3.0 BACKDROP & CONTEXT

3.1 INTRODUCTION

This chapter explores some Norwegian origins and customs on entrepreneurial and technological development and asks whether the current rise of startup-related coworking spaces is a complete import of global trends or if it in fact is partially locally rooted. Silicon Valley of San Francisco is the most famous cluster, science park and startup community in the world. It is natural to investigate the origins of Silicon Valley, in order to differentiate local and global trends. This chapter also explores the industrial revolutions as the backdrop for this thesis, or most prominently the 4th industrial revolution, in order to understand the current rise of coworking spaces. Moreover, in the digital age, global economy, and in regards to the fourth industrial revolution where everybody virtually can work apart from each other; in what way is local proximity still relevant?

At the turn of an industrial tide, from corporate to collective ideology

ICT Norway, an interest and lobbyist organization for the IT industry, notes a recent and ongoing trend in Norway and globally, where highly competent and skilled labor find it more appealing to work in coworking spaces and form tech-related startup companies rather than working for corporate firms and headquarters. What are the factors for this current trend; what does it reflect; and what repercussions could it have for the general working society?

There may not be a coherent string of factors leading to the rise of lone eagles, but many unrelated ones at play both nationally and globally. Traditional industries such as oil and gas currently experience their biggest downturn since the 1990s. Wood MacKenzie, a consulting firm, has identified a remarkable drop in exploration investments among 678 large oil and gas projects worldwide. In 2016 this marks a loss of 250.000 oil industry jobs worldwide, not only workers on the floor, but also highly competent oil engineers (New York Times 2016). In Norway alone, this means 25.000 jobs. Despite general speculations that the crisis may turn within a year in the oil sector, the crisis has created a considerable window for current migrations between professions (TV Vest news channel 2016). CEO Heidi Austlid of ICT Norway sums up Norway's predicament very neatly in an article for Stavanger Aftenblad: on the one side, there are unemployed and highly skilled engineers in the oil industry, on the other side, there are 6300 IT-related positions that has to be filled.

Simultaneously, the digitalization and automation have become the main pillar in streamlining the efficiency of society, causing further unemployment in what has always been considered traditional jobs and professions, everything from cashiers to general practitioners (ICT Norway web article 2015). This is generally considered to contribute greatly to the demand for more digital tech, software solutions and innovation, tasks that tech-related startups usually handles.

Another factor is the decline of the contemporary industrial complexes' additional role as a synergistic community, in line with Wadhwa's critical observation of the cluster strategies should obsess more about the people rather than the facilities It has also been recorded the same tendencies in Oslo Science City and IT Fornebu in 2003 by the National Institute of Urban Research (NIBR) and 2004 by an Oxford Research report, although IT Fornebu as a cluster was technically abandoned before it had a chance, due the dot.com bubble in 2001. These reports do not only critique performance- but also social aspects of the complexes as they are considered interlinked (Johnstad 2003: 47, 49, 59 & Rognlien 57, 58, 61). This is where startup communities and coworking spaces come in.

Startup company

Since the concept of startup is such an important aspect of this thesis it is in place to give the startup company a proper description. A startup company, or more commonly referred to as startup(s), is an entrepreneurial venture generally considered to be a newly emerged, but fast growing business. The main characteristic of startups as that the business model is designed to rapidly develop a scalable business model. Therefore, its state as a startup is considered to be only temporary. Scalability as a business-related term, is the ability to expand and generate revenue growth while minimizing operational costs. One would assume that in the context of immaterial production such as social services, internet innovation that minimizing the cost while expanding is not a hard task. However, as startups aims to grow quickly, the expansion costs come in the increased employment of knowledge workers in a growing startup. As the term became internationally widespread during the dot.com bubble, startups is in contemporary society often related to advanced tech, internet, communication, robotics etc.

3.2 INDUSTRIAL REVOLUTIONS

Industrial revolutions shaping the city we know it today

Society has not always been very receptive to technology and industrial history reveals that the technophiliac spirit leading to a more advanced society was carefully cultivated through conscious choices by intellectuals and government officials. It also reveals how important the concept of community has been in the development of technology and industrial complexes. What significance have different industrial revolutions had in popularizing entrepreneurship and establishing a global culture for shared knowledge?

First Industrial Revolution – integration between urbanity and industry

The first industrial revolution that took place in Europe, most dominantly displayed in Britain, approximately 1760-1840 and in the U.S. 1790-1870, caused a shift in society from working at home to working in factories. Porter would probably have called these industrial settlements the archetype of his cluster theory, but the terms agglomeration or company town are more suiting in this context. These agglomerations were made possible only by steam power; the containment of energy led to the efficiency of mechanical production and railroads. Mills and factories could now be developed independently of geographic location. Geographic independence led also to agglomerations and what can be called industrial complexes, which the general public found unappealing. To circumvent this mindset, the factory owners built new villages and

schools around the factories to attract labor, causing new urban centers to emerge. The rapid urbanization in the cities caused below standard living conditions along with the horrendous working environment in the factories.

Second Industrial Revolution - separation between industry and urbanity
The second industrial revolution commonly known as the technological revolution (1870-1914) is generally considered as a continuation of the 1st industrial revolution. Electricity became one of the main factors changing the way workers proceeded in workspaces with division of labor, mass production of material manufacturing and paved the way for further improvements of urban aspects (social and working culture, health issues etc.)

Moreover, science improved the household technology, drastically impacting the general health in the city. The works of Pasteur and Koch help reduce mortality rate after the 1870s through simple agents such as soap and understanding of hygiene and properly treated food (Mokyr 1998: 12-13). The urban implications of the 1st industrial revolution were another social class and a new typology in urban planning, namely the middle class and the suburbs. There was also an emphasis on the urban design of the cities, leading to strategies such as the Garden City movement popularized by Ebenezer Howard. These cities were planned as self-contained communities separating between industry, agriculture and residences while providing an ideal for the newly invented suburbs. Shared knowledge also became consciously important for societies and cities to advance. Although the concept of shared knowledge can often be mistaken for larceny, as in 2002 the US Congress recognized Antonio Meucci as the real inventor of the telephone. It turns out that Bell, in the contradictory spirit of both shared knowledge and entrepreneurship, had access to Meucci's work and took out a patent on the technology (The Guardian årstall). This example also serves as one of the defining factors of creating Silicon Valley as a cluster, science city, startup community etc., which will be explained in detail later in this chapter.

Third Industrial Revolution - separation and zoning between industry and urbanity
The third industrial revolution commonly known as the digital revolution (the timing varies and is set to both 1969-1980 and 1950-1970) is generally considered to be the jump from mechanical and analogue technology to digital electronics and computers; to put it bluntly, from material to immaterial manufacturing and production. WWI and WWII between the second and the third revolution generated an immense focus on technological advancements in modern warfare – less on working and social culture and urban planning and design. This period marked also the start of the Cold War and the Space Race, which fueled the demand for technological advancements. It was necessary to handle this knowledge through new divisions of labor, from mechanical to digital workload. This led to massive, but segregated, modern, industrial developments paralleling WWII creations such as Bletchley Park in Milton Keynes and MIT in Boston. The post-WWII industrial developments represent the 21st century industrial complexes mentioned in the literature review. The science city and the science park became the development strategies for this period. These kind of complexes put more emphasis on the image of tech supremacy and city prosperity, urban planning and design, but most importantly; civic life together

with corporate, working and social culture was implemented as a strong feature. The much-used term, synergy, is important in the creation of professional communities. These aspects will be explained in details later in the chapter in relation to Silicon Valley.

Fourth Industrial Revolution – blurring, integration and fragmentation of industry and urbanity
The fourth industrial revolution commonly known as Industry 4.0, is generally considered as the introduction of cyber-physical systems into society, such as artificial intelligence, telecommunications, 3-D printing, nano- and bio tech, quantum computing, blurring the lines between traditional sectors such as oil, gas, energy, etc. Industry 4.0 also continues the automation of work labor, data exchange, and new manufacturing technologies.

The fourth industrial revolution was once again brought to public attention in the World Economic Forum (WEF) summit in Davos 19th of January 2016.[1] The founder and executive chairman of WEF Klaus Schwab stated that Industry 4.0 would fundamentally change the way we think, work, live and relate to each other. Schwab sees extensive benefits and drawbacks, such as smart city repercussions, from automated cars to far-fetched human augmentation. He mentions the uncomfortable blurred line and hybrid between war and peace through cyber warfare etc. In the context of this thesis he raises an interesting point about how it may affect the notion of community.

"*...Sometimes I wonder whether inexorable integration of technology in our lives could diminish quintessential human capacities, such as compassion and cooperation (...) Constant connection may deprive us of one of life's most important assets: the time to pause, reflect, and engage in meaningful conversation.*" (Schwab 2016)

According to Schwab it will change how we cultivate our skills, meet people and nurture relationships, diminishing human capacities such as compassion and cooperation in both private and professional life. Although WEF has been accused by the Future Tense of creating unwarranted fear in head of states. However, WEF's real fear might be what was never present in the third industrial revolution; white-collar jobs are at risk this time around. Although Future Tense[2] makes a good argument that the fourth industrial revolution is a meaningless phrase used at every occasion looking at major technological advancements, such as at the beginning of WWII, during the Cold War, and even in the 80s tech boom. Regardless, it does not change the fact that the tech advancements in society are changing and splintering how major firms and corporations conduct business and integrate in value chains. It is necessary to coin the contemporary term of Industry 4.0 to describe the turn of our current industrial tide, regardless what may its significance in retrospect.

1 WEF is a Swiss nonprofit foundation and the international institution for private-public cooperation dedicated to improve the state of the world by engaging business, political, academic and other leaders of society to shape global, regional and industry agendas.
2 Future Tense is a partnership between New America, Arizona State University and Slate Magazine to explore emerging technologies and their transformative effects on society and public policy.

All these factors affect the contemporary working and social culture, generating a bigger emphasis on the knowledge worker, and even urban planning and the implications in relation to smart city discussions. Instead of major clusters, what seems to develop rapidly is a conglomerate and unprecedented number of so-called micro clusters the city. Thus, we see the end of the 21st century industrial complex, as we know it. Moriset concludes:

"*...IT has driven the institutional fragmentation and geographic splintering of value chains. A massive trend toward outsourcing (...) leads firms to become orchestrators rather than owners (...) well-defined entities of innovators and producers being replaced or complemented by myriads of contributors*." (Moriset 2013: 4)

The argument implies that the corporation, firm, institution, and as the literature review states, the 21st century industrial complexes, belong to a dying breed in need of revision.

3.3 SILICON VALLEY

Introduction

Silicon Valley in the San Francisco Bay area, California, is a much-cited reference when discussing clusters or industrial complexes, also in Oslo. It is therefore important to explore the complexities, simplifications and not least, the serendipitous properties that define Silicon Valley. It is indeed one of the earliest examples of a successful tech cluster, with aspects resembling a major startup community across great distances. Yet it is not in the clustering itself which makes Silicon Valley work, but the different creative classes, the liberal image of cool and tolerance, social, working and shared knowledge culture and government support. It is only by taking all these aspects into account, one can understand that Silicon Valley may in fact be one of the unique examples which cannot be replicated.

A foundation based on tolerance and entrepreneurial mindset

What makes Silicon Valley a tempting example to follow, are the stories which revolve around a creative class occurring out of nowhere as parts of the bay area. Before this Silicon Valley consisted mostly of agricultural land and retirement suburbs. Its origins tell another tale: a long history of liberal, technological and entrepreneurial occurrences. We see it in its stance against slavery in 1861, the gold rush which generated both capitalistic and eccentric spirit and diverse immigrations in 1848, and surprisingly enough a significant research tradition on vacuum tubes (origins of the PC) 1912 and even Stanford University's will to create an industrial park seemingly out of thin air in the 50s (Moorhouse 1979: 42-43). Although there is no direct link, these factors may be indicators for the continuation of San Francisco's everlasting image of cool and tolerance, along with its Mediterranean climate.

The world's first science park, Stanford Industrial Park

The creation of Stanford Industrial Park may be one of the misleading factors to why policy makers adopt industrial complexes as a national policy as this science park appeared to have occurred out of thin air. At the time of its creation in 1951, Stanford University was rich on land, but poor on

Stanford Industrial Park 1960. The considerable land that Stanford University in possession of which enabled the university to successfully harboring major companies in their science park. Credit: Palo Alto Historical Association.

knowledge and tech. This excess land at Stanford University became the science park. What policy makers may have underestimated when studying Silicon Valley as a replicable model, may be the power of one individual, Frederick Terman, an educator and professor in Electrical Engineering department at Stanford University.

Frederick Terman spent his formative years in California and even got his bachelor's degree at Stanford University, due to his father's problems with chronic tuberculosis. Why is this trivial fact so important? It turns out, that his father had passed the illness over to his son. At the time, warmer climate was considered to ease the pain, hence the reason for why Terman Jr. would return back to Silicon Valley, after receiving his PhD at MIT under the great Vannevar Bush of Raytheon. One cannot hide the fact that Terman had strong ties to MIT; he was managing a high-technology military project during the WWII.

Terman brought back experiences and intellectual property, which led to the creation of the science park. However, was it the science park that led to a synergy between research and entrepreneurship? To answer that question, we have to go back in time to the 20-30s when he was the dean of Electrical Engineering department at Stanford University. It turns out that the dean single-handedly encouraged and helped students exploit research, setting up firms, lending money from his own pocket to ensure this without taking any stakes in the companies. One of the most famous companies coming out of this deal was Hewlett & Packard. So when Terman led the development of Stanford Industrial Park, he had an army of companies to fill it with, purely based on good will. His main goal was to diffuse R&D for commercial use. He leased the land to electronic firms on very advantageous terms on the basis of their

excellency and their close ties to the University. In one single move he managed to create a community of technical scholars of both research and industry. This is an important fact because it is a model of ensuring intellectual communities on and nearby campus (Castells & Hall 1994: 16). One should note that after this point, the Stanford University was irrelevant to the shaping the Silicon Valley culture, as the private market became self-sufficient.

Post-war era and neoliberalism generating two very different creative classes

During the WWII and the Cold War, MIT in the east was the base of conservative military driven industry not prone to innovation while the west gained a reputation of a strong liberal and entrepreneurial culture, which became the testbed and destination for young ambitious tech workers. This also gave all the startups around Stanford a great beginning, leading to what would become the world's greatest startup cluster (Castells & Hall 1994: 16, 31-35). On the one side, the governmental and military demand for technological advancements in the 60s due to the Cold War contributed to Silicon Valley's image; the "technophiles" or establishments fed the ongoing wars and the culture of materialistic consumption. The war thus fueled the trend of startup companies. On the other side, was the counterculture stance against the established order in the 60s. The generation of "reversionaries" criticizing the wealth, commodities, technology and political state of our society wanting to go back to our roots of living and to communal ideologies. These two classes became quite decisive in shaping the ethos of Silicon Valley, a contradictory mixture of technophiliac, entrepreneurial, corporate, collective and altruistic mindset.

The unlikely culture of shared knowledge

The story of how Silicon Valley attained its trademark culture is much more a freak occurrence than something that can be replicated. The liberal image in this context became synonymous with opportunism, greed, wealth and free market. Corporate secrets were impossible due to strong migrations between free structured firms. The case of William Shockley in 1958 may exemplify this. As nobody at MIT Boston would invest in his invention of semiconductors (which would lead to the creation of microelectronics and PC's), Shockley left town, seeking his fortune somewhere else. But why did he choose San Francisco? The official reason for why he chose San Francisco, of all the east coast clusters, was that he could be closer to his mother. In San Francisco he found venture capital and established the startup company Shockley Semiconductors. But his lack of business acumen caused his opportunistic disciples to branch out and start the spin-off firm Fairchild Semiconductors integrated silicon to Shockley's invention. The reason for why Shockley's disciples left him was because he refused to see this integration as an improvement on his design. Fairchild fell prey for even more spin-offs. This tale would become the very strength and symbol of Silicon Valley, as the workers held no grudge, they actually stayed in the area and still met up over professional issues, or to be more precise, at Walker's Wagon Wheel, the local restaurant. The Fairchild's created the kind of networks that the world would hear so much about (Castells & Hall 1994: 31-35). This meant that the meeting grounds actually facilitating this serendipity production were in fact the restaurants, as opposed to major industrial complexes presented in the literature review. Shockley is today generally considered as the second founding father of Silicon Valley.

Walker's Wagon Wheel. One of the main restaurants that functioned as a meeting ground for shared knowledge. Credit: Carolyn Caddes.

The private and public sector ensuring cultural diversity causing gentrification

The city may have ensured the diverse culture of non-conformism and capitalism in San Francisco after seeing what the diversity might bring back in revenue. For example, by making it illegal for employers to refuse a job because of an applicant's sexual preference in 1972, the inhabitants giving away free coffee to the hippies and beatniks because their presence attracted more tourists, and discounts for startup companies. Both the government of San Francisco and Stanford University was ensuring its brightest tech students to stay with their companies in Stanford Industrial Park and central San Francisco (Moorhouse 1979: 127). The counterculture gave the city a strong social identity initiating a gentrification of the low-rent central San Francisco which they inhabited. Moreover, the firms that stayed and furthered innovation and reindustrialization in the Bay Area generated a great deal of corporate subcultures and entrepreneurial sense, which increased the technological community and financial economy.

Hybrid culture: from military, corporate to civilian market

The merging of countercultural and technophiliac ideology led to a creative class with an interesting agenda in the 70s. As a means to continue their fight, this creative class refocused their efforts in scaling down, democratizing and humanizing technical innovations, forming a strong compromise in their protests against establishments. Technological manufacturing was retracting as governmental spending was shutting down in the 70s and with the crack due to Japanese dominance in 1984, Silicon Valley had to redirect from hardware to software manufacturing.

In the 70s many young nonconformists detested the major tech corporations moving in claiming tech for military and commercial use, leading the nonconformists to monopolize the computer for personal use, hence the name Personal Computer (PC). This may be the first stance in creating the hybrid culture of our contemporary time. In their view, the computer could potentially give millions access to databases of the world, turning the average Joe into a self-reliant citizen. The school dropouts traded bohemian lifestyle with computer knowledge, outflanking major corporations in the US. They were very aware of creating a softer

non-corporate image. Through friendly and folksy club names such as the Itty Bitty Machine Company (an alternative IBM), Kentucky Fried Computers, or most prominently, the Homebrew Computer Club started the personal computer age in 1974. Other unknown Homebrew members at the time were Steve Wozniak and Bill Gates, the two PC hardware and software giants of today (Roszak 1986: 38-39). The name "Apple" was also an attempt on soft, organic identity opposed to the hard-edged image of high tech at the time (Roszak 1986: 38). (Castells & Hall 1993: 20).

Is it really that strange that nonconformists would challenge the corporate modus operandi of handling tech? Theodore Roszak, the author which gained a huge follower base of nonconformists and became an important advocate for the countercultural generation, made a sharp observation between these subcultures. He observed that all of his countercultural students were in fact obsessed with science fiction, even to the degree that the publishers could no longer provide enough literature. Alongside the primitive ways of living, Zen Taoism (Steve Jobs was a self-proclaimed Zen practitioner) which colored the San Francisco culture in the end of 60s, was a strong fascination of devices and space crafts (Roszak 1986: 16). The hippie ideology did not stand in the way of the appreciation of technology. This is the same tendencies seen in the nonconformists liberating the computer for personal use.

Corporate subcultures

Although the hybrid culture did create an image of major corporations being uncool, it seems as if the corporations were aware of it long before the hybrid culture movement in the 70s. Firms and corporations had become more and more obsessed with their image and reputation. They yearned to pose as a "clean energy", with human sensibility rather than a tough corporate ruling. Although very corporate, Hewlett-Packard in Stanford Industrial Park was the first to have a very humanitarian view on their employees, treating them as assets, giving stock-options, tutoring, offering flex time and job sharing. Google takes it even further creating what ranked today as the world's best working environment. Showering their employees with perks and benefits, accommodating a diverse corporate culture, encouraging personal gain and interaction between colleagues.

Invention-out-of-the-garage culture. From left: Apple, Amazon and Google. The garages and "incubators" in the suburbs served as the workspace for entrepreneurs and knowledge workers.
Credit: Katie Henderson.

The urban aftermath of neoliberalism and cultural tolerance

The fact is clear; San Francisco has been successful in maintaining its image of cool and cultural tolerant. It also means that the city opened its doors for whatever migration and culture to come and was a testbed for the 20st century society and the 21st century industrial complexes. Concepts such as cluster, science park, and startup community are developed here. Not to mention how Wozniak and Jobs help popularize the invention-out-of-the-garage culture which rapidly changed the suburbs into tech territory of opportunists/wannabe-innovators (Castells & Hall 1993: 25) The sum of all the garages would make Silicon Valley a startup cluster.

The central San Francisco, home of the counterculture, underwent severe gentrification and became the target of the rich capitalists investing in the innovation of the tech boom. In a way, the beatniks and hippies ignited an urban generator attracting businesspeople, turning the entire Bohemia into financial quarter. Change in central San Francisco was bound to happen as they had somehow invoked dynamic changes and migrations in the region.

An indicator of the trend of humanizing technology in the Bay Area is the shift in technological focus from industrial achievements to commercial manufacturing and to social networking services. Even the social networks such as Facebook, YouTube, Tumblr etc. are breaking down to even smaller fractions while generating even more famous startup companies, such as Instagram, Vine, Flickr etc. To put it bluntly, Silicon Valley has gone from industrial complexes to major corporations to startup companies. This is in line with the technological trends as the tech community in Silicon Valley has adjusted accordingly so.

3.4 THE OSLO SCENE, NORWAY

The Oslo startup front

Scandinavia is today a very hot topic on the global startup front with investors pouring in 800 million dollars in 2014. Yet, out of the 800 million dollars invested in Scandinavia, Norway only managed to attract 3%, whereas Sweden took in 51%. Scandinavian cities that dominate the startup front are Helsinki, Copenhagen and Stockholm (Teknisk Ukeblad 2015). Oslo has had a great emergence of an established startup-related coworking spaces, but it is missing a unified platform of angel investors, accelerator programs and incubators to take them to the next level of growth stage businesses. Startup-related coworking spaces It is inevitable that startup companies main goal is to grow and move on from the coworking spaces. The startup front in Oslo is generally considered as very fragmented by Kjartan Slette CEO of Unacast (one of the Norwegian leading startup companies today), criticizes Oslo-based coworking spaces such as 657 Oslo, StartupLab and MESH for not seeing beyond their own gain and realize what to do for the greater good.
Oslo has in a few years gained a rapid growth of almost 80 startup related businesses. It is assumed to be the start of a major growth in the upcoming years, however Oslo is currently without a holistic infrastructure to sustain it (Teknisk Ukeblad II 2015).

Norwegian origins and customs on entrepreneurial and technological culture and development

During the interview rounds with interest groups of the Oslo-based business development and IT industry

including ICT Norway, Oslo Business Region and startup communities presented in the case study chapter, the same questions were asked: Is it wise to develop a startup front based on foreign ideals and customs? Are there national or local traditions and customs that the Norwegian startup front can/should be based on? The answers pointed in the direction that this was an international trend, meaning it would be senseless to base it on local traditions and customs. The way startups and coworking is marketed today refers more to global trends and does not cast light upon the possibilities that some of this trend may in fact be engrained in the Norwegian culture. In other words, many of the interview subjects (Archer, Holmefjord, Syversen, Winther in chapter 4: case studies) gave the impression that this tradition was mainly rooted in foreign trends and traditions. Prime examples such as Silicon Valley, Boston Highway 128 and most recent reference project, the Hackney district in London, have played a crucial role in the argumentation for the industrial complexes in Oslo and are often mentioned in relation to new developments (Aftenposten 2 2011), such as the new Life Science Center in Gaustadbekkdalen being hailed as "Silicon Valley light". Further investigations into the Norwegian IT basis of entrepreneurial and social culture show both independency and dependency of global trends and not a replication of Silicon Valley or Boston Highway 128. Rather, the investigations show an actually simulation of the same conditions as in the 60s seen in Silicon Valley, all out of an office building at Ole Deviks vei 10 in Oslo. The Nowegian origins does not play a crucial role for this thesis specifically, but it does play a crucial role in how the public perceive the industrial complexes presented by policy makers and interest organizations when talking about the development of the startup communities.

Shift of focus from industrial complexes to coworking spaces

The certain shift of focus, from corporate to collective ideology that is very present on the global scene, is also very present in the history of the two main government-financed interest companies for business development in the Oslo area. Or to be precise, in the foreclosure of Oslo Teknopol IKS (established 2002) and the establishing of Oslo Business Region AS in 2011.

In the mindset of what an industrial complex or cluster strategy would imply, Oslo Teknopol was an inter-municipal and project managing company between Oslo municipality and Akershus county. Their emphasis was to generate beneficial cluster projects in sector-based market such as in maritime, oil and gas, Life Science and IT etc. These cluster projects were envisioned as to be initiated, managed and owned by Oslo Teknopol in cooperation with the municipalities that owned Oslo Teknopol. However, the co-op proved too difficult to carry out. Knut Halvorsen, the managing director of Oslo Teknopol (Aftenposten 4), claimed in 2011 that the Akershus county officials and the government of Norway have resisted any cooperation and opposed to the inter-municipal initiative from the very beginning. The very same county that initiated Oslo Teknopol. In 2008 Innovation Norway[3] pulled their funding and backed out of the Oslo Teknopol initiative. The internal feud became a public fact, after an unfavorable Oxford report was released and 50 million NOK did not produce any results and the owners of Oslo Teknopol demanded a report on the internal issues between Oslo Teknopol and Akershus county officials. Arnhild Danielsen, the county director of Akershus county, in 2011 that a better model for a company handling business development was in demand (Kommunal rapport 2010).

3 Innovation Norway is a state-owned company and a national development bank for Norwegian business development.

The cluster mindset of exercising projects on a regional or even national level proved to be too much of an undertaking, as Danielsen expressed interest to transfer the transfer the tasks and operations of Teknopol to a new and more modern business model, hence backing up the collective ideology, as a means to find a new way to support business and commerce in the Oslo area. This resulted in the Oslo Business Region which is owned by Oslo municipality alone, which focuses more on entrepreneurship and the startup front. Instead of owning and controlling projects on a regional scale, Oslo Business Region collaborates with the current trend of business development, which is the startup-related coworking spaces. Here comes the big change of ideology: instead of generating and create big clusters, the focus is instead on accommodating the established business communities, or to be more precise, startup communities. Oslo Business Region[4] have a narrower scope on entrepreneurship and believe it is easier to make an impact to make a difference on the field of entrepreneurship and start only, instead of turning the wheels of the major cornerstone industries where many other players and factors are in play. This event show a firm sign of the cluster strategy and major industrial complexes' decadence and the impertinence of individual entrepreneurship and smaller entities.

Norsk Data - the highest valued PC in the world '89 was located in Økern.

Does Norway have anything equivalent to the corporate, yet culturally influential tech firms, such as IBM, Hewlett & Packard, Microsoft or Apple, including the corporate culture and entrepreneurial spirit that came with them? After the great PC crack in 84' which hit the U.S. PC manufacturers hardest, IBM would mention how a minicomputer manufacturing firm at Økern in Oslo could do so well in the face of global adversity, keeping a stable growth and increased profitability. IBM was referring to Norsk Data, the highest valued PC manufacturing firm in the world in '89, right before its collapse in '91 (Reve & Sasson 2012: 150). However, the collapse gave Norway a solid IT basis because the competence, culture and intellectual property lived on through Norwegian- or Oslo based spin-offs, startups and software developments (Dolphin, Telenor etc.). It is equally interesting to read about the origins of Norsk Data; how it indirectly forced a reluctant synergy between the private and public technological sector, united global trends, and made its own strides in ushering IT development, very often through a few individuals.

Venture capital on Norwegian soil

When the entrepreneurs and founders of Norsk Data, computer engineer Lars Monrad-Krohn, Rolf Skår and Per Bjørge established the firm in 67', they did so on the basis of their affiliation with the Norwegian Defence Research Establishment (FFI) of post WWII, causing an unlikely migration of 15 persons altogether from FFI to Norsk Data; from a public industrial park to a private startup firm (Steine 1992: 11-22). 67'was also the year that oil was discovered in Norwegian soil. The public sector heavily dominated the industrialization of Norway and private entrepreneurial ventures were not the norm (Regjeringen 2016). All in all, it was the founders' amassed personal experiences and affiliations that made Norsk Data's intellectual property exceptional in influencing future tech spin-offs. First off, the founders were not able to generate venture capital in the conventional way. In a context where only one third was available on the Norwegian market, they did so through a board member's father in-law and Monrad-Krohn's mother, amounting a modest 194.000 NOK. Again, we see indirectly how parents play a crucial role in changing the trajectory in the tech industry, such as

4 Facts is based on an interview with Fredrik Winther February 2016.

Terman's father with his chronic tuberculosis or Shockley's mother living in the sunny side of San Francisco.

Focus on the civilian market

In relation to how the nonconformists in Silicon Valley made their fortunes by looking at potentials in the civilian market, the case of Norway differs a bit. There was a mutual agreement between Norsk Data and the government that the private owned company should handle the civilian market, meanwhile the public owned tech institutions would handle the military market. We know now that the short end of the stick resulting them in breaking the agreement in an attempt to gain monopoly on the PC manufacturing market etc. In 71' however, Norsk Data gained monopoly on installing their NORD-1 (minicomputer) in virtually every institution, university and university college on Norwegian soil, making them highly influential in how academia would process technology and education years to come. How this came to be is still unknown to this day, but it is assumed that political pressure from Norsk Data was crucial in securing the deal (Steine

From FFI to Norsk Data 1967. The image show the members of Sifferlabben, a research team at FFI. The marked dots also show the migration of the intellectual property of the government to the private enterprise.
Credit: Tor Olav Steine.

1992: 22-30). There was also a migration of research- and MIT-based intellectual property to Oslo that is worth mentioning. One of the founding members of Norsk Data, Monrad-Krohn migrated from government-financed research to Norsk Data. He also brought back important intellectual property to Norsk Data from MIT during his stay between 62-64. Another founding member Skår, successfully lobbied for a coworker to migrate from the world famous MIT to Norsk Data and acquiring competence in American timesharing systems which ultimately was critical to Norsk Data's securing the open bid on CERN's upgrade on their computers in 72' (Steine 1992: 26-31) which firmly put Norsk Data on the map and the deepest corners of Norway, as a major player in the global PC industry.

Parallels to Boston Highway 128 and Silicon Valley

In a timeframe of 5 years, Norsk Data managed to fend off government-run initiatives in the tech market dominated by the public sector, synthesize global trends and acquire foreign intellectual property as their own, creating a strong authentic basis for technological entrepreneurship and innovation, native to the local markets of Oslo and Norway. It is therefore peculiar when industrial complexes in Oslo or cluster mindset such as Oslo Teknopol suggest that the Norwegian IT culture are a direct descendant of global trends and events. Also, these facts even reveal that Oslo had the same tendencies as Silicon Valley in both of their formative years in the 60s. Therefore, history reveals in fact that Oslo is not replicating Silicon Valley as portrayed in media, but that it in fact is a simulation of the same conditions.

It may be uncalled for to underplay MIT's importance in the global tech market in this section. However, only the less favorable parts of MIT's track record are depicted in this section, as it is to convey manifestation of the controlled government institution, whereas Silicon Valley as an autonomous and neoliberalist institution. In many ways, this draw parallels to cluster development, as opposed to the coworking concept. Ultimately we have to ask, what is the importance of Norsk Data to the Oslo scene, as how the tech Silicon Valley culture is important to San Francisco? As mentioned in the beginning, the collapse of Norsk Data gave Norway a solid IT basis because the competence, culture and intellectual property lived on through Norwegian- or Oslo based spin-offs, startups and software developments (Dolphin, Telenor etc.). It again draws strong parallels to how the collapse of Shockley Semiconductors paved the way for the Silicon Valley culture of shared knowledge. Alas, we arrive on the subject and the main question: what are the roots of the entrepreneurial culture and startup trend? If we look aside from Shockley Semiconductor and Norsk Data's shortcomings for not readjusting themselves towards new tech advancements and trends. The fact is that the collapses of highly established and influential companies in the Silicon Valley and Oslo context do generate an engrained culture at the specific location where it happens. Shockley's shortcomings created a hunger in his disciples, an entrepreneurial mindset to innovate truly marking the rise of startups after the spin-off Fairchild semiconductor fell apart. However, Norsk Data's shortcomings and collapse was not a result of an opportunistic and entrepreneurial mindset, but did in fact generate a strong IT basis for Norway, or in this case Oslo, to lean upon for future IT companies and the current trend of startup companies.

The first government in the world to groom a generation for entrepreneurship

There is another fact of interest which is seldom mentioned when talking about the roots of Norwegian entrepreneurship. Although the government was depicted as a great adversary to private enterprises in the Norsk Data section, they have later had a hand in encouraging the entrepreneurial spirit in the Norwegian society. Kunnskapsløftet, which was a 2004 nationwide reform to strengthen the basic education for elementary, secondary, and high school, introduced major changes and requirements in the general curriculum. Aside from improved skills in writing and calculation, oral skills and digital tools became an integral part of all subjects. To the dismay of Norwegian counties, in 2007 the minister of education, Øystein Djupedal, equipped high school pupils on 2nd and 3rd grade with free laptops for educational purposes at

the county's expense (Digi). With Kunnskapsløftet, Norway also became the first nation in the world to implement entrepreneurship to the general curriculum on a national scale. Entrepreneurship became one of the focus points of the new reform. Evaluating the results, government officials revealed a certain trend: a major increase and interest in entrepreneurial courses and tasks, especially in elementary and primary schools (Kunnskapsdepartementet 2009: 7). Entrepreneurship and enterprise development became a separate course at high school level, teaching young pupils not only the ethical, environmental and socio-economical aspects of starting their own company, but also how to create sound financial and business plans in compliance with the Norwegian law (Utdanningsdirektoratet læreplankode ENT1-01).

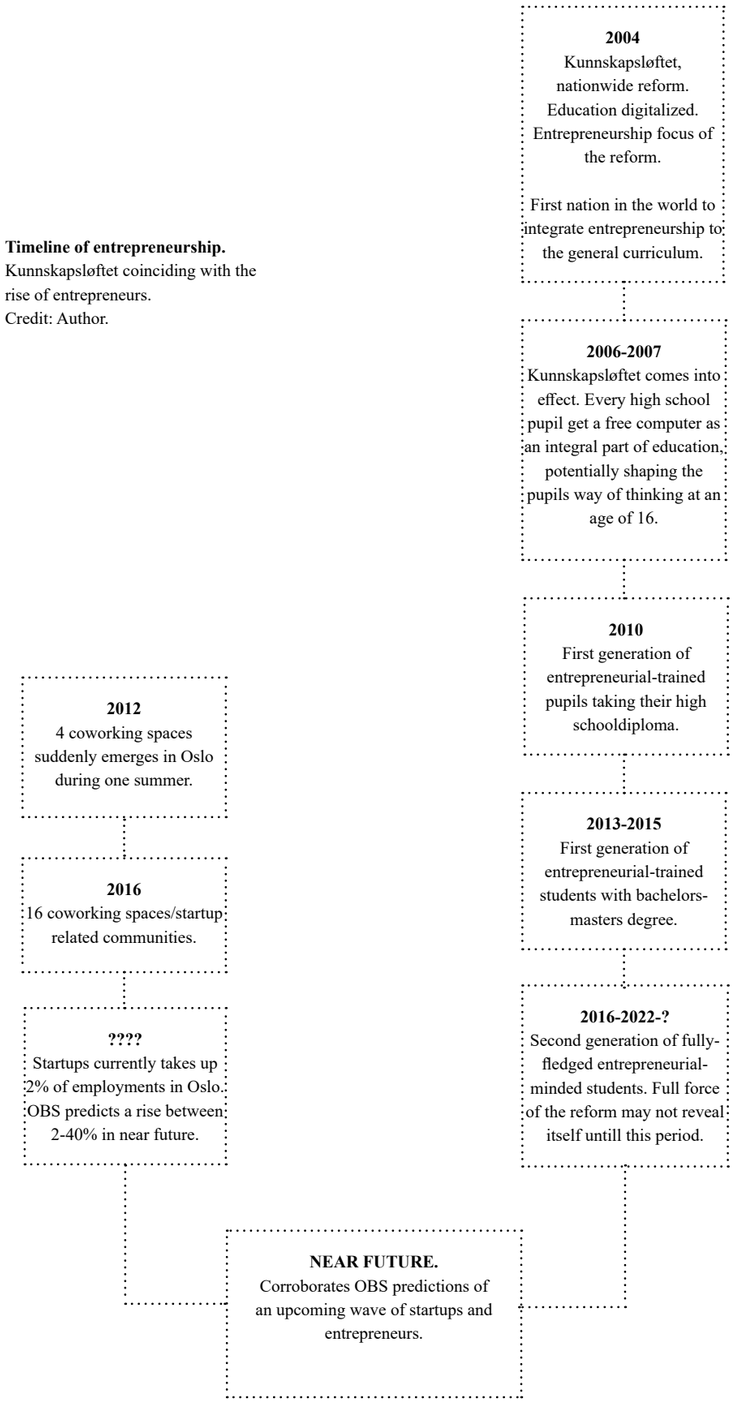
Is there a correlation between the reform and the change in the working culture in Norway? As stated earlier in this chapter, Oslo Business Region and ICT Norway have noted a major turnover in the Norwegian working culture and ethics the last 2-3 years, between 2012-15: skilled labor find it more appealing to work in coworking spaces and smaller startups opposed to major corporate firms and headquarters – workers migrate more frequently than ever. Kunnskapsløftet was enacted in 2004 and it did not come into full effect until 2006-07, which means that the first generation groomed for entrepreneurship and innovation did not receive their high school diploma until the spring of 2010, which also means the earliest fully fledged students with a bachelor's or master's degree would not appear on the working market until 2013-15. This coincides with the occurrence of startup communities and coworking spaces in Oslo and the certain shift in the working culture in Norway – the kind of shift which Winther from Oslo Business Region and Syversen from ICT Norway talk about. If one takes into account at least a year or two as buffer or break between high school and higher education and the 2nd generation from elementary school, the full force of the reform may not reveal itself until 2016-2022 or maybe later. It would then confirm Winter's predictions of a major wave of startups and entrepreneurship in Oslo.

Relevance of a startup community in Oslo

According to a research conducted by the University of Southern California's Marshall school of Business in 2008, Norway came in second, among 31 nations and after Japan, at utilizing new technology and innovations the quickest. It takes only 5,7 years from new technology is released on the market until it is considered mainstream, it takes Japan 5,4 years. According to George Tellis, a professor in marketing from the university behind the research, says this mainly reflects two things: an established culture to understand and adapt to new trends, and secondly, an economy that can sustain and attain new technology amongst its users (NRK news article 2008).[5]

This means a startup front in Oslo will have a very advanced but small consumer base right in their backyard. Basically the cycle of testing and failing and improving can go much faster with such an advanced and small consumer base and the consequences of failure is much smaller when the production also is for a small consumer base, a feature reserved only to Scandinavian countries.

5 Another aspect helping to shape the Norwegian technophiliac culture, was the 00's commodities boom. This caused prices of physical commodities to decline, most notably different metals used in electronics causing flat screens, laptops and smartphones to become basic commodities peaking in the years of 2008-09, around the same time of this research.



Timeline of entrepreneurship.
Kunnskapsløftet coinciding with the rise of entrepreneurs.
Credit: Author.