LANGUAGE AS KNOWLEDGE CARRIERS WITHIN URBAN DEVELOPMENT

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FUSION POINT GOTHENBURG > Chalmers Urban Building at Community Building Technology

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The research program Fusion Point Gothenburg had a practical focus and was run as a collaboration between Älvstranden Utveckling AB and Chalmers University of Technology. The University of Gothenburg and Yale University were also involved in the collaboration and the aim with the program was to strengthen the fusion between research and practice within architecture and urban design to merge theoretical and practical perspectives into knowledge.

Various types of workshops and seminars have been used to spread knowledge and initiate discussions with Gothenburg's operative actors within the building sector and the city's officials, with a focus on promoting and highlighting the development potential within RiverCty Gothenburg (Älvstaden). This series of booklets are primarily aimed to those who work with the development of Älvstaden but may also be of interest to others who work with urban development. The authors highlight different perspectives that affect urban development and base their research on their own background and discipline.

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ABOUT THE AUTHORS

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LANGUAGE AS KNOWLEDGE CARRIERS WITHIN URBAN DEVELOPMENT

1. New knowledge demands in urban development: the implementation deficit

The last decade has produced extensive and convincing proof that the world today is facing environmental threats of an unprecedented scale far from restricted to climate change (E.g. Rockström et al., 2009a; 2009b). On top of this we have witnessed how we have passed through the most severe economic crisis since the 1930's and how current global urbanization processes, where two thirds of the world population are expected to live in cities by the year 2030, put acute stress on the ability of urban and ecological systems to support social cohesion and human wellbeing. Together this has moved the future development of cities to the centre of international discourse.

In the face of these growing social and environmental challenges, urban governance, planning and design are increasingly deemed vital in policy for change, why there has emerged an urgent need for more rigorous knowledge foundations for these practices. We identify three major knowledge challenges of equal concern to scientific disciplines, public authorities, and the professional fields engaged in these fields. First, there is an interdisciplinary challenge where the inherent synergies and conflicts in policy and practice addressing social, economic and ecological sustainability need to be resolved. Second, there is a transdisciplinary challenge where we need to bridge the gap between theory and practice and new research need to be undertaken in close exchange with practice to safeguard adequacy and applicability. Finally, there is need to update and improve the knowledge provision system of the field, consisting of actors such as universities, public authorities and private practices, to procure efficient and accurate knowledge transfer in accordance with their societal roles.

This article focuses on the last challenge, naturally also adhering to the first two, by narrowing down to the knowledge provision within a large complex urban development project, that is, more precisely, the knowledge provision and exchange within the operative constellation of organisations driving such a process. Such a group is of course embedded in a broader institutional framework of organisations, such as public authorities, universities and NGO:s,

but our central concern here is this operative group directly linked to a particular project. We, moreover, on fairly good grounds assume that this constellation of organisations represents an unusually broad range of knowledge forms, concerned with the governance, planning, design and maintenance of a physical urban landscape. With knowledge forms, we do not so much mean knowledge in different fields, such as economy, institutions or architecture – albeit this naturally contribute to the complexity of such a project – as knowledge of different kinds, for instance, theoretical knowledge and practical knowledge, which we deem necessary to explore deeper.

Importantly, projects of this kind are pointed out as strategic in the current global aim to redirect our societies towards trajectories of greater sustainability. However, we in such projects identify serious lacunae for an adequate and satisfactory knowledge provision in several of the regards listed above. Most importantly, there is often pointed to an implementation deficit in this knowledge provision system, where we identify the issue of knowledge transfer as a common theme for many of these limitations.

Not least we believe this to be true when it comes to the concrete forms that knowledge takes, that is, the 'languages' used as knowledge carriers (texts, diagrams, maps, objects), where these specific languages are essential for the kind of knowledge they carry but which at the same time are far from commonly shared or perhaps even understood by all actors and organisations in a particular knowledge provision system. We also note that this is a general problem since similar obstacles also appear in other fields. Such inefficiency in knowledge transfer, we suggest, has an unfortunate hampering effect on inter- and transdisciplinary knowledge development and efficient public governance.

2. Knowledge production mode two: a new role for transdisciplinarity

In the last decades, the modes of knowledge provision have come under scrutiny. The concept transdisciplinarity has opened up new views on where new knowledge actually is generated as well as debates on how to frame knowledge production institutionally. As such it has come to support new research in close relation to fields of practice but also inspired established academia to an interest in practice based thinking as a way to acknowledge types of knowledge and research problems difficult to manage within traditional boundaries. Crucial for this emerging Mode 2 of knowledge production is the seminal book The New Production of Knowledge, where its main feature is identified to be that it operates within a context where problems not are set within a disciplinary framework (Gibbons et al., 1994, pp. 3–5). Through close involvement with practice, it concerns the interaction of many actors and sets of practitioners in a broader social and economic context by way of which it becomes more reflexive, accounting for several societal perspectives.

The strong feature of experimental attitudes and innovation is emphasised, including an interest in specific, concrete and ordered structures and processes, rather than general, unifying first principles. The search for knowledge through design is stressed as central, and the new tools enabled by computers and information technology have played important roles (Gibbons et al., 1994, pp. 43–44). Computers have become powerful tools of science, generating new languages and images capable of connecting and linking fields in novel ways. Examples can be drawn from images of fractals, visual modelling of data and the development of GIS, image analyses in medicine, all of which demonstrate, in different ways, how images and communications cut across disciplines. The transdisciplinary knowledge production implies a shift from a search for fundamental principles to enquiry that is oriented towards contextualised results, reached through experimental practice (Gibbons et al., 1994, p. 19). The focus is on following the problem and its concrete materials and actors by an experimental process guided by design principles.

Not least have recent years witnessed extensive discussions on the concept of transdisciplinarity and its relevance in the fields of urbanism, architecture and design (See e.g. Doucet & Janssens, 2011; Linder, 2005; Stanek & Kaminer, 2007). A growing number of fruitful approaches have also emerged, whereby design abilities are used to grasp current conditions and complexities in urban situations and built environments, and where images, models and artefacts

are used to explore, visualise and communicate complex relationships (See e.g. Burdett, 2006). These approaches are recognising other ways of producing and communicating knowledge. The verbal has often been regarded as the most appropriate and legitimate way of producing and communicating scientific knowledge, while design knowledge often is "tacit" or articulated in other languages that are more implicit and contextual. However, design involves particular kinds of thinking and intellectual abilities that use specific means of expression, articulation and communication. Transdisciplinarity and Mode 2 have appealed to the design scholars as a new "in-practice model" of research that has great similarities with design. This mode opens for various ways in which the design professions could contribute to knowledge production. Bryan Lawson even states that it is possible that architects and designers unknowingly "are just ahead of the game rather than behind it after all" (Lawson 2002, p. 114).

3. The particular knowledge landscape of urban planning and design: unusual heterogeneity

While there is a wide range of academic disciplines and fields where urban systems and processes are central objects of study, the ones that address organised and deliberate intervention in these systems and have direct ties to professional practices are quite few and urban planning and design are here prominent. Hence, we see rapidly growing expectations on these disciplines where they rather suddenly are considered strategic fields of knowledge as well as critical instruments of intervention for the reform of our societies by way of new and restructured urban systems. At the same time, it is not unfair to say that these emergent knowledge demands often have caught these fields unprepared. There are many reasons for this but we can identify three inherent characteristics of the fields that constitute major obstacles for the one who wish to see rapid and comprehensive knowledge development.

First, the multi-disciplinary character of the fields; urban planning and design addresses the most complex human system there is, the city, and it is not surprising that the many different disciplines and sub-fields which urban planning and design comprises and rely upon, only to different degrees have been successful in advancing applicable knowledge about this tremendous system. Especially important here is the fact that this knowledge, as a consequence of this complexity, comprises knowledge of the complete academic range, from

science to the humanities, and even goes beyond the traditional academic boundaries into the arts. Therefore, the field naturally also comprises knowledge with quite different epistemological foundations. It is therefore not surprising that the knowledge in the fields proves difficult to synthesise in any simple comprehensive manner and instead often give rise to intense academic debate.

Second, the practice dominated character of the fields; we are not only talking about academic fields of research but also about professional fields of practice. As a matter of fact, the disciplines of urban planning and design more often find their identity in the different professional practices that they are related to than in their disciplinary research. Practice and research in the fields, furthermore, to a large degree develop as parallel fields of knowledge with little natural rapport between them. Their relation is often even characterised by suspicion and even scorn. Moreover, the two major practices, urban planning on the one hand and urban design on the other, actually stem from quite different knowledge traditions, geography and architecture respectively, between which there neither is any natural rapport or an understanding of a common ground. Altogether, this adds up to a field of knowledge of great epistemological heterogeneity.

Third, the political character of the fields; given their aim to deal with both theoretical and practical knowledge that is used to structure and shape the spatial framework of society at different scales, the disciplines of urban planning and design are inherently political, why they are replete not only of knowledge conflicts but ideological conflicts as well. The very idea of a field of knowledge that concerns how things ‘ought to be’, presupposes alternatives or such a question would never arise. Which these alternatives are and which of them we decide to realise are of course deeply political issues. In the concrete subject matter that urban planning and design deals with, furthermore, this becomes most tangible; in the end, whichever city we decide to build means that there are thousands that not will be built. If we in extension believe that the physical and spatial structure of the city has important implications on the societies we live in, it also means that there are thousands of ‘societies’ that not will be given spatial support.

This means that urban planning and design not only comprises an unusual range of academic disciplines, but also a diversity of practical knowledges developed in different knowledge traditions and, on top of this, also a wide range of ideological preferences concerning what cities and societies ought to be. Together, this adds up to a remarkably heterogeneous epistemological field, something reflected in the actors involved in the knowledge provision of

the field. These naturally have different roles (producers, regulators, appliers) but more importantly, they also handle knowledge that have different forms (generative, analytical, discursive) and, moreover, do so by using different 'languages' (natural, mathematical, diagrammatical, object-based). This presents a highly problematic setting for knowledge transfer in the field, with high risk for misunderstandings and even conflict. To be able to analyse this we need to understand more specifically the knowledge needs of the field, that is, what is the particular nature of its central knowledge object and knowledge process.

4. The knowledge object in urban planning and design: a shift from implements to facilities

To become more concrete in our discussion, we may focus a quite apparent shift taking place in the field of sustainable urban development in the last decade, from more technology based approaches with its roots in the environmental sciences (sustainable urbanism), to approaches based in the ecological sciences (ecological urbanism). While not totally replacing the earlier approach, this shift has two important components. First, a shift in knowledge object from individual detached urban processes with an environmental impact, such as public transport or waste recycling, to the functioning of complete urban ecosystems. Second, a shift in means of implementation, from the translation of separate processes into technological systems, to the development of conditions for the persistence of urban ecosystems in themselves through design of the urban landscape.

Concerning the second shift, it is clear that both approaches need some form of technological support but, most importantly, it implies technology of quite different sorts. In anthropology, we find a fundamental distinction of tools as implements and tools as facilities. Implements typically accelerate and direct energy to specific purposes and are concerned with efficiency. A typical case can be any kind of machine designed for physical processing. Facilities, on the other hand, slow down, store and maintain energy as a resource for a variety of purposes and have a concern for permanence. Typical cases can be anything from a dam to a railroad track. In the first case, furthermore, we speak of tools driven by natural forces, such as wind, fossil fuel and nuclear power, while the second case does not tap the forces of nature on its energy to apply it elsewhere, rather the machine, so to speak, is understood to already be present in the form of the natural system itself.

Typical for earlier approaches in sustainability is the use of implements, such as energy systems, waste recycling systems and public transport systems, all in the form of 'machines' added to the urban landscape so to speak, while the design of the 'landscape' in itself remains rather conventional or detached from the specific issue of sustainability. What we see in the new approaches in contrast is the use of facilities, such as green roofs, water pools for amphibians and natural day-water disposals incorporated with the local ecosystem through the design of the urban landscape, why they often also are referred to as nature-based solutions.

The field of urban planning and design are clearly dominated by facilities rather than implements and is therefore in a position to offer essential contribution to these new directions of technological development. However, facilities of this kind are a far less researched 'knowledge object', why its' system for knowledge provision also is less developed. Moreover, it typically demands other 'languages' than regularly used for its correct and efficient transfer. Without proper attention to this fact, we may see incorrect translations in the knowledge system, for instance, step-wise transformation of 'facility-knowledge' into 'implement-knowledge'.

While this may illustrate a concrete issue in current urban development with sustainability aims, the more general lesson here is that without a proper understanding of the knowledge object at hand, it will for rather natural reasons be difficult to provide accurate and relevant knowledge to the process. What is illustrated above is not that we totally lack knowledge in the system, but that it may be based on an understanding of the central object in the development process that does not fit current aims and that the risk is that this misconception may lead the whole project in the wrong direction.

5. The knowledge processes in urban planning and design: jumping between knowledge forms

If the above concerned the knowledge object, there is a parallel need to better understand the particular knowledge processes in these fields. Here we enter what Hebert Simon called 'the sciences of the artificial' or design methodology, that is, the knowledge and practice to device "courses of action aimed at changing existing situations into preferred ones" (Simon, 1981 [1969], p. 129). It is important to stress here how this definition clearly indicates how design methodology here concerns knowledge processes that are far from limited to what we generally refer to as the design practices, but rather is inherent in any humanly directed process of change.

It is then generally acknowledged that it is through a deeper epistemological understanding that the design process can best be understood (Lawson 2004; 2006). In short, it can be described, as all practice, as a process where different knowledge forms are integrated and applied (Hillier 1996; Marcus 2010). We can summarise this in an epistemological model constituted by a creative phase supported by generative theory (typical for the arts), a predictive phase supported by analytical theory (typical for science) and an interpretative phase supported by discursive theory (typical for the humanities). Naturally, these are not to be understood as phases regularly following upon each other, in real life we rather see jumps back and forth, etc.

Importantly, these knowledge forms do not only vary in epistemological foundations (the arts, science, the humanities) but are, moreover, often embodied in different forms of representations. Recognition of such 'languages' and their strengths and weaknesses has critical bearings for the applicability of theoretical knowledge in design practice. In short, how does 'theoretical' knowledge, typically represented in natural languages or perhaps mathematical languages, enter a design process concerning the physical landscape of cities, where one frequently makes use other languages, such as graphical representations of built form?

Design abilities have been described by Nigel Cross as multifaceted cognitive skills that are possessed by everyone, to some degree. These design abilities fundamentally rely on non-verbal media of thought and communication. In the specific "designerly ways of knowing" employed by designers, knowledge is embodied both in the processes of designing and in the products of designing. Knowledge is accumulated in, and transferred through, methods and approaches, as well as various models and design artefacts what we have called knowledge

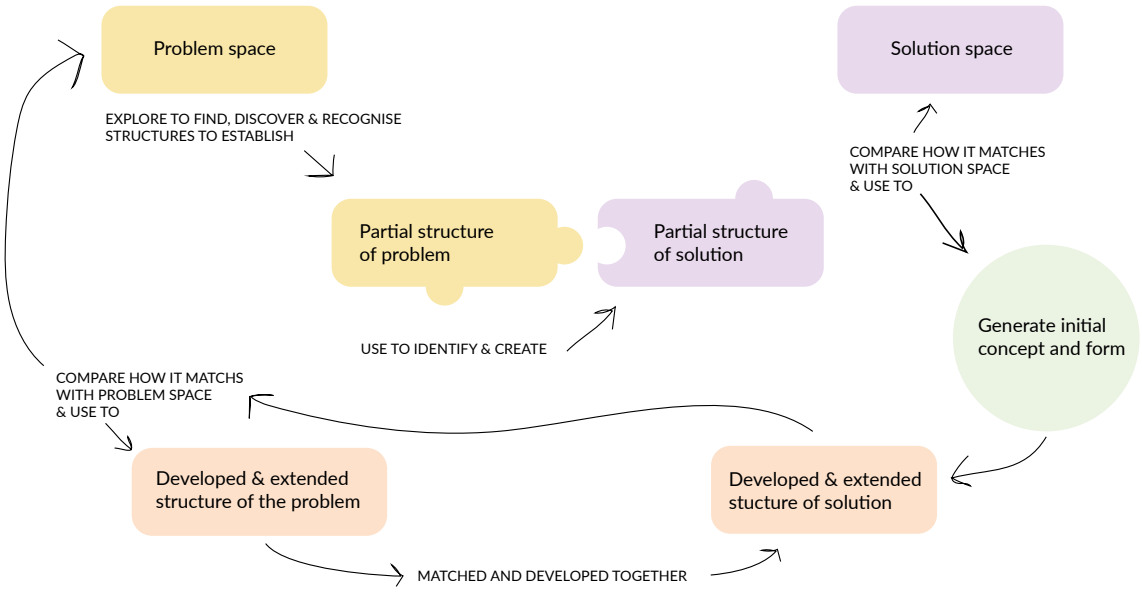
media or languages. Designers have trained abilities for non-verbal thinking and communication, where certain “codes” are used to translate abstract requirements, formulated in the brief, in the visions of the client or in the wishes of the users, into concrete objects. Importantly, these “codes”, or non-verbal thoughts, both “read” and “write” in what Cross calls “object languages” (Cross, 2007, pp. 26–29).

How to use these ‘languages’ in more inter-subjective and critical discourses is a crucial question for the development and transfer of knowledge in the design disciplines (as well as many other practices) (e.g. Nilsson, 2013). A challenge is to formalise these languages so that they can be used to communicate knowledge to broader communities of researchers and professionals without losing their specific generative capacities. Such translations are especially critical in our times of increased inter- and transdisciplinarity.

The principal insight here is to realise that we in the particular field of concern here, the built environment, are dealing with several different representational forms or languages, such as natural languages, mathematical languages and what has been suggested as diagrammatical languages, and that typical for the design process is not only to integrate different knowledge forms, as listed above, but also the need for knowledge to be translated from one representational form to another. It is here we find the intriguing but typical process in design when ideas enter things, or the reversed, when ideas are retrieved from things.

However, this remains a quite abstract description of the design process, why we will try to briefly give a more concrete image of it before moving on. This image is based on the compelling idea presented by Nigel Cross about the typical oscillation in design between what he calls a ‘problem space’ and a ‘solution space’. In a protocol study of a typical design process, he summarises this process and point out the critical role of these ‘spaces’. It may be a help to think of work in the ‘problem space’ as applying analytical knowledge, and work in the ‘solutions space’ as applying generative knowledge, even though this is a bit of a simplification:

“The designers start by exploring the ‘problem space’, and find, discover, or recognise a partial structure. The partial structure is then used to provide them also with a partial structuring of the ‘solution space’. They consider the implications of the partial structure within the ‘solution space’, use it to generate some initial ideas for the form of a design concept, and so extend and develop the partial structuring [...] They transfer the developed partial structure back into the ‘problem space’, and again consider implications and extend the structuring of the ‘problem space’. Their goal [...] is to create a matching problem-solution pair” (Cross, N, 2006).



Adoptation of Nigel Cross’s description of the design process.

While this description clearly captures essentials of the design process that most designers are likely to recognise, it also makes it possible to identify, in a more concrete way, the application of different knowledge forms in this process, as suggested above, and especially how they, so to speak, are written into the form of the designed artefact. For instance, the 'partial structures' that the designer, in Cross' observation, transfers back and forth between the two spaces, typically seems to concern something in the design task that the designer has been able to relate to something in her repertoire; a piece of generative theory that seems to fit a partial problem in the 'problem space'. This joint structure of problem and generative idea is then transported to the 'solution space' where it is developed into a tentative solution. This tentative solution, in turn, is brought back to the problem space where it can be added to with other 'partial structures' concerning additional demands that are joined with new pieces of generative theory. Thereafter, it is again brought back to the solution space for further and more precise development, aiming for a final best fit.

It is important to notice that this should not be taken for an analysis to synthesis-process, rather it constitutes a synthesis as analysis-process. When something in the problem space is related to something in the designer's repertoire, this signifies a synthesis, not an analysis, or rather the analysis is made by way of a synthesis. This synthesis must in most cases, due to its size and complexity, be broken into parts, but that does not take the important insight here away, that the design process rather starts with a synthesis and not an analysis.

6. Towards a theoretical framework for knowledge provision in urban planning and design

Hence, we see how urban planning and design with its close relation between theory and practice presents a tremendous epistemological heterogeneity why it also is an illustrative example of great general interest. Most importantly, this variety of knowledge forms are typically embodied in particular knowledge carriers or 'languages'. Hence, urban planning and design presents an unusually rich, illustrative and apposite example for the analysis of societal knowledge provision.

The analytical framework we envision here is that such a field is an integrated part of a societal system of knowledge provision, constituted by a set of actors (universities, public authorities, private practices) that generate and transfer knowledge according to their particular roles (producers, controllers, appliers). The knowledge that is generated and transferred within this system typically have different epistemological forms (analytical, discursive, generative), which in extension are embodied in a great variety of knowledge carriers or languages (texts, mathematics, diagrams, objects).

In this framework, we identify the issue of knowledge transfer as critical and a way to unlock and analyse the inherent impediments and risks in a system of knowledge provision of this kind. Put briefly in relation to the kind of complex urban development project we envision here, there is need, first, to survey the actors in the project and, second, more precisely describe their roles and mandates; third, there is need to identify the knowledge forms typical for these actors and, fourth, to similarly identify the knowledge carriers preferred or necessary for these knowledge forms.

With this as a background, we may identify a set of risks in each step: are the actors the right ones, are there actors missing, is someone unnecessary; in particular when we move into the defined roles and mandates of the actors in the process; are there overlaps that may lead to conflict or lacunae necessary to fill in? Next, what type of knowledge do the different actors bring to the table and use as a means to discuss and argue their case, to what degree does misunderstandings and conflict arise from misunderstanding of from which point arguments are made and to what degree are they due to actual disagreement, is it clear what is facts, values and proposals in the discussion? Finally, what knowledge carriers or 'languages' are present, can everybody read, understand and speak these 'languages'; does certain languages dominate over others, are there even means present to express certain languages.

This could be studied at working sessions with invited actors in the project focusing on some vital theme, activity or situation. Apart from the kind of mapping of roles etc. suggested above, the focus should be on such things as do actors understand their given role and mandate, are their overlaps written into current mandates that lead to conflict or are actors missing needed to be accountable for certain issues, do the group understand that they all speak not only from different roles but use different forms of knowledge to address the issues related to these roles and in extension also use knowledge carriers necessary for these particular knowledge forms. Do the different actors in the group comprehend these different knowledge forms and can they read and make use of the different knowledge carriers. Especially, how does translation between knowledge forms and knowledge carriers take place and if not, how could this be enhanced. Overall, to what degree are we witnessing a well-performing knowledge provision system an where do we identify the greatest problems.

To gain a greater understanding and to create better condtions for the knowledge transfer between different 'languages' one can identify and investigate the following:

- to identify and describe the essential actors in current system of knowledge provision for urban planning and design according to their role, their knowledge forms and knowledge carriers.

- to identify and describe the typical obstacles in knowledge transfer between the actors in this system according to the knowledge forms and knowledge carriers used.

- to investigate and develop potential means of translation between different knowledge carriers, including education and new knowledge carriers.

- to Investigate and develop an epistemological framework for the system of knowledge provision in the field that recognises the particular characteristics of its constituent actors.

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The research program Fusion Point Gothenburg had a practical focus and was run as a collaboration between Älvstranden Utveckling AB and Chalmers University of Technology. The University of Gothenburg and Yale University have also been involved in the collaboration and the aim with program has been to strengthen the fusion between research and practice within architecture and urban design to merge theoretical and practical perspectives into knowledge.

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