Orientation paper for the Hafencity GmbH regarding

"Urban manufacturing"

(Draft)

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Executive Summary

We observe a growing political, cultural and societal awareness of the importance of manufacturing as key element of the economic fabric. Returning arguments in the debates are re-shoring (production returning home), increasing knowledge-intensity and innovation, links with knowledge institutes, increased networking and supply chain integration, emerging links with design and art, growing customization, the coming "internet of things", machine-to-machine communication, and the growing role of robotisation and use of ICT in manufacturing, the greening of production processes, and the changing complex of energy provision.

All these trends are re-shaping the industrial landscape. It is yet not fully clear, in which way they affect the city-region of Hamburg. Industrial companies and governments join forces to design new approaches. The German "Industrie 4.0" initiative and the Dutch "smart manufacturing" plans are prime examples. At the same time, from bottom-up, we see the emergence of the "maker movement": entrepreneurs, artists, collectives and civic communities discovering the art of making things. In sum, manufacturing is integrated part of the emerging knowledge and creative economy though pointing to many differences to the mainstream debate on knowledge and creative economy.

Although there is rather wide agreement on current trends, it is much less clear how these trends play out in different urban contexts. What new urban locational trends are emerging, what types of environments cater for the "4th industrial revolution"? One thing is clear: there is no single answer. Each city has its unique mix of industrial activity, evolved over the years, and also the spatial organisation of industries differs widely. We observe a strong relation between city-regional manufacturing profiles and site-specific steering models to develop inner-city plots. Global recipes will not work; it needs a clear regional context-specific profile as a starting point to foster "Urban manufacturing".

To redevelop Hamburg East effectively as future-oriented manufacturing area, in-depth insights are needed into the structure of Hamburg's industrial clusters, its governance, local trends and needs. For example, little is known about start-up manufacturers, re-shoring locational approaches back to Hamburg as well as demand for new spaces in the inner city.

Technological trends

The industrial landscape is very dynamic. Technological change is fast, and urges firms to develop a constant stream of product-, process- and organisational innovations. For this, companies first of all need higher skilled people, and attractive cities are prime places. Also, firms need the ability to create networks with other companies, and to understand and interpret the incoming waves of new technologies, new competitors, and new business models, and act upon it. Innovation requires a new balance between closeness (protecting property rights) and openness, the latter leading to new links between manufacturing and design/R&D/software development, resulting in blending worlds of design, art and manufacturing. Innovation processes do not take place in the traditional "silos", but depend on

flexible and situated switches with customers, applied research or independent “creative” stakeholders. Urban environments are prime locations for this, if appropriately designed.

Generally speaking, manufacturing is becoming more flexible, networked, technologically sophisticated, blended with other sectors, reliant on high-skilled workers, communicative, and clean. At the same time, is become less space-intensive and noisy, and new technologies allow vertical production and zero-emission. All these characteristics point at opportunities for “urban manufacturing”. In principle, denser urban areas provide easier access to skilled staff, networking opportunities with “unusual suspects”, knowledge exchange, and image advantages. When developing East Hamburg as industrial area, a key question is how to capitalise on these benefits, and to identify which type of activities would benefit most.

Labour

More and more manufacturing processes depend to an increasing extent on high-skilled labour profiles in order to cope with increasing dynamics regarding technological innovation. Also, medium skills are in demand (craftsmen, operators, etc). For all these groups, lifelong learning has become the norm. The demand for unskilled labour is still there, but it is decreasing.

On the other hand, if well coordinated with educational institutes and job agencies, manufacturing firms can play a key role to absorb school dropouts or other unqualified workers and lift them up in the labour process. Several cases (e.g. New York, Rotterdam) demonstrate how urban manufacturing help to integrate less qualified or even under qualified labour forces. It is worthwhile to study in-depth these cases and draw lessons for Hamburg.

Questions, Research topics, and next steps

Based on our analysis, we raise a number of key issues and questions that can give direction to the development of Hamburg East as innovative manufacturing district:

1. Potential analysis of Hamburg's manufacturing structure

- How can the manufacturing cluster of Hamburg be characterized?
- What networks/trends are emerging? Which location patterns are there?
- Screening of Hamburg´s changing manufacturing sector and what is currently taking place?
- Interviews with firms, owners and CEOs in HH
- Scanning of the manufacturing cluster with the help of 10-15 interviews
- Interviews of hearings with firms would shed light, plus studying existing stats/reports.

2. Labour perspectives in Hamburg

- What types of skills are needed when developing plots for manufacturing in the urban?
- How would an inclusive strategy – offering jobs for the lower qualified as well - look like in the case of Hamburg?
- What are the current labour profiles of Hamburg's manufacturing clusters?
- What changes can be expected?

3. Maker (bottom-up) movement in Hamburg

- What is the rate of start-ups in manufacturing sector?
- Are there new micro-clusters to be observed in Hamburg?
- What requirements do they have regarding networks, community, technology and the build environment?
- How is the maker movement connected to other production clusters?

4. International case studies

- How has the stakeholder management (mainly engagement with industrial firms) been organised, and what lessons can be drawn?
- How did the land-use planning take place? What functional mixes work, which ones don't, and why?
- How is the identity of "new industrial spaces" articulated and communicated?
- How was the phasing of the process? What are to do´s and don'ts?
- What is the role of tech-catalysts such as TechShop or others (currently searching spaces and cities in Germany to start), as well as crowd-based financial players such as (Crowdfunding, Kickstarter or others) that work with Open Innovation/Data tools?

1. Introduction

Hamburg Hafencity GmbH has requested this paper in the course of a joint workshop on Hamburg Billebogen with the Behörde für Stadtentwicklung und Umwelt (BSU) in April 2014. Hamburg Hafencity GmbH has been interest in contextualizing the effects of new production processes on urban space. This process is known as "Urban Production" or "Urban Manufacturing 2.0" and addresses new value chains within a local-regional dimension. Hamburg Hafencity GmbH has asked two research and consultancy bodies – Urban IQ, based in Rotterdam and headed by Dr. Willem van Winden, and Multiplicities based in Berlin and run by Dr. Bastian Lange, to formulate this paper.

Within a short period of time (Mai-June 2014) both research and consultancy bodies have analysed this socio-economic transformation domains as an expression of an increasing creative and knowledge age. The overall aim was to shed more light on trends in production, its geography, new skills required, and the changing socio-spatial contexts in which manufacturing trends are developing in general.
A central observation is that we are confronted with a growing political and societal awareness of the importance of manufacturing as key element of the future city. Emerging links with design and art, growing customization, the coming "internet of things", machine-to-machine communication, and the growing role of robotisation and use of ICT in manufacturing, the greening of production processes, and the changing complex of energy provision are paving the way for a broader understanding of these effects for cities. All these trends are re-shaping the industrial landscape. Industrial companies and governments join forces to design new approaches. The German "Industrie 4.0" initiative and the Dutch "smart manufacturing" plans are prime examples.

At the same time, from bottom-up, we see the emergence of the "maker movement": entrepreneurs, artists and civic communities discovering the art of making things. In sum, manufacturing is integrated part of the emerging knowledge and creative economy.

A first screening of various cities in this regard shows that each city has its unique mix of industrial activity, evolved over the years, and also the spatial organisation of industries differs widely. We observe a strong relation between city-regional manufacturing profiles and site-specific steering models to develop inner-city plots. Global recipes will not work; it needs a clear regional context-specific profile as a starting point to foster "Urban manufacturing".

To redevelop Hamburg East effectively as future-oriented manufacturing area, in-depth insights are needed into the structure of Hamburg's industrial clusters, its governance, local trends and needs. For example, little is known about start-up manufacturers, re-shoring locational approaches back to Hamburg as well as demand for new spaces in the inner city.

Urban IQ and Multiplicities have summarized these new trends in complex structures and were aiming at bringing them to maturity for the benefit of further decision making and planning processes in Hamburg. In an age in which the established and emerging parameters between labour and production appear caught up in disruptive interference, Urban IQ and Multiplicities have worked toward laying down the foundation for new paths in the urban development and planning processes shaping Hamburg's further development.

This report is organised as follows: Section 2 discusses the alleged "renaissance" of urban manufacturing. Is manufacturing making a comeback in cities? What trends and tendencies are driving it? Section 3 discusses the changes in work and labour profiles in manufacturing, production and related creative sectors in Germany. In section 4, we discuss some inspiring cases where we could observe, study, and detect effective manufacturing conditions in urban contexts. How did theses cases start to strategically develop urban spaces? In this section, we do not focus primarily on manufacturing as an industry alone, but take a somewhat broader look at emerging "innovation districts" in cities in which urban production plays a role. Could Hamburg East (or parts of it) be redeveloped into a dynamic innovation district fuelled by new types of manufacturing firms? Section 5, finally, raises a number of questions related the future outline of "Urban manufacturing". It is the basis for further research and analysis that might help to develop Hamburg East as a new urban manufacturing quarter.

2. An urban manufacturing renaissance?

2.1 Global evidence for a manufacturing renaissance

Is manufacturing back on a growth track, after years of decline? Recently, the alleged "re-shoring" process has generated much media attention. In the case of US, there are signs that the outflow of American manufacturing jobs to low-wage China has started to reverse, as shown by recent decisions by Apple Inc., General Electric Co, Caterpillar, and General Motors. Also in Western Europe, we see the discourse if manufacturing and production segments are returning home, but so far there has been no sound evidence for that except for some incidental case stories. Perhaps more important, commentators see that manufacturing has a bright future for another reason: it is increasingly associated with the knowledge-based economy. Manufacturing is linked to digitised production, individualisation of products and new collaborative production methods such as 3D printing and Fab-labs that are changing the relation with services and R&D.

There is an emerging sentiment that production and manufacturing firms – and not just small and fancy creative entrepreneurs and makers – can flourish in expensive and developed countries like the U.S. or Western Europe. It is important to note, however, that the evidence is still thin, and often based on "story telling". It is unclear what the net effects are. In this chapter we elaborate the alleged trend of a manufacturing renaissance more in detail.

2.2 Global evidence for a manufacturing renaissance

There are a number of factors that help to explain a rebounding manufacturing industry in the Western world:

1. Production methods and manufacturing **value chains significantly change** due to digitisation, individualisation of products through costumer involvement, manufacturing all these **products require more knowledge and services. Intensive knowledge as a locational factor** needs new types of labour and situated and temporal forms to secure, to update and to extend these various forms of competencies to new knowledge cycles. Intellectual property protection becomes more relevant

2. Another driver are **high transportation costs**: Oil prices are three times what they were in the year 2000, making cargo-ship fuel much more expensive now than it was then.

3. **Access to Innovation**: Companies see the synergies of keeping their R&D operations close to their production facilities. Despite measureable brain drain since the 2000s, in-

vestment into research and development has led to increase the return of high-skilled worker. Furthermore, access to secure patents is of importance as well as closed-relationships to academic and applied research facilities.

4. There is the strong argument of **human capital**. On the one hand, skills and competences in producing are getting more and more knowledge-based. Therefore, an internal "tertiarisation" takes place within production and manufacturing sectors. This explains the increasing proximity to applied research and development on the one hand, and to talented graduates from universities on the other.

5. One the other hand, the **wage gap between e.g. the U.S. and Western Europe in relation to e.g. China has been shrinking**. In 2000, U.S. wages were nearly 22 times higher than comparable wages in China, but by 2015 the difference will be less than four times.

6. Another driver for urban manufacturing takes places on the **management level**. Management and leaders vote for so-called "**de-complexity**". Especially western multinationals continue to struggle with management of operations in transformation countries. Time zone and cultural differences, inadequate infrastructure, business ethics issues, quality, reliability and traceability concerns, and threats to brand equity all pose everyday challenges. Investing in or acquiring manufacturing operations closer to customers and final markets offers a simpler alternative, also known as **de-complexing**. Supply chain management over large geographical distances becomes increasingly complex the greater the geography between manufacturer, intermediary traders and logistics and end market. The longer distances demand greater inventory requirements for ships at sea, as well as safety stocks, which lead to working capital increases.

7. **Resiliency in manufacturing**: The concept of resiliency is of increasing importance in order to secure investment, transform firms to the demands of ecological and social security standards and to have a robust consolidated structure that is able to face economic crisis.

8. A **key bottom-up driver** is the so-called "**Maker movement**", that itself also generated a number of questions. On the basis of open source software, relatively affordable production factors, a new prototype of "manufacturer" has appeared on the urban stage: Independent, highly connected to like-minded people, using Fab-Labs and other working environments, they fill niches and invent new value chains.

A lot of discussion focused on the possibility of and their role in paving the way for more "urban manufacturing": How to bring together the Makers movement on the one hand and mainstream manufacturing on the other?

9. Since the global recession from 2008 to 2010 Germany is particularly concerned due to its strong specialization in the production and manufacturing sector. However, the **tech-**

nology-intensive production profile of its manufacturing industry is a strong argument for Germany to regain its strength and pass through the current economic crisis. In no other industrialized country the organization of production and research-intensive goods is as strong as in this country. Germany has strengthened its leading position not only in the automotive sector, but also in engineering, communications engineering, and in medicine. Essential foundations of success of German companies are not only compelling products, but also in international comparison efficient production methods.

2.3 The German perspective: – are companies coming home?

For what reasons production activities are relocated from abroad to Germany? There is not much evidence to present at this stage. In a study, Schultheiß (2011) concludes that many companies have simply degraded production capacity abroad in order to build it again for the same production purposes in Germany. Most companies could be rather guided by overarching strategic objectives and a realignment of their corporate policies. They wanted to reduce overcapacity, for example, respond to a decline in international demand or test new production methods with highly qualified professionals at home (see Schultheiß, D.,"*Verlagerung und Rückverlagerung ausländischer Produktionsaktivitäten nach Deutschland, Bayreuth 2011*") presents different motives for changing its location policy:

- Firstly, because essential conditions have changed unpredictably, as e.g. the demand on foreign markets, the prices for fast and reliable transportation, the cost of production or the available skills of excellent workforce in the country or abroad. Consequently, Schultheiß (2011) states that many companies are no longer beneficial to continue their foreign activities unchanged.
- Secondly, many companies have assessed the foreign conditions wrong and recognize this error only after the production has started abroad. The relocation to Germany goes along with relaying to an adequate environment for production.

When companies bring their capacities from abroad to Germany, it is by no means always, a "return in repentance." Therefore Schultheiß (2011) warns to misunderstand such relocations as the "everything's fine" for the production location Germany in general. Mainly because local unit labour costs in international comparison are still high in Germany. Some company managers who opt for the removal of foreign capacities due to changed conditions; they do so in the belief that production abroad had a total worth it. So there is, in many cases, successful internationalization on time. So relocation from abroad is not always a "flight" and a return to home.

Likewise, it would be wrong to enhance any foreign involvement of German companies as an "escape" before unfavourable assessed site conditions in Germany. Many companies that have established production facilities abroad have been guided by the intention to develop new international markets.

New research therefore holds a **key message** for all companies ready: With reviews of domestic and foreign production sites, it is important to identify the **relevant urban factors** as early as possible and to be weighted properly with respect to their **own context** specific undertakings. From a firm perspective, this includes not only the **quantifiable costs** such as wages or raw materials but also transport conditions, the structure of markets, professional skills and the work ethic of employees, the existing technological infrastructure and not least the cultural environment. From a city /city-state perspectives, this includes to ask what **are potential firms that are willing to relocate** internally or what are new tenants in East Hamburg?

2.4 Trends and drivers that affect manufacturing

A number of relevant trends in manufacturing can be discerned:

Customization

Products can be ever more adapted to individual preferences; a new enabler for this is 3d printing, this may lead to new models of local, on-demand production of goods or spare parts

Servitization

Products and services are bundled. Rather than products, firms sell “packages” of leased products including maintenance contracts

New links between manufacturing and design/R&D/software development

Competing on costs is out of the question; competition takes place on the basis of innovation. The speed of technological change and increasing competition makes that R&D and production/design cannot be separated. This is especially true for the following categories:

- Industries with highly complex products sold to individual customers (like machine building)
- Consumer industries that are highly trend-sensitive (fast fashion, furniture, interior design etc.
- Many firms have taken back manufacturing home (Asia) for quality and control reasons

Increasing mixes between the worlds of design, art and manufacturing

Initially and originally in the higher-level consumer oriented industries (household appliances, architecture, interiors etc.) but immersing into more segments. New types of infusion of art & design and technology in traditional industries, like construction and building industries. Dutch Studio Roosegaarde is an example, they work with a big building company to make the highways more visibly attractive and appealing, and also they work on "artificial landscapes" where interactive art is fully integrated into public space.

New business models and organisational modes (open innovation)

Several "layers" of suppliers, but in all layers make complex industrial products, technological sophistication is rising and we see a trend of increasing R&D efforts or partnerships with knowledge institutes. Also, production needs competences from a lot of disciplines and technologies, and no firm can master all of it.

A related trend is the "project economy", where manufacturing firms team up with partners on a project basis, temporary (i.e. BMW develops a new engine with PSA and apply it in both their cars; Intel develops new chips with a lot of partners).

All in all, manufacturing firms become more networked in all ways. They will have more meetings, dinners etc. with outsiders, and this has an impact on the type of location and building they prefer. Supplier industries face extremely high quality demands from their clients, and need upgrading to fulfil these demands. New growth industries emerge in the green economy: electric mobility, waste treatment, solar and wind power etc. Figures?

The "internet of things" is coming, products will be more connected, and new operating systems emerge; this increases the already very high software and electronics content of manufacturing. Another driver is the so-called "maker movement" and the general recognition of "making things" on small scale. This is very often reflected in maker spaces such as TechShops, FabLabs, Open Design City, and other types of Coworking Spaces where small firms and individuals can use equipment and share knowledge. This is also a social movement, mainly urban, in which sharing and sustainability are key words.

2.5 Technological trends and drivers

The following key technological trends and drivers can be identified:

Reduction of the material-consumption by:

- Lightweight construction, multi-material design, joining technologies
- Miniaturisation of dimensions (parts, components, products)

- Intelligent engineering with specialised materials
- Implementation of new technologies (Nano etc.)
- Integration of functions (adaptronic, sensors, actors)
- Mechatronic components, Embedding electronics, MID
- Reduced process chains (near net technologies)
- Process capability (waste, scrap, defects etc.)

→ Recycling technologies, re-manufacturing technologies is a contribution to reduce energy consumption. When it comes to better understanding the types of products that might be produced in larger scales in the future, it directly comes to highly customised technical consumer goods, design oriented products, and configurable or modular constructions.

Key-Technologies, that dynamise the role of the "urban" factory anew are:

- Emotional manufacturing
- Zero Emissions of processes and factories: Especially noise, air, fluids, waste
- Short Process chains, integration of processes
- Desktop Machines: small, medium dimensions
- Intelligent green logistics (whatever that might be)
- Digital products – digital factories
- Human centred workplaces
- Tele working

→ Effects on the layout of the future factory:

- Factory layout: flexible, open, integrated, lowest floor space
- Production System: human centred, flexible hours of work, event-driven organization
- Volume production (back) to Europe

2.6 The role of manufacturing in urban context

In the last sections, we listed a number of developments and trends of different sort, in manufacturing industries. But what about the urban dimension? Urban manufacturing can thrive, for many reasons (Pratt, p. 25).

- First, because cities are fertile grounds for innovation and creativity, and these are exactly the inputs those future industries will need more. Cities offer environment that enable the integration into other economic sectors such as design and the arts and entertainment.

- Second, it is in close proximity to a large consumer market, which makes sense for consumer-oriented specialised production.
- Third, it benefits the availability of educated/skilled workers (an increasingly critical and scarce resource). Big cities have a pipeline of graduates from local colleges and universities, and are magnets for skilled workers (Fraunhofer[1] states that this is a reason why the called "Mittelstands-Unternehmen" increasingly prefer larger cities as a location). Urban locations could cater for new demands of young professionals regarding their working environment, soft mobility etc.
- Fourth, urban locations are good for networking opportunities that become more and more important.
- Fifth, an urban location provides incentives for businesses to experiment with and invest in new "green" manufacturing, in which both product and process are engineered to reduce carbon footprints, conserve resources, and improve efficiencies.
- Sixth, cities are good environment for some manufacturers to mark their identity, to stress their transparency and to develop more intimate relation with their customers. Manufacturing becomes part of the image. Car manufacturers are frontrunners but it will apply to more industries in the future.

A recent online survey among a group of 200 manufacturers[2] and related stakeholders showed that the respondents see especially big chances for Stuttgart, München and Hamburg.

For three reasons: 1) these cities manage to organise services industries around manufacturing; 2) these cities are competitive, green and attractive, and thus attract talent and 3) They are seen as fertile, innovative milieux.

Also, it was asked in which cases companies and city benefit from a symbiosis between city and industry. The following examples were mentioned: Audi (Neckarsulm), Sick (Waldkirch bei Freiburg), Bosch (Stuttgart), BASF (Ludwigshafen), SAP (Walldorf bei Heidelberg), Bayer (Berlin), Novartis (Basel), Siemens (Wien), VW (Pamplona), Freudenberg (Weinheim), Firma Krabag (Hamburg).

In a recent study, Fraunhofer mentions VW Werk in Dresden, in the centre of the city, as a case. This car factory is located since 2001 in the middle of the historic city and very near the central station. It is an early example of new urban manufacturing. „Dass die Dresdner VW-Fabrik sich inmitten der Stadt ansiedeln konnte, ist ein Novum. Galt doch jahrzehntelang der städteplanerische Grundsatz der Moderne, dass Wohnen und Produzieren

[1] Vgl. „Fraunhofer Initiative Morgenstadt", http://www.morgenstadt.de/
[2] http://www.stiftung-nv.de/THINK-TANK/Projekte/Abgeschlossene-Projekte/150884,1031,140878,-1.aspx

in der Stadt unvereinbar seien." Production becomes an event, a statement. See https://www.glaesernemanufaktur.de for details.

The **Stiftung Neue Verantwortung**[3] identifies 5 factors/conditions that cities should take into account to promote urban manufacturing:

- Promote the development of the right skills among young people, in close collaboration with educational institutes.
- Promote intersectoral and interdisciplinary knowledge exchange and "cross fertilisation"
- Engage more with industrial companies, as partners in planning of areas and other respects. Many are ready for that.
- Reduce environmental impact of manufacturing, by strongly promotion zero-emission, green production etc.; this is the only way to make a co-existence in dense cities possible
- Make sure you have appropriate areas for industry available, in which flexibility allows for rapid expansion (or contraction)

Key issues in this respect are:

- How to design urban manufacturing areas in such as way that the benefits (written above) outweigh the extra costs and nuisance (higher land and real estate prices, congestion, delicate relations with neighbours etc.)
- Many industrial zones are unattractive and have very few amenities; how to bring "human" or soft attractiveness in these places, gradually, is a key issue.
- New mixed manufacturing districts: what type mixes could work and make sense?

The dilemma is, that in dense and attractive areas, space is expensive and production is easily outcompeted by other functions (housing, leisure, offices, hotels). Especially in the growing big cities in Germany, pressure to develop for housing is very high. How to handle/manage this? In section 4, we present some possible case studies that may shed light on these issues. But before that, in the next section, we explore the changing work and labour profiles in manufacturing industries.

[3] http://www.stiftung-nv.de/THINK-TANK/Projekte/Abgeschlossene-Projekte/138710,1031,140878,-1,146953,0,-1,0,0,0,0,-1,-1,-1.aspx

3. Work and labour profiles in manufacturing, production, and creative sectors in Germany

3.1 A macro view

Looking at various statistics regarding employment and human capital development in Germany, the key message is that its knowledge intensification continues undimmed in almost all sectors.

The balance of employment after the crisis, between 2008 and 2010, highlights a double structural change: The goods-producing manufacturing sector lost employment, while creating additional jobs almost exclusively in the service sector. At the same time knowledge-intensive industries develop cheaper (less losses in the production sector, stronger growth in the service sector) than the non-knowledge-intensive sector.

In total, between 2008 and 2010, around 30,000 jobs have been lost in the intellectual economy (-0.1%). The decline was in 2008/09 almost caught up. The employment gains in the service sector (+200,000), which are equally distributed to knowledge-intensive and not knowledge-intensive industries, could compensate for the more persistent decline in employment in the production and manufacturing sector (-230 000) only slightly.

Also, the trend of "higher qualification" in the German economy from 2008 to 2010 continued. Both the use of employees with higher education in general and the use of employees with scientific and technical expertise in particular has increased in absolute and in relative terms.

Comparing the structure of the German economy on a European level, it is dominated by its knowledge-intensive industries. With a share of 39.3% in this sector a lot more people are employed than the average of EU-15 (34.7%). The position of Germany depends mainly on the occurrence in the international comparison with knowledge-intensive industries. Germany has a relatively weak share of knowledge-intensive services. Only Japan has a similar industry-dominated employment structure.

Central characteristics

- Knowledge-intensive industries demonstrate growth rates
- They compensate the loss in other production-oriented industries
- Germans industrial basis has been rather robust in the crisis in respect to many other European countries in the last years.
- The German education profiles ("Berufsschule") feeds industries

The relatively favourable development of employment in knowledge-intensive sectors of the economy in Germany in 2008 and 2010 continued so that German country could close the gap in terms of the share of employment in knowledge-intensive sectors of the economy in international comparison.

On the one hand the employment figures in the knowledge-intensive manufacturing sector hardly came under pressure while they have been significantly losses to be found in all other European regions compared to Germany. Secondly, a higher employment growth rate could be achieved in knowledge-intensive services than in other parts of Europe.

Regarding the level of human capital (as measured by the academic intensity), Germany, compared to Europe, has a rear position. With a share of 17.7% of academically qualified workers, the distance to the average of the European comparison countries (22.7%) rates five percentage points.

The relatively low level of academics in Germany can also be seen against the background of its particular secondary education segment.

This average rank is also confirmed when looking at the proportion of people working in academic occupations in trade and industry. Especially in Northern Europe, but also the small neighbouring countries in core Europe, relatively more people with academic professions can be found, which can be attributed to the lower structural weight and the lack of dynamism of the ICT sector, notably ICT services in Germany, among others.

A sectorial perspective on human capital use on the basis of formal educational level of employees presents following insights: In Germany, not only a below-average proportion of graduates in overall economic sectors can be observed in a European comparison, but also within commercial industry and knowledge-intensive industries. The share of academics in the business economy in 2010 in Germany is 14.7%, whereas in the EU-15 18.1%. The generally lower academics share of the industrial sector in comparison to the overall economy is mainly due to the neglected public sector where many high qualified are employed. In the knowledge-intensive industries, however, the share of employment in academic occupations in Germany with 23.2% is below average, especially when compared to the groups of countries core Europe (30.2%)

Central characteristics

Due to its education system, Germany has a rather low rate of academics in production industries.

In knowledge-intensive industries the employment share of academic-based occupations in Germany is on average 16.4%, which is mainly lower than in France (19.1%), UK (18.4%) and the countries of northern Europe (20.0%).

and Northern Europe (34.4%), but also Japan (28,1%). This position of Germany can also be found at a deeper level.

In knowledge-intensive industries the employment share of academic-based occupations in Germany is on average 16.4%, which is mainly lower than in France (19.1%), UK (18.4%) and the countries of northern Europe (20.0%). Especially the share of academics in Germany in the production sector of chemical (12.8%) and pharmaceutical products (19.7%) is low, on a comparative European level. Only in the core countries of Europe and partly in the U.S. (chemistry) or Japan (pharmaceuticals) the proportion of graduates is lower. Above average, the proportion of workers in academics in mechanical engineering (14.5%) is higher, whereas only in the northern European countries have a higher rate of academics (16.3%). This applies to the German automotive industry (17.0 %), which in this respect only the UK (17.7%) has a higher share.

3.2 A micro view

a) What type of entrepreneur, users, and potential tenants can be detected (at these cases and more in general)?

b) What type of skills and job profiles are relevant for the jobs and occupations in urban manufacturing, and which tendencies can be observed?

With the development of digital technologies, their associated infrastructures and new digital production, distribution and development processes, new forms of value formation and value generation can be found: There is a growing number of creative and knowledge workers, that fulfil these needs. Similar to the transition from an agrarian to an industrial society also social structure, value systems, and behaviour patterns and, not least, the concept of work transforms significantly.

On the one hand an increasing number of standardised and routinized activities are transferred on technical systems. On the other hand the digitization knowledge explosion forces greater specialization. Specialization remains always incomplete due to the rapid dynamic changes, so, in order to control new trends and risky developments, communication platforms, face-to-face situations, conferences are becoming increasingly important in order to update knowledge and to include new.

In occupational terms, a new type of worker of the so-called "knowledge worker" (e.g. von Streit 2011) comes to the fore, one of the fastest growing occupational groups and employee group (97% of employment in the cultural and creative industries in Germany are a freelancer) in Germany since a decade. The number of solo self-employed and freelancers in-

creases continuously. The trend of increasing number of entrepreneurial self-employed has increased steadily in the EU Member States since the 1990s.

This trend is also true for Germany, where now 11% of the working population is self-reliant (Federal Statistical Office 2010). Since the early 1990s, self-employment has increased steadily. The number of self-employed has increased 1991-2010 by 40.2% and that of about 3 million to 4.3 million in 2010 were thus in Germany almost 11% of the working force are independent (Source: Federal Statistical Office, the results micro-census, 2010).

In recent times, we do no longer speak of "self-employed", but also of "new self-employed" workers. We hereby describe a protagonist, which relies on their own responsibility, which has a high expertise and qualification, innovation demands and creativity, and, very often, acts as a solo entrepreneur and often pursues work from home. This term also stands for new job profiles and market ideas. The increase of start-ups by these "new self-employed" workers is triggered by so-called "modern services". Solo self-employed workers ever more determine the structure in the creative industries and new intersection to service industries and production segments.

According to empirical estimations by DIW researchers, this means that almost one in five high school graduates in the professional career will act independently (cf. Fritsch / Kritikos / Rusakova 2012: 9 on the basis of micro-census data). Many, especially young and educated people are testing their business ideas by forming a start-up. This is true, as a recent study shows KfW, especially in the creative industries to (KfW Research - position 2011).

Central characteristics

Since the early 1990s, self-employment has increased steadily.

The number of self-employed has increased 1991-2010 by 40.2% and that of about 3 million to 4.3 million in 2010 were thus in Germany almost 11% of the working force are independent

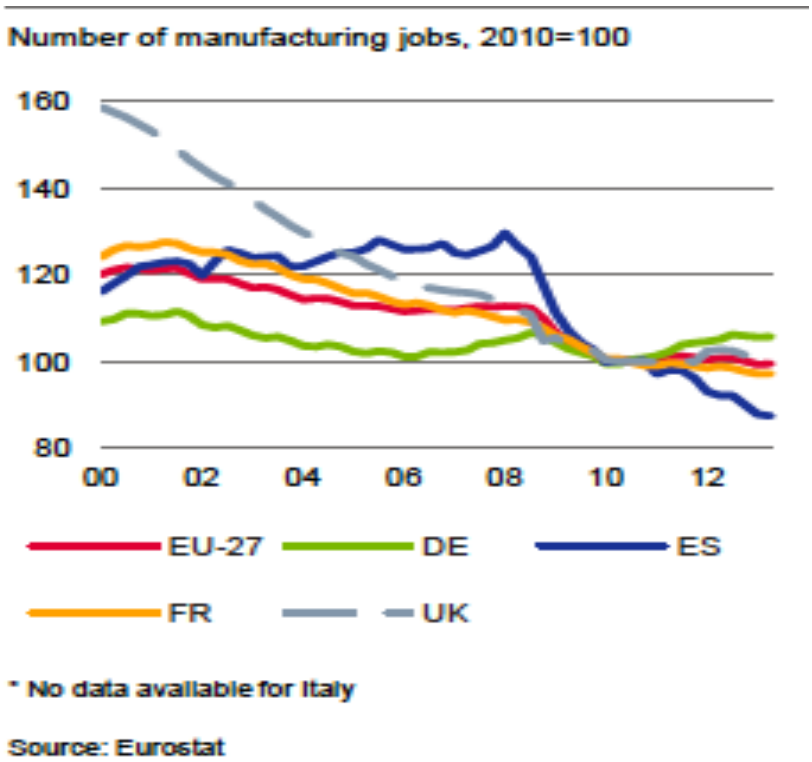
(Source: Federal Statistical Office, the results micro-census, 2010).

This fine graded segmentation goes hand in hand with new modes of development, organization and management of relevant knowledge. It stands out significantly from the industrial form of work from, requires different skills and abilities as well as places of exchange and transfer. Just because relevant knowledge is not always hierarchically structured in these small-scale structures, it is differently situated than in established SMEs and Corporate Companies. On top of that, the Internet enables at the same time new and open cooperation and ways of working that are known under the heading of "open innovation" and bind to the new forms of cooperation.

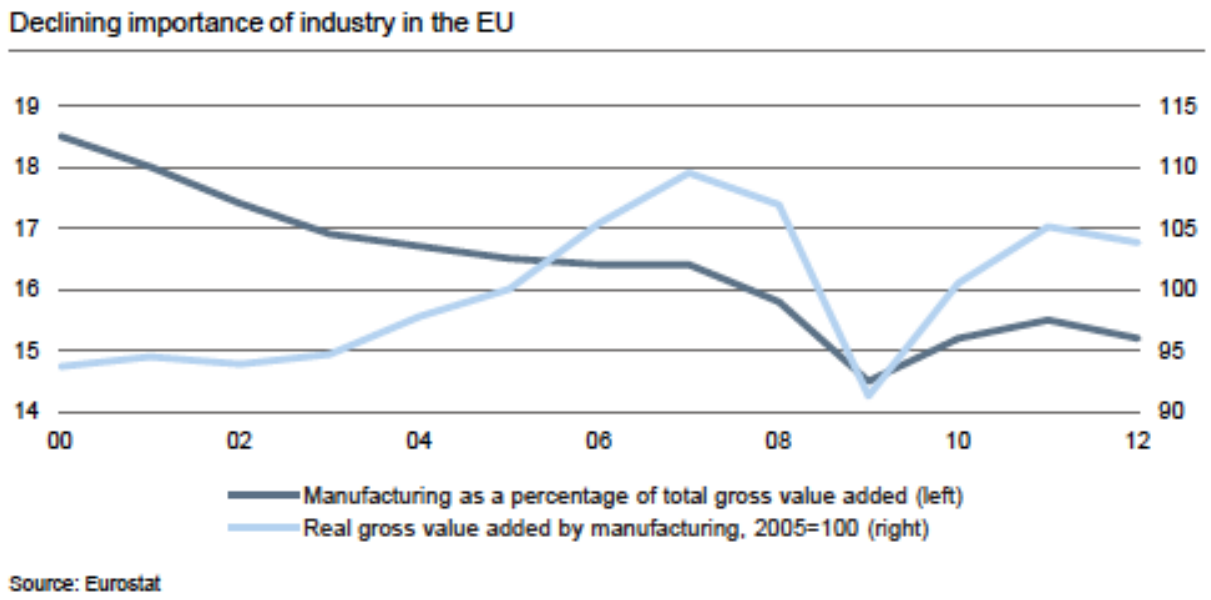
This is particularly true for weak institutionally embedded or completely free creative and knowledge worker who therefore experience new opportunities for profiling off of established professional and career paths. Creative and knowledge workers utilize this communication and social media to better connect their expertise with the expertise of other specialists ¬ and to combine new knowledge on the basis of so-called open source technologies.

3.3 First conclusion and initial generalisations

-still decreasing number of jobs in industry when using traditional metrics; can be explained by productivity increases (report Deutsche Bank, 2012[4])



[4] https://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000323902/Europe's+re-industrialisation%3A+The+gulf+between+aspiration+and+reality.PDF



-The real picture is unclear as there is so much manufacturing-related employment in other sectors: design (product design, packaging), services, logistics, R&D etc. It is unclear how the full "industrial cluster" is developing in quantitative jobs terms

-Overall: there is less need for unskilled labour, more for medium and high skilled technicians. EU report gives more details

-Competition for skilled workers is fierce. Firms can attract them by higher wages, but also soft factors such as quality of working environment, room for self-expression/development etc.

-One aspect of this (already clear in software industry and many service industries) is the hipness of the workplace, and the access to amenities, and the closeness to home (commuting distances).

4. Innovation districts & Manufacturing: Interesting and inspiring cases ("case studies") and Best Practices

4.1 Introduction

What are inspiring cases where we could observe, study, and detect effective manufacturing conditions in urban contexts? How did theses cases start to strategically develop urban spaces? In this section, we do not focus primarily on manufacturing as an industry alone, but take a somewhat broader look at emerging "innovation districts" in cities in which urban production plays a role. Could Hamburg East (or parts of it) be redeveloped into a dynamic innovation district fuelled by new types of manufacturing firms?

4.2 Innovation districts with manufacturing

A growing number of scientists observe a new urban geography of innovation. Innovative activity increasingly thrives in new types of mixed urban districts, where innovating companies, big and small and working in different sectors/technologies, sit close to each other, in amenity-rich dynamic urban areas, next to start-ups, academic institutions etc. More and more evidence becomes available that such environments spur innovation and jobs, increase productivity, attract workers (and visitors), and contribute to sustainability of they cater for soft mobility (bikes, walking, transit access). These volatile, fluid new types of industrial districts are a break with the recent past, in which functions were separated: Industry at business parks, science at science parks, housing in residential zones.

This tendency fits in an economy more oriented towards "open innovation", in which companies draw on external resources to generate new products and bring them to the market. As a result, the boundary between a firm and its surrounding becomes more porous. Open innovation is spreading from large firms also to smaller ones. The "collaborative economy" alters location preferences and internal design of workplaces, towards more collaborative spaces and open floor plans. It is also reshaping the relation between buildings in a district, evokes new connections between the private and the pubic realm, with important (yet unexplored) urban planning implications. The development of innovation districts also fits in the growing demand in big cities for dynamic mixed neighbourhoods, walkable, and accessible by bike and transit.

4.3 Relevant assets of innovation districts

To assess the potential innovation districts, Brookings Institute[5] discerns three categories of assets (based on a global survey of such areas). This typology helps to understand what makes an innovation district "tick", and could be applied, with modifications, to Hamburg East.

These are the asset categories:

Economic assets: firms, institutions that drive, cultivate or support the district

Physical assets: public and privately owned spaces (buildings, open spaces, streets etc) to stimulate connectivity, collaboration, innovation

Networking assets: fruitful relationships between actors in the area

Each type is further broken down into sub-categories, see table 4.3.1. When all tree types are well developed, the district functions as an innovation ecosystem with synergistic relationships between people, firms and place.

[5] B. Katz and J. Wagner, The Rise of Innovation Districts: a New Geography of Innovation in Europe (Washington DC Metropolitan Policy Programme at Brookings, 2014)

Key assets of an innovation district	What	Explanation & Examples
Economic assets		
Innovation drivers	Innovators: Large firms, SMEs, start-ups, research labs, with preference for compact, urban oriented enclaves	Relevant firms: Creative industries, high-value research oriented sectors, specialised small-batch manufacturing firms; mixed with entrepreneurs and universities
Innovation cultivators	Companies and organisations that support the growth of individuals, firms, and their ideas	Incubators, accelerators, proof-of-concept centres, tech transfer offices, training firms
Neighborhood-building amenities	Providers of all sorts of services to residents and firms	They make the area lively and liveable, activate streets and public spaces, and provide meeting places: Shops, stores, coffee bars, restaurants, small hotels
Physical assets		
Public spaces	Attractive streets, parks, squares, plazas	They encourage people to meet each other, to network, and can be turned into living labs
Private spaces	Privately owned buildings and spaces that stimulate innovation and interaction and link up well with public spaces	They connect the private with the public sphere; Flexible office spaces, open/shared labs/equipment models, micro-housing (small private spaces with access to larger public spaces)
Assets that knit the dis-	Eliminate barriers that hin-	Investments to remove barriers

trict together or link it to the broader city	der relationship-building and connectivity	like fences, walls around big plots/firms/campuses; Create smaller, walkable blocks to strengthen connections
Networking assets		
Networking assets that build “strong ties”	Promoting relationships between actors/practitioners within similar fields	These help to build innovative networks. Examples: Cluster-specific meetings, industry-specific conferences,
Networking asset that build “weak ties”	Encouraging cross-sectoral relationships	These help to infuse people and companies with unexpected insights and may evoke new networks and opportunities. Examples: Networking breakfasts, hackatons across industries, programmed open spaces

Table 4.3.1 Relevant assets for innovation districts

4.4 Developing innovation districts: insights from practitioners

It is one thing –and very relevant – to list the assets that a strong innovation district might have; it is another thing to create or promote those districts, and design paths and strategies in the right direction. From the Brookings study (in which a number of leaders were interviewed) and recent studies by Van Winden et al.[6], a number of considerations and lessons emerge:

1. Build a collaborative network with "distributed leadership": consisting of leaders from key firms, tenants, and other relevant institutions in the area, who meet frequently to bring the district further (in terms of design, marketing, governance, investments etc.). One person, or a team, must play a central role as catalyst, integrator, or facilitator

2. Set a vision for growth. This provides clarity and guidance for actions and investments. The vision must not be a dream, but a concept well be grounded in evidence. Detailed and thorough analysis is needed to decide the "colour" of the district (which clusters/types of firms to promote and develop). Preferably, the vision fits in the broader strengths and traditions of the entire city. The growth vision should include an idea how to attract new actors (key firms, research institutes, university branches or other "innovation assets") to the area. Also, the vision must communicate how to transform the physical landscape of the area, and turn it into a dense, mixed, and dynamic area.

3. Attract and develop talent. Talent can be attracted through outreach programmes, and marketing campaigns, and must not be directed to the city region alone but have national or even international reach. Also, entrepreneurs must be supported to develop themselves and their companies. Shared workspaces, equipment and technology centres help entrepreneurs to develop and focus on their core business.

4. Promote inclusive growth. Use the district to improve adjacent distressed neighbourhoods. This can be done through training programmes that open opportunities for unemployed to work in the district, or initiatives to link innovative firms to schools, or encourage tenants to hire locally, offer on-the-job training opportunities etc. The district can become a cradle for local entrepreneurship: through fablabs (high tech equipment that can be used by the community, with training and supervision)

5. Improve, co-ordinate and integrated access to capital. In such districts, there are many funding streams, from many sources, serving many purposes (real estate of all sorts, infrastructure, applied research, incubators, regeneration, education, energy, utilities, specific

[6] Willem van Winden, Erik Braun, Alexander Otgaar, Jan-Jelle Witte (2014), Urban Innovation Systems, what makes them tick?, Routledge, London, http://www.routledge.com/books/details/9780415727785/

subsidies for brownfield cleanups, historic conservation and so on); it is important to have a district-wide integrated strategy to prevent a “silo” approach in which synergies are missed. Also, district developers must actively communicate the value and opportunities of the “package” they offer to investors.

4.5 Interesting and relevant cases to be explored further

For our purposes here, it is most interesting to look at existing innovation districts that have developed in urban transformation areas, for instance along waterfronts, or in industrial areas undergoing a major physical and economic transformation. From a first scan, the following cases look very promising to study more in-depth to derive lessons for Hamburg:

- 22@Barcelona: this area is a complete remake of an old industrial area next to the city core. In 2000 the Barcelona City Council approved a new urban planning ordinance aimed at transforming the old industrial area of Poblenou, with obsolete factories that had long ago been abandoned or were simply not very productive, into a magnet for new activities. This new ordinance allowed for a new land designation called 22@, The project transforms two hundred hectares of industrial land of Poblenou into an innovative district offering modern spaces for the strategic concentration of intensive knowledge-based activities. This initiative is also a project of urban refurbishment and a new model of city providing a response to the challenges posed by the knowledge-based society. It is the most important project of urban transformation of Barcelona city of the last years and one of the most ambitious of Europe of these characteristics, with a high real state potential and a 180 million Euros public investment of infrastructure plan. 22@Barcelona is building a new compact city, where the most innovative companies co-exist with research, training and tech transfer centers, as well as housing (4,000 new subsidized residences), facilities (145,000 m2 of land) and green areas (114,000 m2). This model city coexists with the neighborhood's industrial heritage thanks to the Industrial Heritage Protection Plan, written jointly by 22@Barcelona and the Barcelona City Council, which conserves 114 elements of architectural interest.
- Brooklyn Navy Yard, New York: an old navy yard transformed into “urban manufacturing hub” and marketed as such, it is now internationally known, and symbol of America’s intention to make a comeback as manufacturing powerhouse. It has a big size and economic impact: The BNY is an active industrial park that occupies 300 acres along the Brooklyn waterfront. It houses over 330 businesses and 5,800 employees and supports several of New York City’s key industries, including film, media, arts and culture, architecture, and design. The BNY’s annual economic output, that

is, its “gross domestic product” for New York City, is nearly $2 billion. It is responsible for 10,350 direct and indirect jobs and $390 million in earnings. That economic activity in turn induces another $2 billion in earnings in the local economy and another 15,500 jobs. **More details on this case are in annex 2.**

- RDM Rotterdam: The RDM Campus is developed on the site of a former and historically important shipyard. The initials RDM previously identifying the Rotterdam Dry dock Company (Rotterdamsche Droogdok Maatschappij) have been retained but now stand for Research, Design and Manufacturing. **More details on this case are in annex 2.**
- The “Warm Springs Innovation District” will be created in Fremont, California, anchored by Tesla Motors, a manufacturing company that embraces the “open innovation” economy. Fremont City Council members approved a new planning document that spells out land-use and design guidelines for the 879-acre zone. It allows for a mix of residential, office, industrial and retail uses in the area, which had previously been zoned for heavy industrial use. The plan allows up to 4,000 housing units, plus enough commercial space to support more than 12,000 new jobs. Officials envision concentrating density near the under-construction BART station, slated for completion in late 2015. (see http://bit.ly/1oiR6aI)
- Stockholm Royal Seaport is a new urban development project. The city district has unique characteristics such as close to the water, green areas and cycling distance to the city centre. Ambitious environmental targets have been set for the area, as well as varied architecture, a mix of homes, culture, and spaces for recreation, workplaces and local services. Here, in what is one of Stockholm's prime locations, plans are under way to build about 12,000 new homes and create 35,000 new jobs. The development will largely take place in areas previously used for port operations and other industry. In addition to new homes and workplaces, the port's operations will be modernised and concentrated on the piers, while container and oil handling will be moved elsewhere. This will release land that is important for the development.

In table 4.5.1, the cases are listed, assessing their relevance for Hamburg East. Also, the table contains some company cases (mentioned in section 2) of manufacturing firms that are interwoven in the urban fabric: they are also worth studying in more detail.

Table 4.5.1 Relevance of cases for Hamburg Ost

Case	Size of area	Land ownership	Why interesting
Brooklyn Navy Yard	120 ha	??	Focus on manufacturing in big&expensive city Social aspects/helping unemployed Management model by public-owned development company
22@ Barcelona	200 ha	Mixed	Old industrial area Complex transformation management Interesting "synergy management" Special incentives for land owners
Warm Springs Innovation District, Silicon Valley, California	320 ha	??	Complex transformation of industrial district into new mixed yet industrial innovation district Central anchor role of manufacturer Tesla
RDM campus	About 100 ha	Public/education	New urban manufacturing as key identity Regeneration of surrounding

			area Industrial identity Port-city related Connection between creative industry and other industry
Stockholm Royal Sea-port	236 hectares	100% public	Former port/industrial area Mixed development Long timeframe Clear branding/identity
Company cases (listed in section 2)			
VW Werk Dresden			Early example of inner-city factory How they solve logistics is-sues How city and plant can bene-fit each other
Audi (Neckarsulm), Sick (Waldkirch bei Frei-burg), Bosch (Stuttgart), BASF (Ludwigshafen), SAP (Walldorf bei Hei-delberg), Bayer (Berlin), Novartis (Basel), Sie-mens (Wien), VW (Pam-plona), Freudenberg (Weinheim), Firma Krabag (Hamburg).			Examples of where manufac-turing companies and city benefit from a symbiosis between city and industry

5. Questions related to the future outline of "Urban manufacturing"

In this section, we raise a number of questions related to the topic of urban manufacturing. They can be read as a research agenda with relevance for Hamburg East.

5.1 Exploring connections and tensions between the "innovation" economy and traditional manufacturing

- How can the gap between old and new manufacturing be bridged
- How to ensure that urban manufacturing is a tool for equity?

Interesting connections and tensions could be:

1. Cross-innovation processes e.g. between Design and craftmenship (www.cross-innovation.eu)

2. Local demands and services combined with joint applied research and development and local companies (Triple Helix-Structures)

5.2 Merging old and new industries and its production sequences

- How to use the past to design the future regarding urban manufacturing?
- How can industrial land reuse or traditional apprenticeship models be levered with new models—such as crowd-sourced platforms and new cloud-based communication approaches— to create a future city-region based platform for new labour and production in an urban context?

5.3 Finding innovative solutions in land use planning:

- What are the models and best practices in creating and financing stable, affordable industrial space in cities?
- What are models where the symbiosis between production firm and urban envi-

Interesting solutions in land use planning are:

1. Smart city approaches, first attempts of RIS3 approaches
2. Local building communities such as "ExRotaPrint" Berlin (http://www.exrotaprint.de/index.php?section=21

ronment has worked well, and what are the dos and don'ts (do more case studies of good practices, like the case firms mentioned in section 2).

- Are there opportunities for cities to work together on urban manufacturing?

5.4 Network effects

- How can urban manufacturing leverage technologies to create platforms for shared action?
- Can we develop a web-based sourcing platform to strengthen supply chains between cities to promote local production, and how can we also use better tools to share knowledge and foster collaboration between stakeholders from urban manufacturing, logistics, consumers and research and development?

Interesting networks effects and platforms are:

1. http://urbanmfg.or
2. http://www.sfmade.org
3. http://urban-made.org
4. http://www.offene-werkstaetten.org

- How to bridge the big perception gap between the new and "the old" types of manufacturing?
- Can the worlds of the very "hip" maker movement and the industrial worlds of manufacturing be linked, by infusing the 'old' manufacturing with the economies of agility that characterize the Maker movement and the Sharing Economy, and at the same time 'future-proof' legacy industries by doing so[7]?

5.5 Workforce development

- How can urban manufacturing initiatives create better, more equitable job opportunities for urban residents? What can we learn from other cases in this respect?
- How can we connect with workforce development partners? Is there an opportunity to create apprenticeship programs within stimulating Urban Manufacturing?

[7] http://prattcenter.net/sites/default/files/uma-2nd-national-convening_report.pdf

Annex 1 Statistical tables

Sektor- und Qualifikationsstrukturen in wissensintensiven Wirtschaftszweigen in Deutschland

Tab. 3.2: Qualifikationsmerkmale in wissensintensiven und nicht wissensintensiven Wirtschaftszweigen in Deutschland 2008 bis 2010

Wirtschaftszweig	Wissenschaftler				Akademiker			
	Intensität			jd. V. (in %)	Intensität			jd. V. (in %)
	2008	2009	2010	2008-2010	2008	2009	2010	2008-2010
Produzierendes Gewerbe	**4,9**	**5,0**	**5,1**	**0,4**	**8,6**	**8,9**	**9,0**	**1,1**
wissensintensive Wirtschaftszweige	9,7	10,0	10,1	0,5	15,8	16,3	16,6	1,2
nicht wissensintensive Wirtschaftszweige	2,2	2,3	2,3	0,2	4,6	4,7	4,8	1,0
Verarbeitendes Gewerbe	**5,5**	**5,7**	**5,8**	**0,4**	**9,6**	**10,0**	**10,2**	**1,0**
wissensintensive Wirtschaftszweige	9,8	10,1	10,2	0,4	15,7	16,1	16,5	0,9
darunter								
Schwerpunkt Chemie/Pharma	7,6	7,8	7,9	2,2	16,2	16,7	17,2	3,2
Schwerpunkt Informations- u. Kommunikationstechnik	16,8	16,7	15,9	-9,3	25,9	25,6	24,6	-9,0
Schwerpunkt Elektrotechnik/Elektronik/Optik	12,5	12,9	13,1	1,3	17,8	18,5	18,8	1,5
Schwerpunkt Maschinenbau	8,2	8,4	8,7	2,0	12,4	12,9	13,3	2,8
Schwerpunkt Fahrzeugbau	9,1	9,5	9,9	2,2	14,8	15,5	16,1	2,3
nicht wissensintensive Wirtschaftszweige	2,2	2,3	2,3	0,6	5,0	5,2	5,4	1,2
übriges Produzierendes Gewerbe	**3,1**	**3,2**	**3,1**	**0,1**	**5,5**	**5,6**	**5,6**	**1,9**
wissensintensive Wirtschaftszweige	8,7	9,0	8,7	1,3	17,3	17,9	18,2	3,9
nicht wissensintensive Wirtschaftszweige	2,3	2,3	2,3	-0,6	3,7	3,7	3,7	0,6
Dienstleistungen	**2,1**	**2,2**	**2,2**	**2,1**	**8,9**	**9,2**	**9,3**	**3,1**
wissensintensive Wirtschaftszweige	4,4	4,5	4,5	2,7	17,5	18,1	18,4	3,4
darunter								
Schwerpunkt Finanzen und Vermögen	0,8	0,8	0,8	-1,0	12,2	12,5	12,7	0,7
Schwerpunkt Kommunikation	4,3	4,3	4,3	-1,0	25,1	26,9	27,3	2,6
Schwerpunkt Technische Beratung und Forschung	30,1	30,5	31,0	2,7	35,4	36,0	36,5	2,8
Schwerpunkt Nichttechnische Beratung u. Forschung	1,8	1,8	1,9	6,2	19,1	19,8	20,1	4,8
Schwerpunkt Medien und Kultur	1,1	1,2	1,1	4,5	18,8	19,1	19,5	2,5
Schwerpunkt Gesundheit	0,6	0,7	0,7	7,3	11,9	12,3	12,6	5,2
nicht wissensintensive Wirtschaftszweige	0,7	0,7	0,7	-0,3	3,4	3,5	3,5	2,2
darunter								
Befristete und sonstige Überlassung von Arbeitskräften	0,9	1,2	1,1	7,3	2,8	3,5	3,0	3,3
übrige Wirtschaftszweige	0,7	0,7	0,6	-1,3	3,4	3,4	3,5	2,1
Gewerbliche Wirtschaft	**3,2**	**3,3**	**3,3**	**1,1**	**8,8**	**9,1**	**9,2**	**2,4**
wissensintensive Wirtschaftszweige	6,3	6,4	6,5	1,5	16,9	17,5	17,8	2,7
nicht wissensintensive Wirtschaftszweige	1,3	1,3	1,3	0,0	3,8	3,9	4,0	1,7
Übrige Wirtschaft	**1,8**	**1,8**	**1,8**	**4,2**	**16,3**	**16,7**	**17,0**	**5,2**
Insgesamt	**2,9**	**3,0**	**3,0**	**1,4**	**10,1**	**10,4**	**10,6**	**3,2**

Erläuterungen: Akademiker: Beschäftigte mit Hochschulabschluss; Wissenschaftler: Beschäftigte in den Berufen Naturwissenschaftler bzw. Ingenieure.
jd. V.: jahresdurchschnittliche Veränderung

Quelle: Bundesagentur für Arbeit, Sonderauswertung der Beschäftigtenstatistik. – Berechnungen des NIW.

Abb. 4.1: Gewicht wissensintensiver Wirtschaftszweige in der gewerblichen Wirtschaft in Europa 2010

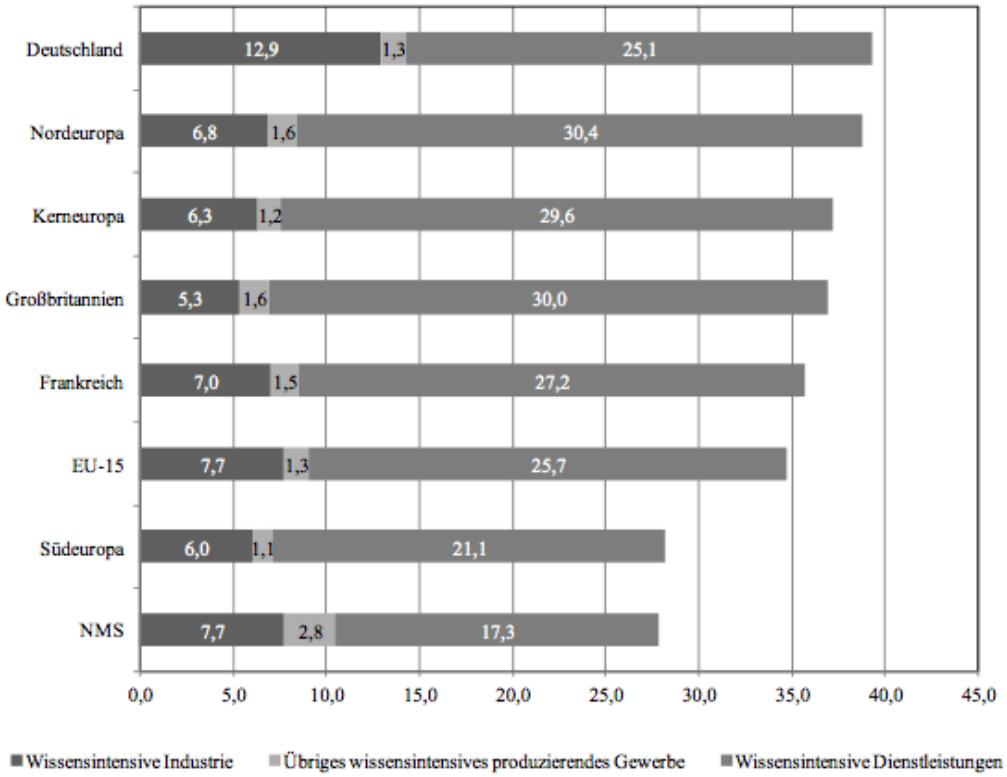
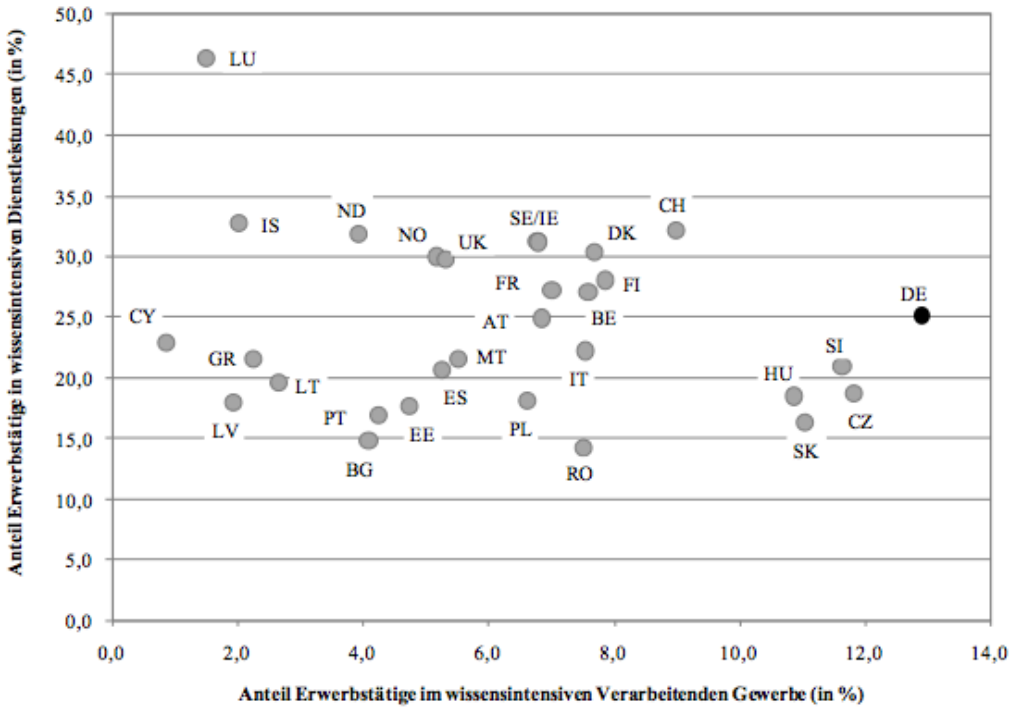


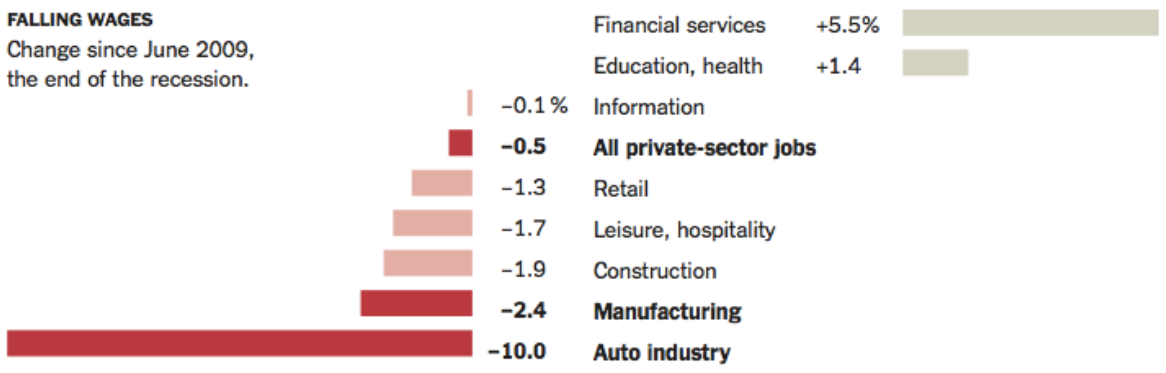
Abb. 4.2: Verteilung der Erwerbstätigenanteile in wissensintensiven Industrien und Dienstleistungen in europäischen Ländern 2010

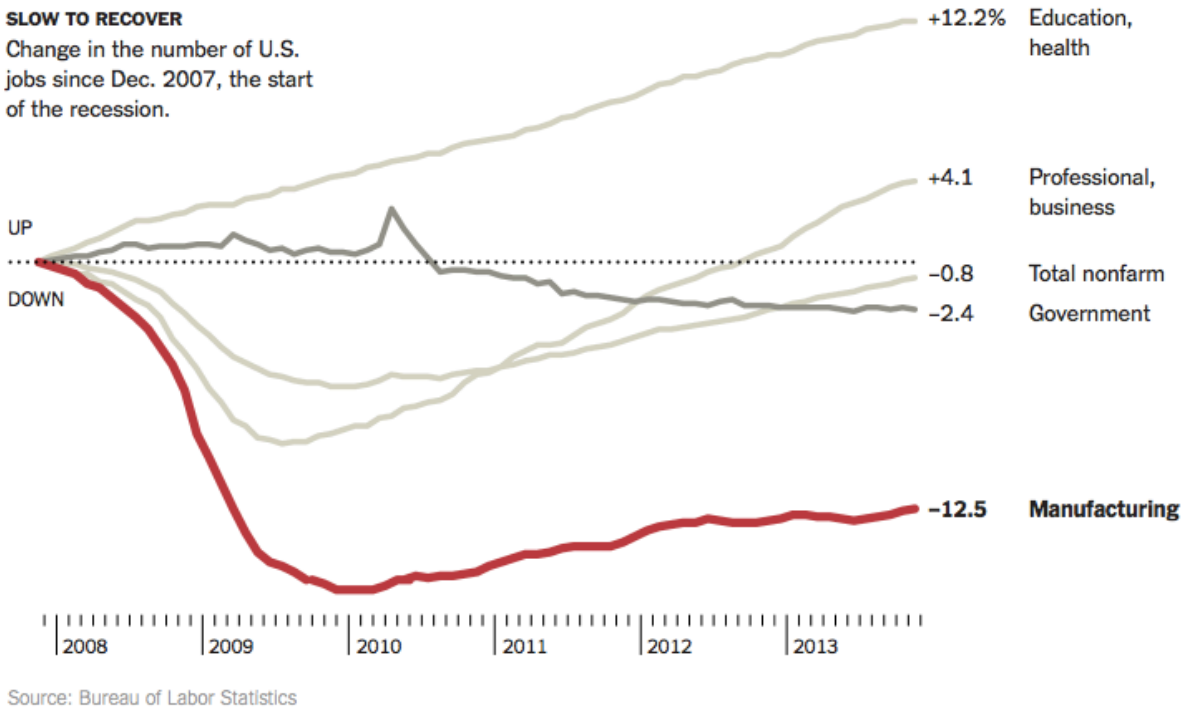


Tab. 4.1: Entwicklung wissensintensiver Wirtschaftszweige 2008 bis 2010 im europäischen Vergleich

Region	Verarbeitendes Gewerbe		übr. Produzierendes Gew.		Dienstleistungen		Gewerbliche Wirtschaft
	wissensint.	nicht wissensint.	wissensint.	nicht wissensint.	wissensint.	nicht wissensint.	
Erwerbstätige 2010 (in Tsd.)							
Deutschland	3.826	4.065	395	2.613	7.433	11.297	29.630
Frankreich	1.245	2.149	263	1.857	4.825	7.404	17.743
Großbritannien	1.074	1.668	332	2.066	6.069	9.047	20.257
Kerneuropa	922	1.701	175	1.328	4.303	6.106	14.535
Nordeuropa	667	1.022	152	917	2.965	4.024	9.748
Südeuropa	2.237	5.630	409	4.313	7.860	16.764	37.212
EU-15	9.615	15.752	1.632	12.667	31.965	52.758	124.389
NMS	2.341	6.099	840	3.703	5.249	12.050	30.282
Veränderung 2008 bis 2009 (in %)							
Deutschland	1,4	-5,7	-1,7	-2,7	4,8	-1,8	-0,4
Frankreich	-7,8	-5,2	7,5	1,5	2,2	-4,5	-2,3
Großbritannien	-17,7	-9,0	-2,5	-23,4	-0,3	-3,4	-6,4
Kerneuropa	-6,7	-5,0	-2,2	-5,0	1,1	-0,4	-1,4
Nordeuropa	-9,0	-12,4	6,8	-14,5	0,7	-2,2	-4,3
Südeuropa	-6,1	-8,8	5,1	-12,9	-1,0	-3,1	-5,0
EU-15	-5,4	-7,7	1,8	-10,9	1,1	-2,9	-3,6
NMS	-10,5	-6,8	-0,1	-3,1	3,5	0,1	-2,2
Veränderung 2009 bis 2010 (in %)							
Deutschland	-1,7	5,7	6,2	5,0	0,5	-1,0	0,8
Frankreich	-1,9	-1,2	0,0	-1,4	1,3	2,2	0,8
Großbritannien	0,6	-0,3	-2,0	-3,6	-1,6	2,2	0,1
Kerneuropa	-0,2	-3,1	5,1	-1,5	0,6	-1,2	-0,8
Nordeuropa	-0,7	-2,2	3,3	-3,4	0,6	-0,4	-0,6
Südeuropa	-2,5	-4,7	-1,9	-6,8	-1,2	-1,2	-2,5
EU-15	-1,5	-1,0	0,7	-2,7	-0,1	-0,2	-0,6
NMS	-3,9	-4,2	-2,6	-5,2	2,8	0,1	-1,4
Veränderung 2008 bis 2010 (jahresdurchschnittlich, in %)							
Deutschland	-0,2	-0,2	2,2	1,1	2,6	-1,4	0,2
Frankreich	-4,9	-3,2	3,6	0,0	1,8	-1,2	-0,8
Großbritannien	-9,0	-4,7	-2,2	-14,1	-0,9	-0,7	-3,2
Kerneuropa	-3,5	-4,0	1,4	-3,3	0,9	-0,8	-1,1
Nordeuropa	-4,9	-7,5	5,0	-9,1	0,6	-1,3	-2,4
Südeuropa	-4,3	-6,8	1,5	-9,9	-1,1	-2,1	-3,8
EU-15	-3,5	-4,4	1,2	-6,9	0,5	-1,6	-2,1
NMS	-7,3	-5,5	-1,4	-4,2	3,2	0,1	-1,8

Erläuterungen: Nordeuropa: SE, FI, NO, DK, IS, IE; Südeuropa: ES, IT, PT, GR; Kerneuropa: CH, AT, BE, LU, NL; NMS (Neue Mitgliedsstaaten, EU-12 neu).
Quelle: Eurostat, Europäische Arbeitskräfteerhebung (Sonderauswertung). – Berechnungen des NIW.


FALLING WAGES
Change since June 2009, the end of the recession.
Financial services +5.5%
Education, health +1.4
–0.1 % Information
–0.5 All private-sector jobs
–1.3 Retail
–1.7 Leisure, hospitality
–1.9 Construction
–2.4 Manufacturing
–10.0 Auto industry
Source: Bureau of Labor Statistics


SLOW TO RECOVER
Change in the number of U.S. jobs since Dec. 2007, the start of the recession.
UP
DOWN
+12.2% Education, health
+4.1 Professional, business
–0.8 Total nonfarm
–2.4 Government
–12.5 Manufacturing
2008
2009
2010
2011
2012
2013
Source: Bureau of Labor Statistics

Annex 2 Case New York and Rotterdam

This annex contains more detailed descriptions of two cases: New York and Rotterdam.

A. Brooklyn Navy Yard (New York)

This is an old navy yard transformed into "urban manufacturing hub" and marketed as such, it is now internationally known, and symbol of America's intention to make a comeback as manufacturing powerhouse.

It has a big size and economic impact: „The BNY is an active industrial park that occupies 300 acres along the Brooklyn waterfront. It houses over 330 businesses and 5,800 employees and supports several of New York City's key industries, including film, media, arts and culture, architecture, and design. The BNY's annual economic output, that is, its "gross domestic product" for New York City, is nearly $2 billion. It is responsible for 10,350 direct and indirect jobs and $390 million in earnings. That economic activity in turn induces another $2 billion in earnings in the local economy and another 15,500 jobs."

It has a not for profit, on spec way of working: "City-owned and managed by the Brooklyn Navy Yard Development Corporation (a non-profit organization with a board of directors appointed by the mayor), the Yard has emerged as a successful model for urban industrial development, with an emphasis on sustainability[8]. BNYDC works with its tenants in ways that a private developer or landlord likely would not: building multi-tenanted buildings on spec with returns on investment much lower than the private market would tolerate, readily working with tenants to right-space as their operations contract or expand, procuring goods and services from tenant companies, maintaining an extended eviction process affording tenants opportunities to pay back-rents, and encouraging business-to-business activity among Navy Yard companies."

Green marketing is a key aspect: "Over the past several years, BNYDC has begun to market itself as an eco-industrial park, striving to become the choice location for green manufacturers and other businesses."

It is opening up to the outside world, and takes responsibility: "BNYDC has also recently increased public access to the Yard with the opening of BLDG 92, a new $25 million exhibition and visitor centre. BLDG 92 also houses the Yard's Employment Centre, which every

[8] Quote from Pratt report p. vi; http://prattcenter.net/sites/default/files/web_2013_bny_full_report_0.pdf)

year places 200 job seekers— particularly residents of local public housing, veterans, and formerly incarcerated individuals—in well-paying industrial jobs in the Yard."

The New York industrial cluster's marketing is remarkable. A dedicated organisation "Made in NYC" has listed all manufacturing companies in New York, subdivided into urban quarters. Source: http://madeinnyc.org/manufacturing-in-nyc/

It created an inspiring list: the way they present the manufacturing industries in NYC in an innovative and accessible way, including geography and case descriptions, making it very lively and vivid to see what NYC has to offer in terms of manufacturing. Suggestion: check carefully the lists of manufacturers in the really "urban" districts near the city centre, such as Manhattan, Queens, to get an understanding of the type of companies that are in such a dense (and relatively expensive) environment.

Manufacturing in New York

Some interesting quotes of an interview with an American urban manufacturing expert[9]

About the importance of manufacturing and its changing nature:

" There's still a tremendous amount of manufacturing going on in New York. It's really diverse, it's very vibrant, and it's tied to a lot of the more high profile industries that NYC has become known for, like finance and design. Manufacturing is part of [the city's overall economic] system, but it's not as visible, so people just aren't aware that it's happening and that things are still being made here."

" The manufacturers that are here today, in large part, are of a different type than what was here fifty years ago. The vast majority of these companies are not competing just on price or volume. The companies that want to be here, and that are thriving here, are the ones that are more custom oriented. There's a real benefit to them being close to their market, and being close to designers, to other innovators, and being part of that network."

About the type of buildings and facilities: smaller, more flexible

"Older industrial real estate often consists of multi-story buildings that people think can't accommodate manufacturing anymore, and that since we don't have the space for giant, single-story industrial buildings [like those found in suburban industrial parks], manufactur-

[9] http://mihnyc.org/urban-manufacturing-qa-jen-becker-pratt-center-for-community-development/

ing can't fit into contemporary New York City. And that's true, we don't have that kind of space, and those companies aren't going to stay in the city. But there's still a way to re-use older, multi-story buildings to meet the needs of these smaller industrial firms that are looking for around 5,000 square feet, by breaking up those spaces. That's what the Navy Yard has done, and we're seeing this all across the city. What we're looking at is that there are going to be a lot more of these smaller manufacturing companies in the future, rather than a few bigger companies. We still need to make sure that we have room for these companies to grow. We need flexible real estate."

About the integration in the urban fabric: No one size fits all

How will manufacturing fit into New York City in the coming years? Will we see more manufacturing integrated back into our neighbourhoods? Or is the campus model of something like the Navy Yard more desirable? "There's not a one-size-fits-all solution; we need to have a mix of tools at our disposal. There is a real need to have areas like the Navy Yard that are universally acknowledged as places for job creation, not for residential development. Underlying all of this is the real estate pressure facing manufacturing; that's the number one challenge for maintaining manufacturing in New York. Residential and commercial uses are always going to be able to pay more than manufacturers for real estate, so it's important for there to be areas in the city where manufacturers know that they can invest in their companies and facilities, to buy new equipment, and to know they aren't going to get priced out. Also important are mixed use areas; there are some manufacturing companies that really want to be in those kinds of areas, which have a different kind of vibrancy. It's really critical that we develop tools to be able to maintain that mix, though. Saying that anybody can be in a given area without some kind of mechanism to balance that mix out over time will lead to the loss of that manufacturing space."

B. Rotterdam: RDM en Vierhavens

A nice virtual tour tells the story of the transformation:
http://stadshavensrotterdam.nl/virtuele-tour/

Vierhavens/Merwehaven

This is a big port area in transition in the West of Rotterdam that is to be transformed. One project is "Marconi Freezone", former rail emplacement that gets a temporary destination as "freezone": storages and temporary architecture. It provides room for ateliers, exhibition rooms, experimental industry and horeca.

Rotterdam Climate campus will be located there, experimentation with floating houses, sustainable production. Plan: 5000 houses, 70,000m^2 room for production and business locations. Some pioneers (creatives) are already there.

A special development fund was created: Stadshavens Ontwikkelingsfonds voor Innovatie & Economie (SOFIE), filled by the city and EU funds, 6.500.000. Entrepreneurs can get loans from the fund, under favourable conditions, to make redevelopment opportunities possible.

RDM Campus

This is located at the south bank of the city, where an "industrial campus" was developed around a former yard (RDM), with industrial heritage.

The RDM Campus is located in the City Ports area of Rotterdam on the site of a former and historically important shipyard. The initials RDM previously identifying the Rotterdam Dry dock Company (Rotterdamsche Droogdok Maatschappij) have been retained but now stand for Research, Design and Manufacturing. The already declining shipbuilding activity virtually collapsed in the 1980s with the loss of 1 370 jobs. Most of those made unemployed lived in the neighbouring settlement of Heijplaat and although residual industrial activities continued through the 90s it proved impossible to re-establish a viable industrial future for the site which was finally abandoned in 2002 – a major setback for the neighbouring community. There was a major risk of the wharves becoming a no-go area in the city. In 2004 the Port of Rotterdam (owner), Albeda College (regional vocational training centre) and the University of Rotterdam came together to explore the potential for redeveloping the site by introducing an alternative use pattern. While the city was interested in improving its economic profile by regenerating and re-exploiting the dockland environment, the educational institutions were looking for new space to house and extend their research, learning and training activities and link to the relevant business community. The result of this partnership was the creation of the RDM Campus as a primary component in the revival of the city ports area. The RDM Campus occupies the buildings and space around the former 'Dokhaven' (Dock Harbour) complex, notably the former machinery hall and the Droogdok building which was originally the head office of the Rotterdam Dry Dock Company. In effect a mixed use pattern supports the installation of the whole refurbishment where vocational training, innovative business locations and research institutions combine in an interactive platform. The monumental 23000m² machinery hall now houses the 'Innovation Dock'. This voluminous structure is divided into two entities: the 'education hall' which accommodates the facilities of Albeda College and Rotterdam University, and the 12 000m² 'business hall' which provides space for small innovative companies in the construction, mobility and power market sectors – forming a dedicated knowledge alliance with the educational insti-

tutes. The former head office of the RDM company has been converted to house ancillary functions such as administrative offices, a restaurant and event and meeting space. The project, supported by a crucial but modest ERDF input, has turned a problematic brownfield area into an important city location where traditional and new approaches to education and enterprise can support each other and the wider business community. At the same time spread effects are achieved through the enhancement of physical and economic links to the city of Rotterdam (ferry connection to city centre) and the stimulation of new prosperity and opportunity in the immediate vicinity of Heijplaat[10].

[10]http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/50_projects/urban_dev_erdf50.pdf

Annex 3 Company profiles Urban IQ / Multiplicities

Willem van Winden is urban economist, specialised in urban innovation and the knowledge economy. He is professor of Urban Management at Amsterdam University of Applied Sciences and owner of UrbanIQ. He holds a Masters and PhD degree from Erasmus University Rotterdam. He has been involved in numerous international studies, exchange projects and consultancy work, mainly in the field of innovation strategies, industrial clusters, and knowledge-based urban development. He acts as lead expert in several European exchange networks (Urbact, Interreg). He has published widely on urban knowledge based development and related topics, in books and (scientific) articles.
https://www.linkedin.com/profile/edit?trk=nav_responsive_sub_nav_edit_profile

http://scholar.google.nl/citations?user=YTENEykAAAAJ&hl=nl

UrbanIQ was founded in 2008 by Willem van Winden, It is a dedicated research, consultancy and training firm, with a mission to support cities and regions developing strategies and policies. UrbanIQ is specialized in knowledge-based development strategies and integrated approaches for cities and regions. UrbanIQ combines analytical rigour with social mediation skills, involving stakeholders and decision makers throughout the process. www.urbaniq.nl

Bastian Lange, Dr. phil., ist Stadt- und Wirtschaftsgeograph und spezialisiert auf Kreativwirtschaft, Governancefragen, Innovationsprozesse und Raumentwicklung. Er leitet das Forschungs- und Strategieberatungsbüro Multiplicities-Berlin und hatte 2011-2012 eine Gastprofessor an der Humboldt Universität zu Berlin inne. Er befasst sich insbesondere mit sozioökonomischen Transformationsprozessen des kreativen Wissenszeitalters und macht sie für Politik, Wirtschaft und kreative Szenen handhabbar.

Bastian Lange hat in Marburg und Edmonton Geographie, Ethnologie und Stadtplanung studiert und an der Johann-Wolfgang Goethe Universität Frankfurt am Main, Institut für Geographie, 2006 promoviert. Er ist Mitglied des Georg-Simmel-Zentrums für Metropolenforschung an der Humboldt Universität zu Berlin.

www.multiplicities.berlin – Gründung 2008

Multiplicities ist ein unabhängiges Forschungs- und Beratungsbüro an der Schnittstelle von Kreativökonomie, Stadtentwicklung sowie Politikgestaltung. Das Projektbüro agiert in den Bereichen von Wirtschaftsberatung, Stadtforschung und Innovationsentwicklung. Kunden sind Kreativunternehmen, Verwaltungen und Politik sowie intermediäre Organisationen.

Multiplicities analysiert sozioökonomische Umbrüche des kreativen Wissenszeitalters und macht sie für Politik, Wirtschaft und kreative Szenen handhabbar. Multiplicities erkennt in komplexen Strukturen neue Trends und bereitet sie für Planungsprozesse vor. An diesen disruptiven Schnittstellen zwischen klassischen und neuen Arbeits- und Produktionsbedingungen erfasst Multiplicities neue Koordinaten für die Entwicklung von neuen Wertschöpfungsprozessen in der zukünftigen Stadt. Multiplicities geht davon aus, dass städtische Entwicklungen heute nicht mehr linearen Planungsprinzipien folgen. Daher sind partizipativ entfaltete Handlungs- und Steuerungsoptionen tragfähig und angemessen. Sie eröffnen unerwartete Impulse für nachhaltige Entwicklungsperspektiven der Stadt.