

## Chapter 9

# Health and Audiovisual Sector: A Meso-analysis of How Systemic Coordination of Sectoral Cooperation Leads to Convergence

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### Abstract

In times of converging and diversifying audiovisual (AV) industries, digitising health sector and the increasing phenomenon of cross-sectoral innovation, the question arises about the state of affairs between the health and AV sectors. The chapter aims to explore what the main modes of cross-sectoral cooperation between the health and AV sectors are and what supports and hinders the emergence of a related cross-innovation system. The chapter introduces two case studies carried out in Estonia and the wider Aarhus region (Midtjylland) in Denmark. At each site representatives of the main stakeholders of both sectors were interviewed – policy makers, entrepreneurs, educators and professionals. The results demonstrate the crucial role of path-dependencies – in terms of both hindering and enabling cross-sectoral dialogues – and also the importance of effective coordination in supporting cross-innovation.

*Keywords:* Cross-sectoral dialogues; path-dependence; health sector; audiovisual media industries; cross-innovation; innovation systems

### Introduction

In this chapter, we introduce developments in the field of cross-sectoral dialogues between the health and audiovisual (AV) media sectors. We use Estonia and the Aarhus region in Denmark (Midtjylland) as case studies. We chose these cases as



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our observations identified that amongst the six countries we studied at the initial phase of the study, the manifestations of these sectors' convergence in these two countries was most visible and/or offered the most interesting initiatives to explore. In Aarhus, we observed the emergence of new convergent enterprises, and in Estonia, the overall systemic development of information and communication technology (ICT) infrastructures and e-governance systems offered a promising starting-point for cross-innovations. The empirical study consisted of 36 interviews with sectoral entrepreneurs, professionals and policy makers of both countries.

We start the chapter with an overview of the sectors' development stage where we outline the main changes that influence the sectors' current and future development and their overall readiness to adapt to these changes. Thereafter, we describe the current institutional landscape that supports the sectors' cooperation. In the second part, we continue with the sectors' general openness to cooperation and describe the common modes and peculiarities of cross-sectoral dialogues. The chapter ends with challenges for policy makers by outlining the main shortcomings that policy could address to better support cross-boundary innovation between the health and AV media sectors.

## **The Changing Face of the AV Media and Health Sectors**

### *AV Media Sector*

The interviews revealed the changing nature of the AV sector – this applies to both Estonia and the Aarhus region. In Aarhus, the AV content and services sector has a rather strong position (2nd place in Denmark after Copenhagen) with a large-scale concentration of AV industries, which are divided into four main categories: films and animation, video games, television production and production of commercials. In Estonia, the main hub of the AV sector is the capital Tallinn. Estonian interviewees were troubled in defining the scope and borders of the AV sector, which demonstrates that sectoral identities remain an important issue. Different opinions existed in terms of what to consider as part of the AV sector and what not, including whether video games are part of the larger AV sector and what fractions of the IT sector should be included. These discussions reflect well both the overall mediatisation trend and convergent processes (discussed in Chapter 1) which have given to the increase in the AV modes used in different sectors and to the borders between different media and creative sectors becoming blurred.

Estonian and Danish interviewees acknowledged that the AV sector is growing and expanding. Growth is particularly noticeable in certain subfields of the AV sector, for example, animation, games, etc., which have gone through a tremendous change from a marginalised sector to a globally ascendant industry. However, micro and small-sized companies (one man to 20–25 employees) still dominate in this sector. The growth of this sector is also reflected in its internationalisation. In particular, the Danish interviewees stated that the sector has heavily internationalised during the last decade. On the one hand, there are increasing numbers of expatriates working in AV companies and, on the other hand, the majority of local companies have ties with big international

corporations. The growth of the sector also means that the amount of AV content is increasing. The interviewees (in particular, the representatives of the AV sector) highlighted the belief that the importance of AV content and tools will continue to grow – thus, the interviewees pointed to the mediatisation trend.

The other important key characteristic of the AV sector is, paradoxically, its both converging and diversifying nature – the multi-directionality of convergence, that Ibrus discusses in Chapter 1; the borders between different sub-sectors are blurring and the intra-sectoral convergence of the AV sector can be observed; the amount of different kinds of cross-, trans- etc. type of content is increasing, the channels and formats have changed, the business models have altered (e.g. emergence of VOD providers as crucial players in the industry), technologies are used more mixedly, the audiences are changing and attracting their attention is becoming more challenging. In addition, the AV sector is also converging with other fields.

The importance of augmented reality (AR) and virtual reality (VR) is expected to increase. The interviewees emphasised that the technology is still rather immature; there are plenty of unused opportunities and less successful solutions. However, quite unanimously, the interviewees argued that the technology will become cheaper and more user-friendly. VR and AR were also seen as engaging technologies that will blur the borders between different AV subfields. As the head of a Danish AV incubator described:

VR and AR call for people from both worlds [...] we work with these new technologies in an engaging way. That's why we work with the term 'digital experiences' instead of 'films' or 'games' or 'audio'.

As flexibility and fast learning ability were seen as main keywords to adapt to the changes in the future, we may argue that social capacities were considered important in coping with (technological) changes. In the light of those changes, the orientation towards constant product and service innovation was also rather obvious. The interviewees highlighted the fact that innovation process is a daily practice. One Estonian AV company CEO discussed that almost everything they do is experimental. He considered this a challenge, because trying out new things is always money- and time-consuming. Although the interviews pointed to innovation examples across the sector (across companies of different development stages), still, in case of Estonia, we can see that innovativeness, especially innovating in new convergent areas, is more common among younger companies. More traditional and long-term AV companies, including production companies, are somewhat more reserved when it comes to innovation in terms of entering new fields. The matured content production companies also did not consider themselves to be innovative. An owner of a company producing films and commercials explained: 'the answer to that, how we feel, we do not feel that we are innovative [...] the [audio-visual] sector is not innovative'. Several Estonian AV sector interviewees argued that innovativeness (in Estonia) is first

and foremost associated with the ICT sector and with the start-up world. Quoting the owner of an Estonian AV company:

At the moment in Estonia, there is a hype that all IT and start-ups are innovative and awesome [...] How are feature films related to innovation? If you don't come up with a new ID card or Skype, then you are just doing your movies [...] despite the fact that, in my opinion, it is innovative to create a world-class film and bring out a new story and thought.

These attitudes reflect that AV media companies, especially those working on film production, often find it difficult to think beyond their traditional practices. The novelty they work towards is usually their next film, but not a new type of cooperation or cross-innovation initiative outside the AV sector. Awareness of development opportunities that cooperation with other sectors would offer is low. Estonian public sector and sectoral umbrella organisations' representatives also stated that the older companies are in something of a comfort zone and do not see the ultimate need for innovation. As the representative from the Estonian Ministry of Culture remarked: 'the situation [is] not bad enough that something new should be developed'.

The situation is somewhat different with broadcasting companies. The focus on cross-media output was obvious in the case of large Danish broadcasters. To quote the programme manager of a Danish TV production company:

They're also looking for unique formats, unique content, produced straight for the big internationals – Facebook, YouTube, stuff like that, but also for their own digital platforms. Two of the major broadcasters in Denmark have their own digital platforms, where they put all the flow TV, but they want unique content there as well. They want new ideas and the stuff that's produced directly for their own platforms as well.

The public media and broadcasting sector has also become more interactive in Estonia; producing content for different platforms has become an everyday practice.

### ***The Health Sector***

The health sector in Estonia and the Aarhus/Midtjylland region is predominantly public. The share of private sector involvement in the health sector is growing, particularly in Denmark. Differently from the AV sector, which was seen as rather progressive, the health sector was often described as old-fashioned and slow to respond to changes. However, the interviewees stressed that a certain shift has already occurred and the health sector is becoming more open, including in terms of its readiness to cooperate with other sectors. The topic that the interviewees very often addressed was the need to change current medicine

education. The interviewees emphasised the need to make it more interdisciplinary and facilitate the connections between students of different fields already during the studies that would facilitate their cooperation in the future.

As to the trends, both Danish and Estonian interviewees highlighted several changes that significantly influence the sector's future development, including those that may also facilitate the emergence of cross-innovations between the health and AV sectors. One of them is the overall change towards a user-centred approach in health care: to put the patient at the centre of the health care system and increase the responsibility of the user for his/her health. Several interviewees also talked about the need to refocus the patient–doctor relationship. The doctor needs to ask the patient what she/he needs (not to define patient's needs by him-/herself). This in turn presumes that the patient should be ready to take active position about her/his health behavior, including to answer about his/her needs, goals in life, etc. Related to that, the interviewees referred to the necessity for new types of personal assistants and new types of 'help-desks' that will change the communication between the patient and the doctor. The CEO and founder of Danish AV + health company remarked:

the trend is maybe that [...] actually resonates with people. So building feelings into the product, building personality, building character into the product [...]. We don't have an avatar that speaks to you, but we do have character.

The trend that is already happening in the health sector is the strategic refocusing towards rehabilitation and prevention. As most of the cooperation with the AV sector predominantly happens in this field of the health sector then this can be seen as a good precondition for cross-innovations to emerge. Another trend that is expected to positively influence cooperation between the AV media and health sectors lies in the generational shift. Future patients are also expected to be more prone for gamified solutions.

The changing technology was also seen as the main trend influencing the sector's development. The driver is the sensed feeling that as technologies evolve one needs to keep up to stay relevant in the marketplace. But the new technologies were also seen as offering opportunities for solutions that were not possible before. Especially, health sector representatives emphasised that the sector's innovativeness lies primarily in the usage of new cutting-edge technology and related infrastructure. Technology-centeredness in innovation (or technological innovation) was explicitly brought out by Estonian interviewees, but it was highlighted also in Aarhus. As part of technological change, the interviewees also discussed more personalised patient information systems and software developments. Cooperation with the technology-intense AV sector would amplify the technological shaping of the health sector. Health sector representatives also expressed the expectation that the world would become more diverse when the sectors' borders become more blurred and the mixture of different competences, including social and technological competences, are highly valued.

## Institutional Landscape for Cross-sectoral Dialogues

The current supportive institutional attitudes towards cooperation between the health and AV sectors in Aarhus and Estonia reflect several understandings in contemporary innovation theories. On the one hand, we can notice developments expressed in contemporary cluster-development theories that focus on cross-sectoral cooperation and social and interaction processes that support it (Granovetter, 1985; Harrison, 1992). On the other hand, for policy developers also, the stream of innovation studies that focus on space and proximity issues has been relevant as they attempt to understand how innovations emerge and develop in particular places (e.g. Asheim, 2012; Florida, 1995; Hassink & Klaerding, 2012; Healy & Morgan, 2012). As demonstrated below, the institutional landscape supporting the sectors' cross-innovation in both studied cases is not limited to the narrow models of 'innovation system' (Edquist, 1997; Nelson, 1993), but also encompasses actors other than research institutions and firms. However, it is interesting to point out that research institutions may not be part of the landscape when it comes to the Estonian case. We shall now describe the institutional landscape of cooperation in more detail, starting with Aarhus.

As to Aarhus, the key players of the supportive institutional landscape are: (a) higher education institutions (HEIs) as regional sectoral hubs, (b) private sector organisations and community-based initiatives specially targeted to foster intersectoral cooperation and (c) public sector measures that facilitate cooperation and partnerships.

HEIs have had a special role to play in supporting the clustering of the AV sector and being the central hub that attracts different actors into the region. Quoting the interviewee from one Danish production company:

Because we have the school in Viborg, the animation school, and they have this environment around school with the companies [...]. People graduating from schools, [...] some people coming back to Viborg starting [their own business]. Because it's very convenient to be very close to truly educated animators and have access to them.

The main ways that private sector organisations and community-based initiatives support the sectors' cooperation are via creation of physical environments that include (a) labs, incubators, etc., and (b) the organisation of events that aim to bring actors physically close and support face-to-face meetings of different actors. One example here is Interactive Denmark, which is a non-profit organisation. Its mission is to accelerate, coordinate and support the development of the Danish game and interactive cluster by focusing (among others) on the interaction between what they call Digital Visual Industry (DVI) and health.<sup>1</sup> The other example relevant to highlight is the Filmby Aarhus Incubator located in

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<sup>1</sup>In addition, cooperation with the education sector is supported.

Aarhus, which is a new incubator for start-up companies working within DVI and is aimed at matching them with companies from other sectors and public organisations that have specific challenges for which they need digital visual solutions. The importance of these kinds of initiatives and physical environments, in particular, were highly emphasised both by companies and policy and sector representatives. Quoting the CEO and founder of the Danish AV + health company:

We are there [in IdeaLab] because we want to be a part of something bigger. There's several considerations in it. One is like it's awesome to go to work and there's more people than us. So it is nice to have a lot of people to talk to, but it's also a part of our identity that we are at a place with people who build digital experiences. So that works really well, just the story about it. [...] And then we use people sometimes – [...] [when] we are testing the product. We have a few conversations with some of the game developers about technical stuff or sometimes they look at it and comment on what we're doing. So, basically, it's really, really good to have this option of talking to other people about what we do.

In Aarhus, the AV sector is the active player in pursuing cross-sectoral cooperation; AV sector organisations build the partnerships and find ways to facilitate cooperation with other sectors, including the health sector. One of the latest examples is the creation of the Vision Denmark alliance,<sup>2</sup> which has been established by seven AV sector organisations and actors, and whose ambition is to support the growth of digital visual industries. Quoting the representative of a Danish AV sector umbrella organisation:

Vision Denmark [...] the aim of this organization is to focus precisely on how we can develop the relationship between the audiovisual sectors. We call them the Digital Visual Industry. [...] both [...] developing their entertainment products, but also developing collaboration with other industries – so, for instance [...] creating simulation software for training stewardesses or making VR products for physiotherapy in other sectors.

Danish interviews highlighted several additional relevant innovation support measures, but also targeted sectoral measures, including AV funds from which the companies can apply for support. One of the central joint health sector initiatives is the MedTech Innovation Consortium,<sup>3</sup> which was founded in 2009 in response to wishes from biotech and medtech companies in the Central Denmark region as part of the business development programme. Also private

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<sup>2</sup>See further: <http://visiondenmark.dk/>

<sup>3</sup>See further: <http://www.mtic.dk/>

sector initiatives, for example, the Egmont fund<sup>4</sup> and the Lego fund, have had a special role to play in supporting cooperation between the health and AV sectors, as they support financially different cooperation projects.

When it comes to Estonia's support ecosystem for the health and AV sectors' cooperation, the general conclusion is that, compared to Aarhus, the support is more modest and the main actor is the public sector. Characteristic of Estonia is the policy focus on generic support measures and lack of private sector initiatives. The main actors in the cooperation ecosystem are: (1) externally (by public sector) supported sectoral cluster organisations and (2) generic public sector measures that facilitate cooperation and partnerships.

As to the clustering support, the emphasis is put on strengthening the AV sector. Estonia supports (through creative industries development centres) the development of different incubators and accelerators in the AV sector that contribute to strengthening the sector in general. Examples include Object, an incubator for AV sector start-ups in Narva and Storytek, an accelerator often highlighted as a good example that fosters cooperation between the AV and technology fields. As to the health sector, recently a new measure has been introduced – an innovation fund – to better plan and support innovative solutions in the health sector. In contrast to Denmark, in Estonia the active parties who seeks cooperation with other sectors are health sector organisations, specifically the Connected Health Cluster<sup>5</sup> (also initiated by public authorities). Estonia has also launched a financial support measure, 'Support for creative industries cooperation projects', which aims at supporting the growth of value added to other sectors through the development of business models, products, services, sales and marketing by building on the specific skills and knowledge from the creative industries. Interviews suggested that this measure has not fallen on fruitful ground: there has not been enough cross-industry initiatives to make use of the available funds.

The fact that educational institutions do not play an important role in the cooperation landscape allows us to argue that this could be one of the reasons why cooperation between the health and AV sectors has remained rather modest in Estonia. According to Chaminade, Lundvall, and Haneef (2018) and as discussed in Chapter 2, educational systems play a crucial role in the evolution of innovation systems and are among the first initiators of intersectoral contacts. Not to mention that, to refer to Johnson (1992), the diversity in the institutional landscape is extremely important from the knowledge diffusion point of view. Thus, we may conclude that the lack of actors involved in the institutional landscape has been the hindering factor of sectors' cooperation in Estonia so far and

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<sup>4</sup>The Egmont Foundation works to safeguard children and young people against 'modern poverty' – the lack of learning and life skills. See further: <https://www.egmontfonden.dk/int/What-we-support/>

<sup>5</sup>Estonian Connected Health Cluster (ECHC) is committed to accelerate the adoption of connected health solutions, at scale and on commercial terms. See further: <https://www.estonianclusters.ee/estonian-clusters-2/connected-health-cluster-3/>

will also slow down changes in the future. In addition, when speaking about public sector intervention mechanisms, we may argue that, despite the creative industries' policy prominence in Estonia for more than 10 years now, the achievement of its core policy objectives has remained modest, including to enhance spillovers to other industries and stir dynamics and growth in them. We may similarly argue that the development of cross-sectoral policies that are associated with creative industries policy by numerous authors (O'Connor, 2009; Potts & Cunningham, 2008; Throsby, 2008) have not become common practice.

## **Openness, Modes and Peculiarities of Cross-sectoral Dialogues**

This section explores the different modes of dialogues and cooperation between the health and AV media sectors. We start with the sectors' general openness towards cooperation and describe the main challenges that hinder cross-sectoral cooperation, which also outlines the peculiarities of sectoral innovation practices.

### ***Sectors' Openness for Mutual Cooperation: Club-mentality and Sectoral Path-dependencies***

In contemporary innovation studies, innovation is understood as an interactive process and interactive learning (Edquist, 1997; Lundvall, 1988) is considered an important prerequisite for (cross-) innovation. Our study, however, highlighted certain differences of sectors' dialogic capacities and readiness to cooperate. At first sight, the results of the study reveal that, in general, both sectors are open to cooperation with other sectors. The 'traffic' of cooperation activity goes both ways. In particular, Danish AV and health sector companies reported that, as a rule, others are turning to them to seek cooperation. One Danish production company representative remarked: 'it's actually like 90% of the time it's the people come to us'.

However, in the case of Estonia, proposing the question about cooperation with other sectors to AV companies or related sector organisations and public sector representatives usually led to an answer about cooperation with other creative industries sectors. The typical answer was for instance that films and games need music and actors. Only after further guiding question(s) did a discussion about cooperation with other sectors (outside creative industries) follow. That is, to consider these kinds of cooperation was somewhat unnatural, with only secondary potentiality.

The motivations for cooperation are very pragmatic both in Estonia and in the Aarhus region: mostly it is a lack of certain type of competences. While some cross-sectoral cooperation, for instance with technology providers, is long term the work on innovative solutions, however, requires seeking out new 'knowledge' partners from other sectors. The study also demonstrated that the activeness of seeking cooperation is conditioned by the stage of development of the companies. Start-ups are more active in looking for cooperation and trying it out in convergent and thus uncharted waters than more matured companies. As described by an interviewee representing a start-up working on a VR solution

in life-saving: ‘So we have to make some phone calls, knock on the doors, just spread the word, to see if they have some interest in it.’ This argument especially applies to companies that are active in emerging convergent fields and that still have to justify their existence and find their place in the market. The emerging businesses in convergent areas (digital health communications, telemedicine, gamified rehabilitation, etc.) also create the need for new type of interdisciplinary dialogues, knowledge transfer and new type of cooperation needs. Quoting the CEO of a Danish VR company that develops apps for the health care sector:

I don’t really have a background in any healthcare related area. But in each project that we do, there’s a very big emphasis on having a collaborative partner. [...] once it was an occupational therapist, [and] in the case of a physiotherapy project it was a physiotherapist [...] and in the case of these multi-handicapped children it was some people that took care of the children at the facility [...] pedagogues.

As to the health sector, the interviewees complained about its ‘club-mentality’ – the establishment of very strong ‘us-ness’ of the sector as described in Chapter 2. The results of the interviews indicate that the health sector seems to have created its own rules (Dopfer & Potts, 2008) that do not cross sectoral boundaries and that cannot be (so easily) adopted by agents from other sectors. The interviewees expressed rather explicitly that it is hard to cooperate, even harder to do business, if you do not have connections within the health sector. The problem is amplified by the fact that different parties do not understand each other (enough). As illustratively described by a Danish health sector organisation representative:

You have to be very precise in how you try to get close to especially the doctors. Because if you don’t speak their language, if you don’t know what they’re saying, understand what they’re saying, you get nowhere.

Estonian interviewees claimed similarly that ‘outsiders’ – those who do not have any background or competence in the health sector – have difficulties to convince the health sector to buy new solutions. The crucial factor that facilitates the sectors’ cooperation is having a person with a health sector background involved in the development process. Quoting an Estonian health sector umbrella organisation innovation manager:

if a technology person develops an application, then [they have] terrible [problems with] persuasion and sales in the direction of [the] healthcare sector. But if an application is developed in cooperation with [the] health sector, then you don’t need the whole sales works [...] it is said that one of the success criteria for

health sector start-ups is whether a health sector person is involved or not in your team. He/she doesn't have to be a team member; they may also be a consultant or shareholder. Even in [the field of] prevention [...] as unbelievable it is [...] a person does not trust advice from non-medical practitioners.

Although, we may conclude that the health and AV sectors have begun to become increasingly important to each other, they still have little tendency to cooperate, as historically the two sectors have not worked together. The study results also demonstrate that dialogues across sectoral boundaries are hindered as the sectors are still learning to know each other: their language, needs and practices. Despite that, we may argue, the potential for cross-innovations is high. This proceeds from Lotman's argument, elaborated by Ibrus in Chapter 2, that the more culturally distant the domains – as the health sector and AV are – the bigger the probable innovation may be when these domains end up in a dialogue.

#### ***Four Modes of Cross-sectoral Dialogues***

The study results demonstrate that co-innovations between the AV and health sectors do not concern the whole spectrum of activities in these sectors. As to the health sector, we can see that emergent dialogues across industry boundaries have concentrated on primary care and rehabilitation (the spectrum is more varied in Aarhus where different new solutions have also been developed for instance in the field of insurance). From the perspective of the AV sector, the main cross-innovation potential with the health sector at the time of our study lay in post-production, or in the development of VR or AR solutions, 360-degree videos, video games, mobile applications, and so on. The CEO of a Danish VR company who develops apps for the health care sector stressed that:

I really think that the healthcare market is a good place for VR technology. And I think that a lot of people can actually make use of this technology [...] Because it's so natural. It's such a natural step to take because VR technology is all about involving the whole body. And if you wanna do physical rehabilitation you want to involve the whole body. [...] I think in the future there will be more time or more focus on how people spend their time. So if people can't really see that they're making any progress with doing normal, boring physical rehabilitation exercises, then they won't do them. So, they want to have fun experience, they want to have engaging experience, they want to feel like they learn something from doing exercises. And we can do that with VR. We can create an actual world for them to rehabilitate in. So I think it will happen, eventually.

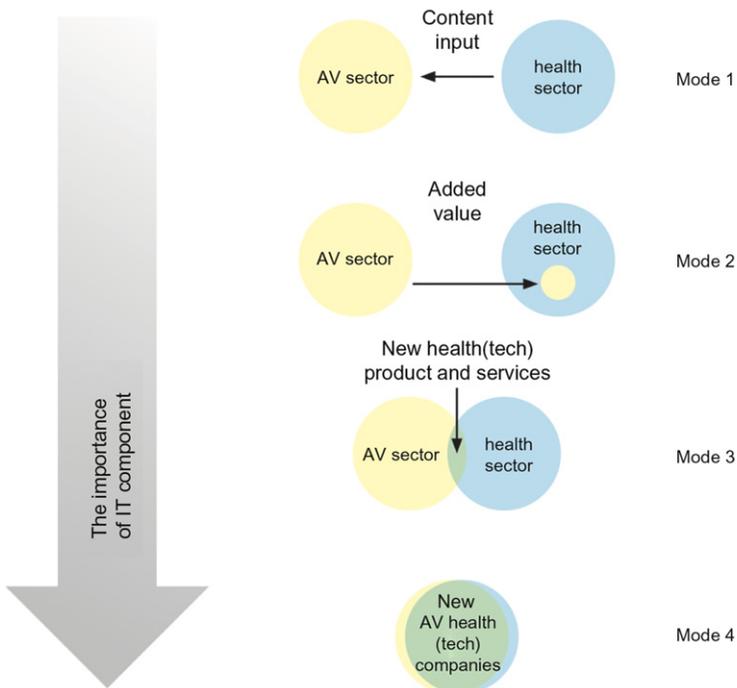
Somewhat separate are those cases where (especially Danish) companies demonstrated articulated awareness that they build their enterprises in

convergent ways, and as such explore new waters. To quote the CEO and founder of Danish AV + health company:

It's this certain mix of digital storytelling, gamification, research-based health insurance. That combination is in itself apparently innovative because we wanted to do something that was new with a new approach.

All in all, our study allows four modes of cross-sectoral cooperation and co-innovations between the AV and health sectors to be highlighted. It is important to stress that the sectoral dialogues are often afforded and invoked by specific new technologies. The importance of the technology component increases the closer the dialogue between the sectors gets (Figure 9.1).

The *first* mode can be considered as 'traditional' cooperation. The interviews talked about the following two forms. On the one hand, this can be the situation where AV tools are used for health products promotion (e.g. a promotion video for a hospital). Another example of the traditional cooperation is where health content



Four Modes of Cross-sectoral Dialogues Between Audiovisual and Health Sector

Figure 9.1. Four Modes of Cross-sectoral Dialogues.

is used in health-related TV shows or in other forms of health journalism or communication, but also in some educational films on health.

The *second* form refers to situations where AV tools are used in health service/product development. Here, the use of AV tools can provide additional value or new features to the health product or service or lead it, in effect, to the next level from the user point of view. In this type of cooperation, the examples include the use of a videos or a VR experiences in medical education to provide new kinds of teaching methods or new user experiences in the health service. Quoting the interviewees:

For example, a person walks in the robot – he does not move his legs, but the robot moves – he sees that he walks over the meadow. [...] We use quite a few such programs.

(Manager of Estonian rehabilitation centre)

So we are trying to make a VR solution, so when the kid comes to the dentist, they can watch a movie... which makes them feel [...] relaxed and [...] they might think it's fun. And the dentist can do the examination much faster. So, there's a business case because they save the time as the kids are more relaxed.

(Coordinator at Danish local municipality in the field of social services)

The *third* mode of cross-sectoral dialogue is a more developed form of the second one. Here we can notice that the sectors have understood that the next new solution may exist outside their sector and innovation can happen through dialogue with the other sector. The co-innovations have resulted in the development of new health products and services due to using AV tools and content in the health sector. Examples are new app-based solutions, new VR rehabilitation tools, games, etc. The interviewees described the following examples:

We are building a product to use in companies or in the insurance sector to help people fight stress. So we use [a] scientific or research-based technique that builds the stress resilience of people in a physiological way. So we work with the training and flexibility of the autonomous nervous system. [...] We build a smartphone-based product that lets people train the flexibility of the nervous system as [a] supplement for cognitive-based therapy or organisational stress measures. So this is [an] individual tool-based product that people can use to build their stress resilience.

(CEO and founder of Danish AV + health company)

We have developed a product for people who have had brain damage from a stroke. And this application helps them in their rehabilitation from this stroke and from the handicap that came with the stroke. Another group that we develop for is multi-handicap

children and what we did for them was an application that helps with the visual stimuli of their senses because these children have such difficulty and are so handicapped that they have no language – our language or physical language. So what we need to do is just stimulate their senses to give them some sort of value in life [...] [it] is a VR system for physiotherapy.

(CEO of VR company that develops apps for the healthcare sector)

As to the *fourth* mode, one can no longer talk about just cooperation, but a new level of convergence of the two fields. In this case health and AV are rather one convergent field – a new field of activity where health and AV competences are converged on a company level. Thus, as discussed by Ibrus in Chapter 2, this can be considered as a clear manifestation of cross-innovation as dialogues between sectors have resulted in a new kind of firm. In particular, in Aarhus, we could observe several new converged AV health companies as embodiments of a new level of cooperation. As one Danish health + AV company described, for their work they have to combine competences from the fields of digital storytelling, gamification, research and health insurance; and that the aim of that is to create a new type of company.

These four modes indicate that the connectedness of the AV and health sectors has developed over time: from traditional types of cooperation towards the (partial) convergence of these two sectors. However, the development process has not been linear, where one form of cooperation is replaced by another. The results of the study demonstrate the diversification of cooperation: new modes of cooperation have been added to existing ones. The fact that the convergence of the two sectors is manifested in the emergence of new types of company – the AV–health(tech) companies – allows to argue that, at least to a certain extent, the latter itself is the phenomenon of cross-innovation as the borders between the two sectors have disappeared or at least become very blurred. Interviewees discussed that the VR solutions are expected to become a ‘normal’ part of the health sector, for example in surgery, and therefore cooperation between related professionals has to be encouraged during their studies. A support organisation manager in Denmark argued similarly that the future is moving more towards interdisciplinarity and mixed sectors:

I think they’re going to be better and better at looking at different kind of business models. [...] Maybe in the future you don’t have to be either [in the] entertainment or other sectors, but you can make some kind of collaboration where it makes sense that it’s something in healthcare but also it’s entertainment.

The results of the study also highlight the differences between Estonia and Denmark. In Estonia, cooperation between the health and AV sectors happens more in the traditional form (the first mode of cooperation described above): a hospital needs a video or a media company makes a TV production about a

certain health-related topic. Health service/product development (mode 3) can be found in both Estonia and the Aarhus region. The examples of new emerged companies were more explicit and prevalent in Aarhus, although there are also examples of company-level convergence in Estonia.

We may conclude that the cooperation pattern is rather path-dependent – and that in different aspects. On the one hand, as the study demonstrated, the more traditional types of cooperation are especially common to developed or matured AV sector companies (content production, broadcasters); they continue to practise traditional forms of cooperation – they are path-dependent in terms of their activity. Whereas the new emerging types of cooperation practices come from the start-ups in the field. On the other hand, the more advanced convergence in the Aarhus region suggests that (cross-)innovations are at least to a certain extent path-dependent – meaning that there have to be certain prerequisites that support the innovations to happen. In Aarhus, there have been years of support via public and private initiatives to bring these two sectors together. As Hassink and Klaerding (2012) argue, at the local level, path extension and path creation are intrinsically linked with endogenous characteristics like regional and industrial culture. The study results fit well with agglomeration and cluster theories (Asheim, 2007; Healy & Morgan, 2012; Rutten & Boekema, 2012), but also with the discussion on creative industries' overall path-dependent nature (Florida, 2002; Hall, 2004; Jones, Lorenzen, & Sapsed, 2015) that stress the importance of (local) 'milieu' and 'environment' that can support or hinder the changes to occur.

### ***Peculiarities of Cross-innovation between the Health and AV Sectors***

Despite the increasing connectedness of the sectors, there are also a number of challenging factors that complicate cross-innovation between them. The five peculiarities described below reflect the nature of the dialogues between the sectors both in Estonia and in the Aarhus/Midtjylland. It can also be noted that cross-innovation challenges are mostly due to the specificities of the health sector, and to a certain extent derive from the specificities of the cooperation between the two.

The first peculiarity relates to user involvement difficulties that make cross-sectoral cooperation time- but also money-consuming. In other words, we may talk about the high sensitivity of the cross-innovation as both Danish and Estonian interviewees stressed that the development of new solutions always presumes testing and a validation period, but it is difficult to find contributors and supporters during the test phase. But in the health sector, without having a solution tested, one cannot gain access to the market. At the same time, the safety of the patient has also to be guaranteed during the test period. Quoting the CEO of a Danish VR company:

Because we do applications for healthcare. It's very, very difficult to make actual tests, user tests, end-user tests because from the clinic or the therapist perspective you want to make sure that the

patient doesn't hurt himself. But still we want to make a test on end-users to prove that this functionality that we make is working or is not working. So it's a grey area often. [...] So, I would say, that's one big hurdle that we have.

Health sector interviewees explained that it is very difficult to involve expert users in testing, because it comes at the expense of their working time. Testing is an extra activity and requires extra resources. Quoting the head of department of an Estonian health company:

[it is hard to] find these three, four, five doctors [for] [...] your projects. First, they won't agree to do it for free and at the expense of their spare time; as a hospital I find it difficult to finance it from my own budget; thus, you have to motivate them somehow.

The second peculiarity is the complexity of finding viable business models for novel cross-disciplinary solutions. As noted by one interviewee, the ultimate goal for co-innovation must still be added value and, as a general rule, this added value should be expressed in terms of money. Partly, this problem derives from the lack of business thinking in the health sector, but, however, there is a certain rigidity in the system that prolongs the development processes and makes them more complex.

The third peculiar aspect relates to the mindset or attitude problem towards using AV tools and content in the health sector. This means that gaming is still often associated with entertainment and leisure, not with serious activities such as health care. This argument particularly applies for the older generation: today's elderly people have not been used to playing computer/mobile games, compared to today's younger generation. In addition to that, the underlying attitude tends to be that people spend too much time behind the screens (and) on playing (computer) games. Therefore, it has been complicated for gamification experts and video games companies in the area to make themselves heard and taken seriously in 'serious' fields like the health care sector. As screen media is associated with entertainment, these rather relate to something that is 'nice to have', but not necessarily needed. Thus, as the (financial) resources are always acute in the health sector, the support for these kinds of developments is not considered a priority. Quoting the CEO of a Danish AV content company:

People may be sceptic [...] We have a lot of people saying: 'This is a computer game, is it okay, can I use it for training? [...]' Computer games for them are often these things their grandson is doing every day and then they just sit and look at the guy playing computer games and that doesn't make much sense to them. So why should they do it? [...] They've always been saying: 'Oh, you play too many games.'

The fourth main challenging factor for cross-innovation between the AV and health sector is the complex nature of the cross-innovation process. The results of the interviews indicate that usually it is not about the development of one new solution, rather about a large-scale reorganisation of the existing system. This usually demands investment in wider (IT) systems and the related maintenance costs, including general IT support (helpdesk) to support the implementation of telemedicine solutions, not to mention the costs of reskilling or upskilling the health sector personnel. Often the development of new solutions presumes the introduction of corresponding new technical devices. These altogether raise the cost of the implementation of the new solutions significantly and hinder cross-innovation between the two sectors.

The fifth peculiarity is closely related to the previous one and is associated with guaranteeing security and health requirements, which also make the innovation process more expensive. Innovations in the health sector have to deal in the health sector have to deal with guaranteeing the security of personal data. Data security as a specific health sector problem was pointed out several times. The interviewees argued that this is a topic whose significance will increase significantly. The manager of an Estonian rehabilitation centre remarked:

At the same time, we must also take into account the threat of cyber-attacks [...] if you consider [a] hospital's information system where you have patients' information [...] and you have devices connected to the internet [...] so security is something that should definitely be guaranteed, because we cannot predict all these dangers.

## **Challenges for Sectoral Policy Makers**

In this last section, we discuss the main challenges that policies could address to facilitate cross-innovation between the health and AV sectors. The related policy challenges can be divided into two main groups. The first group concerns the general (business) environment, for example, small domestic markets, lack of investments and investment culture, etc. – that assume corresponding actions from entrepreneurial and innovation policies. The second group relates to more sector-specific factors that call for action on the sectoral level, including the need for refocusing policies for health and AV media content and services.

As to the shortcomings of the general (business) environment, both Estonia and Denmark struggle with different types of market failures. On the one hand, the interviewees highlighted the problem of the small domestic market, which does not provide enough of a take-off platform for new ideas. Gaining the needed critical mass of customers is complicated. The interviewed project manager of a Danish sectoral umbrella organisation saw that as a considerable obstacle:

A huge problem in Denmark and a lot of small countries is [...] what is possible for example in Germany or France or the United States or UK, is not the same as what's possible if you look at

the business cases in Denmark or other small countries, because there are not enough customers for some products here.

Estonian companies explained the problem of the small domestic market from the limited development opportunities point of view. As the health sector is rather differently regulated in different countries, the opportunities to transfer solutions (to scale up the services and products) from one country to another are also limited. As described by the CEO of an Estonian digital health services company:

[...] healthcare is different in each country and the Estonian market is so small that it immediately creates the problem how to develop a product that is scalable internationally [...] would have a real market potential [...], but would also help people in Estonia.

The market failure problem was also discussed from the perspective of a mismatch between the long-term research and development need versus the limited availability of investment in the market. The interviewees argued that the market for novel AV-intense solutions tends to be project based and opportunities to find long-term investment is limited. The lack of investment becomes even more challenging, as, especially in the case of Aarhus, innovation is hindered arguably due to the modest investment, entrepreneurship and risk-taking culture in Denmark in general. Several interviewees argued that risk capital investments are rather underdeveloped: investment activity in general is low and the capacity to attract investment is poor. Therefore, companies are not able to get the necessary funding for their development activities. Quoting the interviewees:

Denmark is a very small country when it comes to investing. We don't have it like in the US, we don't have a culture of investment or risk taking. We're very much [a] culture of employed people. [...] There's not that much funding to be hand in the sector.

(CEO of a Danish digital audio-visual company)

I would point out that risk capital and the accessibility of risk capital in Denmark is too low. [...] So many private business angels do not have the experience yet because this is also a new business area. They do not have the experience to invest in this area and they tend to focus on more industrially focused investments.

(Vice President of a Danish producers' sector organisation)

Although we may conclude that the market for health-oriented interactive and AV services is in general at an early stage, there is rapidly emerging competition between the product and service providers. This can be seen as a manifestation of the globalising health industry trend where the amount of (global) health platforms and apps have increasingly emerged (Lupton, 2014; Lupton & Jutel, 2015; van Dijck, Poell, & de Waal, 2018). The competition was highlighted by several Danish

companies which argued that recently there has been an emergence of new companies that provide VR, AR and related solutions to the health sector. This has resulted in a situation where there are several companies after rather small amounts of money.

As to the sector-specific challenges, these are predominantly related to the health sector. The central keywords here are the lack of a comprehensive approach and system point of view. This was discussed by a majority of the interviewed companies, representatives of public institutions and sectoral umbrella organisations and public institutions in Estonia and the Aarhus, although from different points of views.

The Danish interviewees stressed that the main problem lies in the regional health care system, which means that every region has its own information system with its own rules and separate budgets, all of which hinders collaboration within the health sector. But it also makes the development processes for the sector much more expensive as a single system or solution could not be applied across all health sector institutions. The CEO of a Danish digital AV company discussed this as follows:

The problem is that we have a saying that they suffer from ‘not developed here’ syndrome. Meaning that every region wants to develop their own system and that system is, then, ‘naturally much better than whatever they’ve done it in other regions’. Which means that none of these regions have any data interoperability on the practical level. So even though all these systems can talk to each other and exchange data on the official level in practise, it doesn’t work. [...] And each of these regions have probably around 1000 to 2500 different systems developed for specific areas that are not necessarily communicating with each other also. So [...] usually if you move from one region to another and sometimes even between hospitals within the region, they would simply re-do the tests. So it’s in their own system.

Although in Estonia with its advanced e-governance infrastructures the information systems of public services are built to be interoperable and data exchange between health care institutions works notably better than in Denmark, the interviewees highlighted the lack of technological support for developing an additional layer of services on top of existing data exchange infrastructures. Quoting the Estonian health sector umbrella organisation’s innovation manager:

In Estonia, it can be said that the great success of e-health is more like a success story for the IT infrastructure. But now, in order that all sorts of different apps are on that IT infrastructure [...] this layer is completely missing today.

The shortcomings in terms of the lack of a systemic viewpoint came up among Estonia’s interviews through the following three aspects. First, the lack of connection between primary care and specialist care/ambulance services, but

also the lack of a systemic approach to rehabilitation and social services. This may lead to situations where, as Estonian health sector policy representative described it: ‘The patient falls between so-to-say different walls [...] and the system does not work together on behalf of the patient.’

Second, the challenging issue for cross-sectoral cooperation in Estonia is the lack of a holistic viewpoint in the treatment process, and the lack of patient focus therein. As described by the Estonian health sector umbrella organisation’s innovation manager:

For example, if heart disease patients get out of the expensive treatment at the hospital and go home, in fact we do not monitor whether he/she actually recovered, whether his/her quality of life has been restored. So if we bought the service that the person’s quality of life is actually restored, that his/her work capability is restored, then the hospital would become interested in all kinds of rehabilitation services, home-monitoring services and applications whose sensors would let us know: yes, he/she is alright, that there is no deviation from the trend, that would alarm us that he/she is about to come back to the hospital right away. We could proactively do something. Well, let’s say that a patient who had a stroke is discharged from the hospital and he/she has a prescription to walk 10,000 steps per day and not to eat these things and to eat other things. But nobody checks that [...] Today, the person should be the manager of his/her own health, but people are not so literate in healthcare so that they can be their own health managers. This is a bigger systemic problem.

Third, the interviewees argued that the Estonian, but also the Danish, health sector lacks outcome-oriented thinking. The dominance of process orientation prevents the overall health care system from being innovative as the goal is not overall improvement (e.g. patient healing and quality of life), but the focus is set on single improvements in different parts of the system. Quoting the Estonian health sector umbrella organisation’s innovation manager:

purchasing of service episodes instead of purchasing outcomes inhibits innovation. [Today] everyone’s goal is to show volume. It is counted how many service elements you have provided, but it does not matter if the person has been healed. And yes, this is the fundamental obstacle to innovation in health, actually. So, if the Estonian Health Insurance Fund [*Haigekassa*] starts buying the outcomes instead of pieces, then the need for innovation would emerge in the system. Today nobody asks for this innovation in the healthcare system and does not demand it.

Thus, the challenge for policy makers concerns the question how to encourage the publicly funded health system to re-conceptualise their whole societal function

and the range of services they need to offer. This would, then, also justify it co-innovating more with other sectors, including the screen media industries.

Another group of sector-specific policy challenges relates to the lack of financing possibilities. The results of the interviews enable to conclude that there is a deficiency of financial support measures for both the AV and health sectors, and this is the case both in Estonia as well as in Aarhus. The main discussion revolved around the problem of expensive technology (VR and AR solutions) and the questionable readiness of the market to cover the development costs. As the technology is still too expensive, it is not accessible to a large group of users. This can be interpreted also from an innovation diffusion (Rogers, 2003) point of view: as the technology is still used mainly by early adopters and expert users, the developments are hindered due to the expensiveness of the innovation process and that again hinders the development of the usability of these technologies and solutions. Quoting the associate professor from the Danish health science institute:

They cannot really ask for the money that they put in. I understand them very well. So it's a lot of development work and you have funding for one to two years and the market does not pay what it costs, it's simply not possible to get a few thousand euro for a simple VR device.

With regard to expectations as to how policy makers should respond to these challenges, the results of the interviews derived rather logically from the current institutional landscapes described above. This means that as the support for sectoral cooperation in Estonia has been rather modest compared to Denmark, expectations of policy support was much higher in Estonia than in Denmark. To quote a CEO of a Danish digital AV media company:

I don't think the state necessarily needs to do anything there. There are a lot of private organisations doing that. [...] I think government should try to focus less on supporting [...] certain initiatives and, instead, simply setting the stage for companies and people to do it themselves.

The position expressed by Estonian companies and public sector organisations was that in the case of sectors with a strong state role, for example health, the public sector has to have a more active role in supporting cross-innovations – the state has to be actively involved in the innovation process. Estonian policy makers in turn emphasised the need for health institutions to become more accessible test-grounds for experimenting. Direct support for experiments was highlighted by companies in both sectors. Interviewees highlighted also the importance of a risk-taking attitude and the tolerance for failures. They also stressed the need to run special venture capital funds: innovation funds, risk funds, etc., to support riskier projects and prototyping (developing new solutions is very expensive in both the health and AV sectors).

However, one of the key challenges to support cross-innovation, stressed by both Estonian and Danish public sector representatives, was the importance of facilitating networking in various ways, including, joint events, matchmaking events, etc. This fits well with the conceptual postulates of innovation systems thinking (see Chapter 2) that cross-innovation relies on all kinds of interaction, including cross-sectoral dialogues, cross-boundary learning, etc. The key here is rising mutual awareness between the sectors and, therefore, all kinds of networking measures should work as central intervention mechanisms. Yet, company representatives in both countries did not see the relevance of networking and were rather critical about the efficiency of those kinds of events. As to Estonia, this explains well the common understanding, especially among the more mature AV sector companies, that innovation is mainly an intra-sectoral thing. The low readiness to enter into cross-sectoral dialogues would, however, limit the opportunities for cross-innovation. This highlights the continuing need to support awareness raising on the policy level.

## **Conclusion**

We finish the chapter with three concluding observations.

First, the study enables to conclude that cross-sectoral cooperation and co-innovation processes between the health and AV sectors have changed over time. Cooperation has intensified and, as the new converged practices have not eradicated old practices, the forms of cross-sectoral cooperation have also diversified. In case of the health and AV sectors, we were able to identify fully converged practices – new companies based on new rules and identities. Both sectors are heavily influenced by digitisation and other technology developments and this has also brought the two sectors closer together. The different modes of cross-sectoral dialogues demonstrated that the importance of the IT component increases the closer the dialogues between the sectors get – thus, at least partly, cross-sectoral dialogue is mediated by a third sector.

Still, if we do not take into account telemedicine that throughout its long history has been mostly about health and ICT sector cooperation, we can only observe first examples of full converged cross-innovation practices. The manifestation of, as it were, identity crises of the new convergent fields also indicates that the cross-sectoral dialogue and the emergence a new convergent domain is still in its very early stage where the central question is whether the new rules are attractive enough for others to adopt, as discussed by Ibrus in Chapter 2.

Second, the main challenges for more intense cross-sectoral cooperation between the health and AV sectors have had a path-dependent character. The ‘easy’ conclusion is that these sectors are not used to cooperate and that is why they are still learning to know each other: their languages, needs and practices. Still, in the case of the health sector, the ‘club-mentality’ or the very strong ‘us-ness’ of the sector is an important hindering factor for cross-boundary communication. In addition, co-innovation with the health sector presumes also coping with peculiar limiting factors: for example data security, user involvement,

hygiene requirements, which often make the cooperation more expensive and time-consuming. As to the AV sector, the main challenge is how to overcome their approach to innovation as intra-sectoral phenomenon (that particularly applies to the Estonian case) where innovation is predominantly understood as a new AV product, film, video game, etc.

Third, the exploration of Estonian and Aarhus region cases explicitly demonstrates the importance of creating systemic support to facilitate cross-innovation processes. As evidenced above, in Denmark the authorities in the public and private sector have over the years developed several targeted programmes that support cooperation and co-innovation between the two sectors. In Estonia, these types of intervention practices have been rare and the existing measures tend not to work. Based on the Aarhus case, we may argue that at least one of the reasons for that is the low readiness of the Estonian AV sector to enter into dialogues with other sectors. The second reason is that sectoral educational and research institutions have not been given roles in the potential cross-innovation system. Higher education institutions have a central role in Aarhus regional cross-innovation systems and this may explain why in Aarhus there is more cooperation and higher convergence – joint R&D and educational activities provide further motivation for cooperation. The new converged solutions tend to be knowledge-intensive.

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