

## 2.0 LITERATURE REVIEW

### 2.1 INTRODUCTION

The literature review makes a point of framing the subject of this thesis, coworking spaces, in the context of 21<sup>st</sup> century industrial complexes. There are currently no literature connecting the two as important aspects in the development of the next generation industrial complexes. The theoretical findings in this literature review implicates a certain decadence of the industrial complexes and the pertinence of coworking spaces. Therefore, there will be a framing of various and often unrelated literature on the subject to understand the definitions, complexities, simplifications and contradictions to provide an overview on the 21<sup>st</sup> century industrial complexes and coworking spaces and how they relate to each other. The rise and decline of industrial complexes may give a better understanding of the relevance of coworking spaces. The angle of this literature review will put much more emphasis on the social culture and physical layouts of complexes such as the technopole, the cluster, the science city, science park, and finally, coworking spaces.

#### The framing of unrelated scholars

The literature and theory on the 21<sup>st</sup> century industrial complexes both contradicts and overlap each other. It seems that theories on the subject is still evolving as concepts in the field of sociology, human geography, economics, urban planning is still being defined and redefined. The literature review makes a point in placing the different and unrelated scholars, which have not been discussed in context of each other, within the same framework of understanding the 21<sup>st</sup> century industrial complexes. This is in order to grasp both complexities and simplifications in their written work and to consistently use the appropriate terms on the appropriate complexes. The unrelated scholars are Manuel Castells & Peter Hall (sociologist and urban theorist), Michael Porter (economist), Bruno Moriset (geographer & planner) and Richard Florida (urban study theorist) and those critiquing the established knowledge.

It is also worth mentioning that the literature and theories written about the concept of 21<sup>st</sup> industrial complexes did not materialize until the 90s till now, as there has been no substantial or academic study of these structures during the formative years of the 21<sup>st</sup> century industrial complexes, which was in the 50s, hence the earliest and most well-known examples of these complexes are Stanford Research Park and Boston's Highway 128. The substantial works in the 90s and early 00s can be found most prominently in the works of Porter, Castells & Hall, Florida etc.

#### What defines the 21<sup>st</sup> century industrial complexes and what are their distinctions?

Generally speaking, an industrial complex refers to a factory or a collection of buildings related to industrial production. The 21<sup>st</sup> century industrial complexes are considered to be post-WWII creations to handle technological advances during the Cold War, from mechanical, military to civilian manufacturing, and in the next step; from hardware to software, or to put it bluntly, from material to immaterial production of innovation. The term industrial complexes transcend from just a mere collection of buildings related to

### CORE LITERATURE:

**Michael Porter**  
economist  
cluster theory



**Manuel Castells & Peter Hall**  
sociologist & urbanist  
21<sup>st</sup> century industrial  
complexes, technopoles etc.



**Bruno Moriset**  
geographer & planner  
coworking spaces



**Richard Florida**  
urban theorist  
the creative class



**Vivek Wadhwa**  
tech entrepreneur  
cluster theory



**Susan Bagwell**  
professor of  
Entrepreneurial  
Studies  
cluster theory



### CRITICAL VIEW:

**Donald Siegel**  
doctor of Philosophy  
science park



**Phillip Phan**  
professor of  
Entrepreneurial  
Economics  
science park



**Mike Wright**  
professor of  
Entrepreneurship  
science park



**Ari-Veikko Anttiroiko**  
adjunct professor of  
government management  
science city



industrial production to a concept introducing social, psychological and urban aspects. These aspects have led contemporary scholars to rename these complexes and to call them 21<sup>st</sup> century knowledge complexes, including the word knowledge, which is rooted in human beings and not machines. This chapter will provide descriptions and definitions on the variety of complexes such as the technopole, cluster, science city, science park which falls under the definition, 21<sup>st</sup> century industrial complex; what their commonalities and differences are; their rise and possible decline; and their relevance for coworking spaces in this discussion.

## 2.2 LITERATURE AND THEORY

### Manuel Castells & Peter Hall and the 21<sup>st</sup> century industrial complexes

One of the early core books that makes a comprehensive attempt of distinguishing industrial complexes and adding a social aspect to the discussion can be found in the work by Manuel Castells and Peter Hall 1994, *Technopoles of the World – The making of the 21<sup>st</sup> century industrial complexes*. Technopole is used as a generic term for 21<sup>st</sup> century industrial complexes and the authors go in depth analyzing history, demographics, entrepreneurial and corporate culture, innovation, urban development, quality of life etc. of at least 20 of the greatest industrial complexes in the world before linking them to different categories. Their joint background as renowned scholars in their respective fields, Castells as a sociologist and Hall as an urbanist, allow them to synthesize a vast array of aspects in the understanding of these industrial complexes and their impact on society – urban, economically and socially. It is worth mentioning that their work was updated for our contemporary society in 2015 in the book *Making 21<sup>st</sup> Century Knowledge Complexes – technopoles of the world revisited* by Julie Tian Miao, Paul Benneworth and Nicholas Phelps as the world has changed profoundly since Castells & Hall wrote *Technopoles of the World*. Nonetheless, the theme is the same and focuses on knowledge complexes in cities and regions through 12 more contemporary case studies. The book by Miao, Benneworth and Phelps is meant as a manual to give policy makers and practitioners a critical insight in managing and developing what they call high-technology urban complexes.

### Michael Porter and the cluster theory

Meanwhile, in the work *The Competitive Advantage of Nations* in 1990, Michael Porter, an economist and professor at Harvard Business School, also talks about the benefits of a significantly large concentration of expertise within a geographical area, but under a different term, the cluster, as a generic term for 21<sup>st</sup> century industrial complexes. Porter's work has been a core element in shaping national policy in countries around the world and changed the thinking in states, cities and regions. In his theory Porter presents the paradox that the enduring competitive advantages in a global economy lie in local circumstances, like local knowledge – relationships and motivation distant rivals cannot replicate. Porter adds an economic perspective to the discussion of the 21<sup>st</sup> century industrial complexes as it ultimately is about growth, gains and prestige. He explains cluster affects competition in three ways:

- Increased productivity in one area, or increased productivity of the companies within the cluster, while similar companies outside would a significantly lower production.

- Driving the direction and pace of innovation, the proximity and competitiveness among companies will affect this greatly.
- Stimulating new businesses within the cluster, with rapid regeneration and growth on all levels of society, these factors will inevitably not only stimulate, but also attract new businesses.

### Richard Florida and the creative class

Another scholar of interest is Richard Florida, an urban theorist with the famous work, *The Rise of the Creative Class* where he specifically talks about the cultural community within the framework of 21<sup>st</sup> century industrial complexes and he describes more detailed what Porter is starting to present about the people as the social glue. He identifies a new social class as the key factor to why some cities and regions grow and thrive, while others fall behind. He defines the three T's, technology, talent and tolerance as key aspect attracting the creative class. The book uses the term, creative class, to define a group of both educated and highly educated that use creativity in their everyday work. His work is a reversal of conventional wisdom, major production-based industry is no longer the cornerstone of city growth, but the creative class itself. He also reverses the conventional wisdom that the major companies are the attractor for skilled workers; it now seems to be the opposite. As society is tapping into a more global competitive and knowledge-based economy, Florida states that the general welfare is hinging on the ability to innovate and retain an international competitive force within the city or region. He also states that there is a strong correlation of people- and business climate and in establishing them.

People climate being the general intellectual social community established, and business climate is the heterogeneity of related businesses in an area. Florida stresses the fact that government officials and city leaders must set the tone for social inclusion and tolerance for a healthy business growth. This will in the long run benefit the businesses in the area as well as the social life.

### Bruno Moriset and coworking spaces

There is also the literature of Bruno Moriset, an associate professor in geography and planning at the University of Lyon, who establishes coworking as the very essence of a successful industrial complex, without actually being an industrial complex. The essence being the focus on the people, a collaborative community towards innovation, and the ongoing trend towards an immaterial production within these facilities, may render the physical requirements and the sheer size of industrial complexes irrelevant. However, Moriset explains that by December 2013, coworking spaces has so far remained almost ignored by the academic literature. It is also important to mention what tendencies is defining the scarce literature on the subject. Brad Neumberg who coined the term coworking, is actually a product engineer at Dropbox with a B.A. in Computer Science and is by no means a scholar in his field or in the field of urbanity or finance (Neumberg's blog). This fact is actually very representative to how coworking space as a term has been defined during the last decade – by independent websites, blogs, media, magazines, entrepreneurs and practitioners, and definitely not by scholars. However, 2013 is also the year Moriset published the research paper, "Building new places of the creative economy: The rise of coworking spaces". His work is currently one of the most accomplished ones on the subject, giving a better understanding how coworking may constitute the contemporary industrial complex.

## 2.3 INDUSTRIAL COMPLEXES

### Technopole

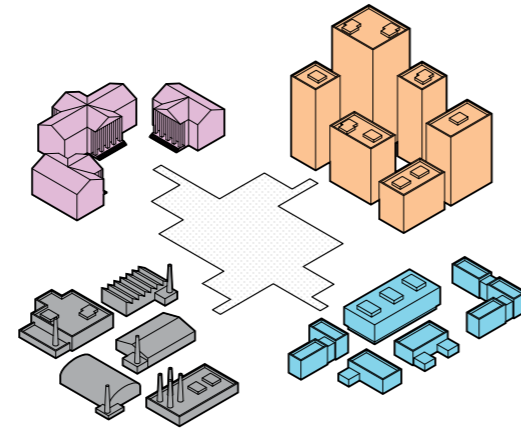
The industrial complexes may be described under different monikers with elements such as techno, science, 21<sup>st</sup> century, park, plaza, polis or -topia, some borrow established terms such as a science city when they are not, while others literature do not even make any distinctions between them, labeling the complex as something different (Castells & Hall 1994: 1). The technopole, a French term equivalent to the 21<sup>st</sup> century industrial complexes popularized by Castells & Hall, refers to a center of high-tech manufacturing in research, education and commerce. This description is quite generic, in terms of physical description, how it is managed and what its aim is. It resembles very much so as the general description of the 21<sup>st</sup> century industrial complex. The difference here from just mere production as industrial complexes usually are, lies in the main drive and aim of technopoles, which create a synergy between research, education and commerce. The synergy is sought after by governments because it is considered to lead to growth on all levels of society, may it be tech, economics, innovation, research, business ventures, reindustrialization etc. For a synergy to happen, networking, shared knowledge and face-to-face interaction between actors of the three components are considered essential. Castells and Hall introduces 3 critical factors to establish a synergy or in their own words, creating an innovative milieu (Castells & Hall: 1-11):

- University, a generator of raw material in R&D and an attractor of young minds to the location.
- Availability of skilled labor, they further innovation and R&D. The university plays a double role with its raw material and produces labor. Raw material in terms of what researchers generate of knowledge, and labor in terms of educated and skilled workers.
- High-risk capital investors, they back up new business ventures and spin-offs through capital, investments, incubators, corporate infrastructure etc.

Since technopole is described more as something fundamental without going into any specific properties or details of such industrial complexes, it is also hard to find any papers that actually critique the technopole.

### Cluster

The cluster, which was characterized and popularized by Michael Porter in 1990, as “*critical masses in one place linked to industries and institutions from suppliers to universities to government agencies that enjoy unusual competitive success in a particular field*” (Porter 1998: 77). In other words, a cluster is a complete set of interconnected firms, suppliers, related industries and specialized institutions that arises in a



**Technopole & cluster:** commerce (orange), education (pink) industry (grey), meeting ground (pattern), research (blue).  
Credit: author.

geographical vicinity to each other. The term cluster can also be used as a fundamental description equivalent to the 21<sup>st</sup> century industrial complexes and to describe synergistic and positive tendencies of firms, suppliers, industries etc. “clustering” together.

In the field of architecture, the term agglomeration is also used about these formations, which is considered as an ancestral term to clusters defined by the economist Alfred Marshall. The term cluster, was first coined in Porter’s work, *The Competitive Advantage of Nations* through the diamond model (Harvard Business School homepage), which focuses very much on the business environment with multiple dimensions of microeconomic competitiveness within a local proximity. Aside from an economist’s perspective, Porter argues that economic activities within the cluster, are in fact embedded in social activities, it is the people as the social glue that binds the cluster together. As Porter mentions the term cluster is applicable to all industries, his categories also responds to this, such as (Porter 1998: 77-91):

- High-tech clusters: knowledge and tech-oriented with renowned universities and research centers at their core. This type serves as the model for many current clusters.
- Historical know-how-based clusters: as the name states these are more traditional and has amassed over the years, and some over centuries, gaining an edge in certain industrial fields.
- Factory endowment clusters: geographical-specific benefits, such as wine productions in sunny areas.
- Low-cost manufacturing clusters: usually placed in development countries where the production cost is low and of industrial nature, such as textile, automotive, electronics etc.
- Knowledge services clusters: also usually placed in development countries because of lower-cost skills.

In 2001 the British government adopted Porter’s cluster theories as part of the City Growth Strategy initiative to encourage regeneration of deprived inner city areas in the U.K. Interestingly enough they identified 3 critical factors for a successful cluster, very similar to the ones identified in Castells & Hall’s technopole:

- Presence of functioning networks and partnerships.
- Strong innovation base with supporting R&D (research & development) activities.
- The existence of a strong skill base, or skilled labor.

### Critical views on clusters

Although the cluster theory is treated as a policy in many nations, the critique on clusters is pointing in the direction that the cluster has been wrongfully understood and labeled as policy, when it should be treated more like how technopoles is described; as a mere observation of something fundamental to 21<sup>st</sup> century industrial complexes and not a definite approach to develop these complexes. Taken Porter’s background as an economist into consideration, the cluster theory does provide a much more extensive economic aspect to the industrial complex discussion.

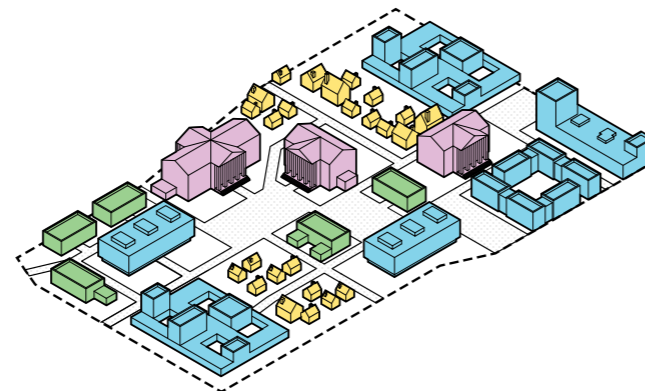
In relation to the initiative in the U.K., Susan Bagwell, a professor in entrepreneurial studies of the Cities Institute at London Metropolitan University, investigated the concept of cluster as a valid development

policy. Bagwell points out that Porter's model is unclear on many counts (Bagwell 2008: 31). It does not specify what kind of firms that have to interact locally. This question has been raised by different scholars discussing the importance of local interaction. Cluster as a policy is a chaotic and problematic concept, as Bagwell is pointing out that there the cluster idea is very flexible on what a geographical boundary of a cluster should be. For example, Silicon Valley and Hollywood are considered the most famous and successful clusters in the western culture. But Silicon Valley is just a nickname and not a geographically specific term and Hollywood covers the entire central region of Los Angeles. The two were also a result of almost complete autonomous processes with little to no government interference or official policies.

The success and failure of clusters seems arbitrary and there is no clear evidence if government interference helps. Many regional clusters may succeed for a short period of time but ultimately the majority of them fail and the ones that actually do succeed, are arguably a result of self-selection processes by firms within the cluster, which indicates an autonomous nature of cluster that may be hard to replicate. If clusters are supposed to serve as a basis for economic development, it is necessary with a stronger understanding of its properties and varieties, and the linking between market failures and cluster strategies, in order to see which development approach should be used in to a particular context (Bagwell 2008: 33). Vivek Wadhwa, an influential tech thinker and entrepreneur in Silicon Valley, criticizes the aspect that policy makers believe there exist a recipe to create clusters. He also has observed clusters all over the world going into obscurity or dying a slow death. Governments' arguments rely heavily on successful examples, such as Stanford Industrial Park in Silicon Valley or North Carolina's Research Triangle Park, both government-sponsored clusters. Wadhwa's main argument is that policy makers should be focus more on the people within the cluster, not the idea of cluster itself. Wadhwa proposes simple but essential measures to better the cluster strategy, such as the knowledge of how to start companies, removing the fear of failure, more mentors and networks, government incentives towards community making, and repairing the research commercialization system. (Wadhwa 2011).

### Science City

The concept of science city is more specific in terms of handling the matter of actual policy, meanwhile the cluster and the technopole do not describe any geographical limitations; how far or close companies and research institutions should be to each other, whereas the science city concept is slightly more precise. The science city, or also commonly referred to as the science town are according to Castells and Hall, new settlements generally planned, built and governed by governments. Meaning autonomy of businesses and relations are non-existent as they are more or less under full control of and



**Science city:** commerce (orange), education (pink)industry (grey), meeting ground (pattern), recreational (green), research (blue), residential (yellow).  
Credit: author.

managed by the government. The main agenda for developing science cities are mainly aimed at generating scientific excellence and synergistic research activities by concentrating expertise within a high-quality urban space. Castells and Hall note that the spatial expression is similar to a campus development: isolated and secluded from "*the day-to-day conflicts and petty interests of society at large*". It is a privileged space to enable scientists, researchers and scholars alike to build a community of intellectual networks and to spur a collective advancement (Castells & Hall 1994: 39-41). These complexes are post WWII inventions from the late 50s-70s, however coined in the 90s. They are interestingly enough non-existent in the U.S. Most science cities can found in former Axis nations in East Asia, Russia and some concentrations in Europe. The period of the 50s -70s was also at the height of the Cold War, and this may serve as the answer to the lack of science cities in the U.S. Most science cities developments fit better in the planned economy and ideology of the East. Ari-Veikko Anttiroiko's research paper, "Science Cities: their characteristics and future challenges", explains science cities with five core characteristics while listing at least four versions of mislabeled science city types. The five core characteristics are:

- Government play a key role, either it be local, regional or national.
- Focus on scientific activities, research and universities according to campus model.
- Little to no industrial activities and manufacturing.
- Clear-cut development in the urban fabric.
- An urban dimension including infrastructure, housing, entertainment, recreational facilities.

What makes the term science city confusing is how it is used in different initiatives and Anttiroiko defines four mislabeled science cities, or in his words, quasi-science cities, to clarify the concept of science cities. One type of mislabeling is typically to use the term on smaller concentrations of international prestige, such as science parks, technocities or high tech metropolitan areas. Another type is science museums, theme parks or sites for recreational learning. There are also examples of single research sites or laboratory labeling itself as an entire science city. Lastly there is the virtual science city, being websites that concentrate on education, information sharing and entertainment (Anttiroiko 2004: 4, 7).

### Critical view on science cities

Anttiroiko uses the Tsukuba Science City of Japan to describe the current decline and future challenges of science cities in general, which also applies to the Siberian Akademgorodok and the South Korean Daedeok. For example, Tsukuba faced difficulties in internal flow and local interaction. Since the government plays a key role, this also affected the various R&D units to serve national interests rather than local interests for the science city community (Anttiroiko 2004: 23). Paradoxically enough, the key factor for science cities is the spatial concept of isolation in the city and the clear-cut development in the urban fabric. In other words, or as in the words of Castells & Hall, science cities are secluded and isolated entities as a physical design and an urban development. This makes the science cities completely dependent on local interaction and a well-working synergy. In the general comparison of science cities of the world by Castells and Hall, they come to a critical conclusion: it is not about the return on investment or cost effectiveness as science cities generally have a modest impact on regional economy, but to showcase the symbolic and materialized value of

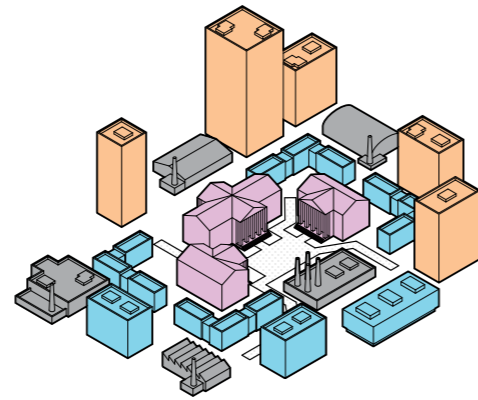


science. With the government spearheading the development, it is also about declaring its capacity to master modernity and power (Castells & Hall 1994: 39-75). This logic may also have been influenced by the setting of the Cold War, a battle for the image of world supremacy.

Anttiroiko argues that science cities should get rid of its core characteristics, such as isolation and campus mindset and instead seek external connections and interaction with strategic partners/stakeholders to increase the regional/national economy. This is to enable it to increase internal dynamism, synergy and inter-sectoral partnerships. According to Anttiroiko, the future of the science city lies in its ability to adapt to current trends, to expand, network and integrate into the wider urban setting, towards a more entrepreneurial science city. The government control on the science city should rely more on result-oriented guidance, support and greater autonomy (Anttiroiko 2004: 24-25). What Anttiroiko is unknowingly proposing is actually the description of its more autonomous counterpart, Science Park, explained in the following sub-chapter.

### Science Park

The science park, although with the government and university as the main initiator (like the science city), is governed according to neoliberal ideology and invites private firms, startup companies and enterprises into the context of researchers and academia. In contrast to the science city, these complexes operate more autonomously. One could also say it is a designated area with the aim of concentrating and attracting a great number of high-tech industrial firms. This in turn provides jobs and skills. The universal goal of the science park is to attract investments by private firms providing a continuous growth while the aim to uphold an image of prosperity, as for the science city, is downplayed.



**Science park:** commerce (orange), education (pink), industry (grey), meeting ground (pattern), research (blue).  
Credit: author.

The science park is considered much more successful than aforementioned such as the cluster and science city, as it encourages cooperation and collaboration between public and private sector, university and private companies. The most famous science parks are in the Western world and the former Allied nations. The Stanford Research Park in San Francisco established in 1951 is considered the world's first science park. Its success gave the bay area its famous moniker, Silicon Valley. Another famous science park is Sophia Antipolis Science Park in France from the 70s. Their emphasis is on manufacturing; some may specialize on the R&D aspect of manufacturing. Castells and Hall were among the first scholars to describe the different approaches to develop a science park. Approaches such as building around a major research university attracting local spin-off firms called the "*Cambridge phenomenon*"; deliberately attracting advanced foreign firms to let them diffuse and tap into local know-how thus generally upgrading the entire industrial structure. The science park has many different aliases, depending on its profile of industries; names such as technology park, industrial park, research park, university research park, technopolis and biopark (Castells & Hall 1993: 84-85).

### Critical view on science parks

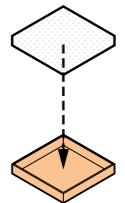
However, an article on business venture (Phan, Siegel & Wright 2005: 1) argues that there is no systematic framework to understand science parks; that there is no clarity of its dynamic nature and nature of performance. Castells & Hall argue that the difficulties in harnessing the science park as a development strategy lies in the very definition of it – the collaboration between the public and private sector. According to Castells & Hall the science park's success lies in the linkage and synergistic interaction of three components:

- Public research centers and university.
- Large firms.
- Small and medium firms.

Castells & Hall's assessment on science parks shows that the relationship between public research center/university and large firms are especially problematic because they are often secluded and hostile to each other. True collaboration and synergy are rather provided by small and medium firms (a nod towards startups), and then, if larger firms become a part of this synergy, a new productive dynamism can occur, as was the case for Sophia Antipolis. Paradoxically enough, Castells & Hall mention government as crucial in the development of the park, but the growth of the park must happen through private investments and entrepreneurial initiative, again through autonomous processes (Castells & Hall 1993: 109-111).

### Coworking Space

The definition of coworking spaces is currently open-ended and generic, but with some unique properties in line with the necessities of an efficient industrial complex. Coworking space is characterized as a working community of different companies, suppliers, consultancies etc. within a single facility. Together all the members become a community sharing amenities in a shared working environment typically run by private stakeholders as a completely autonomous entity. The emphasis on community is important and the altruistic core is a main characteristic. Coworking space is for independent professional activity (Moriset 2013: 4-6).



**Coworking space:** commerce (orange), education (pink), industry (grey), meeting ground (pattern), research (blue).  
Credit: author.

In 2005 Brad Neumberg created, defined, and coined the term coworking space, as a means to satisfy the much needed community freelance work and entrepreneurship is missing (Neumberg's blog). According to Neumberg, the general purpose of these spaces is to serve as a hosting, working and meeting place for entrepreneurs, freelancers, consultants etc., which are carriers of ideas and wish to share them with others. The physical layout, equipment and special events within the facility is to encourage meeting, collaborative and discussions. Moderators, managers or curators are usually necessary to ensure the serendipity production happening within the facility. Generating a successful collaborative community is the outmost priority, while successful corporate prestige or return on investment looms more in the background. Therefore, the core characteristic of coworking spaces is based on altruistic values, that is what benefits the greater good and not only a simple return of

investments. Moriset wrote in 2013, that these spaces do not deal with scalable growth and they are not startups (Moriset 2013: 4-6, 17). In the table “Generics and specifics of coworking spaces” in chapter 4: Case studies, the characteristics are displayed and defined.

If the sheer size of major complexes and industries are irrelevant, the simplification of the meeting grounds are necessary and the notion of community the outmost priority, why continue with the same development strategy with elaborate and expensive physical layout, when there is no assurance for success? What actually stops the direction of these developments to go into more micro-city facilities?

### **The concept of serendipity production, lone eagles and the third place**

So far in the literature review, there are some aspects to the 21<sup>st</sup> century industrial complexes and coworking spaces that still remains undefined as secondary but important concepts. The common aspects between the two tie industrial complexes together with coworking spaces, yet it is in the different aspects which seemingly separates the former as decadent and the latter as pertinent. The theory and literature on industrial complexes and coworking spaces put much emphasis on the synergy and the people, but their properties are not well-defined in the context of physically planning these complexes. There are also notions of a common space or a meeting ground in the co-location of research, commerce, education and industry, yet there is no specific term to describe what these spaces are. In this section, we lend terms in sociology such as serendipity production, lone eagles and the third place as they specifically address the desired traits of industrial complexes whereas the critical scholars do not. It should be noted however that Moriset actually applies these terms on coworking spaces. These concepts are included here to understand better what is missing in the discussion of the 21<sup>st</sup> century industrial complexes and the direction of development that the industrial complexes are taking.

*Serendipity production*, or serendipity itself refers to the occurrence and development of events by chance in a happy and beneficial way, or the phenomenon of finding valuable or agreeable things not sought for. The concept of serendipity production relates to the core of this thesis’ subject, coworking spaces, because of the attempts to capitalizing on the phenomenon of serendipity within coworking environments. This phenomenon was popularized by the coworking pioneer Chris Messina, founder of Citizen Space. It is the idea that people through frequenting certain places will increase the probability of fruitful encounters and informal meetings (Moriset 2013: 8). The concept has been thematized for the urban setting by many sociologists. Serendipitous encounters happen at all kinds of meeting points outside formal offices; around lunch tables, cocktail parties, clubs, lobbies, conferences, golf course or the train (Gottmann 1971: 329). Proximity within physical boundaries enables well-frequented locations with a continuous flow and predictable attendance (Bourdieu 1992: 164). Being a part of a city means being a part of an extremely intense and dense information loop; one of the qualities is the unplanned mix of human encounters, information, experiences, interpretations etc. (Sassen 2001). However, proximity in itself is not enough to generate or produce desired serendipity, it has to be complemented with a degree of social and/or professional proximity. This is in keeping with some of the fundamental aspects of the 21<sup>st</sup> century industrial complexes. The co-location of clusters, technopoles, science cities and science parks, and even the co-

location of companies within a coworking spaces are in fact a concoction of carefully selected players in order to generate unplanned synergy and relations across, not random but selected players. In other words, a carefully crafted serendipity production within industrial complexes and coworking spaces. Moriset argues there has to be a certain balance between coworking space filled with strangers and a place of total professional homogeneity and skills (Moriset 2013: 9).

*Lone eagles*, refer to knowledge workers and skilled labor working from anywhere, primarily due to technological advances in telecommunication. The importance of this term is not defined by only tech advances in telecommunications, but has an increased importance due to many other trends also, led on other technological currents. Invented by Phil Burgess from a Denver-based telecommuting think tank, the term lone eagles were popularized throughout academic circles by William B. Beyers and David P. Lindahl. The rise of lone eagles causes institutional fragmentation and geographic splintering of value chains, fueling the trend of outsourcing. This is a direct result of the current globalization, digitization and IT ubiquity. Corporations and firms no longer have the skills or business-related know-how in-house, but instead are dependent on hiring competent labor at any given point, hence the decline of the conventional conception of industrial complexes. There is a rise of a new corporate mentality called open innovation, meaning major firms or corporations no longer can keep a sustainable flow of innovation by keeping all operations in-house. The corporation and the large firm as an institution are thus at risk with the emergence of the ultimate form of open innovation, “wkinomics”, where single well-defined entities of innovators and producers can potentially be replaced or complemented by myriads of contributors (Moriset 2013: 3-4). Hence, the rise of coworking spaces. In other words, the knowledge workers are the driving force or force of labor in both industrial complexes and coworking spaces. Yet it is the ideology behind the knowledge workers in each of the workplaces that makes the entire difference, from conventional skilled labor in industrial complex and the lone eagle in coworking spaces.

*The third place*, is a term coined by sociologist Ray Oldenburg, and defines here the regular, voluntary, informal gatherings of individuals beyond the realm of home and work. These places are regarded by Oldenburg as irreplaceable in the production of the urban social fabric. The typical third places are cafés, restaurants, hotel, airport lounges, hairdresser or barbershop. Oldenburg even extends the third place to contemporary franchises and brands such as Starbucks and McDonald’s. Essentially, the notion of the creative class inhabiting the third place predates the digital age of computers and the Internet, as it resembles café litteraires in the early and late 20th century such as the birthplace of Dadaism at Cabaret Voltaire in Zürich or the counter cultural hub at City Lights Bookstore in San Francisco (Oldenburg, 1989). This term is relevant to industrial complexes and coworking spaces, because it clearly defines the coveted characteristics and traits of a serendipitous or synergistic meeting or common ground. The difference here, is that Oldenburg defines the the synergy and serendipity production as a physical and manageable entity. Whereas in the literature and theory on 21<sup>st</sup> century industrial complexes, these highly coveted spaces are not described well enough. Again, this is where coworking spaces differs, as it is described as the third place itself, a place where unrelated knowledge workers sit next to each other, across companies, in one facility generating new unforeseen encounters on a daily basis.

**2.4 CONCLUDING REMARKS**

**Discussions on the relation between the 21<sup>st</sup> century industrial complexes and coworking spaces**

Finally, we arrive on the discussion of what is the connection between industrial complexes and coworking spaces. In this context and if there is a connection, what relatable knowledge gained about the industrial complexes can cast light upon the importance of coworking spaces?

Based on the knowledge gained through the literature review presented here, the main critique of the industrial complexes seems to lie more in the misunderstanding between observation of successful industrial to planning them. As mentioned, the cluster and technopole are fundamental observations and not descriptive, yet the cluster is still considered as a highly relevant development strategy. There are also some recurring questions that have to be addressed directly: Is it possible to actually plan and develop an industrial complex, of such scale as implied by Castells & Hall, Porter etc.? If not, is the coworking concept in fact, a more reliable development strategy?

**The general commonalities**

The theory and literature on the industrial complexes may seem confusing and complex. The endless terms and definitions introduced on the same topic is interpreted, reinterpreted and framed in the same context to identify the subtle nuances that define the differences between the 21<sup>st</sup> century industrial complexes, from clusters to technopoles, technopole to science city etc.

However, the scholars all mention a general commonality; that the 21<sup>st</sup> century industrial complexes refer to a significantly large concentration of scientific and technological expertise within a geographical area. To put it bluntly, the three key aspects observed in the various literature of Florida, Castells & Hall and Porter revolve around the same concepts with some variations:

- Technology, university, R&D, research institution as basis.
- Talent or talent pool, skill base and labor, intellectuals etc.
- Established firms, high risk capital investors, venture capital, corporate infrastructure.

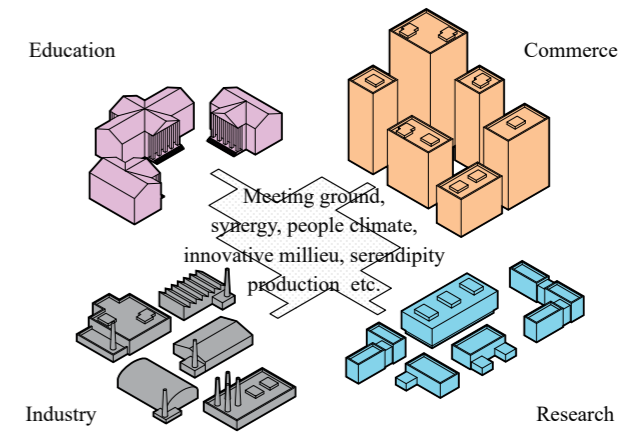
The 21<sup>st</sup> century industrial complexes, or the definition of them, as stated above, are divided in many categories. Although the scholars do not discuss size, physical layout, and vicinity or specify the shared key aspects, there is a certain hierarchy or pecking order in the clarity of them.

Closer inspection even reveals very similar descriptions of different terms. All the categories within the 21<sup>st</sup> century industrial complexes seem to be treated as equals, yet there seems to be a hierarchy amongst them. It is therefore important to understand technopole and cluster more as fundamental and general complex and the science city and science park more specified and partially executable policies.

Lastly, we have to ask a simple question that the scholars on the subject always bring up: what make these complexes so coveted by governments and policy makers? Creative individuals and innovative industries

**Technopole & Cluster.**

Fundamental descriptions to the concept of the 21<sup>st</sup> century industrial complex. An observation of how the four elements come together and form a beneficial community and generate a meeting ground, synergy etc.

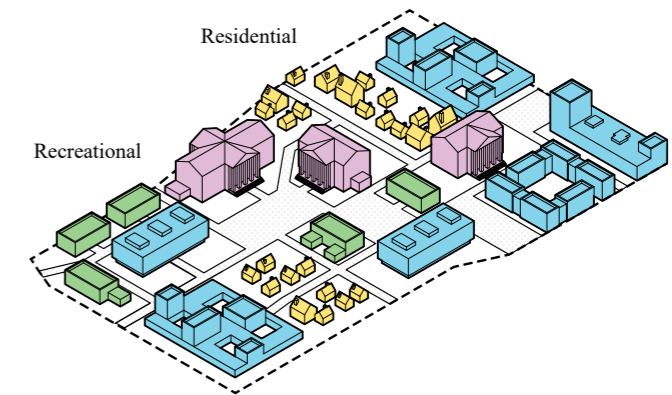


**Science City**

Initiated and governed by the government. introduces a sense of urban quality, infrastructure and design etc.

A secluded clear-cut development in the urban fabric. The image of tech prosperity is more important than actual tech prosperity.

The meeting ground has become too complex to function as intended for the community.

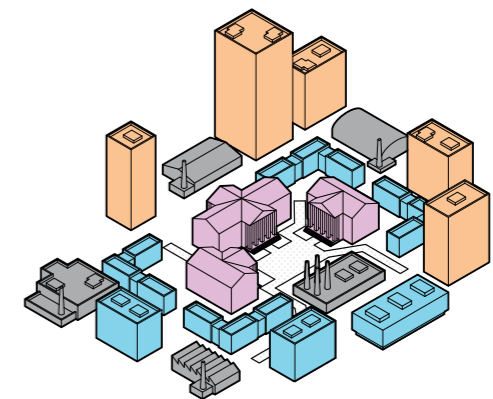


**Science Park**

Initiated by the government, but governed by private initiatives. Highly autonomous.

More organic urban development and an actual attempt of tech prosperity. A synergy between private and public sector.

The meeting ground has become too complex to function as intended for the community.

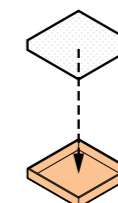


**Coworking space**

Can be initiated indirectly by government, but are often private initiatives, governed by private initiatives. Highly autonomous.

Not a significant focus on urban setting. A synergy between private enterprises.

The meeting ground, synergy is clearly defined within the facility.



are generally regarded as key drivers of sustainable economic growth and prosperity in cities. Aside from financial gains, scientific prestige or local/regional/national growth, which these industrial complexes may bring with them, the concept of “community” plays a vital role.

### **21<sup>st</sup> century industrial complex as a policy?**

There are facts that make the concept of the 21<sup>st</sup> century industrial complexes actually quite alarming, in terms of identifying qualities and translating the complexes to national policies. A recurring critique of the industrial complexes lies in the attempt by policy makers to regenerate near impossible and very successful examples such as Silicon Valley, Boston’s highway 128 and Sophia Annapolis in contexts that have no local basis or culture to support it. Silicon Valley has proven to be a very misleading example, as its track record suggests that a city with no industrial basis can become the cradle of innovation out of thin air, but a closer examination reveals a far more complex development (as explained in chapter 3: backdrop & context). Unsuccessful developments may be the consequence when governments mistake mere observation by scholars as a scientific fact for how to develop these. The developments have been labeled and branded as technopole, cluster, science city or science park after the success was a fact. The literature on the subject carefully explains the components within these complexes, but ironically enough they do not explain the science behind how these complexes actually work, the very complexes that produces most of our contemporary science. In other words, they do not offer a scientific answer defining the content of the cooperation and between which firms; explaining the geographical boundaries and the physical, industrial and social proximity etc. All the shortcomings of the industrial complex, seems to be answered though coworking spaces. It has a clear and defined physical boundary<sup>1</sup>, naturally enough every player within a coworking space are in close proximity etc.

The reality is that scholars provide an incomplete approach to industrial complexes for developers to execute. For example, a successful technopole or cluster would imply that the government would single-handedly have to be able to influence market forces and industries on regional and national level. Looking at it another way, Porter’s theories on clusters also contains an opportunistic view on the alternate direction of urban development, evaluating industrial densification based on geographical financial performance in relation to global markets, without taking into account what urban repercussions it may have. Even though, coworking also deals with global markets, it does not directly generate major urban repercussions, since coworking in its physical nature, resembles much more as an enterprise and not an urban project. Whereas industrial complexes are more comprehensive beings with government involvement, multiple institutions, firms, companies etc. Naturally enough, Porter is an economist, not an urbanist and his expertise does not lie in understanding urban development, but when his theories is adopted as development policy, the specifics on how to proceed has to be clearer.<sup>2</sup>

<sup>1</sup> Coworking spaces are usually defined as an entity within a facility. Geographical boundary is therefore not an issue in coworking spaces.

<sup>2</sup> The origins of science city and science park in the 50s, the ideology behind them is insufficient, as they appear to be an important aspect of polarizing planned economy and neo liberalism. The obsession between the two super powers for public image of technological dominance was so extreme, there are actually conspiracy theories that the U.S. hired Stanley Kubrick to fake the moon landings in 69’ to uphold the image of technological dominance (Time Magazine).

### **Geographic and urban conditions**

Another issue that is especially problematic in regards to identifying these complexes, is the relativity of geographical size. The scholars are obsessed with how entrepreneurs, researchers, skilled labor etc. meet and create beneficial synergies, however, the complexes built to handle these synergies generate meeting grounds or places that are so vast and big that it may be hard to actually create a synergy between the people within the industrial complex. The scholars of industrial complexes do not present any explicit maps, drawings, measurements that explains the necessity of proximity or vicinity for the actors involved. The coworking space are much more defined in terms of geographic and urban conditions, where the meeting ground are simply enough defined within the facility. As with any enterprise, coworking spaces have a definite business model, as opposed to the unclear development model seen in industrial complexes. Coworking as an enterprise dictates an address, location and financial credibility.

Then there is the case of how many players should be involved in industrial complexes and coworking spaces. There are no concrete numbers of actors and companies/industries/research facilities etc. within a geographical location that constitute a functioning a cluster or coworking space. The recurring questions that remain unanswered are many: what are the geographical boundaries? How close and how far can companies be from each other before an industrial complex becomes irrelevant? What urban repercussions may this have for the cities developing industrial complexes? What existing urban conditions are necessary for a successful industrial complex? The scholars state that industrial complexes cannot be artificially created and developed without any basis for it. Meanwhile, it some of these questions are naturally enough answered by the coworking concept.

### **Autonomy**

The characteristics of the science park reveals autonomy as an enduring trait sought after in all of the other complexes. Autonomy seems to be one of the first signs or tools for policy makers to actually translate a phenomenon to fact, from observation to development strategy. As mentioned above, the literature critiquing these complexes often refer to a misunderstanding where policies are based on mere observation of viable developments, such as the cluster and science city. Interestingly enough, the policy makers and critical scholars behind clusters and science cities still suggest the same direction of development for all of the industrial complexes: less government interference or top-down development and more focus on human relations and internal synergies, stronger communities, innovative milieu etc. The people within these complexes appears to be the only measure of value. Aside from physical co-location Porter, Castells & Hall, Anttiroiko and other scholars all emphasize the people, entrepreneurial mindset, their ability to adapt to current trends, to network, to create bonds to interact, as crucial factors. Industrial complexes are big but slow machineries, as the literature (and chapter 3: Context) indicates; they do not respond well to dynamic changes. Florida’s reversal of conventional wisdom becomes very interesting, as he states it is the creative class and the people climate that matters and not the critical amount of industrial complexes that have amassed.

All of these factors can also be seen as certain descriptions of coworking spaces. To make the point clearer, coworking is as a private enterprise managing many other private enterprises. In other words, it becomes the very incarnation of autonomy, without any government interference with total focus on the concept of



community. An enterprise is nothing without the people behind them, therefore the people becomes the only measure of value in coworking spaces. The coworking concept can also be interpreted as a micro-version of a cluster, technopole etc. but a cheaper, smaller and more efficient version of it with all the critique of how the former industrial complexes can be better embedded in it, especially the part about autonomy. To a certain degree, a coworking space is actually a micro version of the more successful science park.<sup>3</sup>

### **Signs of a new contemporary industrial complex**

In the context where digital innovation is dominating through immaterial production and the globalization of industries, sudden trends and change do occur frequently. The constant renaming, relabeling and mislabeling of established concepts convey the nature of industrial complexes. Industrial complex as a concept has to transcend, change and readjust according to technological trends and development. If community and human interaction plays a bigger role, how will this affect the physical layout of these complexes? Where do the creative class or innovative milieu want to be? What kind of environment does all of these factors dictate for the next generation of researchers, entrepreneurs etc.? Or to put it bluntly, what is the next industrial complex suitable for the contemporary society? All the aspects in the different discussions between industrial complex and the coworking concept seems to clearly indicate that coworking may be the better choice.

Let us examine the core necessities this review has brought up as indications and jump from industrial complexes to coworking spaces. These are factors for what an industrial complex must revolve around:

- The community, people climate, innovative milieu etc. is the social glue and key element attaining synergy or serendipity production and numero uno priority and cannot be contested otherwise.
- Increased understanding of these complexes more as an autonomous phenomenon rather than replicable development policies.
- The geographic boundaries and the proximity or vicinity of companies and research facilities must be a more specified than it currently is.
- As the industrial complex inevitably gets of a certain size, so does the complexity of the meeting ground in these developments.
- Major complexes and the master planning of industrial and urban developments may be irrelevant as tools to handle innovation being static and slow, thus unable to adapt sudden changes and trends. The bigger the complexes, the harder it is to adapt.
- The trend of lone eagles is greatly contributing to the irrelevance of major complexes and the improbable change in the physical layout of the 21<sup>st</sup> century industrial complex.
- Autonomy is of great importance in order for the complexes and the actors within to adapt to sudden changes and trends.

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<sup>3</sup> More successful in relation to the 21<sup>st</sup> century industrial complexes.