

Urban Area Development as an Expansive Learning Process: the Relevance of Monitoring and Evaluation

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1 ABSTRACT

Disciplinary professionals in the field of urban area development deal with the task of preparing the (urban) world that is not yet there. In times of increasing complexity and the invariably rise of contradictions, we propose that continuous learning between actors involved can make the urban area development process more resilient: less susceptible to crisis and more responsive to changing demand. In this paper, we build on our REAL CORP 2019 contribution (Peek & Stam, 2019) and further substantiate the idea of learning as a foundational principle of urban area development and examine whether Engeström's (1987) Activity Theory and expansive learning may be a useful conceptual framework to mobilise learning. We highlight the opportunities of expansive learning through monitoring and evaluation and use primarily outcomes of the monitoring and evaluation tool we designed for Merwe-Vierhavens, a transforming port-industrial area in Rotterdam, to analyse opportunities for expansive learning in the urban area development process.

Keywords: urban area development, expansive learning, monitoring and evaluation

2 LEARNING IN URBAN AREA DEVELOPMENT

Now that the Dutch real estate market is at its peak since the financial crisis of 2008, and supply cannot meet demand, there is a need to combine the strength of pre-crisis integrated urban area development and the openness of organic development during the crisis (Buitelaar et al., 2012) for an after-crisis new reference frame of urban area development, which should include a learning strategy (Peek & Stam, 2019). However, learning theory has never been extensively introduced in the field of urban planning. In this section, we examine the introduction of a learning paradigm next to existing paradigms of planning and production (see e.g. De Hoog & Daamen, 2013), resulting in a more resilient urban area development process (Bertolini, 2011).

2.1 The need for learning in urban area development

Peek and Stam (2019) advocate that continuous learning between all actors involved in an urban area development process could make this process more resilient: less susceptible to crisis and more responsive to changing demand. A resilient development process is more iterative and able to deal with a far more dynamic environment, transitional challenges, ambitions of multiple value creation, while not being able to turn to off-the-shelf solutions, and where multiple learning-loops entail involving a much wider set of stakeholders. Development strategies may no longer be prescriptive, but rather emergent and organic. In order to grasp the challenge of marrying the vast body of literature on learning with the urban area development process, we frame the latter as a network of interacting activity systems. In doing so, we may draw on the theory of expansive learning as initiated by Yrjö Engeström (1987), developed within the framework of cultural-historical Activity Theory (Vygotsky, 1978).

2.2 Urban development as a network of activity systems

Learning theory has largely focused on the individual or an organisation (e.g. the 'learning school' of Mintzberg et al., 1998) as subject. An urban area development process goes beyond this framing. Although the work is done by people in organisations, learning in an urban area development process involves learning across multiple organisations and professional disciplines, which is not always done in a coordinated manner. An urban area development process is better described as a heterogenous actor-network (Latour, 1987; 1996) that is made up of all kinds of human and non-human actors involved and their numerous and often conflicting relations. Thus, there is a need to capture learning as a complex process at hand enrolling

all sorts of properties and contradictions within an actor (e.g. an organisation) while at the same time navigating through the complexities of institutional arrangements and other ‘rules of the game’.

Given such complexities, Engeström’s (1987) third generation of Activity Theory provides a conceptual repertoire that can account for multiple perspectives, and networks of multiple interacting activity systems to examine dialectical practices of detecting and dealing with inherent tensions in the activity system. In *Expansive Learning at Work* Engeström (2001) summarises Activity Theory with the help of five principles, referring to his earlier work:

(1) The prime unit of analysis is a collective, artefact-mediated and object-orientated activity system, seen in its network relations to other activity systems. All actions are only understood when interpreted against the background of entire activity systems. Activity systems realise and reproduce themselves by generating actions and operations.

(2) Activity systems are multi-voiced. An activity system is always a community of multiple points of view, traditions and interests. The multivocality is amplified in networks of interacting activity systems. It is a source of trouble and a source of change and innovation, demanding actions of translation and negotiation.

(3) Activity systems take shape and get transformed over lengthy periods of time. Their problems and potentials can only be understood against their own history.

(4) In activity systems contradictions are the source of change and development. Contradictions are not the same as problems or conflicts. Contradictions are historically accumulating structural tensions within and between activity systems. When an activity system adopts a new element from the outside – for example, a new technology, new object or a new player – it often leads to an aggravated secondary contradiction where some old elements collide with the new one. Such contradictions generate disturbances and conflicts, but also innovative attempts to change the activity.

(5) Activity systems may undergo expansive transformations. As the contradictions of an activity system are aggravated, some individual participants begin to question and deviate from its established norms. In some cases, this escalates into collaborative envisioning and a deliberate collective change effort.

Taken together, Engeström’s elaboration of expansive learning in interacting activity systems offers an appropriate conceptual framework to examine how transformative change (Peek & Stam, 2019) can be brought about in urban area development.

2.3 Expansive learning in urban area development

There has been recent interest in framing urban area development in terms of expansive learning. For example, Larsson and Homberg (2018) reflected on the Challenge Lab at Chalmers University of Technology Goteborg Sweden to evaluate how students in this laboratory created value by facilitating a dialogue that integrated actors from different sectors – some of whom are not familiar with working with one another – to produce innovation solutions. Through specific cases of electromobility, addressing stormwater pollution and flooding, and low-carbon transitions, Larsson and Homberg’s account of the Challenge Lab showed how contradictions between local needs and global concerns, and between current problems and future visions can be addressed discursively through the process of expansive learning.

Expansive learning is, however, not unproblematic. Galvin and Simmie (2017), for example, examined an urban regeneration partnership in the Republic of Ireland to show how such partnerships are complex sites of discursive struggle. They unpacked several emerging contradictions in the partnership, including tensions between local communities wanting to be kept intact and policy visions of transforming neighbourhoods. While expansive learning to deal with these discursive struggles has led to what Galvin and Simmie termed as ‘expansive participation’ on the one hand, they also captured how the rhetoric of empowerment in the context of neoliberal democracy is reinforced on the other hand. Their analysis lay open the power asymmetries between the stakeholders involved and show how expansive learning is also an arena for communities – and community-based knowledge – to resist and counteract professional knowledge.

A number of key points can be drawn from studies that mobilise expansive learning in urban area development. First, the transformation of urban areas implies the necessary condition of broadening participation, especially with new actors who are not already involved in and familiar with the urban area development process. Thus, the inclusion of new players invariably raises the potential for tensions and

contradictions, which in turn means that parties must engage in expansive learning to learn from one another. Second, while contradictions have often been regarded as a negative thing to be avoided, expansive learning requires contradictions to be worked through, since these tensions are the basis for propelling novel actions. Third, the transformation of urban areas also means that maintaining the status quo is no longer an option. This means that existing processes and the assumptions that underpin these will need to be reformed. Thus, following current practices and planning prescriptions should give way to radical ways of transforming the activity system. Engeström's Activity Theory and expansive learning provides a useful framework to systematically examine and influence the activity systems of urban area development so that transformative outcomes can form the focal point for addressing transitional challenges and change.

2.4 Expansive learning as a strategy

Conceptualising the urban area development process as a network of interacting activity systems, involving multiple actor groups or communities and numerous professional disciplines all dealing with transitional challenges, means that in order to come to some sort of effective collective action boundaries must be spanned or even crossed. This involves higher levels of learning. What can my professional knowledge or asset bring to someone from another disciplinary field? Why is it that my behaviour is not interpreted as I would have expected by someone from a different community? These are questions that only come to mind in situations involving conflicts, dilemmas, disturbances and local innovations. These are the kind of contradictions, as Engeström calls them, that may become actual driving forces of expansive learning in urban area development. In successful expansive learning, this eventually leads to a qualitative transformation of all components in the activity system (Engeström, 2001).

Traditionally, we expect that learning is manifested as changes in the subject, i.e. in the behaviour and cognition of the learners. In urban area development we must learn new patterns and forms of activity (objects) which are not yet there. They are literally learned when they are created and there is no competent teacher. Standard learning theories have little to offer if one wants to understand these processes: "boundary crossing entails stepping into unfamiliar domains. It is essentially a creative endeavour which requires new conceptual resources. In this sense, boundary crossing involves collective concept formation" (Engeström, 1995, p. 133). In other words, expansive learning is manifested in a trichotomy: 1) expanded patterns and forms of activity, 2) corresponding theoretical concepts, and 3) new types of agencies (Engeström & Sannino, 2010).

Expansive learning leads to the formation of new or expanded patterns and forms of activity oriented to the object. This involves the formation of a new theoretical concept of the new activity, giving rise to those new activities. This formation of complex concepts is not just internalisation of culturally given concepts but above all externalisation or generation of culturally new concepts – which also need to be internalised in use. This requires collective and distributed agency, questioning and breaking away from the constraints of the existing activity and embarking a journey across uncharted terrain (Engeström, 2015). For example, designers may see the resemblances with their work – although here we may rather speak of collective designing – not so much of artefacts but rather of actions or interventions. As such, agency or the participants' ability and will to shape their activity systems is the most important outcome of expansive learning.

2.5 Expansive learning through monitoring and evaluation

In our case, the entire network of activity systems in which learners are engaged – the urban area development process – is subject of expansive learning. What we aim at in the end is to entail cultural and institutional change and new patterns and forms of activity, leading us to novel actions in the network of interacting activity systems and transformative change in urban area development processes. We need to design and develop new tools and situations that may mobilise expansive learning, being aware that this needs to occur in a changing mosaic of interacting activity systems which are energised by their own inner contradictions (Engeström, 2001). Peek and Stam (2019) advocated monitoring and evaluation as a potential tool to foster continuous learning including recurring strategy-checking, although not yet embedded in a conceptual framework of Activity Theory and expansive learning.

Last year, we introduced monitoring and evaluation to the complex network of interacting activity systems in the redevelopment process of Merwe-Vierhavens (shortly M4H), a transforming port-industrial area in

Rotterdam. Although not initially thought of or designed as a tool to mobilise expansive learning, in this paper we examine its potential as such. In line with the theory of expansive learning, we may question ourselves:

- (1) Does the design of the M4H-monitor lead to new patterns of activity?
- (2) Does the design of the M4H-monitor involve a new theoretical concept?
- (3) Does the design of the M4H-monitor bring about a new type of agency?

Although we can only build on primarily findings, we will use the first lessons learned in the design and execution of the M4H-monitor to further examine the opportunities for expansive learning in urban area development through monitoring and evaluation.

3 MONITORING AND EVALUATION IN URBAN AREA DEVELOPMENT

In section 2 we have described a conceptual framework to systematically examine and influence the activity systems of urban area development processes, which we found in Engeström's Activity Theory and expansive learning. In this section we highlight the professional debate amongst scholars, urban planners, policymakers and data-scientists on the relevance of monitoring and evaluation and the use of data in urban area development processes. Several arguments raised by disciplinary professionals complement our conceptual propositions on the relevance of monitoring and evaluation.

3.1 Increasing complexity of urban area development

The first argument lies in the increasing complexity of urban area development. Today, technology, demography, economy, climate and mobility increasingly determine the physical design of our urban areas. Our current planning instruments seem unable to forecast the appearance of our living and working environments in ten, twenty or thirty years (Verhoeven, 2019). Often, an urban area development process takes decades, making it almost impossible to design blueprint plans that capture the future of our urban areas: there is simply too much uncertainty. However, capturing future designs and linked business cases in blueprint plans is at the heart of the Dutch planning tradition (Peek, 2015). In this classic planning process, the role of monitoring and evaluation is restricted to checking implementations of pre-designed plans (Peek & Stam, 2019).

The increasing complexity of urban area development requires adaptive planning processes, including flexible plans: we can decide on goals and ambitions for an area, not yet on concrete functions and activities that contribute to those goals and ambitions. Monitoring and evaluation – and so data-collection – then provide insight in the effectivity of actions, interventions and strategies, and offer urban planners and policymakers up-to-date information to respond to changing demand (Verhoeven, 2019). In action, this means actors act on the one hand, and on the other monitor and evaluate whether it brings the expected results (Verdaas et al., 2018). Potentially, data help urban planners and policymakers to make better decisions and with monitoring and evaluation we embrace the current uncertainty in urban area development.

3.2 Participation of local actors

Complexity increases even more since urban area development today is largely about transformations of inner-city (port)industrial areas, in which living and working is mixed in high densities. In the Netherlands we are not yet familiar with such a form of urbanity (Alkemade et al., 2019). In transformations, disciplinary professionals must collaborate with current residents, entrepreneurs and other users in an area, who may value their neighbourhood differently and may have their own ideas on future plans. Therefore, disciplinary professionals and local actors must collectively operationalise multiple value creation. With new actors who are not already involved in and familiar with urban area development processes, the potential for tensions and contradictions within and between activity systems invariably raises.

Verdaas et al. (2018) argue, in complex planning processes, it pays off to invest in a shared foundation: joint fact finding. With a decent empirical foundation all stakeholders involved in the planning process may develop a common vision on challenges and urgency. When such a foundation is missing, later on this will result in tensions, process delay and additional costs. Monitoring may provide an empirical foundation and evaluation may facilitate joint fact finding among disciplinary professionals and local actors. Continuous monitoring then provides insight in ongoing trends and may substantiate the need to adjust or design new

actions, interventions and strategies. Monitoring and evaluation provide a foundation for an adaptive and collective development process. The Dutch Council of State (2018) rightfully underlines the importance of traceability and transparency in data-collection and decision-making.

3.3 Introduction of a new Environmental and Planning Act

The arguments as described above – increasing complexity of urban area development and participation of local actors – merge in the new Environmental and Planning Act (Omgevingswet) which is envisioned to simplify regulations on the physical environment in the Netherlands. The Environmental and Planning Act obligates governmental and municipal institutions to adopt adaptive planning processes in urban area development. As we have seen, adaptive planning processes cannot without effective monitoring and evaluation. Moreover, the Environmental and Planning Act advocates a transparent development process in which decisions are made based on information that is available for everyone: open data. With this, the Environmental and Planning Act aims to create a level playing-field for every actor involved in the development process. The forthcoming introduction of the Environmental and Planning Act in 2021 will result in a legal obligation to put monitoring and evaluation at the heart of development processes.

However, despite all opportunities seen by scholars and professionals, data is anything but a foundational principle in urban area development (Janse, 2019). A primary example of monitoring and evaluation – in relation to the Environmental and Planning Act – is the Haven-Stad project in the Dutch capital city of Amsterdam. Here, the main goals of monitoring and evaluation are to make sure the Environmental Impact Assessment is up-to-date and to make sure the goals and ambitions of the development strategy are realised (Dolman, 2019). By generating data during the development process, urban planners and policymakers always have an up-to-date image of the physical environment. A biennially monitoring report evaluates whether it is necessary to adjust or design new actions, interventions and strategies (Verhoeven, 2019).

3.4 Data-supported or data-driven development processes

We conclude this section with a critical note: data do not tell us everything. Data do not simply generate the perfect answer and might overlook stories that are hard to quantify. Without any knowledge and input from the local activity system, data-driven decisions deliver unfeasible solutions. And, the simple argument ‘the data tells us so’ kills every fruitful discussion. Data are input to the decision-making process and not the decision-making process itself. Therefore, we embrace the point of view that advocates a data-supported development and decision-making process rather than a data-driven process (Van den Berg, 2019; Vermeulen, 2019). In other words, monitoring and evaluation may be useful, it can never be the one and only tool or situation that is used to mobilise expansive learning.

4 LEARNING IN THE ROTTERDAM MAKERS DISTRICT

We illustrate our conceptual framework of urban area development process as an expansive learning process with the development of Rotterdam Makers District, our object of research over the last five years. In 2019 we – the Research Centre for Sustainable Port Cities in close collaboration with City and Port authorities – designed a monitoring and evaluation tool for the development process of Merwe-Vierhavens (in short M4H). M4H is a transforming port-industrial area situated approximately four kilometres from Rotterdam’s city-centre and is part of Rotterdam Makers District. In this section we describe the development process of the Rotterdam Makers District and introduce our prior explorations of learning in the transformation of M4H.

4.1 Developing the Rotterdam Makers District

The city of Rotterdam has a long history in urban waterfront redevelopment projects. In 2004, the City and Port authorities announced the new major Stadshavens (City-Ports) project: 1600 hectares of waterfront development along the Meuse river (see figure 1). However, it soon became clear that this area was too large and too diverse to develop simultaneously (Daamen, 2010), as various port areas in the Stadshavens project still made a significant contribution to the port’s operations. In recent years, the focus of the City and Port authorities has been on the redevelopment of RDM, the 30-hectares former shipyard of the Rotterdam Drydock Company, and M4H, a 120-hectares transforming port-industrial area specialised in storage and trans-shipment of fruit and juices.

In 2015, RDM and M4H were collectively branded as the Rotterdam Innovation District, and in 2017 rebranded as the Rotterdam Makers District. The Makers District is envisioned as an attractive business location for innovative manufacturing companies and young entrepreneurs, characterised by additive manufacturing, robotisation and material science, simply described as ‘makers’. Instead of a ‘port out-city in’ approach, in RDM and M4H the City and Port authorities apply a joint ‘port-city’ approach, creating crossover areas where the economies of port and city merge. The redevelopment of RDM is nearly finished, the transformation of M4H has just started. After years of strategy-formation and community-building, the very first projects (e.g. transformation of historical buildings and infrastructural interventions) in the new port-city approach are now underway.

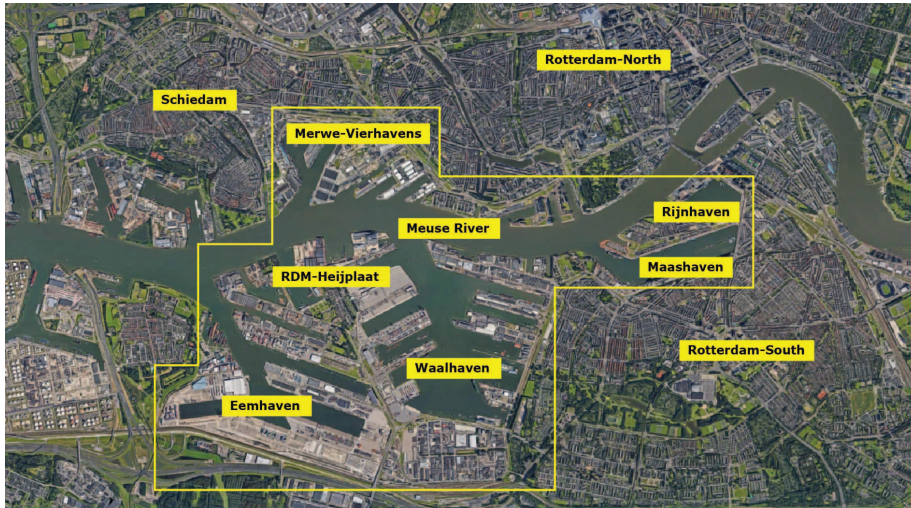


Fig. 1. The Stadshavens project area in Rotterdam. Recent focus has been on the development of RDM and Merwe-Vierhavens, branded as Rotterdam Makers District. Heijplaat refers to the village that was built for the Rotterdam Drydock Company workforce.

4.2 Multiple changing sociotechnical systems

A joint governance process between City and Port authorities in port-city planning as found in Rotterdam is the exception rather than the rule (Daamen & Vries, 2013). The involvement of the Rotterdam Port Authority in urban area development is the result of the transitional context wherein the port operates. A changing energy system and growing societal pressure are leading the port of Rotterdam into transition to low-carbon activities (Bosman et al., 2018). The Rotterdam Port Authority increasingly focuses on economic development and renewal through innovation and entrepreneurship and hence developed special interest in crossover areas in the realm of city and port. In this new port governance, RDM was developed to accommodate large companies, young entrepreneurs, students and researchers who collaborate on innovations that contribute to smart and low-carbon port operations.

With the branding of Rotterdam Innovation District in 2015, the innovation-oriented strategy skipped over to M4H on the north bank of the Meuse river. From the onset of the Stadshavens project, major urban waterfront redevelopment was planned for M4H. However, as a result of the financial crisis of 2008 those ambitions came to a halt. In 2015, the City and Port authorities presented a new development strategy that was not so much a plan with a linked business case, but rather an open invitation to local actors to participate in the development process (Peek, 2015). This organic and bottom-up approach of urban area development resulted in an emerging living lab environment, not just for innovative companies and entrepreneurs but for disciplinary professionals and policymakers also. Over the years, an active and committed M4H-community developed, including disciplinary professionals and policymakers, local architects, designers and craftsmen, innovative start-ups and local research institutions.

We take M4H as a single case-study because it provides a unique and timely example of simultaneously changing sociotechnical systems like port-city planning, housing, economic development, energy transition and urban mobility including numerous professional disciplines. Those simultaneously changing sociotechnical systems are in M4H married with an organic and bottom-up approach of urban area development (see table 1). In M4H, the City and Port authorities experiment with new roles, new coalitions and new business models (Peek, 2015). We observe elements that may foster learning in the complex

network of activity systems in the development process of M4H, potentially leading us to transformative changes in urban area development (Peek & Stam, 2019).

Variable	RDM	M4H
Location	South bank	North bank
Land area	30 hectares	120 hectares
Properties	Industrial heritage	All sorts
Ownership	Port Authority	City and Port authorities
Strategy	Integrated	Organic
Approach	Top-down	Bottom-up
Management	Project	Process
Innovation	Triple-Helix	Quadruple-Helix
Result	Campus	Living lab

Table 1: Different approaches to urban area development in RDM and M4H

4.3 Single and double loop learning

In our prior explorations of learning in M4H (see Peek & Meijer, 2016 and Peek & Stam, 2019) we drew on the theory of ‘single and double loop learning’ as initiated by Chris Argyris (1977). In those explorations we view innovation in RDM and M4H as a first loop of learning. In RDM, innovation is based on the Triple-Helix of university-industry-government relations as initiated by Etzkowitz and Leydesdorff (1996). In M4H, local actors are involved in innovation. Here, we observe elements of the Quadruple-Helix as initiated by Carayannis and Campbell (2009). The pre-planned and top-down redevelopment of RDM did not bring major additional opportunities for learning. In the organic and bottom-up transformation of M4H this is different. The development process is open for local actors to step in and actively participate in this process. Here, the first learning-loop of innovation blends with the learning-loop that co-exists with an organic and bottom-up approach to urban area development: a second loop of learning. It is about the ‘makers in the district’ as well as about ‘making the district’. The transformation of M4H is part of the innovation process itself.

The theory of single and double loop learning allowed us to describe the distinctly different approaches to urban area development of City and Port authorities, and to explain the different opportunities for learning and innovation in RDM and M4H. Peek and Meijer (2016) argued it is the challenge of Rotterdam Makers District to further explore the potential of double loop learning in M4H. In addition, Peek and Stam (2019) focused on several conditions that may foster learning in the development process. In this paper, we view the development process of M4H as a network of interacting activity systems – including multiple actor-groups and numerous professional disciplines– and examine whether Engeström’s (1987) Activity Theory and ‘expansive learning’ may be more useful in order to introduce learning theory to the field of urban area development.

5 DESIGNING A MONITORING AND EVALUATION TOOL FOR M4H

In 2019 we designed and executed a monitoring and evaluation tool for the organic development process of M4H. Initially, this tool was meant to strengthen the ‘story of M4H’ with recent facts and figures and to provide insight in the development process to politicians, administrative clients and other stakeholders. Although not initially thought of or designed as a tool to mobilise expansive learning, we were aware of its transitional potential (Peek & Stam, 2019) but did not see it in the perspective of expansive learning as we do now. In this section we elaborate on the design and first execution of the M4H-monitor.

5.1 Ambitions, subjects and Key Performance Indicators

As we explained in section 4, the City and Port authorities apply an organic and bottom-up approach to urban area development of M4H, meaning there is no blueprint future plan for the area. Instead, the ambitions as captured in the Vision and Strategy for Rotterdam Makers District in 2017 are the starting point of the development process. This envisioning document proposes five overarching ambitions for RDM and M4H:

- (1) Rotterdam Makers District attracts and facilitates innovative companies and entrepreneurs with an accent on companies and entrepreneurs characterised by additive manufacturing, robotisation and material science.
- (2) Rotterdam Makers District creates jobs for the breadth of the population of Rotterdam, not just for higher-educated but for lower-educated and vulnerable citizens with less or no education also.

(3) Rotterdam Makers District is an open innovation environment in which companies and entrepreneurs intensively collaborate with each other as well as with students and local knowledge institutions.

(4) Rotterdam Makers District contributes to the housing programme of the Rotterdam region and so develops an urban living and working environment which must be realised in M4H.

(5) Rotterdam Makers District develops as a living lab and showcase for the circular future of city and port in which innovations are invented, designed, tested and applied.

For monitoring, these ambitions must be translated into measurable Key Performance Indicators (KPIs). However, the ambitions are rather envisioning and therewith relatively abstract. To overcome the gap between ambitions on the one hand and KPIs on the other, we first translated the ambitions into so-called subjects in the development process of M4H. For example, below the ambition of developing an urban living and working environment are subjects like housing, amenities and public space. For every subject we proposed several KPIs. The KPIs are constructed upon measurement data. For example, to construct the KPI average company size we had to know the total number of companies and the total number of jobs in M4H, whereby the latter are measurement data.

The KPIs then provide insight in the development of every subject and allow disciplinary professionals and policymakers – and the authors as embedded researchers – to evaluate how subjects develop in relation to overarching ambitions. It is crucial not to just evaluate whether we are underway, but also whether it is still the best and desirable way: recurring strategy-checking (Peek & Stam, 2019). Herein lies the potential of monitoring and evaluation as a tool to mobilise expansive learning. Yet, the entire M4H-monitor covers almost twenty subjects in the development process of M4H. To prevent an enormous workload, we chose to organically develop the M4H-monitor, and construct KPIs per subject step-by-step. In 2019 we explicated economic activities in M4H and further examined the subjects companies and jobs.

5.2 Limitations to monitoring and evaluation

In designing a monitoring and evaluation tool for M4H, we were confronted by several limitations. First, to start monitoring one of the first steps is to define a reference point, in which it may be tempting to look back in time as far as possible. However, in our case we were limited by an administrative boundary correction of the project area, and as a result, measurement data of before 2014 were not comparable with measurement data of after 2014. This forced us to choose 2014 as the reference point of monitoring, which is, in the end, a natural reference point since the focus of City and Port authorities has been on the transformation of M4H from 2014-2015 onwards.

Second, we discovered that several subjects we defined based on ambitions, are not easily traceable using KPIs. For example, subjects like companies and jobs are perfectly measurable in KPIs, which is very different from measuring subjects like inclusivity or collaboration. These latter subjects are hard to quantify, making it difficult to capture them in KPIs. Further and in-depth research – both quantitative and qualitative – is needed to construct appropriate KPIs for those subjects. Moreover, since M4H is still largely a port-industrial area, many data that is available for the city's living neighbourhoods is not yet available for a working-area like M4H.

For the construction of KPIs we largely built upon measurement data from external resources. Then a third limitation is that we are depending on time-paths of those external resources. Therefore, the measurement data of several KPIs in the M4H-monitor are not as recent as intended. For example, economic data of 2018 were only available in the last months of 2019. After analysing and evaluating the data, we were able to present outcomes of the 2019-execution of the M4H-monitor no sooner than February 2020, while the facts and figures in the publication are of 2018. Hence, recent projects and developments are not reflected in the 2019-execution of the M4H-monitor. We tackled this issue by including a qualitative overview of projects and developments that took place in 2019 and noted that these projects and developments will be reflected in future executions of the M4H-monitor.

Fourth and finally, we must discuss accuracy and reliability of available data. Many data, and particularly economic data, are appropriate for macro-level analyses (e.g. on the level of cities or regions) but contain inaccuracies at the micro-level, the level we are looking at in urban area development. Only a small amount of inaccuracies may have large impact on the data and so on conclusions drawn from evaluation. In the case of M4H, we manually corrected prominent inaccuracies in the data. Our experiences underline the

importance of sufficient contextual knowledge to turn raw data into useful information (Van den Berg, 2019) and effectively execute monitoring and evaluation in urban area development processes.

5.3 Outcomes of the M4H-monitor

The contentive outcomes of the M4H-monitor are, off course, particularly relevant for actors involved in the development process of M4H. In this paper, we are particularly interested in the opportunities for expansive learning in the development process through monitoring and evaluation, which we will further discuss in section 6. The design and execution of the M4H-monitor has resulted in an extensive database including approximately fifty KPIs organised into subjects. A corresponding monitoring and evaluation plan captured the construction of every KPI so that the database can be updated annually with recent measurement data. In the first execution of the M4H-monitor we further examined the subjects companies and jobs (see figure 2). These additional research efforts significantly increased the accuracy and reliability of KPIs under these subjects. In the coming years, we aim to further design the M4H-monitor and conduct additional research efforts on different subjects. To share outcomes with politicians, administrative clients and the whole M4H-community, we designed a printed flyer that summarises both the design and the outcomes of the first execution of the M4H-monitor.

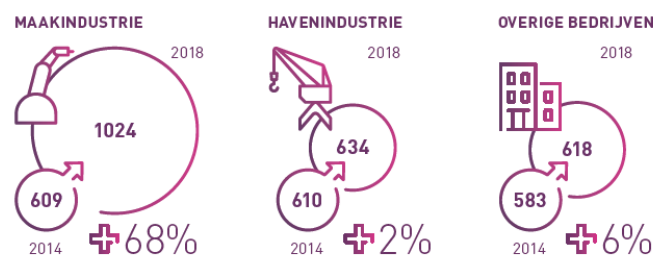


Fig. 2. An example of an infographic as presented in the printed flyer. The infographic is created by creative agency Friends For Brands and shows the number of jobs per economic industry, from left to right: 1) innovative manufacturing industries, 2) traditional port operations, and 3) other industries. The rather simple conclusion based on this infographic may be that M4H indeed creates jobs in innovative manufacturing industries – as envisioned in the ambitions – without reducing the number of jobs in traditional industries.

6 CONCLUSION AND DISCUSSION

In this paper, we frame an urban area development process as a complex network of interacting activity systems and introduce Engeström's (1987) Activity Theory and expansive learning in this process. In doing so, we build upon Peek and Stam (2019) who advocate that continuous learning between all actors involved can make urban area development processes more resilient. We highlight the opportunities of expansive learning through monitoring and evaluation and use Merwe-Vierhavens (shortly M4H), a transforming port-industrial area in Rotterdam, as a single case-study. In this section we reflect on our findings and discuss the potential of expansive learning through monitoring and evaluation.

6.1 Potential of expansive learning in urban area development

Recently, expansive learning has been introduced in the urban context (see e.g. Galvin & Simmie, 2017 and Larsson & Holmberg, 2018). Engeström's elaboration on expansive learning in interacting activity systems offers an appropriate conceptual framework to examine how transformative change (Peek & Stam, 2019) can be brought about in urban area development. Peek and Stam (2019) advocate monitoring and evaluation as tool that potentially may foster continuous learning, although not yet embedded in the conceptual framework of Activity Theory and expansive learning. In 2019 we – the Research Centre for Sustainable Port Cities – designed a monitoring and evaluation tool for the development process of M4H. Although not initially designed as a tool to initiate expansive learning, we were aware of its transitional potential.

When actors in an urban area development process both act and monitor and evaluate what it brings (Verdaas et al., 2018), we may observe a learning-loop. Through monitoring and evaluation, we learn what works (or not) and learn when it is time to design new actions, interventions or strategies. Monitoring and evaluation provide answers, but also raise new questions that will deepen and strengthen the development process. Thus, monitoring and evaluation may foster learning in urban area development, and we may recognise

learning in urban area development then in actions, interventions and strategies whereof the focus or goals have clearly changed (De Hoog & Daamen, 2013).

With new actors who are not already involved in and familiar with urban area development processes, the potential for tensions and contradictions within and between activity systems invariably raises. And, while contradictions are often regarded as a negative thing to be avoided (Verdaas et al., 2018), expansive learning requires contradictions to be worked through, since contradictions are the source of change and innovation in activity systems (Engeström, 2001). Hence, an active and committed local community is indispensable in a network of interacting activity systems to come to transformative change in urban area development. In the end, resilient cities do not develop by brilliant plans but rather through evolutionary processes of expansive learning with all different actors of what are common challenges and urgencies in urban areas (Bertolini, 2011; Peek & Stam, 2019).

Towards expansive learning through monitoring and evaluation

We may reflect on expansive learning through the M4H-monitor, but these are rather preliminary findings and need to be interpreted carefully. However, we observe elements that potentially mobilise expansive learning in the complex network of interacting activity systems, potentially leading us to transformative change in urban area development. To start with, the design of the M4H-monitor may be thought of as being a new form of activity. Both the City and Port authorities executed monitoring and evaluation before, however not yet in the context of a complex urban area development process as found in a transforming port-industrial area like M4H. Building on prior experiences within both activity systems, the City and Port authorities took the initiative to intensively collaborate with a local research institution to design a M4H-monitor since they recognise the relevance of monitoring and evaluation.

In some sense, the same is done in the Haven-Stad project in Amsterdam. Potentially, the monitoring and evaluation tools designed for M4H and Haven-Stad enable the exchange knowledge in a more coordinated manner instead of the fragmented collaboration today. Here, two very different networks of interacting activity systems may be connected through monitoring and evaluation in order to learn mutually from the two networks of activity systems. What makes the M4H-monitor a potentially valuable tool to mobilise expansive learning is that it covers the full breadth and thus a wide variety of subjects in the development process, including multiple simultaneously changing sociotechnical systems. Hence, through the M4H-monitor we learn when to adjust or design new actions, interventions and strategies. The relatedness between subjects in the development process – which is reflected in the monitor – provides detailed insight in the interdependence of subjects in such a complex urban area development process.

We also found a contradiction that may (potentially) lead to a new theoretical concept. The outcomes of the M4H-monitor increased discussions between City and Port authorities on what kind of companies must be seen as ‘makers’. RDM attracts and facilitates port-related companies while M4H due to the larger land area may accommodate a wide variety of companies. However, the design of the monitor fuelled discussions whether innovative start-ups in, for example, the life sciences and health sector must be seen as makers, since this economic sector is well represented in M4H. In addition, the design of the monitor showed that innovative and fast-growing start-ups are not the ones that make a major contribution to jobs for local and lower-educated citizens. Those findings expose a contradiction between the ambition to attract and facilitate innovative (manufacturing) companies on the one hand and create jobs for the breadth of the population of Rotterdam on the other hand. Potentially, those outcomes of the monitor may lead to a change in acquisition-policy and marketing strategy of the City and Port authorities, which may be developed into a new theoretical concept.

6.2 Conclusion and future research ambitions

In analysing outcomes and initial impact of the M4H-monitor we found some elements for (potential) expansive learning in the development process of M4H. Engeström’s Activity Theory and expansive learning thus may be a useful conceptual framework to mobilise expansive learning in urban area development processes, although we are aware that these are preliminary findings and therefore rather precarious. Moreover, in the future we may challenge monitoring and evaluation as a lagging performance management practice to one that shows how monitoring and evaluation of outcomes can be more proactive and prospective rather than reactive and retrospective. Here, expansive learning may be particularly applicable. By expanding participation to stakeholders who are not familiar with the urban development

process, this raises the opportunities for expanding on what are valuable outcomes, which in turn creates the impetus for change.

In this paper we introduced a conceptual framework from the learning theory in an urban area development process, which is rarely done before. This paper builds on our earlier explorations of learning in urban area development but may mark a next phase in our work at the same time, since we aim to further explore learning in urban area development in the future in order to reach transformative change. A promising start is made with the approval of a new consortium-based and subsidised project in collaboration with Delft University of Technology and the University of Amsterdam which focuses on accelerating deep transdisciplinary and interprofessional learning for innovative actions, interventions and strategies of deep sustainable transitions in port area development.

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