02

CHARACTERISTICS OF INTEGRATION IN INTER- AND TRANSDISCIPLINARY URBAN RESEARCH AND PRACTICE

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Introduction

In this chapter, we offer a *philosophy of science* perspective on the dimension of *integration* in inter- and transdisciplinary (ITD) processes. We reflect on different disciplinary understandings of integration and relate this to some of the urban case studies presented in Part II in this volume and build on some of the concepts and vocabulary used.

Unlike most (if not all) authors who contributed to this book, our main research activities are not in the urban domain. We work in the philosophy of science, a field of study that aims to obtain a better understanding of scientific methods, concepts and knowledge-generation processes, but also of what science is – as a whole – and how it evolves. One subject that we study is "cross-disciplinary integration." We use the term "cross-disciplinarity" for all scientific endeavours that transgress the boundaries of established academic disciplines. Cross-disciplinary research occurs in various forms, including in the shape of multidisciplinary, interdisciplinary and transdisciplinary research.[1] Cross-disciplinary integration is also popular in the urban domain because urban problems are necessarily multi-dimensional and complex, and their resolution requires the integration of knowledge and skills from different disciplines (Kraas et al., 2016). Philosophers of science and urban researchers thus share an interest in cross-disciplinary integration. Yet, the ways in which the issue is approached in both domains differs slightly. In the philosophy of science integration is commonly approached as a process of combining elements from different "models," "concepts," "theories" and "methods" (e.g. Darden & Maull, 1977; Klein, 2014), while in urban studies the focus is often on integration as a process of "knowledge co-creation," "co-design" or "co-production" (e.g. Pohl, 2010; Polk, 2015).

Reflecting on *integration* in urban studies from a philosophical viewpoint offers an additional, potentially broader, perspective on inter- and transdisciplinary processes central to this volume. It

FIGURE IV.2.1 Erno Goldfinger's innovative 1939 Modernist house, 2 Willow Road, London - detail of staircase. Photo by Olivia Bina.

allows us to compare integration in urban studies to integration in other domains, thereby revealing what the characteristic traits are. In philosophical and science studies literature, integration is often characterised by means of a mere metaphor, such as "fusing," "melding," "amalgamating," "harnessing" or "knitting" (O'Rourke et al., 2016, p. 67). Philosophical accounts of integration that go beyond the typical metaphors are often vague. For instance, in O'Rourke et al. (2016) we find claims such as: "integration is a generic combination process the details of which are determined by the specific contexts in which particular instances of integration occur" (p.67). Also that "integration is an input/output process, where a series of changes to the inputs results in a 'bringing together' or combination of inputs, producing an output" (ibid. p.67). Because the characterisations are vague we attempt to gain more insight into what integration, the "bringing together," the "combination" looks like in the context of the case studies presented in Part II in this book.

In the first part of this chapter we focus on identifying common denominators of characteristics of the outcomes of integration, differentiating between both types of integrative cross-disciplinarity namely, inter- and transdisciplinarity. In the second part of this chapter we discuss challenges and difficulties for transdisciplinary research and practice, and highlight its democratic potential in general and more specifically in the urban realm.

Interdisciplinary Integration

A theoretical characterisation of interdisciplinary integration – namely the integration of academic disciplines – in the urban realm is developed through an analysis of Andersen and Kirkeby's chapter on Care Homes in Denmark (Chapter II.8) and by reflecting on other non-urban interdisciplinary research projects.

The Nature of Urban Knowledge

As an entry point to the fundamental importance of inter- and transdisciplinary integration in the urban realm, we use the introduction of Hans Thor Andersen and Rob Atkinson's edited volume on *The Production and Use of Urban Knowledge*[2] where they put forward two characteristics that are important for us. The first one is about the future:

> *"[T]here is an increasing demand that urban knowledge should look forward rather than simply backward (i.e. attempt to provide guidelines for policy intervention instead of purely building knowledge on retrospective analysis); this requires the development of a more forward-looking approach based both upon 'science' and knowledge constructed on the basis of experience (e.g. about what works and what does not work). This approach implies the need to identify possible solutions to problems rather than simply looking for empirical evidence of failures" (pp. 2–3).*

The second characteristic is the involvement of many scientific disciplines:

> *"[A]s no single academic discipline covers the full spectrum of urban relationships, it is almost always necessary to combine different disciplines. Relevant knowledge of cities, their structures and relationships and so on is not limited to one discipline (e.g. geography, architecture, sociology). On the contrary, elements essential to it can be located in many disciplines and no single discipline assigns the urban a central role in its field of studies, as a result 'the urban' too often falls into the cracks between disciplinary fault lines" (p. 3).*

These two features give a characterisation of integration in the context of the production of urban knowledge. Theorising this characterisation we propose that integration in the urban realm typically involves bringing together knowledge from various source disciplines to develop and support an *intricate scenario*. It is claimed that, if this scenario is executed, this results in an *end state* of the relevant part of the world in which several *divergent* requirements are simultaneously satisfied.

Let us clarify the terms in italics. "Scenario" is a common umbrella term in urban planning that refers to, among other things, plans in the traditional (architectural) sense. This is exemplified by two chapters from Part II of this volume that we will use later in this chapter: the first "Barriers and Potentials of Interprofessional Planning – Creating Care Homes for People with Dementia" (Chapter II.8) and secondly "Explorations on Residential Resilience, the Brf Viva 2011-2019" (Chapter II.3). However, the policy recommendations document in Chapter II.2 "A Creative Nano-Town in Calabria" is also a scenario in our sense, as well as the regeneration plans that are the core of City Regeneration Plovdiv (Chapter II.7) and the future scenarios used in Chapter II.1 on energy where relevant community scenarios were key to the whole transdisciplinary project.

"End states" can be diverse. Sometimes the end state is a particular building as in the Cooperative Housing in Gothenburg (Chapter II.3). Sometimes it is a collection of buildings sharing some crucial features as in the chapter on Care Homes in Denmark (Chapter II.8). Sometimes it is the urban outlook and appeal of a village, as in NanoTown, Gagliato (Chapter II.2) or a city district as in the chapter on City Regeneration in Plovdiv (Chapter II.7). It is often combined with enhanced socio-economic conditions of the inhabitants.

Finally, we call a set of requirements "divergent" if, in order to show that they are satisfied, we require research that belongs to different scientific disciplines. A scenario that is expected to lead to an end state with divergent properties is called an *intricate* scenario. Showing that the execution of an intricate scenario can be expected to result in an end state with divergent properties requires research in different scientific disciplines. This corresponds to the second characteristic of Andersen and Atkinson of the involvement of many disciplines. Their first characteristic is incorporated by means of the idea of scenarios, which are always forward-looking. What we add is a crucial connection between the two characteristics and the link with integration: developing and supporting intricate scenarios is what integration amounts to in the context of the production of urban knowledge. The result is a theoretical characterisation of integration in the urban realm that revolves around the desired outcome of urban planning.

For the illustration based on the case of the Care Homes in Denmark (Chapter II.8), we focus on the two steering groups that were involved. In Denmark, steering groups are appointed to follow and guide the planning process. In our terminology, these groups are without any doubt cross-disciplinary, since they contain experts from different fields. The authors describe the diversity of the two steering groups of two building projects near Copenhagen,

> *"Taken together, they covered knowledge concerning medical aspects, care aspects, ergonomic aspects for staff working in the care home, economics, social aspects, architecture and construction. Their professional backgrounds were from architecture, engineering, political science and nursing" (Chapter II.8, p. 157).*

So, the functioning of these steering groups requires a kind of cross-disciplinary cooperation. However, the authors of the chapter use more specific labels: they talk about "interdisciplinary cooperation" and "interdisciplinary knowledge transfer." According to the definitions of the baseline vocabulary that we also briefly discussed in the introduction to this chapter, the use of these more precise labels requires the integration of knowledge to be present in the case at hand.

The use of more specific labels is adequate here because there is integration of the type explained in the previous section. The steering groups aim at co-designing care homes that simultaneously meet the following requirements:

a) economically well-functioning;
b) well-functioning from a care perspective (supports staff members working with the patients);
c) creating a feeling of homeliness; and
d) having optic and acoustic qualities that are agreeable to people with dementia.

The co-design process, in which the architects mainly carry out the actual design work and the other members mainly constrain and define the design task, is a process in which a scenario is developed and supported. The support – which justifies the expectations attached to the execution of the resulting design – comes from different scientific disciplines, because the requirements are obviously divergent. Apart from engineering constraints, there are requirements that fall into the realm of the biomedical sciences, psychology, labour sociology and economics. So, the research exhibits the type of integration of developing and supporting intricate scenarios.

Similarities and Differences

Two other interdisciplinary fields, namely economic sociology and social robotics are used here to enhance our understanding through the similarities and differences of urban and non urban research and practice. Our discussion of interdisciplinary integration comes initially from the founding father of economic sociology Richard Swedberg in *Principles of Economic Sociology*. He sees economic sociology as a kind of interdisciplinary research aimed at "better knowledge of a phenomenon," e.g. success in explaining economic phenomena that have not previously been explained. Swedberg's view is that in order to explain and understand the dynamics of the different types of economic organisations and markets, one needs to look at both (self-)interests which are traditionally ignored by sociologists and social relations which are traditionally ignored by economists:

> *"The main theoretical point […] is that we cannot fully understand the dynamic of the different types of economic organization without realizing that their structures are determined by a combination of interests and social relations" (2003).*

Swedberg's idea of "interest" is a classic economic one: human behaviour is explained by assuming that people are isolated, all-knowing, and utility maximising economic agents. Paying attention to social relations means that you use relevant categories of social relations in your analysis (e.g. "exchange," "conflict," "trust," "subordination").

Milan Zafirovski's (2002) discussion of models of production in economics is a function of variables such as capital, labour, energy and materials, a simple and determined process based on "outputs" and "inputs". By contrast, economic sociology develops models that allow us to describe and explain variation in production (p. 153). In order to be able to do so, production is approached as a complex process that involves human decision-making and is characterised by human limitations taking sociological factors into account, such as networks, groups, social structures, institutions, social controls and cultural context (p. 152). Thus in economic sociology, the desired outcome of

integration is a *model* that has high *explanatory power*, in urban planning, it consists of a *scenario*, the execution of which is expected to *meet diverging requirements*.

The aim of "social robotics" is to develop and study robots that are able to interact and communicate among themselves, with humans and with the environment. So, a social robot has the ability to interact autonomously with humans, generally to achieve social–emotional goals related to different disciplines – education, health or entertainment.[3] What we see here is that integration is "materialised" in an artefact. The aim of creating one object in which all these diverging properties are combined is the driving force behind the interdisciplinary co-operation and could be conceived as similar to what happens in urban planning. However, the main difference is that, while in social robotics, the desired outcome of integration is a physical prototype that has diverging *properties*, in urban planning or architecture, the desired outcome consists of a *scenario* (in the case of Care Homes Denmark, a building plan for a care home), the *execution* of which is expected to *meet diverging requirements*.[4]

Transdisciplinary Integration

For transdisciplinary integration, we propose a theoretical characterisation and illustrate it by means of another one of the case studies in Part II of this book, The Cooperative Housing Gothenburg (Chapter II.3).

The characterisation we propose is that transdisciplinary integration in urban planning typically aims at developing and supporting an intricate scenario that is *entrenched*. It is claimed that, if this scenario is executed, this results in an end state of the relevant part of the project that satisfies the preferences of the most important stakeholders.

If we compare characterisations of both entrenched and intricate integration we see that the idea of (forward-looking) scenarios is maintained, and in this way, the characteristics of urban knowledge identified by Andersen and Atkinson are incorporated. What is new (compared with intricate integration) is the idea of an *entrenched* scenario: one that supposedly satisfies the preferences of the most important stakeholders.

We will now illustrate this by means of Cooperative Housing Gothenburg (Chapter II.3 in this volume). This illustration will also clarify that arriving at an entrenched scenario typically requires a transdisciplinary dialogue (i.e. requires that the stakeholders are involved in the development of the scenario). Initially, the preferences of stakeholders are often *vague* and are expressed by means of concepts that can be operationalised in many ways, such as "sustainable," "green," "social," "ethical." The transdisciplinary dialogue is required to define the concrete preferences that have to be incorporated. Sten Gromark and his co-authors present their project as transdisciplinary:

> *"The intricate process that was unfolded of a transdisciplinary dialogue of exchange within Positive Footprint Housing© between different partners and stakeholders, academic and professional, even extended to local inhabitants and future residents, may be considered the very key to the alleged virtual success of the project" (Chapter II.3, p. 82).*

The intended end state is an urban residential block with 133 apartments in total. Planning started in 2011, building in 2016. So, a forward-looking scenario is clearly present. As to the interdisciplinary nature of the project, the authors stress that academics of different departments of Chalmers University of Technology and the University of Gothenburg were involved. In general, there were

issues of ecological, economic and social sustainability. These require a variety of academic inputs. The authors explicitly mention that some of the preferences of the stakeholders were vague, and that the development of a concrete scenario required some negotiations:

> *"Throughout this process, the inherent vagueness of general formulations of sustainability, predominant from the beginning, especially concerning social sustainability, was made very clear to all. This also underlines the importance of undertaking inter- and transdisciplinary research directly in the conflicting social fabric, where sustainable goals are negotiated and given a concrete, substantial significance" (Chapter II.3, p. 83).*

Social sustainability relates to issues about social solidarity, economic justice and adaptability of the building. The idea is that social sustainability can only become more precise and substantial by means of a transdisciplinary dialogue. Once the preferences have been made precise, transdisciplinary integration becomes possible and an intricate and entrenched scenario can be developed and supported.

Challenges and Potential of Transdisciplinary Research

Having explored integration and its possible outcomes in the context of urban studies, we now discuss an example of both the challenges and potential of transdisciplinary research.

In the case study by Elena Dimitrova on City Regeneration in Plovdiv (Chapter II.7), one sees disappointment surge up. The researchers involved in this project were not happy with the way things went. The ideals of interaction and integration encoded in the chapter on Care Homes (Chapter II.8) discussed above, allow us to understand their disappointment: these ideals were shared by the Plovdiv researchers, but not realised in this project. Elena Dimitrova calls City Regeneration in Plovdiv a "transdisciplinary initiative":

> *"urban experts not only cross disciplinary boundaries but also enter a transdisciplinary dialogue with local communities about their needs and values in building a path to the future" (p. 139).*

The project investigated the possibilities of developing a creative district close to the city centre. It is clear that the researchers wanted their proposals to be "entrenched" in the sense defined in the previous section. They actively searched for relevant input during a two-day visit to the Kapana quarter in Plovdiv by the student teams involved in the project. The visit was also combined with meeting some key local actors: municipal planning experts, a specialist from the city library, and representatives of citizens' organisations and small local arts and crafts businesses.

> *"This provided a chance to ask questions about the past and present of the quarter, and to listen to various visions about creative industries in general and the envisaged future of the area" (p. 143).*

On the academic side, the project involved research teams from four disciplines: ethnology, sociology, urban planning and architecture. The involvement of these four disciplines makes the project cross-disciplinary, but not necessarily interdisciplinary: the latter requires integration.

The project suffered from huge time constraints in both the preparation and execution phases. Such constraints were experienced by the staff members as well as the students involved. These time constraints had a clear impact on the project, where no explicit interdisciplinary interaction was envisaged due to the estimated shortage of time.

The project was clearly forward-looking, but did not lead to an integrated scenario: the teams focused on different aspects of the urban process and developed different types of intervention proposals. This conflicts with the ideals of interaction and integration and explains the disappointment of the researchers involved.

The Democratic Potential of Transdisciplinary Research

In this section, we use Chapter II.2 (in this volume) to highlight the democratic potential of transdisciplinary research and to discuss the role of scientific expertise in democratic societies. Giulio Verdini and his co-authors introduce the NanoTown project as a two-year research programme from 2016 to 2018, where scholars and students from different disciplinary backgrounds engaged with the local community of the town of Gagliato in Calabria, Italy, to co-produce future scenarios of local development. The different disciplinary backgrounds mentioned here include architecture, urban planning and economists. The main "operational tool" in the project was a "participatory design workshop" held in July 2017. The output of the workshop (and the main output of the project as a whole) is a policy recommendations document. So, the research is clearly forward-looking: a scenario is developed. The idea is to inform the political agenda of the town. The idea is that this scenario is entrenched in the sense defined earlier in this chapter:

> *"The research has been designed to enable transdisciplinary knowledge production in the urban field that could matter for the local community and would ultimately produce a real, positive impact on people's lives" (p. 65).*

This ambition and the way the NanoTown Gagliato project was implemented provide an illustration of the crucial role that transdisciplinary research can play in a democratic society: it allows us to reconcile the ideals of democracy with the idea that policy should be evidence-based (based on scientific knowledge).

Arguments in favour of democracy as a political system start from the idea that the interests of all inhabitants of a state are equally important. Political philosopher Amy Gutmann (2007) formulates the idea that "all types of democracy presume that people who live together in a society need a process for arriving at binding decisions that takes everybody's interests into account" (p. 521).

This is not in itself an argument for democracy. In principle, it is possible that an enlightened despot looks after the interests of all residents in a society evenly. Epistemic arguments have been formulated against this option: it is impossible for the despot to know what the interests are, and any balancing of those interests is debatable. Applied to the case at hand, however, this means that the local inhabitants of Gagliato have to determine what matters and which aspects of their life need to be addressed. The academics cannot and should not do this. If they were to do this, they would not necessarily become "enlightened despots," but they would become "technocrats." In his book *Technocracy and the Politics of Expertise*, Frank Fischer (1990) defines technocracy as "Technocracy, in classical political terms, refers to a system of governance in which technically trained experts rule by virtue of their specialized knowledge and position in dominant political and economic institutions" (p. 17).

What the academics should do instead is to find out what people consider important, which motivates transdisciplinary research in this case and more generally. The need for transdisciplinary

research is connected to democratic ideals; more precisely, to the ideal of finding a non-technocratic way of using scientific knowledge in democratic policy decisions. In his book *The Politics of Evidence-Based Policy Making*, Paul Cairney (2016) puts forward the following ideal that "Scientists can help identify problems, and assess the effectiveness of solutions without feeling that they should be at the centre of a democratic policymaking system" (p. 4).

Transdisciplinary research is a way in which scientists can have impact without occupying centre stage.

Summary

The purpose of this contribution to *Enabling the City* was to reflect on *integration* in the urban realm from a philosophical viewpoint, to offer a broader perspective on inter- and transdisciplinary processes central to this volume, and their possible outcomes. First, we developed a theoretical characterisation of integration of academic disciplines in urban planning and architecture. This characterisation, was illustrated by means of the chapter on Care Homes in Denmark, and the resulting reflections helped describe how integration in urban planning differs from what goes on in other interdisciplinary research projects. We compared the desired outcome of integration in the urban realm, which consists of an intricate *scenario*, the execution of which is expected to *meet diverging requirements*, with the alternative disciplinary examples of social robotics (where the desired outcome is an *artefact* that has diverging *properties*) and economic sociology (where the outcome is a *model* that has a high *explanatory power*).

Second, we discussed transdisciplinary integration in an analogous way; we proposed a theoretical characterisation of entrenched integration and illustrated it by means of the chapter on Cooperative Housing in Gothenburg. Transdisciplinary integration in urban planning and architecture typically aims at developing and supporting an intricate scenario that is *entrenched*. The outcome here is linked to the execution of the scenario, resulting in an end state of the relevant part of the world (in this case Gothenburg) that satisfies the preferences of the most important stakeholders.

Third, we explored the extent of challenges in inter- and transdisciplinary processes. We used the characterisation of intricate integration to explain the disappointment of the researchers involved in City Regeneration Plovdiv. In the framework (Chapter I.2 in this volume) "time" was proposed as a key enabling condition for inter- and transdisciplinary research, and we saw here that lack of time made it impossible to realise the ideals of interaction and integration.

Finally, we sought to reflect on the democratic potential of inter- and transdisciplinary processes. We used NanoTown Gagliato to connect inter- and transdisciplinary research to democratic ideals and challenges (such as avoiding technocracy and ensuring that policy is evidence-based), thus reconciling ideals of democracy with evidence-based policy which are also central to the United Nations agendas discussed in the final chapter of this book (Chapter IV.3).

Notes

1 As defined in the baseline vocabulary (Chapter I.3 in this volume), in the philosophical and science studies literature, multidisciplinarity and interdisciplinarity are distinguished by a degree of integration, where multidisciplinarity is considered non-integrative and interdisciplinarity integrative (e.g. Bruce et al., 2004; Holbrook, 2013). Transdisciplinarity is generally distinguished by means of a scope of integration; whereas multi- and interdisciplinarity are considered a strictly academic endeavour, transdisciplinary research is usually characterised as a type of cross-disciplinary research that involves the integration of academic disciplinary knowledge with knowledge, values and interests of people outside academia (e.g. Kötter & Balsiger, 1999; Jahn et al., 2012).

2 Andersen & Atkinson (2013), Production and Use of Urban Knowledge also resulted from a COST action.

3 To illustrate the interdisciplinary character of social robotics research and to show what kind of integration takes place in that field, we use the robot Probo, which was developed by a team of Belgian researchers based

at the Free University of Brussels (VUB). Probo is a social robot that is designed to serve as an interface (during therapy) for children with an autism spectrum disorder. It looks like a green elephant, can move its head and can "talk." The main goal of the team working on Probo was to create a robot that has the ability to perform certain movements of the head, eyes, ears, mouth and trunk in an accurate, repeatable and durable way and the ability to express six emotions (happy, sad, disgust, anger, surprise, fear). In more abstract terms, the Probo team wanted to create an artefact with properties that are defined and investigated by different disciplines. The expressing of emotions is a "psychological" feature; the mechanical movements are an "engineering" feature. Developing Probo thus required engineering research (described in detail in Goris et al., 2011) and psychological research (described in detail in Saldien et al., 2010).

4 The typical "cognitive products" in urban planning and social robotics differ strongly. In a literature review, Julie Klein proposes her "Principle #1. Variability of Goals," according to which the cognitive products that cross-disciplinary researchers aim at are diverse. She mentions, for example, technical equipment, information technology protocols, medicines and measuring devices (2008, p. S118). We see this diversity by comparing urban planning with social robotics.

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