the City of Montreal (Ville de Montréal, 2004) has reasserted its desire to improve the quality of its built environments and to grow in a more sustainable manner. Considering also that several academics as well as a growing number of professionals in urban planning and architecture are already familiar with TMA, the ground seems fertile for exploring the potential of typomorphology-based urban design as a means of placemaking
and sustainable design in Montreal. The following chapter examines more closely the state of knowledge on TMA among academics and professional urban planners and architects in Montreal.
4> Typomorphological Analysis in Montreal

This chapter aims to assess the state of knowledge on TMA as an approach for urban design and planning in Montreal. Specifically, the state of knowledge in both the academic and professional realms in architecture and urban planning is addressed. For the state of knowledge in academia, research and teaching activities in architecture and urban planning schools relevant to the systematic study of urban form are surveyed. Subsequently, for the state of knowledge in professional practice, a few examples of the use of TMA by professional architects and urban planners working in Montreal are examined.

The first part of the chapter (Section 4.1) examines how the study of urban form and the use of different varieties of morphological analysis, including but not limited to TMA, has developed in architecture and planning schools in Quebec. Most of the remainder of the chapter (Section 4.2) is dedicated to three case studies. All three case studies examine works recently commissioned by the City of Montreal that made use, or at least claimed to make use, of a TMA method. As each case study is concerned with the work of a different private firm, together the case studies shed light on the state of knowledge and the practice of TMA in the professional realm.
4.1> State of Knowledge in Academia

Over the last few decades, there has been a considerable volume of research on urban form conducted in Canada. In English Canada, the bulk of the research on urban form has had very little in common with the work of the three schools of morphological analysis. Most of this research has taken an externalist-epistemic stance (see Gauthier and Gilliland, 2006; Gilliland and Gauthier, 2006), unlike the internalist stance taken by the three schools of morphological analysis. Researchers in Quebec, however, have been interested in internalist approaches to the study of the built landscape for over three decades (Gilliland and Gauthier, 2006). The approaches developed by the three schools, but especially that of the Italian School, have made their way into the curricula of architecture schools in Quebec and appear to be slowly entering practice in architecture and urban planning. The following is a brief overview of history of the teaching and application of internalist approaches to the study of urban form in Quebec, based on Gilliland and Gauthier (2006).

Early interest in the systematic study of urban form in Quebec can be traced back to Alfred Neumann, an Austrian architect who had a brief tenure as a professor of architecture at Université Laval in the 1960s. He was the first to introduce the internalist approach to urban morphology to architectural education in Quebec. After his death, several of his students took up teaching positions at the same university and continued teaching his methods of morphological analysis. One of Neumann’s former students, Pierre Larochelle, is credited with pioneering the teaching and the application of Italian process typology in Quebec. Larochelle traveled to Italy frequently to learn process typology directly from Muratori’s followers. In the late 1980s, he set up a graduate seminar in which students were taught Caniggia’s process typology approach. In the early 1990s, he would also introduce a similar undergraduate course. In the meantime, Larochelle also produced French translations of several of the seminal texts by Caniggia and colleagues, including the
now-canonical Caniggia and Maffei (1979). In the 1980s and 1990s, Larochelle and colleagues (including many former students) produced a series of studies that applied the Caniggian methodology in the Quebec context. These studies focused on old, vernacular urban fabrics in Quebec City (Larochelle et al., 1986; Després and Larochelle, 1996; Gauthier, 1997; Gauthier, 2003) and its environs (Larochelle and Dubé, 1993; Larochelle, 1999; Larochelle, 2002).

A number of Larochelle’s former students are now introducing process typology to other universities in Quebec while continuing to expand the body of work on built landscapes in the province. To date, there have been studies on vernacular architecture (Bourque, 1991; Vallière, 1999; Dufaux, 2000; Vachon and Luka, 2002), on morphogenesis and typological processes (Gauthier, 1997; 2003); on such themes as early pre-automobile suburbs (Vachon, 1994; Verret, 1996) and automobile-oriented suburbs (Fortin et al., 2002; Vachon et al., 2004), speculative housing forms (Neji, 1996), countryside settlements (Morency, 1994), and shopping centres (Moretti, 2004).

An internalist approach to urban form was also introduced to Université de Montréal in the late 1970s by way of Pierre Morisset, another former student of Neumann. Whereas Larochelle and colleagues at Laval University worked mostly on the cognitive end of the cognitive-normative spectrum (i.e. gaining an understanding of built form in Quebec rather than intervening on it), the work undertaken by faculty and students at Université de Montréal would primarily be of a normative nature (i.e. focused on the design of new built form). Morisset’s colleagues Melvin Charney, Denis Marchand, and Alan Knight started a studio course called Unité d’architecture urbaine (UAU). It developed an original urban design methodology that was based on the morphological analysis of existing urban fabrics. The idea of basing urban design on an analysis of the morphology of existing fabrics was inspired by the writings of Aldo Rossi (Adamczyk, 1992), one of Muratori and Caniggia’s former students. However, the UAU methodology was quite different from that espoused by the Italian school. It consisted of ‘reading’ the urban form by means of a figurative drawing
technique developed by Charney. By preparing a series of overlapping drawings, the designer was supposed to gain an intuitive understanding of the characteristic patterns of the given urban fabric. The intuitive spirit of the UAU’s work contrasts sharply with the spirit of Muratori and his followers’ work, which sought an explicit understanding of built form.

Due to the graphic nature of UAU approach, its dissemination in print has been quite limited (Gilliland and Gauthier, 2006); only one book about the method has been published, *Ville Métaphore Projet* (Latek et al., 1992). This limited dissemination did not stop the UAU from exercising a significant influence on the practice of urban design in Montreal. Some of this influence was quite direct, as the UAU had been commissioned by the City of Montreal to work on several prominent revitalization projects. A less direct form of influence came via the numerous Université de Montréal architecture graduates who were exposed to the UAU’s ideas and methods and who now work for various local architecture and urban planning firms, as well as for the City of Montreal and other municipalities.

The internalist approaches to urban morphological analysis taught at Université Laval and Université de Montréal appear to be making their way into the practice of architecture and urban planning in Quebec, doubtless thanks to former students of these universities joining the ranks of these professions. The dissemination of internalist ideas into the professional realm is demonstrated by a number of recent studies commissioned by municipal governments across Quebec that employ techniques of morphological analysis (see Gilliland and Gauthier, 2006). The very existence of these studies suggests there are professionals working for municipal planning departments who are aware of the morphological analysis approach and are willing to explore its potential. The number of private firms that were given the mandates to perform these studies suggests that there are some professionals working in Quebec who have applied knowledge morphological analysis. The case studies below examine three examples of professional studies, performed in Montreal, that explicitly claim to use TMA as part of their methodology.
4.2> State of Knowledge in Professional Practice: Case Studies

4.2.1> Background

The three case studies below examine three works commissioned by the City of Montreal and performed by three different private firms. The criteria for choosing the case studies were simple: first, the work had to explicitly claim that it employed a method of TMA; second, the work had to pertain to Montreal or a part thereof; third, the work had to be undertaken since 2000; and fourth, each selected work had to have different authors. The aim of the final criterion was to provide a cross-section of different TMA methods for the three case studies.

The first two case studies look at works commissioned by the City of Montreal's central planning department in 2003. Both works belong to a series of five complimentary studies of the city's form, called 'characterization studies of the urban form' (études de caractérisation de la forme urbaine), that were part of the background research that was used in the preparation of the 2004 Montreal Master Plan. The studies were assigned one of five sectors of the Island of Montreal. The mandates for the studies were given to four different, local firms including: Atelier BRIC Architectes + Urbanistes; Affleck + de la Riva Architectes; Consortium Atelier BRAQ/Atelier In Situ; and Groupe Cardinal Hardy, which took two of the studies. The mandates for all five studies were roughly the same: to provide a portrait of the built form in the assigned sector and to propose general urban design interventions based on this portrait. The diagnostic part of the mandate required an overview of the historical formation of the urban form in the given sector and a general assessment of its present state. In addition to this, the mandate required that a number of

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5 Between January 1, 2002 and January 1, 2006, while the Master Plan was being prepared, all municipalities on the Island of Montreal were merged into one 'mega-city'. After January 1, 2006, fifteen municipalities on seceded from Montreal.
specific items be given special consideration, namely major road networks, major public transportation networks, and gateways to the city, and public spaces. A detailed report was produced for each of the five sectors⁶. Of the five studies, three explicitly claimed to use of TMA: the studies of the Centre and Centre-Est sectors by Groupe Cardinal Hardy and the study of the Centre-Ouest sector by Atelier BRIC. The two studies performed by Groupe Cardinal Hardy employ precisely the same methodology; Case Study 1 investigates the Centre sector study only. Case Study 2 investigates the Centre-Ouest sector study by Atelier BRIC that uses a different methodology, albeit one also said to be based on TMA.

Case Study 3 examines one of two similar studies commissioned by two boroughs of the City of Montreal, namely the Plateau–Mont-Royal and Sud-Ouest boroughs. Both are typomorphological studies intended to be used as the basis for new building regulations. The mandates for both studies were given to the firm Patri-Arch, who applied the same methodology in both cases. The mandates consisted of describing the structural development of the borough and then identifying homogenous areas of the built landscape and describing them in terms of their formal characteristics. The focus below will be on the Plateau–Mont-Royal study, as it has been used as the basis for that borough’s newly enacted PIIA (Plan d’implantation et d’intégration architecturale or ‘Architectural Implementation and Integration Plan’), a regulatory tool for controlling urban design (see Box 3). The Arrondissement Sud-Ouest has yet to enact its new PIIA.

4.2.2> Methodology
For each case study, brief background information is provided and the mandate for the work in question is described. The methodology employed in the work in question is described in detail. In the case of works that employed a variety of methods, only the

⁶The reports are available in electronic format on the City of Montreal’s website. They were retrieved at http://ville.montreal.qc.ca/portal/page?_pageid=2762,3101863&_dad=portal&_schema=PORTAL
methods to which the authors refer as TMA are investigated. For each case study, three specific elements are examined: (1) the scale of spatial resolution; (2) the defined typologies; (3) the method by which homogenous areas of urban form are identified. The spatial resolution is assessed in order to determine how comparable a given work is to the other works. The defined typologies and the method by which homogenous morphological areas are observed are assessed in order to evaluate the quality of the TMA.

Two studies operating on similar scales of spatial resolution should have directly comparable methodologies; two studies operating at different scales of spatial resolution will be harder to compare directly. Spatial resolution is assessed in terms of the relative size of the smallest and largest units of urban form that are considered by the work in question. The case studies are considered in terms of three broad scales of spatial resolution: small, intermediate, or large. Methods that analyze relatively small units of urban form, namely buildings or clusters of building are considered to operate at a small scale. Methods that analyze larger units, such as blocks, urban fabrics, and entire districts, are considered to operate at an intermediate scale. Methodologies that analyze entire cities or regions are considered to operate at a large scale.

While there are important differences among the methodologies developed by the three schools of TMA, they all resemble each other in a crucial way: they are all based on defining typologies for certain units of urban form and then ‘reading’ urban form in terms of these typologies. Reading urban form consists of systematically classifying occurrences of a particular unit of urban form according to a defined typology. Furthermore, for all three schools, the transformation of urban form over time is understood in terms of the genetic evolution of types of units, and not of individual units, of urban form. This distinguishes typomorphological analysis from other forms of morphological analysis.

Typologies can be defined in many ways at different scales of spatial resolution. As discussed in Chapter 1, each of the three schools had its own idiosyncratic way of defining typologies. The units of urban form for which typologies are defined vary. In principle, a
typology can be defined for any reoccurring unit of urban form. Commonly used units include buildings, parcels, blocks, urban fabrics, roads, and public or open spaces. For each case study, the physical units of urban form for which typologies are defined are identified and the typologies themselves are listed in tables.

Though the works of the three schools read urban form at different scales of spatial resolution, the reading always leads to a similar end: the identification of homogenous areas of urban form. These are areas that are not only homogenous in terms of certain physical properties but are also homogenous in terms of the transformational logics that have governed their development over time. For the purpose of the present study, the method by which the works in the case studies identify homogenous morphological areas is assessed in two ways: (1) whether homogenous morphological areas are identified on the basis of a systematic reading of the urban form in terms of well defined typologies; and (2) whether the homogenous morphological units identified reflect historical development processes.

In sum, the case studies look for evidence of the following framework:

1. the definition of typologies of certain units of urban form

2. the systematic classification of all or a representative sample of occurrences of a certain unit of urban form within the given territory according to the above typologies

3. the identification of homogenous morphological areas within the given territory informed by:
   a. the above systematic classification
   b. an analysis of the historic transformation processes of the given territory
Case Study 1

Title
Étude de caractérisation de la forme urbaine: Centre

Firm
Groupe Cardinal Hardy, Montreal, QC

Authors
François Dufaux, Michel Dufresne, and Ernst Perdriel

Area Studied
Boroughs of Centre-Sud, Côte-des-Neiges, Outremont, Plateau-Mont-Royal, Pointe Saint-Charles, Saint-Henri, and Ville Marie plus the Harbour, Mount-Royal, and Nun’s Island.

Methodology
The area under study, the Centre sector of the Island, was subdivided into smaller sub-sectors. For each sub-sector, the urban form was classified in terms of a simple route typology and urban fabric typology. The classification of routes and urban fabric, in turn, served as the basis for identifying homogenous units of urban fabric (aire morphologiques homogènes). A map of each sub-sector shows both routes and urban fabric according to type. Each map identifies homogenous morphological units – areas that have a consistent pattern of urban form.
Spatial Resolution
This study operates at an intermediate scale of spatial resolution of built form. Individual blocks are the smallest unit of urban form found in this study – individual buildings are not considered. At the same time, borough districts are the largest unit of urban form considered – larger units such as city and region are not considered.

Typologies
The route typology is strikingly similar to that proposed in Caniggia and Maffei (2001), even though an explicit reference is not made. Four basic types of routes identified by Caniggia and Maffei (2001) appear to correspond closely to the types used by Groupe Cardinal-Hardy: matrix routes resembles voies primitives, building routes resembles voies d’implantation, back routes resembles voies de raccordement, and break-through routes resembles voies de restructuration (see Box 2 below for definitions). The urban fabric typology, however, does not resemble anything in Caniggia and Maffei (2001). As there is no reference provided, it is unclear whether the authors devised this typology themselves or whether they borrowed an existing typology. There are two main types of urban fabric: that which is made is made up of îlots constitués or ‘complete blocks’ and that which is not. Completed blocks are divided into three subtypes: blocks with laneways (îlots avec ruelle), blocks without laneways (îlots sans ruelle), and picturesque blocks (îlots pittoresques). The first two types cover virtually all rectilinear blocks, characteristic of prewar urban form in Montreal; the third type covers all curvilinear blocks, characteristic of postwar urban form in Montreal.

Areas that are not completed blocks fall into one of four subtypes: public spaces, large institutional spaces, superblocks (pièces urbaines), and fragmented spaces. The public space type covers all types of green spaces as well as squares and plazas. The large institutional space type includes hospital campuses, university and college campuses, churches and convents and other institutional grounds. Urban fabric of this type is
Figure 7 – Example of typological classification and identification of homogenous morphological areas
generally implanted at the initial stages of urbanization, on land on which there is not yet any established urban fabric. McGill University is an example of this type – the land that it occupies and the lands around it were not yet urbanized when it was founded. Urban fabric of the superblock type is usually designated for commercial, industrial, and institutional uses but, unlike urban fabric of the large institutional space type, it is implanted long after the initial stages of urbanization, replacing an existing urban fabric during a phase of redevelopment. Whereas large institutional spaces tend to be organically integrated with their surrounding urban fabrics, superblocks are generally associated with negative impacts on the surrounding urban fabrics. Good examples of superblocks that are disjointed from their surroundings include Place des Arts and the CBC complex. Finally, the fragmented space type covers all lands that fall into none of the above categories. Mainly, these are vacant lands that are not legitimate green spaces and also unused lands around major transportation infrastructure, such as freeways (autoroutes).
Matrix Route
This is a route whose initial purpose is to link two or more focal points. In other words, it is a route whose primary purpose is to allow travel from one point to another. Matrix routes often follow topographic contours (G1). A matrix route is laid down before any urban tissue. The initial growth of urban tissue straddles the matrix route (A and G1).

Building Route
The primary purpose of a building route, unlike a matrix route, is to provide access to buildings; it is not a route intended for travel between focal points. In most cases, building routes grow out from matrix routes, allowing the urban tissue to spread outward from the matrix route. Building routes emerge together with the growth of the urban tissue (B, C1, and C2).

Back Route
A back route is essentially a link between two or routes of any type (F2). Buildings are not oriented towards a back route but are rather oriented towards the routes that the back route is linking. Like building routes, they emerge together with the growth of the urban tissue.

Break-through Route
This type of route is similar to a matrix route in that it is intended for travel between different focal points. However, whereas a matrix precedes the existence of any urban tissue, a break-through route is imposed on an existing urban tissue. This means that a path is cleared through an existing tissue – buildings are razed to make way for the break-through route (D).

Source: Caniggia and Maffei (2001)
Table 1 – Typologies in Case Study 1

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<th>Unit</th>
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<th>Subtypes</th>
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<td>– voies de restructuration</td>
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</table>

**Homogenous Morphological Areas**

The homogenous morphological areas are defined in terms of the defined route and urban fabric typologies. The homogenous morphological areas were only areas made up of urban fabrics of the îlots constitués type. A continuous area made up of îlots constitués of the same subtype and with a continuous pattern of route types is considered a homogenous morphological area.

The homogenous morphological areas are defined entirely on the basis of a synchronic analysis of the urban form (i.e. an analysis of the present state of the urban from). Even though the authors of this work consider the historic development of the Centre sector in an earlier section of their study (Section 2 – Formation historique du territoire), it does not appear that this had any bearing on the identification of homogenous morphological areas.
Case Study 2

Title
Études de caractérisation de la forme urbaine: Centre-Ouest

Firm
Atelier BRIC (Baird Racine Interventions Contextuelles), Montreal, QC

Authors
François Racine and Cécile Baird

Area Studied
Dorval, Hampstead, Lachine, Montreal West, Town of Mount Royal, and Ville Saint-Laurent

Methodology

The study performed by Atelier BRIC consists of a diachronic analysis and a synchronic analysis. The diachronic analysis consists of a comparison three different historical maps (Figure 9) that illustrate the physico-spatial development the sector. The authors briefly describe the changing nature of development through time. Photographs are provided to illustrate the typical built form that was produced during the different phases of growth of the sector. The structuring effects of certain elements of the urban form, such as major roads and railways are also mentioned.

The synchronic analysis consists of a reading of the built form according to seven themes. The following is a summary of the material presented for each of the themes:
1) For the natural setting of the sector, a map illustrating the topography, the hydrological features, and major green spaces is provided. A brief description accompanied by a few photos mentions the key natural features of the sector.

2) For the road network, a map illustrates the main arteries in the sector. An accompanying text names the main road axes crossing the sectors. Accompanying photos illustrate the diversity of streetscapes to be found along the principal arteries of the sector; captions under the photos mention the different land use along the main arteries.

3) For railways, a map showing metro lines, commuter train lines and freight railroads is provided; passenger stations are indicated for the metro and commuter trains. The accompanying text describes passenger rail services in the sector and photos illustrate train stations on two different commuter lines.

4) For the built form, three maps are provided to illustrate the spatial distribution of three main types of built form: residential, industrial, and institutional built form. Each map is accompanied by a very brief description of the distribution and historical development of the given type of built form. Accompanying photos demonstrate different examples of each main type of built form found in the sector.

5) For public spaces, a map showing the road network and the location of public spaces is shown. Highlights are mentioned in the accompanying text and illustrated with photos.
6) For gateways, the included map illustrates access points to the sector, including bridges and major highways as well as the airport. The visibility of important landmarks, such as Mount Royal, from these access points is mentioned. Accompanying photos illustrate the landscape seen from two gateways: Autoroute 40 and the airport.

7) Finally, for axes and nodes of development, a map shows the locations of current hotbeds of economic activity and development in the sector. The accompanying text mentions the key areas of current and identifies currently vacant or underused areas in which there is a potential for future growth. These are depicted in the accompanying photos.

**Spatial Resolution**

This study operates at the intermediate and large scales of spatial resolution of built form. It considers a large sector of a city-region that contains several boroughs. Smaller units of urban form, such as buildings, blocks, and urban fabrics are not considered in a systematic manner – they are mentioned only anecdotally.

**Typologies**

This study does not explicitly define a typology of any unit of urban form.

**Homogenous Morphological Areas**

The study does identify the existence of five different *ensembles bâtis homogènes*. It is not explained according to which physical criteria these homogenous morphological areas were identified; only historic criteria are mentioned. The *ensembles bâtis homogènes*

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7 Many of the boroughs covered by this study were independent municipalities before the 2002 forced merger and became independent again in 2006.
are said to be the products of one of three different phases of development: (1) formation des faubourgs or formation of suburbs, 1900-1945; (2) formation des banlieues résidentielles de la première génération or formation of first-generation residential suburbs, 1945-1960; and (3) formation des banlieues résidentielles de la deuxième génération or formation of second-generation residential suburbs, 1960-1970). The spatial nature of these homogenous morphological areas is unknown since no map depicting their boundaries is included.

The identification of homogenous morphological areas is not based on reading of the urban form according to defined typologies of units of urban form – no such typologies are defined in the study. They are only defined in terms of broad historical phases of development.
Case Study 3

Title
Étude typomorphologique de l’arrondissement du Plateau–Mont-Royal

Firm
Patri-Arch, Québec, QC

Authors
Martin Dubois and Patrick Marmen

Area Studied
The borough of Plateau–Mont-Royal, Montreal, QC

Methodology
The study uses a three-tiered approach. First, the authors set out to identify the principal phases of development of the borough. This task was carried out by studying archival maps and various written historical records. Second, they identified the morphologically homogenous areas of the borough. They formed an initial hypothesis as to the homogeneity based on the prior study of historical maps and records – urban form yielded by a particular phase of development, it was hypothesized, was likely to have consistent morphological properties. The hypotheses were refined by comparing historical and contemporary maps, taking into account four basic characteristics of the urban form: first, the time of its initial development; second, its basic organizational characteristics;
third, the typology of blocks; and fourth, the typology of parcels. The third and final phase consisted of validating the hypothesis from the previous phase and formally describing the characteristics of each morphologically homogenous area. Three basic criteria were assessed: building types, building masses (height, width, and depth), and setbacks.

Spatial Resolution

This study operates on the small and intermediate scales of spatial resolution. The smallest unit of analysis are individual buildings and the largest unit, the *aires de paysage*, are essentially urban fabrics.

Typologies

The building typology defined by Patri-Arch consisted of nine main types of buildings, each having a number of subtypes. Each building subtype was defined in terms of relationship to the lot, its volumetric properties, its external cladding materials, doors and window geometries, and general stylistic treatment of the façade; some minor variants of the subtype were also briefly mentioned where applicable (see Table 1 below).

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8 The block and parcel typologies are not explained in detail in the public version of the report that was consulted for this case study.
### Table 2 – Typologies in Case Study 3

<table>
<thead>
<tr>
<th>Unit</th>
<th>Types</th>
<th>Subtypes</th>
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<tbody>
<tr>
<td>Parcels</td>
<td>n/a*</td>
<td></td>
</tr>
<tr>
<td>Blocks</td>
<td>n/a*</td>
<td></td>
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<tr>
<td>Buildings</td>
<td>la maison de faubourg</td>
<td>à toit à deux versants</td>
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<td></td>
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<td>à toit à mansarde</td>
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<td></td>
<td>le duplex</td>
<td>sans marge de recule avant</td>
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<td>avec marge de recule avant</td>
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<td>à escalier exterieur</td>
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<td></td>
<td>le triplex</td>
<td>avec escalier interieur</td>
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<td>multiplex</td>
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<td></td>
<td>la maison urbaine</td>
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<td>à unités superposées</td>
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<td></td>
<td>l'immeuble d'apartements</td>
<td>l'immeuble de rapport sans cour</td>
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<td>l'immeuble de rapport avec cour</td>
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<td></td>
<td></td>
<td>contemporain et la tour de logement</td>
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<td></td>
<td>l'immeuble a vocation mixte</td>
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<td>l'immeuble institutionel</td>
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* The block and parcel typologies are not explained in detail in the public version of the report that was consulted for this case study.
Homogenous Morphological Areas

Based on the information collected with the above-described methods, Patri-Arch divided the entire territory of the given borough into two types of sectors. The first type, landscape areas (aires de paysage), consists of relatively large areas wherein the built form underwent a similar process of initial formation and subsequent transformation. Architecturally, landscape units are heterogeneous; they correspond to broad, historical phases of development. The authors identify five such broad phases: (1) before 1845, the formation of the territorial structure; (2) 1845-1880, the formation of villages; (3) 1880-1914, the golden age of development; (4) 1914-1960, consolidation; and (5) after 1960, the major restructuring and the return to the city. They also point out that the borders of these areas often correspond to administrative boundaries as well as impermeable physical barriers, such as railways. The second type of sector, landscape units (unités de paysage), are sub-units of the landscape areas. They are relatively small areas that are architecturally homogenous. Their boundaries generally correspond to either cadastral boundaries or the boundaries of areas that were subdivided at the same time and which were subjected to the same set of building regulations.

A total of five landscape areas comprising a total of 53 landscape units were identified. Each landscape area was described in terms of the history of its formation, its general morphological characteristics (especially the configuration of the road network), its topography, and its land uses. In turn, each landscape unit was described in terms of its dominant building types and their architectural characteristics.
Fig. 13 – Example of one of five *aires de paysage*
Box 3 – Plateau–Mont-Royal PIIA

The Plateau–Mont-Royal PIIA essentially translates the Patri-Arch study into design regulations. The regulation states that any new building in the borough must take into account the morphological characteristics of the landscape area and the landscape unit in which it is to be built. In particular, the new building must correspond to one of the building types that is already present in the given landscape unit. Its height and setbacks must be continuous with those of the adjacent buildings, as must floor levels and window and door geometries. Exterior spaces such as balconies and terraces must correspond in size and shape to those of buildings of the same type as the new building in the given landscape unit.

The fundamental objective of the PIIA is to conserve the unique identity and the ‘architectural cachet’ of the Plateau–Mont-Royal, a neighbourhood rich in traditional, pre-war urban form, much of which is considered emblematic of Montreal. The PIIA documents state that the desire is not that new buildings mimic the stylistic qualities of adjacent traditional buildings but rather that they be contemporary in style while ‘demonstrating an understanding’ of the surrounding urban form and the adjacent architecture.

The Plateau–Mont-Royal PIIA is unquestionably an example of an urban design regulation based on a valid TMA. However, it is important to point out that its primary purpose is the conservation of the morphological properties of an existing urban fabric, not the extension of these properties into a new urban fabric. The PIIA will mostly apply to small infill projects – mostly individual buildings being inserted on otherwise entirely built up streets. It seems unlikely that it would be used for larger projects, such as greenfield or brownfield developments that would entail an expansion of the current urban fabric – there is virtually no land left in the Plateau–Mont-Royal.
4.3> Discussion

The work in Case Study 1 has most of the ingredients of a TMA identified in Section 4.2.2 above. In this work, typologies for different units of urban form are defined and all occurrences of these units within the assigned territory are classified according to these typologies. Subsequently, homogenous morphological areas are identified on the basis of this typological classification. Being based only on a cartographic representation of contemporary Montreal, this typological classification lacks a diachronic dimension and therefore the homogenous morphological areas that are identified do not reflect historic transformation processes.

The work in Case Study 2, while ostensibly having the same purpose as the work in Case Study 1, employs a very different methodological approach. It appears to have very few of the ingredients of a TMA identified in Section 4.2.2. There is no evidence of explicitly defined typologies. There is no evidence of systematic classification of certain units of urban form throughout the assigned territory. Homogenous morphological areas are mentioned but their exact boundaries are not defined or depicted cartographically. They are defined solely in terms of certain historic phases of development. Whereas the work in Case Study 1 contains most of the basic elements of TMA defined in Section 4.2.2, the work in Case Study 2 lacks most of these elements. Ironically, the latter exhibits the one element that the former lacks: a definition of homogenous morphological areas that reflects historic transformation processes.

The work in Case Study 3 has a very different purpose than the works in Case Studies 1 and 2 and, unsurprisingly, also has a distinct methodological approach. Unlike the approaches taken by the works in the previous two case studies, this approach contains all of the ingredients of TMA listed in Section 4.2.2. Typologies are explicitly defined and then used to read the urban form of the assigned territory. Homogenous morphological areas are defined at two scales: larger *aires de paysage* and the smaller *unités de paysage*. The
larger scale *aires de paysage* reflect historic transformation processes whereas the smaller *unités de paysage*, as subunits of the former, reflect both the historic transformation processes and physical characteristics of the built form, as identified through typological classification.

| Case Study 1 | intermediate | roads, urban fabrics | yes | no |
| Case Study 2 | intermediate and large | none | no | yes |
| Case Study 3 | small and intermediate | buildings, parcels, blocks | yes | yes |

Table 3 – Case Studies: Summary of Findings

Of the three works examined through the case studies, the one by Patri-Arch is the most consistent with the framework for TMA laid out in section 4.2.2. The work by Groupe Cardinal Hardy exhibits most of the basic elements of a TMA but lacks one crucial element – identification of homogenous morphological areas that reflects historic transformation processes. The work does contain a diachronic analysis, describing the historic development of the assigned territory but does not consider it in the identification of homogenous morphological areas. Rather, the identification is based entirely on a synchronic reading of the territory. The work by Atelier BRIC exhibits almost none of the basic elements of the framework for TMA presented in Section 4.2.2. In effect, the approach taken by this work bears little resemblance to approaches of any of the three schools of TMA, as presented in Chapter 1.
While the works in Case Studies 1 and 3 are both largely consistent with the framework for TMA presented in Section 4.2.2, the two works are nonetheless very different in nature. Firstly, the two operated on different scales of spatial resolution. The Groupe Cardinal Hardy study employs a very limited form of TMA that operates only at the intermediate scale of spatial resolution. The typologies in terms of which the urban form is read are simple – four types of roads and two main types of urban fabric with a total of seven, very general subtypes. The Patri-Arch study uses a much more detailed TMA that operates on both the intermediate and the small scales. On the intermediate scale, a typology of blocks and a typology of parcels, combined with historic information, were used to identify morphologically homogenous areas, or *unités de paysages*. As parcel structure and historic processes were considered in addition to block structure, the *unités de paysages* identified by Patri-Arch were more fine-grained than the *aires morphologiques homogènes* identified by Groupe Cardinal Hardy. On the small scale, a fairly elaborate building typology was defined, with nine main types and over a dozen subtypes. The TMA in the Patri-Arch study is unquestionably much more elaborate than that in the Groupe Cardinal Hardy study, but this may largely be a function of the vast difference in the size of the investigated territories – the Patri-Arch study dealt with a small subsection of the area the studied by Groupe Cardinal Hardy. Furthermore, the limitations of the Groupe Cardinal Hardy TMA could also be a result of the project mandate. The mandate called for a general ‘characterization’ of the urban form in the sector, but not explicitly for a TMA – it was Groupe Cardinal Hardy that chose to employ TMA. The performance a more elaborate TMA may not have been possible within the allotted time frame and budget.

Ultimately, the differences between the Groupe Cardinal Hardy TMA and the Atelier BRIC TMA can be ascribed to the entirely different purposes of the two works. In the Groupe Cardinal Hardy study, TMA is used as a systematic diagnostic tool for determining the general mode of planning for all areas in a large sector of the city. Based on the results of the TMA, three general types of planning areas are identified throughout the sector: *aires*
de planification générale, aires de planification particulières, and aires de planification prioritaires. The homogenous morphological units detected with the TMA all fell into the planification générale or ‘general planning’ category. The authors recommended that such areas undergo more detailed morphological analyses to refine the regulatory frameworks that apply to them. Areas that were classified as either institutional spaces or superblocks fell into the category of aires de planification particulières, or ‘specific planning areas’. These were identified as areas requiring individualized plans, specific to each case. The authors suggested that the main theme for this type of area would be to improve the interface with the surrounding urban fabrics – in other words, to better integrate the institutional space or the superblock with its context. Areas found to constitute fragmented spaces fell into the aires de planification prioritaires or ‘priority planning areas’ category. The authors indicated that these were areas most urgently in need of planning interventions; as with the aires de planification particulières, these would require case-specific interventions pertaining to the area itself and its integration with surrounding areas. In the Patri-Arch study, TMA is not used as a diagnostic tool but rather as a normative tool. Whereas Groupe Cardinal Hardy read the urban form to determine where and what kind of urban planning or design interventions are needed, Patri-Arch read the urban form in order to devise rules that will control the nature of any interventions on the urban form – especially the insertion of new buildings.
4.4> Summary

It appears that there is already considerable expertise in the study of urban form through TMA in the schools of planning and architecture in Quebec. However, the School of Architecture at Université Laval is evidently leading the pack, particularly in terms the volume of research employing TMA produced thus far. Université Laval adopted morphological analysis as an area of study very early on and has for a long time championed rigorous, scientific approaches, especially the typomorphological or process typology approaches of the Italian School. Université de Montréal's architecture department also embraced morphological analysis fairly early on but ended up adopting an idiosyncratic approach that could be described as more artistic than scientific. Nonetheless, recent work from Université de Montréal, including a typomorphological study of its campus and surrounding urban fabric (Garcia and Garcia, 2006) demonstrates that the more rigorous and scientific TMA approach has now also been embraced.

Students at Université Laval and Université de Montréal have been graduating with some knowledge of the morphological approach for over two decades and presumably populating the ranks of architecture firms and planning departments in Montreal and elsewhere in Quebec. The case studies in this chapter were designed to probe the expertise on TMA among the professional community. Indeed, they clearly show that there is some expertise on TMA among working professionals. There are at least two firms, Group Cardinal Hardy and Patri-Arch, who have demonstrated a gasp of the TMA approach while applying it in the Montreal context. Yet, the case studies also reveal that there may be some professionals who, while aware of TMA's existence, do not fully understand what it is. The authors of the work in Case Study 2 state that they employ TMA but their methodology was found to be inconsistent with the framework for TMA proposed earlier in this chapter – a framework that synthesizes the common aspects of the approaches of the three schools of
TMA. This indicates a possible gap in their knowledge – perhaps a result of limited exposure to TMA during their professional training.

The third case study suggests that the value of TMA as a normative tool for urban design is starting to be recognized in the municipal planning world. Two borough-level planning departments in the City of Montreal have commissioned typomorphological studies in order to devise a new set of urban design regulations. Now that the PIIA based on the work in Case Study 3 is in place, all new buildings in the Plateau-Mont-Royal will have to base their design on TMA; soon, the same will apply in the Centre-Sud borough. Other boroughs and municipalities in Montreal may eventually follow the precedent set by the Plateau-Mont-Royal and Centre-Sud. Nevertheless, there are still various challenges to overcome if typomorphology-based urban design is to be widely adopted in Montreal. The next chapter examines this issue more closely.
5> Towards Wider Practice of Typomorphology-based Urban Design in Montreal

Building on points raised in the previous chapter, this chapter briefly examines the obstacles that would need to be overcome in order to facilitate wider practice of TMA as a basis for urban design in Montreal. Four themes are investigated: the need for further research, the need to facilitate access to sources of data essential for TMA, the need for wider recognition of TMA as a design approach by architecture and urban design practitioners, and the need for changes to the practices involved in the production of built form, especially those pertaining to design, to accommodate for the use of TMA.

The information presented in this chapter is taken mainly from a set of interviews conducted in April 2007. Interviewees included Pierre Gauthier, assistant professor at the Department of Geography, Planning and Environment at Concordia University; François Dufaux, a freelance architect and PhD candidate in Architecture at University College in London, UK; Cécile Baird and François Racine, principals of Atelier BRIC; and lastly, Patrick Marmen, currently Conseiller en développement culturel et touristique (advisor on cultural
development and tourism) in the planning department at the City of Longueuil. Gauthier was interviewed on account of being the foremost researcher on urban form and expert on TMA in Montreal, not to mention author of some of the key works cited in the previous chapters. Dufaux, Baird and Racine, and Marmen were interviewed on account of their participation in the works reviewed in Case Studies 1, 2, and 3 respectively (see Section 4.2). It is worth noting that all of the interviewees are graduates of architecture programs at either Université Laval or Université de Montréal, or both in the case of Gauthier.

The interviews were informal. All interviewees were asked to describe any obstacles that might deter the practice of TMA for urban design purposes in Montreal. They were then asked to describe the conditions that they believed should be met so that TMA is practiced more widely as a basis for urban design in Montreal. The four themes discussed below emerged from the conversations with the interviewees.

5.1> The Need for Research

While there is a body of research on urban form in Quebec (see Section 4.1), only a small fraction is concerned with the urban form of Montreal. Professor Pierre Gauthier of Concordia University, one of the foremost experts on TMA in Quebec, believes that more ‘fundamental research’ on the urban form of Montreal must be carried out if TMA is to be used more widely for architecture, planning, and urban design purposes. By fundamental research, Gauthier means especially more research on the morphogenetic processes that gave Montreal its present form. A better understanding of the different phases of development of Montreal and of the structuring logics that operated during each phase is needed. Architecture and urban planning departments in Montreal, he believes, have the necessary expertise to undertake such a program of research. Given increasing interest in the study of urban form among students, these departments also have a supply of labour to
perform the many tedious and time consuming tasks that such research would entail; the only thing they lack is sufficient financial resources. Gauthier admits that the kind of fundamental research program he has in mind would be a very ambitious undertaking; it would require a significant public funding commitment.

Gauthier also stressed the importance of research on using Geographic Information Systems (GIS) as a tool for TMA. Researchers and practicing professionals alike stand to benefit from the use of GIS for TMA. GIS has the potential to automate many of the repetitive, tedious tasks involved in performing TMAs and can help handle very large and complex sets of data that would otherwise be nearly impossible to manage. For Gauthier and other researcher, the increased use of GIS can expedite existing lines of research and open new lines of research that would otherwise be impossible (see Box 4 below). For urban planning and design professionals, GIS may be the key to operationalizing TMA by rendering it much less time consuming and less labour intensive. (See Section 5.4 for a discussion on the practical limitations of TMA for urban planning and design.)

By tracking contemporary urban development with GIS in longitudinal studies, it may also be possible to explore the structuring logics that are shaping cities today (Moudon, 1997). For synchronic analyses of urban form, GIS can automate typological classification of units of urban form. For diachronic analyses, by entering historic cartographic data into GIS, it may be possible to model urban morphogenesis thereby exploring the structuring logics that have shaped cities. Furthermore, as GIS allows the linking of spatial data with quantitative data, it could be quite useful for investigating the impact of social and economic forces on urban form (Moudon, 1997). There is already some work on automated typological classification of buildings (Li et al., 2004) but more much more research is still needed.
5.2> Access to Data

The performance of TMAs, for research and for design purposes, depends crucially on access to historic data on urban form. François Dufaux mentioned that it is much harder to obtain two types of historic data in Quebec than it generally is in Europe: historic maps of urbanized areas and building plans.

Where historic maps of urbanized areas are concerned, Dufaux says that historic cartographic records of all built areas in Quebec, and most of North America for that matter, are quite poor compared to the rich records that exist for many old built areas in Europe. As a general rule, built areas in Europe have been mapped repeatedly over many centuries. As a result, it is possible to reconstruct the spatial evolution of a given town or city and to grasp the morphogenetic processes that were at play. Dufaux claims that cartography in Quebec, like elsewhere in North America, was until recently focused primarily on resource exploitation. As a result, there is a legacy of historic maps of un-built areas but a comparatively impoverished historic cartographic record of built areas. The data available for diachronic analyses of town plans are sparse compared to the data on which many of the seminal works on the morphogenesis of towns in Europe are based.

In the case of building plans, the problem is not so much a lack of data as it is difficulty in accessing data. Records of building plans do exist but they are inaccessible because, in Quebec, they are considered private. Without access to building plan records, building typologies can only be defined in a coarse way, on the basis of façades and general volumetric characteristics (as is the case in work reviewed in Case Study 3). However, morphogenetic studies that look at the evolution of the interior layout of certain building types are impossible to perform. This hindrance is apparently largely absent in Europe – building plans publicly accessible. Whereas there is no way to make up for the lack of historic maps of urbanized areas, at least in this case it may be possible to take action to improve the situation.
5.3> Awareness and Expertise among Professional Practitioners

The use of TMA as a basis for urban design in Montreal is very likely to depend on increasing awareness of this approach in the professional ranks of design firms and planning departments. Pierre Gauthier noted that a number of graduates from the schools of architecture at Université de Montréal and Université Laval who, like himself, were exposed to the concept of TMA in the early 1980s have already brought their knowledge to local firms and planning departments. However, Gauthier suggests that in many cases this exposure may have been very limited – there are professionals who are aware of the approach but are far from proficient in its use. Nevertheless, he believes that it is only a matter of time before the situation improves. Université de Montréal and Université Laval’s architecture departments continue to produce graduates familiar, to some extent, with TMA. Gauthier himself has been introducing undergraduate planning students at Concordia to the typomorphological approach. There are not only more graduates who are merely familiar with TMA, but more who have acquired greater proficiency with TMA by participating in a number of the research projects on urban form in Quebec published over the last decade (see Section 4.1). Gauthier believes that this new generation of graduates, more proficient in TMA, will soon make its mark on design firms and planning departments.

Patrick Marmen suggested that awareness of the TMA as a basis for urban design depends on the success of current and future projects that employ this approach. Successful implementations of typomorphology-based urban design or design regulations should generate good publicity, thereby raising awareness of the approach, he claims. Case in point, the Plateau–Mont-Royal borough’s recently enacted PIIA (see Box 3), a set urban design regulations based on a TMA performed by Marmen and colleagues at Patri-Arch (reviewed in Case Study 3), has generated interest in the architecture and planning community and has brought attention to the TMA approach.
5.4 Development Practices

Present development practices in Montreal impose practical limitations on the use of TMA as a basis for design. As all of the interviewees mentioned, TMA is labour-intensive and time-consuming. However, most mandates for architecture or for urban design projects do not make allowances for pre-design research and site analysis. Firms wishing to inform their designs on TMA are forced to find ways to squeeze it in the allowed time frame and budget. As a result, if TMAs are performed at all, they must be very coarse or superficial. In principle, an architecture or design firm could propose to do TMA in an offer of service and receive a mandate that accommodates it. In practice, however, according to Cécile Baird and François Racine, firms do not make significant provisions for TMAs or any other pre-design exercises in offers of service because developers are rarely interested in paying for them. They look first and foremost for designs that are executed quickly and cheaply; quality of the design and integration with surrounding urban fabric are secondary considerations. This situation puts pressure on design firms wishing to perform TMA to do so as quickly and efficiently as possible. Any innovations that will decrease the labour inputs and time needed to perform TMA should allow design firms to use it more extensively. Nonetheless, developers will still have to make more allowances for pre-design exercises such as TMA.

Developers are unlikely to accommodate TMA in the mandates that they give to designers of their own volition. Their behaviour depends to a large extent on regulatory constraints. Municipalities have the power to enact regulations that control quality of built form and can thus influence developers’ behaviour. The recently enacted Plateau–Mont-Royal PIIA (see Box 4) is an example of a design regulation based on a TMA that constrains the design of new buildings and other physical interventions in throughout the borough. The PIIA requires that all new buildings inserted within the borough be congruous with the surrounding urban form, in effect requiring that their design be based on TMA. Developers
wishing to build in borough must comply with the PIIA. Other municipalities will most likely have to follow the example set by Plateau–Mont-Royal and enact appropriate design regulations to coax developers to integrate TMA into project design. The enactment of regulations such as the Plateau–Mont-Royal PIIA is likely to depend on awareness of the TMA approach in planning departments. As suggested in Section 5.3 above, this awareness is likely to increase in the near future.

5.5> Summary

It appears that a number of conditions must be met for TMA to become an urban design practice in Montreal. First, more fundamental research on the urban form of Montreal, and on the structuring processes that shaped it, is needed. Also, further work on use of GIS for TMA may yield less labour and time consuming ways of performing TMA, benefiting researchers and urban design practitioners alike. Second, simplifying access to historical maps of the city and, more importantly, to building plans is crucial for both researchers and practitioners wishing to perform TMAs. Thirdly, the prospects of wider application of TMA for urban design depend critically on awareness of the approach and the level proficiency in its use among practicing architecture and urban design professionals. As a new generation of architecture and planning students that have considerable experience with the use of TMA will soon be taking positions in design firms and planning departments, the levels of awareness and proficiency among the professional community is likely to increase. Fourth, development practices will have to change to accommodate the use of TMA in the design process. New urban design regulations will need to be enacted to coax developers into making these accommodations in the mandates that they give to design firms.
After convincing more academics and then professionals of the merits of TMA based urban design, perhaps the next challenge will be to educate the general public. There are already a few popular works that tout the merits of vernacular urban form (e.g. Brand, 1994; Kunstler, 1993). The founders of the New Urbanism movement, for example, have already promoted the idea using older, vernacular urban form as a model for neighbourhood design (Duany et al., 2000). A strategy for promoting typomorphology-based design could build on the aforementioned efforts. One possible approach might be to differentiate typomorphology-based design from New Urbanist design, framing the former as an approach with similar aims to the latter but allowing for more sophisticated mode of borrowing from the past. It might be useful to highlight that typomorphology-based design is more apt to produce place-specific built form, in contrast to New Urbanist design which tends to produce built form that looks like an idealized version of a late 19th or early 20th century neighbourhood somewhere in North America rather than one that resembles the actual historic built form in the given region⁹. Given the growing popular sensitivity to environmental issues, another good strategy might be to play up the potential ecological merits of applying typomorphology-based design.

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⁹ See comments on Cornell, a New Urbanist development in Toronto, in Relph (2004). Also, see Box 2.
6> Conclusions and Recommendations

6.1> General Conclusions

This project has explored the possibilities of using the systematic approach to analyzing urban form known as typomorphological analysis (TMA) as a basis for urban design. It began by reviewing and summarizing the three main schools of thought on TMA. This was complemented by an overview of important changes that occurred in the production of built form in North America during the last century, identifying certain issues that have emerged in consequence. The core of the project was then presented: how basing urban design on TMA can help to deal with these issues, particularly with conserving the integrity of heritage neighbourhoods, with creating a sense of place, and with developing the city in a sustainable manner, with the metropolitan region of Montreal serving as an example. Case studies were presented to illustrate the ways in which TMA is already being used for planning and urban design purposes in Montreal. These were bracketed by results of interviews with a cross-section of academics and professionals working in Montreal, probing two themes: the apparent state of knowledge of TMA, and the challenges that lie ahead for putting TMA into wider practice as a basis for urban design.

TMA is already established as a field of research in the academic realms of urban planning and architecture in Quebec and is increasingly being recognized by practicing
professionals, as observed in Gilliland and Gauthier (2006). Two architecture departments, those at Université Laval and Université de Montréal, have espoused the study of urban form for over two decades. Initially, however, only the former pursued the rigorous TMA approach proposed by the Italians. To date, various groups at Université Laval together have produced a fairly significant corpus of work on urban form using in this province, most of which is based on a TMA methodology. Université de Montréal initially pursued its own form, not-so-rigorous form of morphological analysis but appears to have now also embraced the more rigorous TMA. A number of professionals who have graduated from these two schools who work either in local municipal planning departments or local architecture and planning firms were exposed to the TMA during their studies. The case studies in Chapter 4 confirm that TMA is known in the professional realm of urban planning and architecture in Montreal. Groupe Cardinal Hardy used a valid TMA to perform an étude de caractérisation, a study whose purpose was to determine the modalities for urban planning and design in fairly large swath of the city (Case Study 1). Atelier BRIC also claimed to use TMA to perform a parallel étude de caractérisation to that by Groupe Cardinal Hardy. Despite being both called TMA by their respective authors, the actual methodologies employed were very different. Unlike that of Groupe Cardinal Hardy, the methodology employed by Atelier BRIC was not consistent with the framework for TMA defined in this study. This is an indication that there could be some confusion or lack of understanding of the exact nature of TMA among practicing professionals. This could reflect, as Gauthier pointed in his interview, that some of the professionals working in Montreal today have only had a limited exposure to the TMA approach while they were students and may therefore lack a thorough understanding.

It appears that urban planning and architecture professionals are not blind to the potential for using TMA as basis for urban design. In Case Study 3, Patri-Arch used TMA to characterize the built form of the Plateau–Mont-Royal borough, on the basis of which new, borough-wide urban design regulations, in the form of a PIIA, were elaborated. Another
borough in Montreal, Centre-Sud, is likely to soon produce its own PIIA, also based on TMA of its territory by Patri-Arch. That the two boroughs commissioned TMA studies for the explicit purpose of elaborating design regulations shows that municipal planners in Montreal are beginning to recognize TMA and its urban design applications.

While the idea of basing design on TMA is gaining ground, it does not seem that its full potential is widely recognized – especially by professionals. This study examined three potential applications TMA as a basis for urban design; it seems that professionals and municipal planners in Montreal recognize only one, conserving the integrity of heritage urban fabric. There does not appear to be awareness of the other two potential applications, namely placemaking and sustainable design. The documentation on the Plateau–Mont-Royal PIIA (Arrondissement Plateau–Mont-Royal, 2006), for instance, argues only for conserving the integrity of the borough’s built form, but makes no reference to sense of place or to sustainability. Similarly, none of the professionals interviewed during this study made any reference, either direct or oblique, to the notion of using typomorphology-based design for placemaking or for sustainable design. If the capacity of typomorphology-based urban design for placemaking and sustainable design were recognized, professionals would be more compelled to gain expertise in TMA and to use it as a design tool.
6.2> The Future of Typomorphology-based Urban Design in Montreal

Though TMA is now taught at several architecture and urban planning schools in Quebec and though practitioners in the province already recognize some of its design applications, additional academic research and the support of municipalities is needed to push the approach into wider practice. Research is needed to demonstrate the effectiveness of typomorphology-based design for all three of the potential applications proposed in this study, but especially for placemaking and sustainable design. Some research should also focus on further operationalizing TMA – to make it less time and resource consuming – so that it is more accessible to practitioners. Municipalities have a crucial role to play on many levels, from funding the above-described research to enacting regulations that will encourage the use of TMA in the design process. The first of the two sections below proposes a set of general directions for future research. The second section consists of a set of recommendations for planning departments interested in enabling wider use of typomorphology-based design.

6.2.1> Recommendations for Future Research

Two main axes of research on the applications for typomorphology-based urban design are suggested in this study. The first is to investigate whether typomorphology-based urban design could constitute a form of placemaking while the second is to investigate whether the same could also constitute a form of sustainable design. Chapter 3 presents a number of theoretical arguments for both of these potential applications of typomorphology-based urban design but offers no concrete empirical evidence in support of either idea. It appears that no such evidence exists. Yet, it would be worth obtaining;
positive results would bolster the case for using typomorphology-based design whereas negative results would indicate that the approach might not be worth pursuing.

Proving that typomorphology-based design could be a form of placemaking is no simple matter. According to the hypothesis presented in Chapter 3, a new urban fabric whose form is designed on the basis of TMA of an existing fabric should have the same capacity to engender a sense of place as the existing urban fabric. To prove this hypothesis, it would be necessary to compare the sense of place invoked by two urban fabrics – an older fabric and a newer fabric, whose design is based on TMA of the older fabric. Alternatively, it would be necessary to demonstrate that most people identify the new fabric with a particular region – that they recognize it as characteristic of that region. For example, for a new urban fabric produced in Montreal, most people (Montrealers or not) would have to be able to recognize it as a Montreal urban fabric. As Charney (1980) put it, the new urban fabric would have to exhibit a readily identifiable ‘Montrealness’.

Testing the capacity of typomorphology-based design to recapture the sense of place of an existing urban fabric could be based on a perceptual methodology. One possible methodology could involve showing a group of subjects photos of various prototypical urban fabrics as well as various newly produced urban fabrics whose design was based on TMA of the same prototypical fabrics. If the subjects are able to match the new urban fabrics with the prototypical fabrics upon which their design is based, then there would evidence that the typomorphology-based urban design method succeeded in reproducing the sense of place, or at least its visual underpinnings. Of course, for such a test to be possible, a number of urban fabrics designed on the basis of TMA of existing urban fabrics would first have to be built. As pointed out at the end of Chapter 3, it might be necessary to undertake experimental building projects in order to explore the full potential of typomorphology-based design.

Devising a methodology for testing whether typomorphology-based design could be considered a form of sustainable design is another challenge. One possible strategy might
consist of defining a set of performance dimensions and to apply them to a new urban fabric and to the original urban fabric that served as the basis for its design. If the new fabric would have a similar performance profile to that of the original fabric, there would be a strong case for typomorphology-based urban design being a form of sustainable design. It is important to note that the performance dimensions used in such a test would probably have to include ecological as well as social and economic considerations, as these are at heart of most current definitions of sustainability. Again, as with testing the placemaking capacity of typomorphology-based design, built examples will be needed to conduct such research. It should be noted that the same experimental building project could be used to test both the placemaking and the sustainable design capacity of typomorphology-based design.

6.2.2 Recommendations for Future Practice

The recommendations for practice discussed in this section flow directly from the points raised in the interviews in Chapter 5. The following recommendations are targeted at planners and decision makers working for the City of Montreal or for any other municipality in the region that wishes to encourage wider practice of typomorphology-based urban design. They include:

1) providing sustained funding for fundamental research on the morphogenesis of Montreal. Such funding should be directed to university departments with expertise in TMA. In Montreal, the main recipients for such funding should be the Department of Geography, Planning, and Environment at Concordia University and the Faculté d’aménagement at Université de Montréal. Students at these universities can provide much of the labour needed to perform such research while gaining expertise with TMA, which they may eventually bring to professional practice.
2) funding research on GIS and the automation of TMA. The labour and resource intensiveness of TMA is one of the main barriers to using this approach for research and practice. Academics and professionals alike would benefit from the automation of the tedious tasks involved in performing TMA as well as from new ways of manipulating the rich data involved in TMA. Reducing the time and labour intensiveness of TMA is especially crucial for practitioners wishing to use it as an approach to design, given how design mandates typically make little room for pre-design research and analysis.

3) facilitating access to historical maps of urbanized areas. Getting access to historic maps of Montreal is slow, as many of these documents are rare and access is therefore restricted. Scanning all available historical maps of the city into an electronic database would be an ideal strategy for streamlining access to historic cartographic data.

4) finding legal means of access to building plans for research purposes. Access to these plans is crucial for TMA at the scale of individual buildings. It is suggested that legal means for granting at least limited access for research purposes should be established.

5) encouraging or requiring TMA to be part of design process for new projects by enacting appropriate regulations. Developers are unlikely to embrace TMA of their own volition; the city might have to force their hand by enacting design regulations that will require the use TMA. The typomorphology-based PIIA enacted by the
Plateau–Mont-Royal borough is an example that other boroughs and municipalities could follow.

Also, it is recommended that the success of the Plateau–Mont-Royal borough’s typomorphology-based PIIA be evaluated longitudinally. The success of the PIIA will only become evident after several years, when a number of new buildings constrained by its requirements will have been built. It will then be possible to assess how well the new insertions integrate with their context. It will also be possible to compare the pre-typomorphology-based PIIA insertions with those built after it was enacted to assess whether the new PIIA led to a significant improvement in the quality of contextual integration of new buildings. Other municipalities seeking new ways of controlling the integrity of heritage neighbourhoods are likely to have keen interest in such data.
6.3> Final Remarks

On a final note, perhaps it is useful to situate the ideas presented in this study within the leading contemporary intellectual trend. Urban planning and architecture, following other fields in the humanities and social sciences, are moving deeper into post-modernism (Ascher, 2001). Post-modernism emerged in the context of disappointment with modernism, which failed to meet many of its promises. It follows that post-modernism is characterized by a dismissal of the key tenets of modernism and a wide re-examination of pre-modernist ideas. The universalizing, functionalist concepts of ‘good’ urban form that dominated urban planning and architecture in the modernist era have been largely dismissed by academics in the two disciplines (though arguably not by many practitioners yet). Like other disciplines, urban planning and architecture are turning back to their pre-modern legacy for inspiration. The New Urbanist movement can be seen as a manifestation of this renewed interest in pre-modernist traditions. The idea of basing urban design on TMA of pre-modernist built form fits the post-modernist trend quite well and might in fact embody the next stage of post-modernism. The early stages of post-modernism have been characterized by a kind of eclecticism or, in effect, random or arbitrary borrowing from the past. The next stage will hopefully consist of more strategic and more place-specific borrowing from the past. Hopefully, this will lead to a reconciliation of pre-modernist local building traditions with contemporary building techniques. Typomorphology-based urban design could be the future of post-modern urban planning and architecture – in Montreal and elsewhere.
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