Planning and Experimental Knowledge Production: Zeche Zollverein as an Urban Laboratory

PHILIPP DORSTEWITZ

Abstract
Within a time span of 10 years, the old colliery Zeche Zollverein in Essen, Germany, was transformed from a troubled brownfield to a celebrated UNESCO world heritage site. In 2010 it served as the central hub for events held during Essen’s year as European Cultural Capital. In this article I argue that we should consider Zollverein as an urban laboratory and understand its planning history as an experimental inquiry process in the Deweyan sense. I develop the concept of an ‘urban laboratory’ by paralleling the contexts of urban planning on Zollverein with recent developments in the philosophy of science and science studies on scientific laboratories. Laboratory work is understood as context-bound experimental practice focused on resolving concrete problem situations. Theory and experimental practice are more closely linked than traditional views have held. Scientific inquiry must always be understood as a normative quest and cannot be reduced to a descriptive task of representing nature. Finally, I frame laboratory work as a transactive social process in which a community of inquiry is formed and transformed. These four ideas help to adapt the concept of scientific laboratory to urban planning contexts, and I use the Zollverein case study to illustrate these characteristics.

Introduction
Zollverein is an abandoned colliery and coking plant near the centre of Essen in Germany. With its gloomy, dirty and rusty structures and overgrown mining waste-tips, it was widely regarded as an expensive liability of a bygone industrial age. After being abandoned by its owners, demolition and redevelopment plans were pursued. Today, the entire area is a protected UNESCO world cultural heritage site and an international hot spot for design, dance and fine arts. Zollverein was also the central coordinating place for all programme activities during Essen’s year as European Capital of Culture in 2010. How did this transition happen and what concepts can we use to describe it? In this article, I claim that traditional notions of planning as providing services, solving a set of local problems, or creating environments that facilitate everyday pursuits of client groups and local citizenry cannot fully account for this experimental project.

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In the case of Zollverein, goals, visions and plans were developed continuously and, most importantly, the intellectual, normative and aesthetic ideas that guided Zollverein’s transformation from a brownfield to an internationally recognized industrial-heritage site were lacking at the outset and had to be developed during the planning process. I argue that Zollverein should be described as an urban laboratory, and this is possible without overstretching the scientific laboratory concept. The project is best understood as following a situated Deweyan inquiry process (Dewey, 1938; 1996 [1882–1953]) in which theoretical inspection and practical experiment overlap. Zollverein generated creative solutions for a complex problematic situation and produced transferable theoretical insights. The story of Zollverein is an ongoing quest for new aesthetic, historical, cultural and moral concepts.

In this article, I provide a comprehensive description of Zollverein to illustrate the relevance and fertility of abstract notions that constitute the concept of ‘urban laboratory’. Essen council member Oliver Scheytt wrote an article titled ‘Zollverein: a laboratory’ (2002) to advertise its innovative potential and regional impact. I investigate this notion and outline the conceptual groundwork for a theory of ‘urban laboratories’. Instead of providing a turnkey concept of ‘urban laboratories’, including necessary and sufficient conditions, I summarize a research trajectory that traces recent transformations within the scientific laboratory concept and suggest how this is amenable to the context of urban planning. Zollverein is a case of experimental land-use planning that demonstrates how we can begin to think of urban design as experimental laboratory science.

In the early 1990s, I participated personally in a demonstration against the demolition of significant parts of the ensemble. Since then I have followed the developments of Zollverein through the study of media content, planning documents and academic publications, as well as through multiple personal visits. I also conducted semi-structured interviews with Walter Buschmann (formerly working for the heritage protection agency Rheinisches Amt für Denkmalpflege), who presented a rich picture of historical and political details, and Ute Durchholz (press officer of the Stiftung Zollverein), who, during a series of interviews, imparted an insider’s perspective on the structures and dynamics of Zollverein’s development.

Zollverein can be understood as a case of culture-led regeneration, a movement in urban planning that focused on iconic cultural initiatives as a key to transforming burdened post-industrial cityscapes into new, service-oriented yet historically embedded destinations (Hauser, 2001; Garcia, 2004; Miles, 2005). Cultural projects such as the Internationale Bau-Austellung (IBA) Emscher Park exhibition or an international dance fair on the site ignited transformative processes that led to the establishment of flagship institutions such as the dance school PACT and the Red Dot Design Museum. These were cultural catalysts for realizing new creative industries and making Zollverein a place of regional cultural identification. The reflections by Miles (2005: 922) about the Newcastle Gateshead Quayside also apply to Essen’s abandoned colliery: ‘[These] [l]andmark sites . . . have a significant symbolic and material power. They make a powerful statement about a place and that place’s intentions. But that statement is not . . . imposed upon the people of a city. Its meanings are at least potentially open to negotiation’.

Susanne Hauser (2001) studied how planners have approached industrial ruins, wastelands and ‘refuse’, and traced the creation and negotiation of new meanings through three basic strategies: commercial redevelopment, musealization and creation of green spaces. All three strategies are manifest on the Zollverein site. Hauser points specifically to the capacity of ‘musealization’, which turns refuse into a resource for

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1 Only a very rough framework of mission statements was drafted in the early stages (Der Oberstadtdirektor et al., 1993). These included design/business, science/education, and culture and history. While the mission statements provided an important orientation for further developments, they cannot be interpreted as a master plan.
the ‘creation of a past, an identity, a history’ (ibid.: 85). This reinterpretation of decommissioned technological artefacts as objects of historical value is more than the rehabilitation and re-use of disposed objects. It is a way of creating ‘crystallising points’ for models of a post-industrial environment (‘Umweltmodelle’) (Hauser, 2001; 2007a). Hauser (2001: 38) understands ‘model-building’ as a ‘fundamental semiotic activity’, which manifests itself equally in practices of urban planning, arts and science. Hauser’s project aims at ‘identifying the way in which concepts are created and transformed, which determine the material conditions for planning’ (ibid.: 14).

In this article, I adopt a perspective that is compatible but not congruent with that of culture-led regeneration. The notion of the ‘urban laboratory’ is an independent analytical framework with the power to guide and facilitate new planning processes explicitly as forms of inquiry and knowledge production. Specific to this approach are processes of experimentation and exploration, which are driving forces in productive and creative urban transformation processes. In her article ‘Über das Forschen (in) der Architektur’, Hauser delineates the possibility of ‘developing a programme of research and knowledge transfer’ for architecture based on a ‘history of science of architecture.’ (Hauser, 2007a: 95) She continues: ‘An investigation of this form would be one way of assigning architecture a place in the production of knowledge and thereby within contemporary science’ (ibid.). In a concluding remark to the article, Hauser proposes architecture as a potent field for studying approaches to ‘complex and ill-defined contexts in which tensions between technology and society are investigated and instruments are developed and tested’ (ibid.: 96) [my translations]. The present article pursues a similar idea, while focusing on the related field of urban planning and design.2

Urban planning and scientific inquiry

Framing planning as laboratory science constitutes a novel approach, although close links between theories of science and planning theory have always existed (cf. Camhis, 1979). Classic instrumental planning models (Dror, 1968; Chadwick, 1970; Banfield, 1973; Davidoff and Reiner, 1973) often embraced a positivistic paradigm by modelling planning not merely as the application of scientific knowledge but as a process that mimics the scientific process of hypothesis formulation and experiment (cf. Chadwick, 1970). Critics introduced hermeneutic and humanist notions from social sciences into planning theory, drawing attention to the symbols, meanings and narratives that participants use in planning processes (Checkland, 1981, Allmendinger and Tewdwr-Jones, 2002). Incrementalists such as Lindblom and Faludi modelled planning after Popper’s falsificationism in science and interpreted social coordination through planning as a heuristic trial-and-error procedure in which hypotheses (plans) and experiments (implementations) are continuously and mutually adapted.

Some planning scholars see more than inspiring analogies in scientific research processes. Critical planning theorists such as Ulrich (1983), Friedman (1987), Forester (1993) and Hoch (2007) understand planning as a social enterprise in which planners provide other participants with the means to explore their material and ideological conditions. Critical theorists agree that social scientists must involve their subjects in the research processes, which focus on technical and ideological conditions in the lives of these subjects in order to facilitate change and emancipation. They also draw the reverse conclusion that planning which facilitates social transformations cannot be separated from critically focusing attention on a situation and studying its structures. Forester

2 I am grateful to the anonymous IJURR peer reviewers who proposed contextualizing my work within the culture-led regeneration debate and brought my attention to Susan Hauser’s work.
(1993: 27) argues that the planner is not ‘a processor of facts, but a practical organizer . . . of attention’. It is not surprising that critical planning theorists such as Hoch (1996; 2002; 2007), Friedman (1987), and Healey (2009) often embrace American pragmatism as part of their foundation, a philosophy that postulates an uninterrupted continuity between practical problem-solving activity and scientific inquiry. Pragmatists such as John Dewey (1907) and Jane Addams (Addams and Sidel, 1998) were interested in social planning by means of experimentation as early as the beginning of the twentieth century (cf. Gross, 2009) and left a long-term legacy in the history of planning thought (Churchman, 1971; Dunn, 1971; Friedman, 1973; Churchman, 1979; Healey, 2009). Recent movements in science and technology studies have turned towards urban development and the built environment (Hommels, 2005; Gieryn, 2006; Gross, 2006; Moore and Karvonen, 2008; Evans and Karvonen, 2011), and there is an increasing focus on processes of knowledge production, which gives rise to the notion of ‘urban laboratory’.

Laboratories

The images that spring to mind when speaking of laboratories are dust-free, antiseptic and vibration-shielded spaces (Hacking, 2007) that are restricted to scientists wearing white protective overalls. We commonly use the word ‘laboratory’ for places that fulfil at least one of the four following functions: (1) conducting experiments; (2) diagnosing and/or analysing substances, probes and samples; (3) producing (and selling) non-industrial quantities of highly specialized or purified products; and (4) educating professionals (scientists, medical doctors, chemical engineers and dental assistants). What do these diverse activities have in common? Products of laboratory work have a special relation to theoretical knowledge, which they test through experiments, employ for analyses or production, or convey to students. Laboratories aim to create transformations that are well understood, exact and, if possible, predictable and repeatable. Given these images and functions, it is hard to see how the term ‘laboratory’ should be paired with the attribute ‘urban’, where processes are notoriously inexact, improvised and often uncontrollable.

Since the 1980s philosophers and science-studies scholars have revolutionized our concepts of laboratory and experimental science. This transformation makes it possible to talk about ‘urban laboratories’, as the present contribution will outline. Notable names here are Ian Hacking, Andrew Pickering, Bruno Latour and H.M. Collins, with John Dewey as an under-acknowledged predecessor.\(^3\) The understanding of scientific laboratories and experimental practices has changed along three dimensions. These can be stated in four theses: (1) We should emphasize that experiments take place in concrete contexts and must therefore evaluate their relevance to particular situations; (2) laboratory research is a social process in which communities of inquiry are formed and transformed; (3) theory and practice are often so enmeshed in laboratory experiments that we will fail to draw a sharp line that separates them; and (4) it makes little sense to reduce experimental work in laboratories to the descriptive task of representing and analysing nature. Laboratories employ and develop normative principles that often reach far beyond the context of empirical research and have wider social and political relevance. These four dimensions of contemporary laboratory concepts will structure the rest of this article. I shall alternate between theoretical aspects of contemporary laboratory conceptions and their application to the relevant aspects of the Zollverein case.

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\(^3\) All references to the latter use the standard format and refer to Dewey (1996 [1882-1953]).
Laboratory work as situated inquiry

A received notion of science saw laboratories as places for crucial experiments. Such particular experiments were intended to provide evidence on theories of universal scope. In other words, experiments served as local demonstrations of relations that hold everywhere in the universe and at all times. Scientists performed experiments to demonstrate permanent structures that underlie the changing panoply of particular phenomena.

Robert Boyle’s belief that all experiments were only instances of universal natural relations and that they could and should be repeated has been challenged by philosophers in recent years. Bruno Latour (1987) pointed out the prohibitive costs of doubting facts that had penetrated the fabric of scientific practices after being established through experiments. H.M. Collins (1974) traced cases where tacit knowledge and manual skills were essential to devising experimental instruments and argued, for example, that it was impossible to replicate a TEA laser simply by using instructions written in manuals; scientists had to visit the laboratory where the first laser of its kind had been successfully devised in order to get a ‘feel’ for the way it was done. Meticulous studies of laboratory practice revealed that scientists improvised during the production of experimental gear and in their experiments to make things work here and now rather than once and for all. In other words, they seemed less guided by theories and deductive inferences and more occupied with a ‘bricolage’ (Latour and Woolgar, 1986) of theory and practice or with practical and intuitive ‘tinkering’ (Knorr-Cetina, 1981) to conduct satisfactory experiments. These observations led philosophers of science to search for the meaning of experimental practices in particular contexts rather than in universal conclusions.

All of these examples point in one direction. While it is dedicated to the production and testing of knowledge, laboratory work is always a practical local task that involves efforts to solve problems and impasses of one particular situation at a time. Even knowledge produced in laboratories is not ipso facto general or universal. Experimental knowledge production is imbued with context and needs to undergo a transformation and adaptation process to be applied in new contexts. For John Dewey, inquiry begins not with a determinate theoretical hypothesis but with an indeterminate problematic situation, which is marred by conflicts, doubts and practical impasses (Dewey, 1922; 1938). Inquiry uses both practical and thought experiments to find a satisfactory resolution of the initial problematic situation. This pragmatist notion of inquiry constitutes the first step towards aligning the laboratory concept with urban planning. If experimental science is itself defined as an effort to resolve particular problematic situations, it seems reasonable to consider such urban planning cases that aim to explore, understand and transform places as scientific laboratories.

Zollverein as a situated inquiry

Franz Haniel (1779–1868), founder of the colliery Zollverein, bought 14 coalfields and in 1848 began digging a pit in the northern Ruhr region. The idea of a central extraction plant (Schacht XII) in the north of Essen took shape only during the 1920s after the pit had been taken over by the steel consortium Vereinigte Stahlwerke AG. The architects Schupp and Kremmer were commissioned to design the world’s largest extraction and processing plant of the time. Zollverein came to boast an impressive 12,000 tons of coal production per day before it was finally abandoned in 1986. It was built the year the famous Bauhaus in Dessau (in eastern Germany) closed, in 1933. Apart from their aesthetic value as pristine and rare surviving examples of the period’s industrial architecture, these buildings embodied the avant-garde of technology and structural engineering (see Figure 1). Schupp and Kremmer were among the first to use suspended steel-frame facades, which later became the standard in high-rise buildings.

After ending operations at this location, the Ruhrkohle AG (RAG, later Evonic) relinquished an area of 100 hectares, including the pit with its magnificent shaft frame,
numerous halls, conveyor belts, workshops, railway lines, stockpiles of coal and rock and coal processing plant. The neighbouring coking plant is part of the ensemble and was taken out of service only in 1993. Zollverein’s closure in 1986 marked the end of an era of coal production in the Ruhr valley. This brought about economic and social changes that the region has only now begun to grapple with. Zollverein has become an object of prestige in Essen and the Ruhr region, symbolising a successful transition, which may explain why it is now quite difficult to reconstruct the history of the attempts to demolish it in the 1980s and 1990s.

According to Karl Ganser (former director of IBA Emscher Park), the Ruhrkohle AG filed an application in 1986 to demolish parts of Zollverein, permission for which was swiftly granted by the city administration. The City of Essen bought the estate with the purpose of razing the site to ready it for new construction by private developers (Der Oberstadtdirektor et al., 1993: 4). The low selling price of €500,000 for Shaft XII and Shaft 1/2/8 reflected the predominant view that ‘the existing architecture [was] unsightly’ and ‘preservation [was] unaffordable’ (Ganser, 2002: 24, my translation).

Only the timely intervention and enduring engagement of a few individuals stopped the plans that would have destroyed this heritage site. After 1993, new quarrels broke out over the neighbouring coking plant. The owner had plans to disassemble the entire plant and ship the pieces to China for reassembly (Heidner and Mehrfeld, 2002: 8). These plans were thwarted by an initiative of IBA Emscher Park (1989–1999), an international building and construction exhibition, which rehabilitated the adjacent coking plant as a landmark site in its own right. IBA Emscher Park promoted visionary urban planning and construction projects and gave rise to changes in the region’s perception of its own industrial heritage. It attracted some 300,000 visitors during its exhibition ‘Sonne, Mond und Sterne’ (Sun, Moon and Stars). Its bizarre industrial landscape offered exciting visual and spatial experiences and encouraged visitors to discover the place. This event

Figure 1 Perspective of Shaft XII (source: photo by Thomas Lehr, reproduced with permission)
was specifically planned as an experiment to explore the aesthetic power of installations such as conveyor belts, furnaces and the interior of a chimney with its *camera obscura* effect. The exhibition was designed to put visitors in touch with the history of the place and thereby confronted the need to define a new social and historical identity for the region. The experiment was extended by making more indoor spaces accessible to visitors and establishing the *Route Industriekultur*, a regional network of industrial heritage places. Such experiments with the material conditions of an old industrial wasteland led to the consolidation of new purposes and usages. Moreover, they generated transferable theoretical insights, as I shall describe in the section that follows.

For my purposes here, Zollverein’s planning history is framed as an epistemic enterprise directed at understanding a particular problematic situation through experimentation and learning. According to Dewey (1922; 1938), inquiry is a practical process of exploring and remedying an ‘indeterminate situation’. This is a situation in which habitual routines begin to fail. Inquiry aims at gaining a new and more thorough understanding of this situation, and subsequently defining new and more successful practices. The absence of clearly defined goals and ends in a planning situation is therefore a hallmark for practicing ‘inquiry’ in the Deweyan sense.

Zollverein’s inquiry-centred planning process is in direct contrast with the proliferation of new urban commercial centres in Germany, such as malls, entertainment parks and event gastronomy areas that are often centrally designed by large development corporations like Trizec Hahn and ECE. Previously I contrasted Zollverein’s planning approach with the failed project to build a shopping mall system (MultiCasa) on the site of an abandoned freight depot in Essen’s neighbouring city Duisburg (and incidentally the site of the 2010 Love Parade disaster). MultiCasa foundered because the design team failed to consider the local context and to develop concepts that were not only economically feasible but also politically and socially adequate (Dorstewitz, 2008).

Prior to 1986, Zollverein’s daily extraction and processing of coal constituted, in terms of Deweyan inquiry, a state of habitual equilibrium. Around the time of Zollverein’s closure, this equilibrium gave way to an unsettled or indeterminate situation. At that point even those factions who urged for the comprehensive preservation of the entire ensemble had no clear concept of its further possible use. Heidner and Mehrfeld confirm that responsible groups hoped that ‘patience and curiosity’ would help to raise fascination for this masterpiece of industrial architecture, ‘and good concepts [for its use] would then arise almost by themselves’ (2002: 20, my translation). Later developments justified this intuition. Zollverein rapidly gained recognition in the region as an important historical identification point, an architectural monument of first rank, and a renowned cultural location that has hosted countless exhibitions, projects and events (see Figure 2). The final breakthrough came in 2001 when Zollverein received recognition from UNESCO as a world cultural heritage site.

In retrospect, the planning method adopted at Zollverein can be summarized as an iterative experimental exploration of the place and its potentials. These experiments addressed the social and historical meanings of the site, its aesthetic significance and its power to stimulate creativity. Zollverein was studied as a place of industrial heritage and a crystallizing point of local identity in a region that underwent dramatic structural changes during these years. Many smaller and larger experiments were undertaken to discover the potential of the site as a workshop for arts, design and new creative industries.

Theoretical questions about historical identity and cultural meanings were pursued in experiments that centred on the material conditions at hand. The planning history since 1986 shows a tendency to move from improvised and provisional experiments to larger, more systematic experimental structures. Earlier activities can be recognized only with hindsight as steps in the unfolding process of urban design. For example, design students at the University of Essen began to explore the coal wash as a place for exhibitions in the early 1990s. Later, the Red Dot Design Museum was established in the Kesselhaus, which was redeveloped for that purpose by renowned British architect Sir Norman Foster. Sculptors, musicians and dancers experimented with the various locations as
workshops, stages and exhibition parks and improvised auditoriums before more permanent structures became established, *inter alia*, galleries, PACT (a dance school) and a branch of Folkwang University.

It is important to emphasize that the transformation of Zollverein was not a free improvisation in a power vacuum. In spite of a ‘jumble of competences’ (Ganser, 2002: 25) that stymied the organization for a long time, several of my interlocutors emphasized that the planning process was far from chaotic. Planning activities never lacked a commitment to Zollverein’s long-term future. As early as 1987, the Forum for Art and Culture developed a vision that distinguished *art, history, and business* as core functions for the future of Zollverein. These still define its present profile. In light of subsequent developments, they are bold intuitions, akin to scientific conjectures in a research project. The meanings and content of these concepts were unclear and had to be developed throughout Zollverein’s planning process. They functioned as guides for the transformation process but left much room for interpretation and explorative planning.

The transformation of Zollverein from a beacon of industrial production to a centre of culture and regional identification was not only harmonious, but it seems that the role of conflict as a determining factor quickly decreased during the planning process. Except for a short period of anarchy in the late 1980s when the site was left to marauding youths, railway buffs and the odd artist, Zollverein has been considered a heritage site. Negotiations and conflicts addressed both the scope and interpretation of heritage protection, including the prospective utilization of the site. The most heightened conflict occurred when the mining cooperation Ruhrkohle planned to demolish Zollverein and when the City of Essen intended to clear large parts of the site to establish new industries. In a personal interview with the author (11 May 2007) Walter Buschmann, who represented the regional heritage protection agency (Rheinisches Amt für Denkmalpflege), confirmed that the struggle for protection was difficult. It was fought mainly by individuals attached to the heritage protection agency, the ministry for urban planning and the IBA. These individuals challenged Ruhrkohle’s plans to demolish the...
emblematic hoist frame of Shaft XII. Later, the struggles continued between protection agencies and the municipality, which was merely interested in the ’street aspect’ of the hoist frame and its surrounding buildings, and more than willing to sacrifice the remaining structures on the site.

After heritage status was granted by UNESCO, conflict diminished, although Zollverein press officer Ute Durchholz explained in an interview (12 March 2007) that Zollverein always had the power to polarize. The polarization had much to do with appreciating the aesthetic value of the abandoned industrial site. Interestingly, a large faction of ex-miners from Zollverein was initially against preserving the site, which only reminded them of their toils. Nevertheless, during my research I was surprised to find very little evidence of fundamental or persistent clashes between stakeholders’ interests, even though detail issues regarding the interpretation of heritage protection were contested (for example, which technical parts of the old coal wash had to be preserved and which could yield to the creation of a new exhibition space, or whether broken windows that had been replaced with conventional window glass should be covered with an adhesive foil with the printed pattern of a wire grid to resemble the original panes). Conflicts between meticulous efforts at heritage protection and free-handed attempts to make commercial use of the newly discovered resource flared up from time to time. However, there is no evidence of severe and persistent conflicts of the kind that would suggest Zollverein as a space of power struggles. I will shortly return to the interaction of diverse agents and stakeholders in the planning process.

Communities of inquiry

Sergio Sismondo observes that the concept of laboratory has been extended beyond the place and location of experiments: ‘The laboratory need not be neatly bounded by four walls, and laboratory studies need not describe only experimental work. Researchers have therefore extended the approach, problems, and style of early laboratory studies to other areas’ (Sismondo, 2004: 95). He further reports that the concept of ‘laboratory science’ has been extended to agricultural fieldwork, health economics, sociological research and a wide variety of scientific and technological studies. Latour and Woolgar (1986) were pioneers in defining laboratory work as involving large networks of actors and instruments. In their account, laboratories emerge as forms of collective agency and are no longer defined in terms of local experiments or workplaces.

For pragmatists, inquiry is a social process conducted by a ‘community of inquiry’ (Shields, 2003). A community of inquiry is an emergent system of agency. ‘Actor’ is for Dewey a ‘confused and confusing word; offering a primitive and usually deceptive organization for the complex behavioural transaction . . . Under present postulation actor should always be taken as . . . a trans-actor’ (Dewey, 1996 [1882–1953], LW16.260)

Dewey uses the concept of ‘transaction’ to describe a system’s point of view, that is, a perspective on a problematic situation as a whole (cf. Churchman, 1979). ‘Transaction’ comprises all processes and interactions that take place within a situation. An inquiry process is for Dewey always concerned with establishing and redefining the boundaries of a community.

Zollverein’s emergent organization

A number of individuals and organizations held responsible positions during the planning process. When Ganser spoke of a ‘jumble of competences’, he explained: ‘The gradually unfolding path that Zollverein took was accompanied by many accidents and led to a parallel existence of institutions, actors, and competences’ (Ganser, 2002: 92, my
My take on the urban laboratory approach is its commitment to recognize agency as an emergent ‘community of inquiry’ system. It therefore refuses to interpret an initial ‘jumble of competences’ as ‘inefficiency’ in the planning process. The process of agency formation in an urban laboratory is gradual and, importantly, it is responsive to the unfolding planning situation. Dettmar (2006: 92) lists nine key actors that determined Zollverein’s destiny:

- LEG/Grundstücksfond, the estate administration and development agencies of the land in Northrhine Westphalia, and the current owner of large parts of the estate, including Shaft XII and Shaft 1/2/8;
- The City of Essen’s diverse planning and administrative departments and the Wirtschaftsförderungsgesellschaft, an organization for economic development that runs the Essen’s job-creation company, EBAG;
- The foundation Stiftung Zollverein, installed as the successor of the Bauhütte and coordinator of the programmatic dimension of Zollverein’s development;
- The Foundation for Industrial Heritage (Stiftung Industriedenkmalpflege), established by RAG (today Evonic) and responsible for the ‘black side’ (coke production) of the coking plant;
- Montan-Grund, an estate company owned by RAG and responsible for the ‘white side’ (chemical processing) of the coking plant;
- RVR (formerly KVR), an organization of associated communes in the Ruhr region responsible for the Route Industriekultur (an industrial heritage route across the Ruhr region);
- The Northrhine-Westphalian Design Centre;
- Restflächenprojekt/Industriewald Ruhrgebiet, an organization that manages overgrown areas without constructions; and
- Geschichtswerkstatt (Zollverein e.V.), the association of ex-miners.

During an interview I conducted on 12 March 2007, Ute Durchholz, press officer of the Stiftung Zollverein added UNESCO, the community of artists and small- and medium-sized enterprises and the Betreibergesellschaft Zollverein (operating body Zollverein) to the list, while leaving three other organizations aside.

It would be tedious to trace the precise missions and responsibilities of all organizations and agencies involved over the past 30 years, and therefore my analysis will remain at a rather general level. A list of key competences shared by the aforementioned organizations include heritage protection; building and construction measures; marketing; external utilization and letting; publicity and communication; tourism; and commercial development and settlement of small- and medium-sized third-sector industries. These competences were distributed among the organizations and often shared by more than one. Furthermore, various entities held ownership of diverse parts of the ensemble.

The time of anarchy and broken windows between 1986 and the early 1990s gradually gave way to a more structured approach to managing the site. Initially, tolerance for spontaneous projects and initiatives was high: design students were allowed to use the coal wash as an exhibition stage and visual and performing artists were given free rein to set up shows and workshops. The increasing scope and rigour of heritage protection slowed down the speed with which new initiatives, including new business enterprises, filled the perceived vacuum of space and governance. The installations of a Ferris wheel and a swimming pool in the coking plant are examples of a much more liberal planning process in the past. Although these installations are aesthetically well embedded in the ensemble, such invasive measures would have no chance under current protection statutes. Particularly, the UNESCO listing of the ensemble as a world cultural heritage site made it necessary to enforce a stricter protection regime.

The relative lack of a clear and unified organizational structure made it necessary for key players to coordinate and communicate effectively. Referred to as the ‘Nutzerkonferenz’ (user conference), it afforded regular and wide participation to all
stakeholder groups in strategic matters. There are four principal areas of interest: (1) protecting industrial heritage; (2) utilizing the ensemble for cultural projects; (3) establishing new industries; and (4) providing educational services. These were not all represented by separate entities. The potential for clashes is nevertheless clear, for example, between protection and new building measures; between cultural projects and maintenance activities; between more and less lucrative utilizations of differential cultural value. Such conflicts did occur but never resulted in an entrenched opposition of interest groups. The communication and inclusion of diverse agents was one factor that reduced the polarization of interests. Another was the general spirit of exploration and openness to opportunity. Mission statements and purposes formed only slowly as the new potential of this site gradually emerged. General perceptions of Zollverein passed through several stages, during which it was seen as, *inter alia*, an empty space for establishing new industry — even a liability; an experimental scene for cultural projects and a reminder of Essen’s mining history; an economic and cultural growth zone; and finally, an internationally recognized emblem of the city and the crystallizing point of a new Ruhr identity. Agencies that represented the interests of heritage protection, municipal planning, economic development and cultural institutions had to clarify and adapt their missions continuously within the rapidly transforming character and perception of the ensemble. In doing so, they were mutually dependent on one other. For example, the heritage protection agencies (Rheinisches Amt für Denkmalpflege and UNESCO) were still searching for a viable conception of industrial heritage in the given context. This prevented the imposition of a ready-made set of rules and regulations, which might have made many developments impossible (for example, the interior redevelopment of the coal wash into an exhibition space). In establishing a new business structure, the relevant agencies (the LEG and later the Stiftung Z and the City of Essen) had to trust in the power of cultural initiatives such as the Red Dot Design Museum to attract creative-industry enterprises. It was also essential that management and planning functions were not assigned to a single organization such as the business sector, heritage protection or the municipality. This prevented Zollverein from being developed solely as a new-enterprise zone, a museum, or a cultural theme park.

The plurality of agents and participants turned out to be a valuable resource in the evolution of the development. It allowed for the emergence of diverse creative projects and attracted contributions from artists, designers, academics, public servants, entrepreneurs and ex-miners. The combination of perceiving an open space for new and creative initiatives, while also approaching it respectfully as a place of great historical and aesthetic significance was crucial to Zollverein’s success.

In recent years, serious attempts have been made to put planning and management competences into the hands of one organization. The process of organizational and functional unification was gradual and responded to a growing demand for unified management. During a personal interview on 12 March 2007, the press officer of the Stiftung Zollverein explained that the dimensions of construction and substantive development activities, for which the LEG with its sub-organizations was responsible, could not always be neatly separated from the service mandate of the Stiftung Zollverein to run and develop the programmatic dimension of the ensemble. This problem became apparent when prestigious events such as a European meeting of Environmental Ministers, the popular annual festival ExtraSchicht, and World Heritage Day events coincided with planned dates for disruptive construction activities. Further coordination problems were related to the external perception that Zollverein was a unified organization, which had repercussions for the ability of the Zollverein foundation to raise funds and for communicating Zollverein’s programme effectively. Buschmann (2006: 120, my translation) wrote: ‘what is missing is a position of overall responsibility and coordination between the old colliery and its surrounding quarters’. Finally, in 2008 all

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4 This is a strong indicator for the applicability of the culture-led regeneration framework.
responsibilities for developing and managing Zollverein were granted to the Stiftung Zollverein, which also became the formal proprietor of most parts of the ensemble. The foundation today embodies the core competences listed at the beginning of this section.

**Experimental practice and theory in scientific laboratories**

Laboratory work is *exemplary* work; the outcome of an experiment goes beyond the particular situation in which it is produced. Identifying laboratory work as an exercise in theory production, however, does not imply the Baconian notion of experiments as conduits between abstract entities like hypotheses and established theoretical claims of universal scope. We may instead adopt Kuhn’s view that scientific work is an ‘exemplary illustration of how science is to be done’ (Kasser, 2006). ‘Theory’ in Deweyan epistemology is not a disembodied structure of ideas or sentences. In his 1938 work, *Logic: Theory of Inquiry*, Dewey translates ‘hypothesis’ as the hyphenated composite of a ‘problem-solution’. Theory is abstract, or independent from particular contexts of experience, only in the sense that a transferable solution is independent from a problem. A successful experiment could be a concrete example of how to solve like problems in other sufficiently similar contexts.

Experiments play a functional role in inquiry. They are designed for a specific purpose. If they do not yield the results they were designed for, scientists must recalibrate their experimental setup or begin to redesign their intellectual instruments (beliefs, theories and auxiliary assumptions). Based on Dewey’s instrumentalist account, experimental activity in laboratories is not principally different from creative work in any other problematic design context. For him, the experimental procedure is one that installs doing at the heart of knowing’ (Dewey, 1996 [1882–1953], LW4.29). This provides an additional reason for transferring the laboratory concept to the context of experimental urban planning.

For Dewey, as for his teacher Charles Sanders Peirce, inquiry is a practical matter because ‘doubt’ is not a purely intellectual affair. Doubt is an impasse or conflict in our practical dispositions which these philosophers call ‘beliefs’. Dewey emphasizes that scientific inquiry does not aim at accidental resolutions or quick fixes. The ‘method of intelligence’ resolves a problematic situation by working out a differentiated understanding and by exploring the consequences of possible interventions. In short, inquiry aims at deepening our understanding of a problematic context.

**Experimental practice as theoretical inquiry on Zollverein**

The two core mandates of the Stiftung Zollverein are to protect the monument and to make it accessible to a wide audience. These mandates appear to be in direct conflict which each other. Ingrid Krau (2006: 177) speaks of the opposing demands of authenticity and utilization as a ‘tightrope walk’. The annual number of visitors between 1998 and 2005 increased from 20,000 to 64,000 (Noelle and Durchholz, 2006); UNESCO lists tourism as one of the prime threats to heritage sites worldwide. Easy solutions such as cordonning off sensitive areas and channelling visitors along fixed paths were rejected because they contradicted the idea of Zollverein as an accessible living field of experimentation. Instead, planners searched for a genuine synthesis between these opposing demands. Human guides who were familiar with the location (many of them ex-miners) were employed, and several systems of signposting were tested as ways of keeping the site open yet protected. The right choice of programme and adequate concepts for involving visitors in projects were developed, which required studying the monument and its meanings from a sociological, demographic, educational and cultural point of view. Further theoretical problems occurred, with urgent practical implications:
the architects had originally intended the centrepiece, Shaft XII, as an area of automated processes and pure ‘machine rationality’, as a ‘giant machine without workers’ (Krau, 2006: 177) (see Figure 3). The very presence of visitors might therefore contradict the architectural language. Miners used to enter and exit their workplaces at Shaft 1/2/8, far from the central area. Again the question moved to a higher level of abstraction: how can protecting the authenticity of such monuments be reconciled with a large numbers of visitors?

Boris Groys pinpointed a further important problem:5

It seems that this question cannot be answered by claiming that such modernist constructions are just as beautiful or as interesting as the monuments of pre-modern periods . . . In fact this problem cannot be solved at all, because of the paradoxical nature of the particular context: we are asked to treat and protect something as a museum that originally resisted the very concept of preserved heritage and rebelled against the very idea of something permanent or remaining. It is this notion that [Zollverein] embodies and which lends it its remaining quality (quoted in Ganser, 2002: 28, my translation).

Dealing with this paradox gave rise to one of Zollverein’s most defining inquiry projects, and it should be mentioned that this tension already exists within the architects’ own account: besides explicating their rejection of facades and the character of buildings as

5 Boris Groys is Director of the Vienna Academy of Fine Arts and member of the heritage commission of the Northrhine-Westphalian ministry for urban planning and culture.
monuments, they still adhere to enduring aesthetic principles. In Schupp’s 1931 article ‘Über das Entwerfen von Industriebauten’, the architect claims that ‘The measuring and pondering of architectural masses against each other is governed by eternal laws, which will make a building appear great or poor in all times to come’ (cf. Hauser, 2007b). UNESCO lists tourism as one produced solution that gave rise to new indeterminacies and doubts and thus continuously spawned the need for further inquiry. These ensuing inquiries were generally taken seriously. Questions about answers that were once given and conflicts between solutions became the fuel for further, often highly abstract investigations. Theoretical and philosophical studies were not intellectual indulgences; they addressed the need for new concepts to allow practical judgements and the implementation of coordinated policies, that is, acts of theorizing fed directly back into the planning practice and informed further experimental steps.

Answers to the core dilemma of protecting the structure evolved over time, while the fear of ‘killing through preservation’ was joined by an urgent need to raise popular awareness for the entire ensemble in order to protect it from various destruction plans. Groys had an appealing idea: these ‘monuments of modernity’ should neither be seen as museums nor as leisure parks. Instead they should continue as ‘locations for projects, research, reflection and experiments’ (Dettmar, 2006: 97, interpreting Groys, my translation). Yet the appeal of this suggestion lies precisely in refusing to give a final answer and relegating the search for meaning and legitimacy of developments to further research and experimentation.

Zollverein is a great example of how urban planning can introduce a differentiated level of theoretical inquiry into the practical contexts of situated experiments. Many of the theoretical answers that were given have been transferred to other contexts. For example, Zollverein has led in the development of the notion of industrial heritage both as an aesthetic category and as a point of regional identification. This concept inspired the creation of the Route Industriekultur, a network of industrial relics that engulfs the German Ruhr region. Zollverein was in the vanguard of a worldwide trend towards appreciating vestiges of the industrial age as heritage.

Laboratory work as a normative quest

Since Kuhn and later Latour and Woolgar, the concept of epistemic norms has dramatically changed in laboratory studies. Norms that govern research and knowledge production are seen as institutional rules, which scientists follow in their daily practice according to their socialization. Consequently many theorists challenged epistemic norms as independent standards of rationality that warrant good scientific reasoning. Dewey identified norms as transferable tools, which were themselves produced by means of inquiry. Norms, like theories and experimental apparatuses, are for him ‘instruments’ that help to organize inquiry. Shapin et al. (1985) suggested that Robert Boyle’s experimental method was more than a means for solving theoretical disputes in science; it was a role model for resolving socio-political conflicts of their age. If so, their case demonstrates how norms that govern laboratory work are inseparable from wider social and political contexts. Dewey’s pragmatist notion of science provides the mechanism by which laboratories serve as testing grounds for norms with wider socio-political relevance. Inquiry originates from the practical conditions of life. However detailed and sophisticated the pursuit of inquiry may become, it must never lose touch with this original purpose. Inquiry into the process of inquiry itself is a natural extension of Dewey’s ‘method of intelligence’.

Instrumental in their character, norms draw their authority from their ability to guide action in concrete contexts. The quality of both norms and ends rests on how well we interpret and adapt them to particular situations. Zollverein is an interesting case in point. Heritage protection and the preservation of monuments are established institutions in
Germany. A framework of norms is in place; they are legally established, recognized by the general public and implemented by various agencies and executive institutions. The general public believes that certain buildings should be protected on account of their historical, cultural or aesthetic significance. Cathedrals, cloisters and palaces are traditionally listed under protection acts, that is, they are buildings that were designed for representative purposes. Nevertheless, applying the framework of heritage protection to Zollverein was difficult because the ensemble did not match the existing understanding of cultural heritage. Zollverein’s prestige rested on its technological achievements, not on its aesthetic properties. Most parts seemed like an eyesore to many of Essen’s citizens at the beginning of the 1990s.

Well-established norms and institutions for protecting monuments did little to preserve Zollverein and could have remained impervious during its demolition. Applying these normative frameworks to the case at hand demanded a great deal of imaginative transfer and adaptive work. New aesthetic concepts and new ways of seeing had to be developed, together with the understanding that such buildings are important historical witnesses of an industrial age. Regarding the difficult transfer of norms to new contexts, Dewey says:

> There is no label, on any given idea or principle, that says automatically, ‘Use me in this situation’ — as the magic cakes of Alice in Wonderland were inscribed ‘Eat me’. The thinker has to decide, to choose . . . Memory may provide an antiseptic refrigerator in which to store a stock of meanings for future use, but judgement selects and adopts the one to be used in an emergency (Dewey, 1996 [1882–1953], *How We Think*, MW6.263)

This ‘emergency’ arose after RAG and the City of Essen had filed their demolition plans. The ensuing question was not simply which parts of the ensemble were to be protected. Some cogent arguments had to be addressed before the norms of heritage protection could be used in favour of preservation. Schupp and Kremmer’s constructions were designed as ‘outer skins’ for the protection of machinery, not as indoor spaces that would readily yield new uses. The buildings were designed to last no more than 60 years. Besides tight budgeting on the part of the mining corporation, the architects interpreted the Bauhaus motto ‘form follows function’ to imply that function also exhausts the *raison d’être* of architecture. Subscribing to the movement of ‘new objectivity’, the architects intentionally refused to build monuments for eternity. All of this made the case for preservation difficult when, in the early 1990s, these buildings were found in a deplorable state of disrepair.

The recipe for Zollverein’s eventual success had several ingredients. One was a series of initiatives that spelled out a framework of functions that provided perspectives for future developments. These activities helped to create a new identity for the place. This was achieved by using local material conditions as a potential resource. Through experimentation, these conditions served new purposes that the materials at hand helped to define. Engelskirchen wrote the following about Zollverein:

> A thing taken out of its functional context becomes ‘garbage’ with regard to features of its design purpose. But not everything that is garbage will be thrown away. Some things undergo a process of re-evaluation: A pit becomes a shut-down pit, hence garbage, and then the monument of a pit. Instead of coal, historical insights are now produced and a lateral shift has taken place (Engelskirchen, 2006: 216, my translation).

A few artists, among them Ulrich Rückriem and Stefan Pietryga, began to produce and exhibit their work at Zollverein. They were not only inspired by the space, but made use of the abandoned halls and the old equipment of the mine to construct, lift and transport large sculptures. Rückriem created a sculpture park of monolithic blocks in an overgrown stretch of wasteland. These multi-ton granite blocks were officially integrated into the renowned exhibition for contemporary art, documenta 9, in Kassel. Many other artists made use of the location in equally original ways. Walk-around theatre performances
turned constructions and machinery into sceneries, experimental concerts took place in different locations and international dance companies made stages out of waste-tips, conveyor belts and heavyweight lifts. It is well known to architects that the optimal acoustics for musical performances are achieved in shoe-box shaped rooms. This made many of Zollverein’s indoor spaces ideal concert halls. Many creative ideas were inspired by the bizarre character of the location, and old mining tools and technology were used as resources for new artistic purposes (see Figure 4).

In 2001, the artists Dirk Paschke and Daniel Milohnic created an outdoor swimming pool on the roof of the old coal mixing facility by joining two blue cargo containers. Next to it, a cooling basin, stretching alongside the coking plant, was turned into a 150-metre-long ice rink that attracts up to 22,000 visitors each year.

Conclusion

The transformation of Zollverein from an industrial site to a world cultural heritage site illustrates how means and purposes can co-evolve creatively in an experimentally approached situation. Purposes can grow organically out of a context by turning local conditions into means for their realization. To achieve this, planners need to turn into explorers and experimenters. They must relinquish the idea that their chief task consists of implementing improvements and realizing goals. Urban laboratories attempt to understand the potentials inherent in places by experimenting with the materials at hand. They enter into a conversational learning process in which plans and environments co-evolve. In this they resemble scientific laboratories, where the complementary movements of theorizing and experimental practice continuously alter the research.
questions and prompt new research methods. The sum of the activities and projects mentioned above has helped to shape the very distinct character of this location and give it a new functionality.

What lessons can be drawn from studying the planning history of Zollverein as an ‘urban laboratory’? And what do we learn about this new concept? This article traced some philosophical ideas that have the power to change our understanding of experimental laboratory studies and make the laboratory concept amenable to urban planning contexts. To characterize the quality of Zollverein’s planning history one should refrain from using present outcomes and realized achievements as measures for the success and efficiency of the planning process. Such achievements are better described as discoveries made during a systematic inquiry process. Not all purposes and uses were discovered or invented de novo. Like any research process, Zollverein started with a set of conjectures and hypotheses, which gave direction to an experimentation process that largely shaped its outlook today. As a planning project, Zollverein should be appreciated for instantiating a form of intelligence, which Dewey identifies with scientific inquiry. This form of intelligence is defined by learning how to resolve an indeterminate and problematic situation by gaining an understanding of its determinants and by mutually calibrating theories and experimental activity. This process relies on the ethical component of developing normative guides in response to instrumental predicaments and demonstrates how the intelligence of a laboratory approach to urban planning depends on the way collective forms of coordination emerge in response to situational challenges. This may be as rewarding from an academic point of view as it is promising from an urban planning point of view in the pursuit of a more context-sensitive, creative and reflective practice.

Philipp Dorstewitz (philipp.dorstewitz@aurak.ae), Department of Humanities and Social Sciences, American University Ras al Khaimah, PO Box, 10021, Ras Al Khaimah, UAE.

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