

THE WELFARE TECHNOLOGICAL ECOSYSTEM IN THE REGION OF SOUTHERN DENMARK

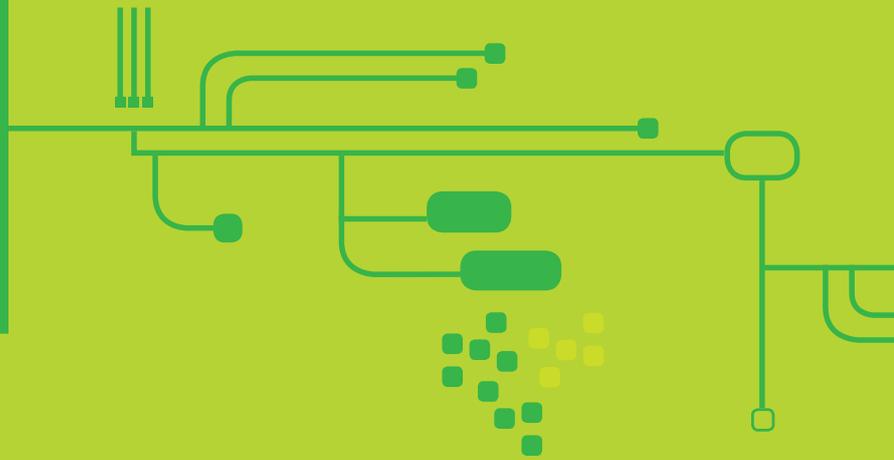
Glenda Napier and Sabina Kethelz
REG X – The Danish Cluster Academy



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Idéa & layout: Trine Vu, www.hungogyiu.com



THE WELFARE TECHNOLOGICAL ECOSYSTEM

FOREWORD



Clusters are growth engines and under the right circumstances, they may result in greater innovation, entrepreneurship and employment. Clusters consist of dynamic ecosystems with strong partnership between the players in the cluster. It is mainly the presence of companies willing to cooperate and their networking to other companies, growth entrepreneurs, investors and consultants that make a strong ecosystem.

The purpose of this analysis is to examine the strengths and development potential of the ecosystem of the welfare technological cluster in the Region of Southern Denmark, and using this as basis, to present policy recommendations relating to the development of the cluster's ecosystem.

The analysis is qualitative and is based primarily on more than 30 interviews with key players in the ecosystem. The analysis must be seen i.a. in the context of the quantitative analysis "Syddansk Klynge: Sundheds og velfærdsinnovation" (Southern Denmark's Cluster: Health and Welfare Innovation) by the Region of Southern Denmark in 2014.

The analysis can be read by cluster players in the welfare technological cluster in the Region of Southern Denmark, but the model and the results of the analysis can also be used as input for cluster development in other clusters.

REG X – The Danish Cluster Academy has conducted the analysis for the Region of Southern Denmark.



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THE WELFARE TECHNOLOGICAL ECOSYSTEM

SUMMARY



Development and production of welfare and health technological solutions are an area which comprises major economic and business growth potential on a global scale. An increasing global, national and regional demand for innovative solutions in the area of health care and welfare creates opportunities for growth for the welfare technological cluster in the Region of Southern Denmark.

The welfare technological cluster in the Region of Southern Denmark seems to have spotted this potential. The number of companies in the cluster is growing. New welfare technological entrepreneurial businesses are established while at the same time the existing companies see new opportunities within the area and convert their production completely or partially to the welfare technology. In addition, big, already established companies, regard the cluster as access to a possible growth market for selling their knowledge and products. Furthermore, the companies in the cluster become more and more interested in cooperating with other companies in order to develop together and bring new solutions to the market. It is especially the big companies' commitment to the cluster collaboration that can drive forward the cluster development of the welfare technological cluster.

The cluster's strengths can also be found in the areas of research and knowledge. The University of Southern Denmark (SDU) has several research and knowledge-related competences concentrated in Odense, i.a. health care, sports, medicine and robotics. SDU opens the doors for the business life of the cluster and sees more and more opportunities for commercialisation of new knowledge in the cluster. Public players such as the Heath Innovation Centre of Southern Denmark and Living Lab Denmark, which bridge the demand side while at the same time facilitate the maturing of the market, together with the access to unique test facilities, also play a significant role in the development of the cluster. This contributes to creating new business opportunities for the cluster companies. Finally, in 2014 the cluster organisation Welfare Tech became a national innovation network.

However, if the welfare technological cluster in Southern

Denmark is to realise its national and international growth potential and continue to develop its position as a lighthouse in the area, it is of decisive importance to address the cluster's main challenges.

One of the things that make a cluster strong is the presence of a concentration of specialised companies. Given this aspect, the welfare technological cluster needs to continue to increase the critical mass of companies. This applies to big, already established companies, small and medium-sized enterprises and growth companies. At the same time, it is important to get the interest of the companies in open innovation to grow into new specific innovation cooperation that would promote the development of the cluster. There is a need for more visible successful cases where public-private innovation (PPI) work together, and the public demand of municipalities and regions constitutes a basis for commercial and welfare technological success which has resulted in a forward push on global markets. This can contribute to inspiring other companies and public authorities to follow suit. Finally, it is necessary to gather together the many players in the cluster around a common cluster identity and to create closer coordination and cooperation between the players in the ecosystem in order to better utilise the synergy between them and avoid internal competition in the cluster development.



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RECOMMENDATIONS



Several forward-looking policy recommendations have been developed based on the analysis for the purpose of carrying on the development towards becoming a national and international welfare technological lighthouse in the Region of Southern Denmark.

RECOMMENDATION 1:

Strengthen the cooperation in the ecosystem

The welfare technological cluster is characterised by having many public players involved in the cluster development. This is due to the nature of the cluster since, as a starting point, the local market and the demand are public in Denmark. This is what is different from other clusters, which are directed towards the private market to a higher extent. In addition to the presence of public stakeholders promoting the business in the cluster, there are also public players, working on improving the demand and the market for welfare technological solutions as part of the cluster development. It is necessary to strengthen the critical mass of welfare technological companies and create a common access point for cluster players who deal with promoting the business and cluster development. It is necessary to ensure closer coordination and cooperation between the public players in the ecosystem in order to optimise the synergy between them and avoid internal competition in the cluster development. The analysis shows that a widely held view amongst the interviewed companies and players is that the cluster organisation Welfare Tech should take the lead and strengthen its position as a unifying player in the ecosystem.

We recommend the following:

- To gather the business related parts of the cluster venture, such as, for example Welfare Tech, Accelerace Welfare, Welfare Tech Invest, SDTI etc., and create stronger synergies to other business-related players such as Scandinavian Cortex Park etc.
- To streamline the cooperation between the business-related players and the knowledge of the cluster, and research in the area in order to thereby strengthen the commercialisation and research in the welfare technological area. Closer cooperation should be established between the business-related initiatives of the cluster and the related SDU institutions with competences in the field of welfare technology, as well as the newly established SDU Erhverv, whose purpose is to strengthen the companies' access to SDU knowledge and research.
- To strengthen the cluster value chain through cross-regional cooperation with corresponding welfare technological initiatives, including MTIC and Medicon Valley Alliance by identifying common cooperation projects which takes as a starting point the cluster's work, including the development of models for innovative public demand.

- To increase the business specialisation of the cluster by developing the critical mass of welfare technological companies in the cluster.
- To strengthen the involvement of the big companies in particular in the development of the cluster so that these companies would get an even more active role in contributing to outlining and developing the cluster.

RECOMMENDATION 2:

Roll out PPI and Innovative Public Procurement

The cluster has positive experiences in developing new and innovative welfare technology solutions and in bringing them to the market in close collaboration with private and public players. Another distinguishing feature of the cluster is that the public buyers of welfare technological solutions such as municipalities and regions act as a critical test market and as partners for the welfare technological solutions of the cluster. There are also examples of cooperation and innovation across clusters, such as welfare technology and design. Mainly on the basis of gathered experience, there is potential for developing the cluster into a leading international test and development environment in the field of welfare technology. The prerequisite for it, however, is that more public players become test and development environments and demand new welfare technological solutions, thereby creating a greater local market for the innovative solutions of the cluster.

We recommend the following:

- The welfare technological cluster is nationally and internationally branded as a leading global test market for companies with the ambition to grow globally by offering access to unique test facilities and access to critical users in the public sector.
- To develop, gather and make visible more cases of successful PPIs and innovative public purchases, which are the result of the development of new solutions and global marketing.
- To roll out well-functioning PPI models and innovative, public procurement across municipalities and in the region, i.a. through Living Lab Denmark. It is important for the development of the cluster to get more municipalities to actively demand innovative solutions and to roll out these solutions locally.
- To extend the existing cross-sector cooperation.
- To improve the cooperation between the Region's prioritised cluster and utilise the synergy between the Region's positions of strength within welfare technology, energy and design. This can be done by using the Region's design competences in development and implementation of new, innovative welfare technological solutions in the public sector.

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RECOMMENDATION 3:

Create a common profile for the cluster and its ecosystem

In a time when the world's most specialised regions take the lead in the global competition, it is of crucial importance that clusters can identify and communicate their own cutting-edge competence to the outside world. A clear, common welfare technological cluster profile can contribute to putting the cluster on the global map and calling the attention of foreign companies, partners, public parties on the demand side and investors to the special welfare technological competences and knowledge of the cluster. It can also contribute to gathering the cluster's companies and players within the cluster around a common identity and objective.

We recommend the following:

- To create a common generic cluster story about welfare technology with point of departure in the Region of Southern Denmark. The cluster story should reflect the special characteristics of the cluster as compared to other (welfare technological) clusters. This applies, amongst other things, to the unique business concentration, the special research and knowledge of the cluster, including SDU's welfare technological activities, test facilities, the cluster's critical public parties on the demand side, access to a test market and examples of successful commercialisation of innovative solutions created within the cluster. The cross-sector cooperation and usable solutions that have originated through this should also contribute to outlining the cluster profile.
- To utilise the existing cluster platforms in order to make visible and brand the cluster, such as European Cluster Collaboration, TCI network and any other relevant networks.
- The cluster organisation Welfare Tech should take the lead for the development of a strong cluster success story in close cooperation and dialogue with the different players and companies in the ecosystem.



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INTRODUCTION

WELFARE TECHNOLOGY AS A GROWTH AREA



The development and production of welfare and health care technological solutions is an area with great economic and business growth potential on a global scale¹.

According to the demographic trends, the world population is increasing while at the same time the number of able-bodied adults is decreasing. Only 1% of the world population was 80 years or older in 1950, but by 2050, this number is expected to be 10% in the OECD countries². At the same time, the number of able-bodied adults is dropping. According to OECD, 67% of the population were of working age in 2010 and this number will fall to 58% by 2050³. This trend puts great pressure on the organisation and funding of the welfare state.

The demographic development requires new thinking and new forms of services in the field of welfare in all countries. "More shall be achieved for less", i.e. more welfare tasks must be completed using fewer economic and human resources. In part, the share of the population that requires care is growing, in part people's care needs and preferences become more personal and need special input. Consumers in the private market will have higher requirements as regards services and will demand more advanced and user-friendly solutions. As a result, the hospitals, authorities and social institutions have to introduce new technology to a higher extent and arrange treatment, nursing and care in new ways in order to be able to meet the future demand for growing and individual needs for care and special contributions.

The development offers opportunities for growth for the companies which understand the new way of thinking and which develop innovative welfare solutions. In the long run, this may result in economic growth and more jobs to the benefit of all Denmark.

NATIONAL FOCUS AREA

The development of welfare and health technological solutions has high priority in the business political agenda. The government has received recommendations, amongst other things, from the Growth Team for Health and Welfare technological solutions and has prepared a growth plan in the

area. Not surprisingly, other countries also see the opportunities for growth in the area, which is why it is of decisive importance to further develop and preserve the Danish competitiveness in the field of health and welfare technology.

According to the plan for growth in health and care solutions of the Danish government, Denmark is one of the leading countries on a global scale in the fields of pharmaceuticals, medical equipment and aids⁴. Health and care solutions in the sense of aids, medical equipment, automation, telemedicine, pharmaceuticals and services relating to the building of hospitals and the care for the elderly/handicapped employ around 35,000 people in at least 800 Danish companies. The companies account for 3.6% of the value creation in the Danish economy and 12% of the Danish export⁵. In addition, the importance of businesses, which are involved in the development of health and care solutions to a lesser extent, as well as companies that sidestep to a greater extent, i.e. enter this business area from already existing business areas such as robotics, for example. The welfare technological area has attracted a lot of attention from the public sector and a growing number of publicly funded projects have been launched in regions and municipalities in order to support and strengthen this business development.

However, there is a risk that the strong business background in Denmark can be a pretext for doing nothing. This will be the case if the business life is not capable of commercialising the welfare and health technological solutions that are being developed both at home and on the international market⁶. In this context, there are also great requirements towards the public sector and its capacity to test and absorb new welfare technological solutions.

From a global perspective, the country's health care expenses per inhabitant are increasing considerably, which is a tendency that cannot be stopped given the general demographic trend⁷. During this same period, indications suggest that Denmark has lost shares in the global market for welfare technological solutions. In Russia, India and the USA in particular, the Danish export has not kept up with the countries' import of welfare technology. Measured in DKK, the lost market shares have been particularly big in the USA (3.8 billion) and Russia (1.4 billion). Ideally, the export >>

1: Velfærdsteknologi – på vej til ny vækst, Danmarks Vækstråd 2009. Velfærdsteknologi og –service i Region Syddanmark, Copenhagen Economics 2008, Vækstteamets anbefalinger for sundheds og velfærdsløsninger 2013.

2: OECD 2011 Help wanted? Providing and paying for longterm care.

3: OECD 2011 Help wanted? Providing and paying for longterm care.

4: Regeringens vækstplan for sundheds og velfærdsløsninger, 2013.

5: Dansk velfærdsteknologi til udlandet, Damvad 2012.

6: Vækstteamets anbefalinger for sundheds og velfærdsløsninger, 2013.

7: OECD Health Data 2011.

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should have grown with respectively just under 200% and 500% in 2001-2010, if the Danish export had kept up with the countries' growth as regards the import of welfare technological solutions in this period⁸.

DEVELOPMENT OF WELFARE TECHNOLOGY IN THE REGION OF SOUTHERN DENMARK

The development of welfare and health technological solutions is also of high priority on the regional business-political agenda. The use of new technology can help hospitals and health care centres manage their tasks in new and more user-friendly and effective ways.

Denmark's strong position in the field of welfare technology is due to the unique competence and knowledge present in Danish companies, knowledge institutions, investor and other players. The interaction between them can be described as clusters and is often anchored geographically in regional growth pockets⁹. The development of the cluster has high priority in the Region of Southern Denmark. Since 2008, the Region has had a special focus on cluster development as a business-political tool for promoting growth, innovation and employment. The Growth Forum of Southern Denmark has identified four strategic focus areas with special business strengths and development potential, hereunder offshore, energy efficiency, welfare technology and design¹⁰.

OECD have pointed out the strengths of this model in Southern Denmark, but they have also underlined that there is a need to get better at the characteristic features of the business concentration, amongst other things, in the field of welfare technology¹¹. This is so because the clusters will be stronger in the global competition if they can rely on a high concentration of specialised companies.

There is a business potential in the welfare area in the Region of Southern Denmark. Previous analyses have shown that the Region of Southern Denmark has available a special prerequisite to develop a solid national position of strength in the field of welfare technology. Especially in the field of automation, intelligent tools, telemedicine and IT systems, the region has a lot of opportunities to distinguish itself from the rest of the country¹². New analyses show that 3,000

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persons are employed in the development and production of welfare technology in companies in Southern Denmark¹³. This corresponds to 14% of the total Danish private employment in this area, which is the third highest regional concentration of private welfare technological workplaces in Denmark.

There is a great focus on welfare technology in the region. The Region of Southern Denmark has made considerable investments in the field of welfare technology in order to strengthen its potential for innovation and growth. For example, DKK 326 million were granted for business development in health and welfare innovation in the period 2008-2012. Hence, the Region of Southern Denmark is the Danish region with the highest regional investment in this business area in this period¹⁴.

The 2020 Business Strategy has the ambition for the Region of Southern Denmark to acquire a leading international position in development, testing and use of health and care technological solutions. In this context, the Region offers, among other things, test facilities, consultations and tools facilitating the public-private innovation and innovative public procurement. In addition, companies can enter into partnerships with the hospitals, psychiatric and social institutions in the Region for the purpose of developing and implementing welfare technological solutions. A cluster

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8: Dansk velfærdsteknologi til udlandet, Damvad 2012.

9: The competitive advantages of nations, Porter, 1990. Økosystemer for vækstvirksomheder, Napier og Hansen, 2012.

10: Syddansk Vækstforums erhvervsudviklingsstrategi 2012-2020

11: OECD Reviews of Regional Innovation, Central and Southern Denmark, 2012.

12: Velfærdsteknologi og service i Region Syddanmark, Copenhagen Economics, 2008.

13: Syddansk Klynge: Sundheds og velfærdsinnovation, Region Syddanmark, 2014.

14: Syddansk Klynge: Sundheds og velfærdsinnovation, Region Syddanmark, 2014.

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organisation (Welfare Tech) has been established. In addition, an elite training programme (Accelerace Welfare) has been launched for entrepreneurs. An investment fund has also been set up where companies operating in the field of health and welfare and operating in Southern Denmark can apply for venture capital (Welfare Tech Invest). Denmark's biggest welfare technological research and innovation project, Patient@Home is also based in the region. There is a plan to set up an international technological test bed for welfare innovation in Southern Denmark, as well as a European "Knowledge and Innovation Community" (KIC) for healthy living and active ageing.

The Region of Southern Denmark uses its public demand strategically for promoting and creating growth in the cluster. The development of new super hospitals is expected to push forward the growth both regionally and nationally. The building works worth billions can give Danish companies and companies in Southern Denmark priceless experience, competences and networking, which can strengthen their position on the global market. New hospitals worth DKK 45 billion have to be built in Denmark, DKK 12 billion in the Region of Denmark alone. Under the right circumstances this can create 60,000 new jobs throughout the country. Some of the new jobs will be in Southern Denmark's companies. In 2013, the government and the Region of Southern Denmark entered into a growth partnership agreement, according to which the welfare technological lighthouse in Southern Denmark can contribute to promoting the utilization of the business potential in the field of health and welfare technology in the whole country¹⁵.

However, in order to realise the national and regional growth potential in the field of health and welfare technology, there has to be a sufficient number of Danish and Southern Denmark companies that specialise in welfare technology. This requires that their competence and knowledge interact properly within a strong welfare technological cluster characterised by cross-company cooperation and cooperation between the companies and public players for the purpose of creating innovation, growth and employment.

THE ANALYSIS

The purpose of this analysis is to examine the strengths of the welfare technological cluster anchored in the Region of Southern Denmark and to point out the opportunities for developing the cluster ecosystem. This is done in order to help the cluster maintain and develop its position as a national and international lighthouse in the field of welfare technology.

The analysis is conducted using a cluster ecosystem model based on studies of successful ecosystems in i.a. the USA, including Boulder, Chicago, Silicon Valley, North Carolina, Austin and Seattle¹⁶.

The strengths and challenges in the ecosystem of the welfare technological cluster in Southern Denmark are outlined through qualitative interviews with different ecosystem players, including private companies, public players, knowledge institutions, consultants, investors and other parties in the cluster's ecosystem. A total of 33 interviews were conducted in 2013 with key players in the ecosystem (see the interview list in the appendix).

The interviewed persons are asked questions about the strengths, challenges and specific cooperation in the cluster. The interviews with key players are used as basis when preparing the ecosystem analysis, and several specific recommendations have been drawn up on how to improve the welfare technological ecosystem of the cluster.

All players are important for the ecosystem, but their importance can differ depending on cluster characteristics, maturity, etc. In this specific context, this means that the subanalyses of the individual components of the welfare technological ecosystem in the Region of Southern Denmark have been assigned different weight with a focus on the market, the big companies and the entrepreneurs.

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15: Regionalt vækstpartnerskab 2013 mellem regeringen og Syddansk Vækstforum.

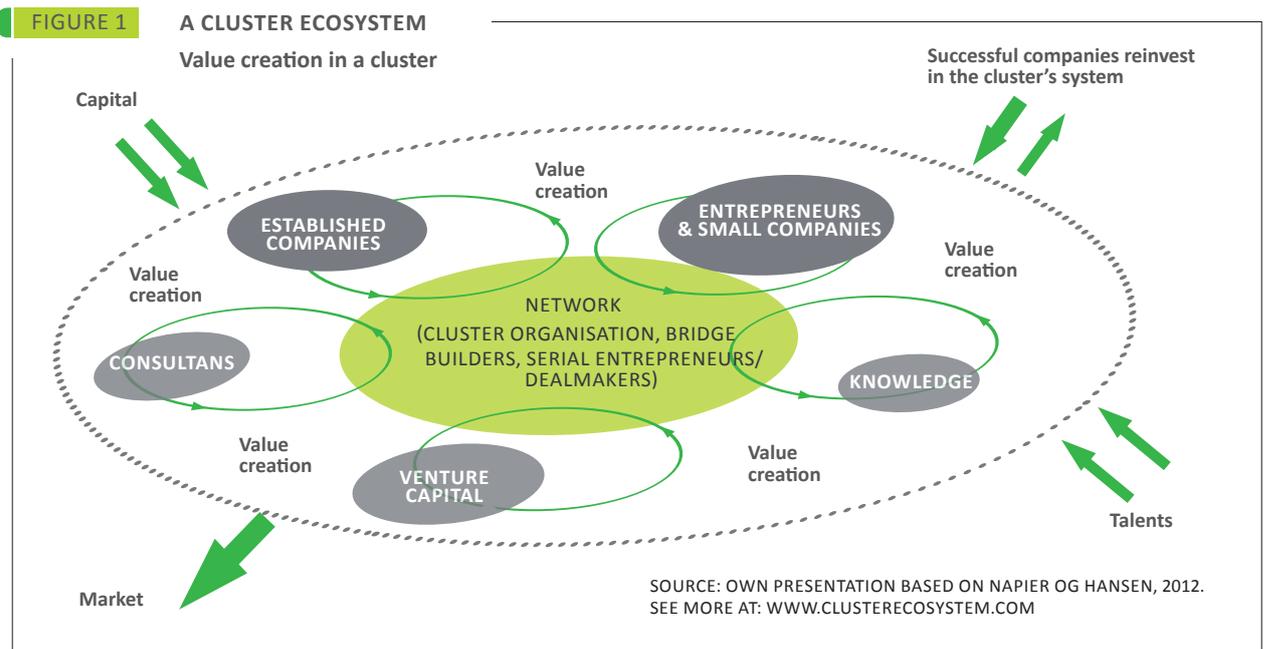
16: Napier og Rosted, 2012.

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THE ANALYSIS MODEL: AN ECOSYSTEM

An ecosystem is characterised by the presence of players in a cluster, all of them supporting the creation of growth in the cluster companies. The ecosystem reflects the network and the cooperation between the players in the clus-

ter, including i.a. companies, educational and knowledge institutions, public institutions and authorities, investors and consultants¹⁷.



According to the ecosystem model, strong clusters consist of an ecosystem, which includes the following:

- A market for the products and services of the cluster. The cluster's market comprises either private or public demand, or both.
- Big companies willing to cooperate and acting as flagships work together and reinvest their success in the cluster. Doing so helps attract other companies to possible growth.
- Entrepreneurs and small innovative companies, which cause the cluster to change and contribute with new knowledge and innovation in different ways.
- Relevant knowledge institutions which provide the cluster with new knowledge that the cluster companies can benefit from.
- Investors who invest venture capital in the cluster companies. The strong involvement of private investors, including venture investors, is also needed.

- Consultants who support the companies in their development and innovation work. In Denmark, consultants are often lawyers, auditors, GTS institutes, growth houses etc.
- Strong networking between ecosystem players. The network can be facilitated by different players, both private and public ones. Private players include, i.a. serial entrepreneurs and deal-makers¹⁸, but the public players often are cluster organisations and different network organisations.

The point of departure, when working with cluster ecosystems, is that the greater the knowledge about the cluster's ecosystem players and their dynamics, the greater the potential for further improving the strengths of and challenges in the cluster. All ecosystem players contribute in different ways to creating growth in the companies. What is most important, however, is the networking and cooperation between them. The ecosystem model has been developed on the basis of studies in the USA and has been adapted to the Danish context. For example, the involvement of the public in the development of clusters and growth companies is not particularly strong in the USA, but it is in Denmark. >>

17: Napier og Hansen, Ecosystems for Scalable Firms, 2012.

18: "Dealmakers" refers to experienced business people on the board of several companies at the same time.

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IMPORTANT CLUSTER TERMS

A cluster

A cluster is a group of companies situated close to each other by choice and working on a strategic level with other companies, public authorities and knowledge institutions because it renders competitive advantages, which the individual company cannot obtain on its own¹⁹. Clusters have different strength. A cluster is strong not when the companies are located close to each other but when the cluster players work together to create, develop and utilise the potential of the value chain.

The geographical concentration of the ecosystem's players (companies, knowledge players etc.) can be described as the epicentre of the cluster. The epicentre is often a town, a city or a region, but it is in no way clearly defined. An epicentre can be anchored in a town or a city, but the cluster itself works with and attracts companies from all over the country as well as from abroad. A strong cluster is open and it cooperates and has work relations with clusters and markets from the rest of the world.

Cluster organisation

A cluster organisation is a unit which facilitates the cooperation between the players in the cluster's ecosystem for the purpose of strengthening and utilising the synergies between the players. Many clusters have one cluster organisation in which the different players of the cluster can become members. The cluster organisation outlines the profile of the cluster and makes visible the main competences and specialisation of the cluster. Cluster organisations identify also new opportunities and collaboration that the players in the cluster can benefit from.



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19: REG X' cluster definition.

ECOSYSTEM ANALYSIS

A MARKET FOR THE PRODUCTS AND SERVICES OF THE CLUSTER



All clusters have a market, which demands the products and services of the cluster. The market and the demand can be local, national and global depending on the business profile of the cluster. Most big clusters have or are in the process of developing a global demand. Most often, the markets of a cluster are private, i.e. other companies or private end-users. But the public sector can also be a market for the solutions of a cluster.

The market of the welfare technological cluster is more often the public sector. The cluster's market comprises regions and municipalities based on the welfare state and the public sector's use of welfare technological products and services. The Region of Southern Denmark (and other regions) demand health and welfare technological solutions, which can contribute to renewing and developing the hospital sector, while the municipalities demand care-related solutions.

The national and regional demand for new hospital solutions is a considerable part of the market of the cluster. The Region of Southern Denmark will invest DKK 12 billion in the development of new hospitals, including the new OUH (Odense University Hospital). Numerous new innovative solutions are planned in connection with the new building and hospital, which opens up opportunities for the cluster companies. The building works worth billions can give Danish companies and companies in Southern Denmark priceless experience, competences and networking, which can strengthen their position on the global market.

In order to facilitate the access to the regional market of welfare technological solutions and help it mature, the Region of Southern Denmark established the Health Innovation Centre of Southern Denmark (SDSI) in 2012. SDSI must be the portal into the Region of Southern Denmark's contributions for innovation, welfare technology, telemedicine, new hospital buildings and public-private collaboration. More information about SDSI can be found in Box 1.

It is expected that the municipal and regional demand for digital welfare technological solutions will also be strengthened by the new public-sector strategy for digital welfare (2013-2020), in which the municipalities are under an obligation to implement technological solutions.

Several municipalities in Southern Denmark are already on the right way as regards the demand for new welfare technological solutions in this context. The municipality of Odense, for example, has a lot of experience in developing and testing new "assisted living" technology. The municipality of Odense has developed a robotic bed together with Panasonic and has several test centres, which are at the

BOX 1

HEALTH INNOVATION CENTRE OF SOUTHERN DENMARK

The Health Innovation Centre of Southern Denmark (SDSI) is an important player as far as the development of the regional market for welfare technological solutions is concerned.

SDSI was established in 2012. It functions as an access portal to the innovation ventures of the Region of Southern Denmark within welfare technology, telemedicine and the new buildings in the region (hospitals and social institutions). They work together with the Region's hospitals, psychiatric institutions and municipal social institutions in order to deliver results and products that resolve the challenges of the operation, contribute to promoting growth and creating more jobs in the region and improving the level of service for the patients.

Together with the personnel of hospitals and social institutions, patients, relatives, researchers and companies, SDSI is set on qualifying construction works and delivering results that will improve the health-related activities and make them more efficient. In addition, SDSI is also responsible for the digitalization of cross-sector collaboration and for the implementation of telemedical and welfare technological solutions. Finally, SDSI has to contribute to creating a strong framework for cooperation between companies and has to support the public-private cooperation in practice.

On behalf of several partners, SDSI manages the platform Living Lab Denmark, which facilitates the development of innovation-promoting procurement and successful PPI cooperation between companies and the public sector in the field of welfare technology.

disposal of the companies so that they can develop new welfare technological solutions. This takes place, for example, at the Municipality of Odense's nursing homes in Rytterkasernen, Svovlhatten and Munkehatten, which have been selected for electronic exploratorium. Another example of a coordinated effort to develop welfare technological solutions in the municipalities is the network VelfærdsTeknologi Syd (Welfare Tech - South), which consists of a cooperation between the four municipalities Haderslev, Sønderborg, Tønder and Aabenraa aimed at spreading the welfare technology in municipal homecare.

The public (regional and municipal) demand for the products and services of the cluster can be a driving force for the development of the cluster, but also involves some special challenges.



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The advantages of having the public sector as market is that the companies can participate in “living labs” collaboration concerning the development of innovative welfare technological solutions, where new solutions and technology can be developed in close cooperation with the users (citizens, hospitals, homecare, etc.). The direct access to the users in the area is unique as compared to the situation in many other countries, where welfare services are managed primarily by the private sector. There is a great potential in profiling the Region of Southern Denmark and the cluster as a place with very good understanding of the citizens and as a place that offers unique opportunities for development, test and implementation in cooperation with critical users. This helps create a solid welfare technological image around the world, something the cluster companies have also benefited from when entering the export markets. Similarly, the public demand can be used strategically to promote innovation in the area as there can be special requirements for innovation in public tenders in this field.

According to the interviewed persons, the fact that the demand is public can also be a challenge. To some extent, the companies are aware that they often develop very local solutions that can be primarily used in a specific context, as a result of which they can be more difficult to export. To some extent, the market for welfare technological solutions can be difficult to enter because of the tender rules and procurement culture. There are different procurement units in the regions, which take care of the regional welfare technological procurement for hospitals. However, it is not the personnel in the procurement units that decide which solutions to buy. The solutions are selected by the physicians and clinicians at the hospitals. This is why companies need to have good networking at the hospitals in order to be considered as a service provider and be awarded a tender. On the whole, the access to development and procurement cooperation can seem complex to the companies.

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Conclusion

There is a demand in all clusters that drives the development of the cluster. The welfare technological cluster differs from many other clusters because most of the cluster’s market is public. This creates some unique opportunities for developing a cluster based on a strong development dialogue with the public sector and its users, which can also serve as a test bed for the companies, products and services of the cluster. This has great global value.

In the meantime, this also means that cluster companies meet some specific challenges when their products and services have to be commercialised. There is a potential in strengthening the market of the cluster by unifying the public demand side (regions and municipalities) and creating an even bigger market for the products and services of the cluster.

It is also important to ensure that the companies would not regard the regional and national market as a final station for their welfare technological solutions but rather that they further develop their products so that they can be offered on other markets, including international ones. In order to develop the group further, it is recommended to develop and make visible more cases of successful PPI cooperation and innovative procurement, which have resulted in the development of new innovative welfare technological solutions and global marketing.

BIG COMPANIES, WILLING TO COOPERATE AND ACTING AS FLAGSHIPS, WORK TOGETHER AND REINVEST THEIR SUCCESS IN THE CLUSTER

Strong clusters often include one or several already established companies which are willing to cooperate and which act as a flagship in the cluster and contribute to defining and developing the cluster.

The welfare technological cluster is not characterised by having many big companies, willing to cooperate, that assume this role. This can be due to the fact that the field of welfare technology is relatively new and it does not use a well-established industry as a starting point.

However, big companies are becoming more and more interested in being a part of the welfare technological cluster. Under the right circumstances, as a result of this interest already established companies can get involved in and contribute to the development of the cluster in different ways.

For example, in 2012, Phillips entered into an agreement with the Region of Southern Denmark on a closer strategic cooperation, including the setting up of an office in the epicentre of the cluster in Odense. The cooperation is the result of a close dialogue between Phillips and the Region of Southern Denmark. These activities are under development

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in the cluster. Of the local successful welfare technological companies, we have to mention Linak, which currently has more than 1,600 employees in 35 countries. Linak has developed the intelligent bed, which is used in the hospital and care sector, and is a member of Welfare Tech. Through the cluster, Linak has been involved in development projects. In 2013, Falck's group managing director took up the position as chairman of the board of the cluster organisation Welfare Tech. This is expected to have a positive impact on the cluster development which would be revealed by the greater attention that activities and companies of the cluster receive.

The question is what has to be done to attract and, last but not least, to keep the big companies and increase the chances for their active involvement in the cluster development. According to interviews conducted with already established companies, there is a growing interest amongst these companies to enter the cluster and collaborate with other local innovative companies. At this moment, the big foreign companies do not consider that it is a certain business specialisation or ground-breaking research in the cluster that has attracted them to the cluster. The companies are not very familiar with the special business or research specialties characterising the cluster.

Their reason for becoming an active innovation partner in the field of welfare technology is first and foremost the possibility to gain access to a new welfare technological market in the making. The development of the new super hospitals means new opportunities for development and an increasing demand for new technological and non-technological solutions. The interviewed companies also point to the broad Southern Denmark's political interest and support on municipal and regional level for promoting the welfare technology and developing the welfare technological market, which contributes to arousing the companies' interest in the cluster. The foreign companies in particular regard these opportunities as exceptionally valuable and unique. It is considered that, to a great extent, the big companies' attention to the cluster in Southern Denmark is the result of the strong business-political commitment of the region in attracting the companies to the cluster.

According to the companies, the access to unique test facilities in the cluster is also of decisive importance. The big companies are drawn in by the possibilities to use the hospitals and institutions in the Region as test facilities. They see the potential in testing their solutions due to the structured mechanisms in several municipalities and hospitals in

Southern Denmark²⁰. This applies to Odense, for example, where the nursing homes in Rytterkasernen, Svovlhatten and Munkehatten are designated as so-called electronic exploratoriums. In addition, the companies mention the test environments in the cluster and "11 mockup", i.e. test facilities in realistic dimensions, which are found in the region of the University of Southern Denmark and the Health Innovation Centre of Southern Denmark. There are opportunities here to cooperate with students and health professionals, research and other companies as well as with local decision-makers. The companies consider the unique opportunities in Southern Denmark allowing them to test new welfare technological solutions, i.a. SDSI, SDU, OUH and selected nursing homes as being key for choosing the cluster. The advantages the companies mention include, for example, that the use of test environments offers much better and more usable feedback from both personnel as well as users and patients in Denmark because they are often more constructively critical. With a new campus and super hospitals, there are opportunities to strengthen this aspect even more in the future.

But there is a long way from drawing companies to the cluster, to keeping them and collaborating with them as an active innovation partner. Despite the increasing interest amongst the big companies, on the whole there is a lack of big already established companies with open culture, which

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20: Kortlægning af velfærdsteknologiske projekter: Velfærdsteknologi i Danmark, udarbejdet af Udviklingspartnerskabet i Gribskov Kommune, 2009.

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play a key role in the development of the cluster and its ecosystem and market in the field of welfare technology.

In many ways it is crucial to have the major players in the cluster. Big companies can have a positive role for the development of the cluster. It is, for example, the big companies with market shares, networks and liquidity that, through cooperation, can increase the growth of the small companies and thereby get awarded bigger tenders. As a result, it is easier for the big companies to get entrepreneurs and SMEs as service providers and innovation partners. For example, Philips has many years of experience with cluster cooperation and open innovation in other countries and has a clear and open innovation strategy involving research and business players in development activities. From a global perspective Philips is far ahead when it comes to innovations of hospital buildings and health solutions, and there is therefore relevant inspiration to gain from the collaboration.

Philips has experience from strategic hospital cooperation in the USA, i.e. in Florida, Colorado and Georgia, as well as in Ontario, Canada, where hospital users and other companies are involved in the development of hospital solutions. One example of this is the cooperation Philips has entered into with Georgia Regents Medical Center, which is Georgia's public university health centre and which is famous for its high clinical standards. The cooperation started in 2013 and will continue in the next 15 years.

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Drawing in an internationally recognised company such as Philips, which has relevant development experience and global market shares, means that the other companies in the cluster can enter into strategic partnerships with Philips and to come into play in the global welfare technological value chain. Philips will therefore also be able to contribute positively to the development in the welfare technological cluster in Southern Denmark.

Conclusion

Strong clusters often have one or more big companies that act as flagships, cooperate with other companies and reinvest their success in the cluster. Doing so helps to outline the cluster and attract other companies to new growth processes.

The welfare technological cluster faces the challenge of attracting big companies and getting them involved in the cluster. The cluster is not based on an already established industry and there are not many big established companies in the cluster at the moment. However, the interest amongst big companies is growing.

It can be beneficial to focus on how the big companies can benefit from a strong cluster and how they can get involved more actively into the development of the cluster. Among other things, the companies themselves demand a more systematic contact with other companies and entrepreneurs in the area, as well as a clearer invitation to actively participate in the cluster cooperation. For example, one can imagine organising "Phillips Open Days", where Phillips opens its doors to the young companies and invites them to discussions and cooperation. The essence is that companies such as Philips must be invited and encouraged to get involved and to initiate such activities, as they would not necessarily take the first step because they do not want others in the cluster to regard them as "dominating". Another big company has suggested setting up a company panel. It will discuss the direction of the development of the welfare technological market and the opportunities the development can offer to the cluster and its development and innovation activities.

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BOX 2

EXAMPLES OF ESTABLISHED COMPANIES IN THE CLUSTER

Linak

Linak was originally established in 1907 under the name Christin Jensen og Sønner, but the company changed its name to Linak in 1984. Today, Linak has more than 1,600 employees in 35 countries. In 1989 Linak had a breakthrough of actuator systems for the hospital and health care sector, which have later become known as intelligent beds (raise/lower beds) used in hospitals and the care sector. Linak is expert in electrical linear actuators used in countless applications all over the world. The company provides solutions that can be added to hospital and care beds, industrial use, automation and construction, tables with adjustable height, comfort furniture, automation of switching equipment for power supply nets and many more.

Linak is a member of Welfare Tech and has been a lead partner in a big project, "I care" together with the municipalities of Odense and Sønderborg. The objective of the project is to develop new knowledge about intelligent beds in close collaboration with the public sector. The new concepts will optimise the structural frameworks in relation to the staff, will free man-hours for personal contact and will offer citizens better service, including helping them maintain their personal independence and improving the safety level.

Falck Hjælpepidler

Falck Hjælpepidler A/S is a service company that collaborates and forms partnerships with public organisations in order to operate, optimise and innovate solutions that meet the challenges in the society and public commitments towards the elderly and disabled people in Scandinavia. Falck Hjælpepidler is a public-private partnership between the Capital Region of Denmark and Falck Danmark A/S, which with an ownership share of 91.6% is the principle shareholder.

Falck Hjælpepidler is a member of Welfare Tech. Since 2013 the managing director of Falck A/S has been chairman of the board of Welfare Tech. His commitment in the field of welfare technology is reflected in his being chairman of the govern-

ment's growth team for health and welfare solutions and in his being a member of the board of DI (The Confederation of Danish Industry).

Philips

Philips Danmark A/S Philips Healthcare combines unique clinical expertise with human insight to develop solutions that deliver value throughout the entire care cycle: From disease prevention to screening and diagnosis, through treatment, monitoring and health management –wherever care is given, in the hospital or at home.

The Region of Southern Denmark has played an important strategic, proactive and decisive role for attracting Philips to the region. In 2012 the Region of Southern Denmark entered into a strategic cooperation agreement with Philips on closer cooperation in pilot projects, tests and user-driven innovation in the field of welfare technology. It was also agreed that Philips will increase its presence in the cluster by setting up a research, development and design office in Forskerparken, Odense.

Philips started working together with the Region of Southern Denmark because of the strategic commitment of the region and because it gives high priority to the development of welfare technological solutions. In connection with the signing of the cooperation agreement between the Region of Southern Denmark and Philips, the Region invited a delegation of physicians and hospital staff to Philips' development department in Eindhoven so that the delegation could become acquainted with the development activities. When all is said and done, it is the hospital staff who decide which solutions to be implemented at the hospitals of the cluster, companies are attracted by the opportunity to invite these decision-makers participating in the development. The Region of Southern Denmark can therefore play a key role in attracting and keeping big, well-established companies such as Philips and making it desirable for them to become a driving force in the development of the cluster.

ENTREPRENEURS AND SMALL INNOVATIVE COMPANIES THAT RENEW THE CLUSTER AND CONTRIBUTE WITH KNOWLEDGE AND INNOVATION IN DIFFERENT WAYS

Entrepreneurs and small innovative companies play a key role in the cluster as growth and innovation agents. They can bring innovation to a cluster because they are more agile at commercialising new technology and innovative solutions than bigger companies. They can also serve as proof that universities and big companies commercialise new knowledge and research and create new companies, i.e. spin-outs.

The entrepreneurs' interest in the welfare technological

cluster is increasing. Many entrepreneurial businesses often originate from the knowledge institutions of the cluster or from projects of different nature. Examples of welfare technological growth entrepreneurs in the cluster are Medisat, Team Online and Blue Ocean Robotics, among others. See **Box 3** on the next page for a description of the companies.

The cluster faces a challenge, however, associated with a sufficient critical mass of successful growth entrepreneurs and entrepreneurial talents with cluster experience, who can achieve commercial success with the cluster projects. There is a need to mobilise more experts from the health care system, whether by entering into partnerships with



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growth entrepreneurs or by using their unique knowledge in the area for developing commercial welfare technological growth companies.

According to the interviewed persons, there are many explanations as to the lack of growth entrepreneurs in the cluster. First, there are many entrepreneurs in the area who do not possess sufficient market knowledge of how to sell one's solutions to hospitals, institutions and municipalities. This is due to the fact that public markets are often more fragmented than the B2B and B2C markets because the process of identifying the decision-makers and the actual buyers is much more complex. In addition, being familiar with the procurement rules is also a prerequisite and some entrepreneurs can find them difficult to comprehend.

Second, many welfare technological solutions also require different certificates and research results, which take a long time to obtain. This is particularly true when the solutions are to be exported. As a result, many entrepreneurs do not go further than the development phase. This means that their solutions do not reach the phase where they are implemented and consequently cannot realise their real earning potential. Last, many entrepreneurs do not necessarily consider the opportunities for international growth. Many welfare technological products are developed in a local concept, which cannot be implemented abroad because of the different technical infrastructure and culture of the welfare technology. It is vital to work on the course of these challenges, if the entrepreneurs' share in the cluster is to be strengthened.

BOX 3

EXAMPLES OF SMALL, INNOVATIVE COMPANIES IN THE CLUSTER

Medisat

Medisat was founded in 2002. In the middle of December 2013, TreFor acquired 90% of the shares in Medisat. At the same time, Tre-For has provided a two-digit million amount for development of telemedical solutions. Today, the company consists of two departments located in Odense (the head office) and Ballerup respectively.

Medisat is a technological company, which is a supplier for the Danish health care sector. The company's vision is to modernise health care services by introducing telemedical solutions to different patient groups. In addition, the company also develops innovative solutions which make it easier to be a patient.

One of the great successes of Medisat is the Patient Briefcase for patients with COPD (chronic bronchitis) and cardiac patients. The Patient Briefcase makes it possible for the patient to be treated at his/her home. There are 1,516 COPD patients in the Region of Southern Denmark who are treated at their homes using the Patient Briefcase. This corresponds to 14,208 telemedical acute treatments. Medisat is now also present on the markets of England and Norway. On the whole, more than 2,200 patients are treated using the Patient Briefcase. Thanks to this solution, the frequency of admitting patients has dropped almost in half.

Team Online

Team Online was founded in 1998 as a welfare technological company that delivers IT control systems to homes in Denmark and abroad. Today, the company has more than 50 employees.

The Bosted System is Team Online's system for tenders and arrangements relating to the specialised social area. It is a social educational IT system that supports the daily work

concerning documentation, knowledge sharing and measuring the effect of the social product range. Today, Team Online's products which are used primarily by Danish municipalities, have also been implemented on the American market, where significant growth is projected. CEO Michael Sandal participates actively in the development of new welfare technological companies.

Blue Ocean Robotics

The welfare technological business entrepreneur Blue Ocean Robotics was established in 2013 and has increased from three to about 25 employees in less than six months.

Behind the company there are three local serial entrepreneurs: Claus Risager, Rune Larsen and John Erland. Before the company was set up, the entrepreneurs had launched several welfare technological initiatives and arrangements in the cluster. For example, Claus Risager set up the Robotics Department of the Danish Technological Institute. Rune Larsen has started RoboCluster and has managed the robotics company Scape Technologies. John Erland Østergaard has started TEK Momentum at SDU and has managed Alight Technologies.

Blue Ocean Robotics develops robotics technology. One of the company's main markets is the health sector. Blue Ocean Robotics is working, for example, on a pilot project involving robotised telemedical solutions for the Hospital of Southern Jutland, which will make it easier to monitor patients that are being physically tested in, for example, Aabenraa, Haderslev, Sønderborg and Tønder, without the doctors to have to be physically present with the patient. A telerobot is a remotely controlled robot that allows the user to control the robot from a computer. Telemedical robots are equipped with a screen, a camera, microphones and a network connection so that the user can act regardless of where the robot is.

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It is not just young companies that are often more innovative. Small companies too can be innovation agents, which is why we have examined the smaller companies in the cluster.

The centre of the welfare technological cluster is located in a geographical area with strong presence of robotics companies. Analyses have previously shown that there are many companies in the region and in the Odense area in particular, which deal with the development of robot technology²¹. This is so, among other things, because the Odense Steel Shipyard, also known as the Lindø Yard, was established in the vicinity of Odense. Research was conducted and new technology was developed in the field of robotics in connection with the Lindø Yard. In other words, some robotics companies established themselves in the area, such as Universal Robots, for example.

Since then, some of these companies have expanded their use of robotics so that it also includes development of welfare technological solutions. One way to increase the number of companies operating in the field of welfare technology is if the existing companies “sidestep” into welfare. This means that they fully or partially would replace or supplement their existing business with the development and production of welfare technological products and services. Sidestepping contributes to making it possible for the companies to test the new welfare technological business area, which in turn creates more welfare technological innovation. Robotics is a field which causes many companies to sidestep. This is so because robotics is integrated into the development of welfare technological solutions and thus creates innovation and more effective solutions. See **Box 4** for a case description of a robotics company which has sidestepped in the cluster.

Working with welfare technology requires certain knowledge of the domain, i.e. in-depth knowledge about processes in the care sector and in hospitals. Similarly, companies from many different fields sidestep over to welfare technology. According to the conducted interviews, sidestepping occurs amongst the big, already established companies as well as amongst the local SMEs, which see new opportunities in the welfare technological area. There are examples of companies working with robotics, design, communication, development of toys and energy efficiency improvements which also perform sidestepping welfare technological activities.

Conclusion

There are different entrepreneurs in the cluster who have managed to develop and commercialise welfare technological products. However, there continues to be a potential to strengthen the entrepreneurial part of the cluster. Welfare technology is a new business area and some strong examples need to be set by young companies which have managed to grow within the area. This will inspire others to try and do the same. However, there are several challenges in this context that have to be addressed. In this connection, if the ecosystem around the entrepreneurs is extended, efforts are required to promote the quality of the growth entrepreneurs in the cluster. This can be done, for example, by developing an incubator environment specifically directed towards entrepreneurs in the field of welfare technology.

In order to increase the innovation power of the cluster, there is a lot of potential in increasing the sidestepping activities and creating incentives, allowing the companies to fully or partially test the development of products in the field of welfare technology. Sidestepping into the cluster is not unproblematic because it requires prior knowledge of the domain. The public tenders in the welfare field have served as a driving force in some of the companies’ decisions to test the opportunities sidestepping has to offer. More sidestepping activities can supplement the development of growth entrepreneurs and growth companies in the cluster.

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21: Velfærdsteknologi og –service i Region Syddanmark, Copenhagen Economics 2008.

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BOX 4

GIBOTECH, A ROBOTICS COMPANY THAT HAS SIDESTEPED INTO WELFARE TECHNOLOGY

Gibotech is a company which has been developing, supplying and installing high technological machines, automation with and without robots and panel sizing machinery since 1984. Traditionally, Gibotech delivers solutions to the furniture and timber industry in Denmark and abroad. Today, Gibotech has more than 25 employees and is located in Odense.

As the furniture industry outsources its production, Gibotech has seen growth opportunities in making a sidestep to the welfare industry, i.e. something new in the company is that it has expanded its business area so that now it also includes welfare technological solutions.

In 2011, Gibotech developed and delivered fully automated sterile warehouse for Gentofte Hospital. What is new in the sterile warehouse is that it automatically cleans and sterilises surgical instruments. The new equipment reduces the spreading of diseases at the hospital and saves personnel time. This is the first facility of its kind in the world, and the solution has attracted a lot of interest in Denmark and abroad. There are about 30 public sterile warehouses in Denmark alone, and if the solution is used throughout the entire sector, it has been suggested that it is possible to save DKK 110 million a year. A public tender was what motivated

the company to enter the welfare technology sector.

In this way Gibotech developed the fully automated sterile warehouse for a public tender of the Capital Region of Denmark in 2010, where innovative solutions were required. To a great extent, the sidestep was motivated by the public tender and the demand for new technological solutions for automating and improving the efficiency of the health industry. Today, Gibotech continues to develop solutions for the health sector. Gibotech's sidestepping has opened up opportunities for the company to expand and develop new business areas using an existing business area as a starting point. Similarly, it has also contributed to better opportunities to export abroad.

On the basis of its business development and the growing markets in the field of welfare technology, after its sidestepping, Gibotech has been oriented towards the welfare technological cluster, Welfare Tech, in Odense. Gibotech is now part of innovation projects and consortiums with other companies and public players for automation of hospitals, some of which are facilitated by the cluster organisation Welfare Tech.

Source: Interview with Poul Fuglsang, CEO of Gibotech at that time.

RELEVANT KNOWLEDGE PLAYERS WHO PROVIDE THE CLUSTER WITH NEW KNOWLEDGE THAT THE CLUSTER COMPANIES CAN BENEFIT FROM

In clusters, the access to and cooperation with relevant knowledge players is essential for the companies' opportunities to develop new innovative solutions and set up companies based on relevant knowledge and research.

In the welfare technological cluster, research and development in the field are of top priority. In 2012, 52% of the public research and development expenses in the region, which correspond to DKK 6.12 million, were for health science. This percentage is higher than in any other Danish region²².

In the cluster, there is a high concentration of welfare technology knowledge players, trainings and research with a dominating specialisation in care, sports and robotics at SDU Odense campus. However, the Lillebaelt Academy of Professional Higher Education and the University College Lillebaelt also deal with welfare technology.

SDU's faculty of health sciences and Institute of Sports Science and Clinical Biomechanics are important players in the field of welfare technology in the cluster. There are many living labs for welfare technology at the institute, offering the opportunity to cooperate with municipalities and companies (cf. Box 4). The Institute has been in the lead of cross-sector cooperation between own competences, the Technical Faculty and playground, toy and furniture manufacturers. The aim of the cooperation has been to expand the welfare technological solutions so as to prevent child diseases.

Research in ageing at Max-Planck Odense Centre is also an important welfare technological area. The new international research centre was established in SDU in 2013 and is the first Max-Planck centre in the Nordic countries. In 2014, a new common Centre for Integration of Medicine and Innovative Technology was recently opened. Odense University Hospital and SDU share CIMIT which contributes to research in health technology in the Region of Southern Denmark

22: Syddansk Klynge: Sundheds og velfærdsinnovation, Region Syddanmark, 2014.

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and make their common efforts more evident in Denmark and internationally.

Knowledge in robotics is also a strong suit at SDU. In particular, the Mærsk McKinney Møller Institute engages in robotics and welfare technology. Since the 1900s, robotics researchers from SDU have been part of establishing a connection between robotics and welfare technology. Several big business and research initiatives with a special focus on welfare technology have originated with the support of the Mærsk McKinney Møller Institute, including Robocluster, Patient@ home, UNIK and Intellicare, among others. In addition to study programmes associated with the Mærsk McKinney Møller Institute, there is also a Master of Engineering programme in welfare technology at SDU.

Hence, there are clear strengths in welfare technology knowledge in the cluster. If, on the other hand, we consider the challenges associated with the development of welfare technology knowledge and research in the cluster, interviews show that one of the challenges is the obscurity and access to relevant knowledge and research at SDU. Companies find it difficult to understand when, how and with whom to cooperate when developing welfare technology, and how to come in contact with the many professionals they need. Furthermore, many point out that the solutions do not have to be developed only by engineers. The solutions need to be brought closer to the clinics and institutions, which can be achieved through greater cooperation with doctors and any other relevant professionals. Several of the interviewed companies responded that they did not know enough or that they knew nothing about SDU's knowledge and research in the area.

In order to meet these challenges, SDU set up a new department, SDU Erhverv, in 2013. SDU Erhverv aims to open the doors to SDU's knowledge and research – in the field of welfare technology too. The establishment of SDU Erhverv and the intensified focus on the commercialisation of SDU's welfare technological knowledge and research are expected to be of benefit to the companies in the cluster.

Conclusion

New relevant knowledge and research that are commercialised in companies are essential for the development of a strong cluster.

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Relevant welfare technological knowledge and research are present in the cluster. The welfare technological knowledge and research are deeply rooted in SDU and have been given higher priority in the past few years. Public investments in research and development of health science are highest in the region, relatively speaking, in relation to the other regions.

Nonetheless, the analysis shows that the companies' knowledge and access to knowledge and research in the area can be strengthened considerably. There is a need to increase both the companies' and the outside world's awareness of the unique knowledge and research in the area. Interviews have pointed out that companies are not sufficiently familiar with SDU's knowledge and research in the area. There is great potential in marketing the welfare technological cluster better by using as a basis the unique knowledge and research available at SDU. It is also necessary to strengthen the welfare technological companies' access to SDU's knowledge in the field, and SDU can get better at commercialising its knowledge within the cluster to the benefit of the cluster companies and their growth and innovation.

BOX 5

“ACTIVE LIVING” AT THE INSTITUTE OF SPORTS SCIENCE AND CLINICAL BIOMECHANICS AT SDU

In the spring of 2013, the Institute for Sports Science and Clinical Biomechanics of the University of Southern Denmark inaugurated the new “active living” building, which is part of the growing health and sports environment at Campus Odense. The expansion allows for closer interaction between the university and the outside world. The building neighbours upon large public natural areas and a football stadium, hence, the framework for creating a new, active intersection, from which the university, the businesses and the citizens can benefit, is in place. The area of the new building is 3,500 square metres, distributed amongst three floors, it contains: A fitness/training centre, a laboratory for play and innovation, a gait and motion laboratory, play/ motion laboratory, cross-disciplinary research clinic, rehabilitation hall, conversation rooms and offices. There will be ambulance entrance and bed lifts so that bedbound patients can also participate in research and development projects.

The Active Living building with the accompanying 1-1 mock-up laboratory possibilities is a good example of how an institute at the University of Southern Denmark opens its doors to the outside world and takes an active part in the development of welfare technology.

By and large, the University of Southern Denmark is in the lead within the new research area and focuses on how to utilize the latest technology in order to promote a more active everyday life. In addition to having established Active Living, the university operates also a new network called Active Living Technologies. The project is supported by the Southern Denmark Growth Forum and is a platform where researchers and companies can exchange knowledge, define good ideas together and develop them into new products. The network must participate in ensuring that Denmark will be a strong and important player in the field of technology-supported physical activities.

On institutional level, the Institute of Sports Science and Clinical Biomechanics makes proactive contributions to the development of the welfare technological cluster and is part of the innovation and development cooperation with businesses, the public sector and other institutes of the University of Southern Denmark, as well as international researches. Among other things, the institute has been part of developing the interactive school furniture iMo Learn. The furniture is designed as a dice which allows the students to move, while being trained instead of sitting on an ordinary chair. Even though the first results are not certain from a statistical point of view yet, they are so convincing that the project manager Lars Elbæk from the Institute of Sports Science and Clinical Biomechanics at the University of Southern Denmark states that the furniture improves the health and learning capacity of the children. It has turned out that the chair increases the total physical activity of the children with 25- 39%. As far as the society is concerned, this translates into a reduced risk for lifestyle-related diseases. Another conclusion that can be drawn is that the furniture increases the student’s attention in class and their motivation to acquire basic academic skills.

The development of the Institute of Sports Science and Clinical Biomechanics is attractive for other knowledge players too. Among other things, the University College Lillebælt has decided to build sports facilities close to the Institute of Sports Science and Clinical Biomechanics in order to come closer to the Institute and the business life.

Source: Interview with Jørgen Povlsen, Institute for Sports Science and Clinical Biomechanics, SDU

INVESTORS WHO INVEST VENTURE CAPITAL IN THE CLUSTER COMPANIES

In a strong ecosystem, the access to venture capital is essential for the growth of the companies just as the strong involvement of private investors and funds are a sign of creating values in the companies.

The welfare technological cluster attracts some capital. For example, in 2010, the Region of Southern Denmark was the place in which the Danish Public Welfare Technology Fund

made the second highest investment in welfare technological companies and projects²³. It was second only to the Capital Region of Denmark. The primary venture investors in the cluster are SDTI (Syddansk Teknologisk Innovation) and Welfare Tech Invest. There are also other funding possibilities, i.a. the Market Development Fund and the regional private-public innovation foundation OPI-puljen (the PPI pool).

However, the majority of the cluster’s venture capital stems from public funds. Attracting more privately funded capital

23: Syddansk Klynge: Sundheds og velfærdsinnovation, Region Syddanmark, 2014.

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is a challenge for the cluster. In light of the interviews, it is assessed that the limited dealflow of welfare technological growth entrepreneurs is one of the main causes for the small number of private investors in the cluster. Despite the limited dealflow, in the period from the beginning of 2012 until the end of 2013, Welfare Tech Invest has made investments amounting to approx. DKK 40 million in 12 companies in the field of welfare technology. An elite training centre for welfare technological entrepreneurs (Accelerace Welfare) has been launched in the cluster in order to strengthen the development of welfare technological entrepreneurs and thereby also attract private investors.

There might be potential in involving more business angels and successful (serial) entrepreneurs in the area in order to prepare the ground for promoting more private investments as well as for utilising the business and commercial experience required in the area both in and outside the cluster epicentre in Odense. This experience can also help strengthen the development of entrepreneurs and create the value that will contribute to attracting even more private venture capital.

Conclusion

Strong clusters often have more privately funded venture capital. In Denmark, the private venture capital in some areas is not fully developed as compared to the USA, for example, and there is a tradition for potential growth companies to be given public funding. This is particularly true for business areas under development.

In the welfare technological cluster, public funding is the most important source of venture capital. There is a great development potential in strengthening the value creation in the cluster's growth entrepreneurs and growth companies in order to make it possible to a higher extent to attract more and bigger private players that would invest in the field of welfare technology.

CONSULTANTS WHO SUPPORT THE COMPANIES IN THEIR DEVELOPMENT AND INNOVATION WORK

Strong ecosystems offer access to different types of consultants who support the companies in their development. This can be done in many ways. It is usually lawyers and auditors who offer company consulting about the more practical aspects. In some countries there are also institutions such as growth houses, GTS and other parties dealing with the more professional and technical aspects of the company development. What characterises strong clusters is that the consultancy segment is evolving towards becoming more and more private, as the value of the cluster becomes greater and as more money therefore can be earned by developing the companies.

There are several publicly funded consultants in the welfare

“ What characterises strong clusters is that the consultancy segment is evolving towards becoming more and more private. The greater the value the cluster creates, the more money can be earned by developing the companies. ”

technological group who deal with company development in different ways. These are i.a. Growth House South Denmark, Accelerace Welfare, the Technological Institute, Udvikling Fyn (Development Funen) and PPI LAB Umbrella. The consultants deliver different services, including consulting in the field of welfare technology but also consulting and other services of more general business nature, such as business development, entrepreneurship and matchmaking.

One of the reasons why there are many consultants present in the cluster is that the market of the cluster, to a great extent, is the public sector, and can be municipal, regional and national. As a result, there are consultants who deal with market development and help the companies to get access to the public market (PPI Lab), while at the same time there are also consultants from different levels in Denmark (municipalities, regions and the state).

There is a common opinion amongst the interviewed persons that the number of different interrelated consultants in the cluster is high. The interviewed consultants in the cluster demand more streamlined and complementary objectives, which can contribute to increasing the degree of cooperation amongst consultants for the purpose of creating value in the cluster and its companies and together strengthen the business-promoting efforts in the cluster.

It is pointed out that there is a need for consolidation and dialogue amongst the public consultants, so that they can act better and create the necessary glue and cohesion in the ecosystem of the cluster. Municipal, regional and national consultants and initiatives should also be coordinated closely.

Conclusion

Most clusters have consultants dealing with the development of the companies in the cluster. The consultants can be private or public players to a varying extent. There are many different kinds of consultants in the welfare technological cluster. A large share of the consultants are public players. This is due, among other things, to the fact that the market of the cluster is mainly public and agents who can contribute to developing the market and helping companies in the direction of the public market are needed.

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There is a potential in strengthening the glue between them and ensuring that there is a stronger food chain and cooperation between consultants in order to increase the synergy between them. The analysis has shown that consultants themselves demand close cooperation and dialogue with each other in order to thereby create more growth and value in the cluster companies.

STRONG NETWORKING BETWEEN THE ECOSYSTEM PLAYERS

As already described, an ecosystem consists of different players who create value in the cluster in different ways. However, the presence of such players alone is not sufficient for creating a strong ecosystem. A cluster can have all or many players present in its ecosystem, but if they do not cooperate and network with each other, the necessary synergies, which contribute to creating growth in the companies of the cluster, will not be created. A characteristic feature of the ecosystems is that the players are closely connected in mutually-dependent partnerships. It is in the players' own interest to enter into a network and cooperate with other cluster players, because the cooperation contributes to increasing the innovation and growth in the companies. The networking between the players can also be described as a food chain. The food chain consists of different parts and the value is rising with the increasing number of parts in the food chain.

In many clusters, the cluster organisation is facilitated by the networking and cooperation between the cluster players. In the welfare technological cluster, Welfare Tech operates as a cluster organisation. See Box 6 for a more detailed description of Welfare Tech.

As described above, there are many cluster players in the welfare technological cluster and because of the public market, there are some public players too. There is a widespread belief that instead of cooperation between the public players in the cluster, there is a competition for cluster companies, which is inappropriate at times. Competition is an important element in the cluster, but the challenge is to unite the many public players in one strategic direction for the cluster. The task is to convince the public players to cooperate with and act based on common goals for the development of the cluster.

The analysis shows that cluster players cooperate more and more across the cluster. But there is also a need to strengthen the network and cooperation between the ecosystem players and create networks that contribute to actually creating value in the cluster. In order to be able to strengthen the cooperation and the common value creation, there is a need for the players to gain better understanding of each other's activities in the cluster and, based on this, to create complementary common cluster activities.

BOX 6

THE WELFARE TECH CLUSTER ORGANISATION

Welfare Tech was established in 2010 as a cluster organisation of the welfare technological cluster. In the spring of 2011, Welfare Tech changed its name from Welfare Tech Region to Welfare Tech in order to emphasise the national focus on work within cluster development. In 2013, Welfare Tech became a national innovation network.

Welfare Tech develops business and creates innovation through cooperation between private companies and public parties in the field of the social and health area. Its task is to bind together the players in the ecosystem. They carry out projects, conferences, workshops, networking, matchmaking and negotiations aimed at optimising the framework so that the business life can realise its economic potential that lies within the field of welfare technology.

Welfare Tech deals with three business specialisations, since the term "welfare technology" is too broad: Hospitals and hospital innovation, Rehab innovation and Social service innovation.

(As of 20 December 2013) there are 180 members in Welfare Tech, distributed amongst companies in and outside Southern Denmark, and public players such as regions and municipalities throughout the country.

“ Competition is an important element in the cluster, but the challenge is to unite the many public players in one strategic direction for the cluster. The task is to convince the public players to cooperate with and act based on common goals for the development of the cluster.

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There is a need for strengthened interaction between all players in the cluster, including the big already established companies, the growth entrepreneurs and the small innovative companies, knowledge players, investors, consultants, the market etc. According to the interviewed persons' understanding, Welfare Tech should assume the role as a unifying organisation for the whole cluster. This should be done more distinctly than it is done today. The cluster organisation should facilitate the possibilities for a dialogue and networking between the players in the ecosystem.

The interviews emphasise also the need for formulating a stronger common cluster profile. A common cluster profile has to profile the main competences of the cluster, the business-related positions of strength, the knowledge-related competences and special success stories. The cluster profile should also involve a discussion of what "welfare technology" covers. The new common cluster profile must be able to profile the cluster both nationally and internationally.

Conclusion

A strong cluster consists of several players in the ecosystem. However, the players will not be able to create value unless they cooperate and network closely.

The welfare technological cluster is a cluster with many players and they all have a special role in the ecosystem, as described in this analysis. There is potential in strengthening the community and cooperation between the different cluster players. A closer cooperation must be based on a common strategy to increase the value creation in the cluster. It must also contribute to creating a common cluster story. A common cluster story is required of the players in the ecosystem and this story will help profile the cluster, both nationally and internationally.

“ There is potential in strengthening the community and cooperation between the different cluster players. A closer cooperation must be based on a common strategy to increase the value creation in the cluster. It must also contribute to creating a common cluster story. A common cluster story is required of the players in the ecosystem and this story will help profile the cluster, both nationally and internationally.

INTERVIEW LIST



COMPANY/ ORGANISATION	NAME
Blue Ocean Robotics	Claus Risager
Caretech Consult	Jens Kastenskov
Daintel	Troels Bier Mortensen
Erhvervsakademiet Lillebælt (EAL)	Jan Lund
E-mergency	Brian Østergaard
Falck	Ole Qvist Pedersen
Gibotech	Poul Fuglsang
KMD	Søren Henriksen
Living Lab Denmark	Peter Bamberg
Medicoteknik, Procurement, the Region of Southern Denmark	Calle Thøgersen
Odense Campus Development, Health and Welfare Technology	Mette Reebirk
Municipality of Odense, Center for Welfare Technology	Henriette Jakobsen
Municipality of Odense, Business and Growth	Mikael Tind
Municipality of Odense, Procurement	Helle Holst
Patient@home	Conny Heidtman
Philips Healthcare	Jens Ole Pedersen
Philips Healthcare	Rasmus Vestergaard
Region of Southern Denmark	Dorte Kusk
Region of Southern Denmark	Thomas Dyhr Vestergaard
Region of Southern Denmark: Group 1, Procurement	Erik Krogh
University of Southern Denmark,	
Institute of Sports Science and Clinical Biomechanics	Jørgen Povlsen
University of Southern Denmark, the Mærsk McKinney Møller Institute	Anders Stengaard Sørensen
University of Southern Denmark, Faculty of Technology	Louise Just
Health Innovation Centre of Southern Denmark, PPI Lab	Diana Nielsen
SDTI	Klaus Holmsberg
Team Online	Michael Sandal
SDU Erhverv, TEK Momentum	Stig Møller
Teknologisk Institut	Troels Pedersen
Udvikling Fyn	Joost Nijhoof
University College Lillebælt (UCL)	Erik Knudsen
UNIK	Jakob Bakke
Welfare Tech	Henrik Kagenow
Welfare Tech Invest/Accelerace	Mads Rasmussen



**REG X – THE DANISH
CLUSTER ACADEMY**

UNIVERSITY OF SOUTH-
ERN DENMARK
ENGSTIEN 1
6000 KOLDING
WWW.REGX.DK
INFO@REGX.DK
TLF: 6550 1319

