A canvas for a digital ecosphere

Digital Hub Denmark attracts digital talents, investors, and customers to Denmark. Digital Hub Denmark Professor, Claus A Foss Rosenstand, from Aalborg University, is helping organisations achieve exponential growth by leveraging digital disruptive technologies. While still in its early stages, this action research programme has produced a canvas to support digital ecosystems made up of digital tech-businesses in areas that are identified as regional strongholds. Seven digital ecosystems – Fin-tech, Health-tech, Robotics, Crea-tech, Prop-tech, Agro-tech, and Ed-tech – have been identified, and form the Danish Digital Ecosphere.

Digital Hub Denmark connects tech talent, start-ups, established companies, and investors with business opportunities in Denmark. This non-profit organisation was launched during 2018 in response to the Danish government’s focus on digitalisation, with the aim of ensuring Denmark becomes a digital front-runner in Europe by 2023. Focusing on private-public partnerships and digital ecosystems, one of Digital Hub Denmark’s tasks is to position Denmark at the centre of innovative, sustainable digital solutions, attracting leading international talent, customers, and investors.

Digital Hub Denmark Professor, Claus A Foss Rosenstand’s professorship is a cooperative agreement between Digital Hub Denmark and Aalborg University, Denmark. His role includes helping digital tech-businesses achieve exponential growth by leveraging digital disruptive technologies.

Digital Disruptive Technologies
Digital disruptive innovation radically transforms how consumers, businesses, and industries function. This alters expectations and behaviours and affects the value proposition of the existing goods and services that they replace. Professor Rosenstand adds to the theory of innovation that a digital disruptive technology’s price-performance is on an exponential growth trajectory.

Digital Ecosystems
A digital ecosystem is a value-network of different stakeholders, such as suppliers, customers, trading partners, competitors, and government agencies, together with all the respective technologies. Each element of the ecosystem affects and is affected by the others, as in a biological ecosystem. This creates a constantly evolving relationship in which each element must fit to survive. A sustainable ecosystem creates synergy with each participant gaining more value than any of the individual participants would be able to do outside of the ecosystem.

To succeed, ecosystems can be reconfigured by separating, combining, relocating, adding, and removing elements. Professor Rosenstand describes digital ecosystems as market-driven, bottom-up phenomena, unlike politically implemented top-down cluster organisations. Consequently, governmental support of ecosystems should involve representatives from the private sector. Private-public partnerships, with key partners from both private and public sectors, are therefore the most inclusive solution.

Existing research demonstrates the design of an individual digital ecosystem model using the Business Model Canvas, a strategic business tool used to visualise all the building blocks – such as infrastructure, customers, and finance – that are required to develop new business models and document existing ones. Digital business ecosystem characteristics are also described for a fully decentralised architecture on a general level. These mention that such ecosystems should not have a single point of failure or control; nor should they be reliant on an individual actor or situation. They should, however, be scalable and robust.

A Research Gap
Professor Rosenstand explains that since digital ecosystems cannot be created top-down, they must be identified and then selected for support. Having carried out a thorough review of ecosystem literature and system theory, he identified a research gap in the form of a canvas model to select, combine, and cultivate multiple digital ecosystems in a private-public partnership. From a practical perspective, research into the orchestration of the digital ecosystem’s action research methodology. Action research is an emergent process that seeks transformative change through a combination of research, action, and participation. It involves a cyclic process of action and critical reflection. The researcher draws on the understanding developed during the earlier cycles and continues to refine procedures, data, and interpretation throughout subsequent iterations converging towards practical solutions, driven by the rationalities that drive practice.

Identifying Digital Ecosystems
A Startup Genome report, funded by Digital Hub Denmark, was the starting point for the identification of suitable digital ecosystems. This mapped Denmark’s position in the global startup ecosystem lifecycle. The report identified four digital ecosystems where Denmark has a stronghold: Fin-tech, or finance technology; developing innovative solutions to augment, streamline and digitise financial services; Robotics, developing intelligent robots, drones, and automation solutions; Agro-tech, providing intelligent solutions for the agricultural and food sectors; and Ed-tech, developing digital solutions for education eg, using technologies such as machine learning, AI, and natural language processing.

Three further digital ecosystems that are considered national strongholds were also created with actors from creative industries of gaming, animation, XR, and movies forming a Crea-tech (creativity technology) ecosystem; actors from the property industry, construction, and real estate forming a Prop-tech (property technology) ecosystem; and actors from Health-tech ecosystem, creating technologies to facilitate healthcare services.

Digital Ecosystem
As illustrated in Figure 1, these seven ecosystems form what Professor Rosenstand terms a ‘digital ecosphere’. He explains how an ecosphere is an open/closed system of multiple
ecosystems. Digital ecosystems are social systems, so system theory can be used to understand them. While a digital ecosystem is structured closed to its surroundings because it is self-organised and self-structured, it is also operatively open to its surroundings in terms of communication. He draws an analogy between biological and digital ecosystems. The earth is a biological ecosphere that is open to energy from the sun and waves and results in multiple ecosystems with evolutionary growth. Similarly, the Danish digital ecosphere is open towards energy that comes from talents, customers, and investors, and currently results in the seven digital ecosystems with exponential growth.

The digital tech-businesses included in the digital ecosphere share the aim of achieving exponential growth through a common value proposition of digital transformation, leveraged by digital disruptive technologies. Accordingly, they have a shared agenda with respect to business development regarding, e.g., strategy, organisation, technology, sales, marketing, partnerships, business models, investment, networking, processes, agility, management, digital talents, etc. It is therefore meaningful and effective to select, combine, and cultivate digital ecosystems in a coherent digital ecosphere.

These digital ecosystems are identified in terms of their size, turnover, and investments. In addition, Professor Rosenstand employs three further criteria. The ecosystem should be formally organised as a nationwide not-for-profit association. It should be represented by an innovation manager, such as a cluster director or CEO. Finally, the ‘innovation managers must have a global, open, and integrative mindset, where all national businesses are considered as potential ecosystem participants rather than competitors’.

**A CANVAS FOR A DIGITAL ECOSPHERE**

The action research process has produced a dynamic canvas supporting the co-creation process of forming a digital ecosphere. Professor Rosenstand has discussed and developed the canvas with input from the ecosystem innovation managers. Digital Hub Denmark co-workers, and other innovation researchers. The Digital Ecosphere Canvas borrows conceptually from the more familiar notion of the biological ecosphere, in which the earth is reliant upon the mutual interactions of numerous ecosystems for evolutionary growth. Instead, Professor Rosenstand’s novel digital ecosphere canvas is constituted by a series of interlinked market verticals and horizontals.

Figure 2 shows how market verticals are made up of those digital ecosystems which maintain global value propositions. More specifically, these value propositions are linked by digital transformations, though each of those transformations will pertain to a specific domain (an example might be a digital transformation in the financial sector).

Market horizontals, on the other hand, will meet the requirements of a diverse array of businesses across a multitude of industries. This will require the shared cultivation of plans and proposals and key resources across numerous ecosystems. The canvas is open to other horizontal players regarding such things as investment, business models, accelerators, etc. The digital ecosphere canvas can be utilised in support of exponential growth and can cultivate further digital ecosystems within the digital disruptive domain. Importantly, the canvas highlights where initiatives which are publicly supported might have an influence on individual ecosystems.

An important objective for future research will be to assess how Professor Rosenstand’s canvas might transcend the digital sector and work in relation to other industries and ecospheres, potentially even non-digital industries. Professor Rosenstand notes, however, that digital connection might be essential for the sort of ecosystem reconfiguration he is thinking of.

**SUPPORTING THE DIGITAL ECOSPHERE**

Digital Hub Denmark supports the digital ecosphere by matching private companies, researchers, tech-entrepreneurs, and students to the development of new digital products, services, and business models. The hub delivers marketing, delegations, and special initiatives, including campaigns to attract digital talents, and tech-alliances through (virtual) delegations to attract customers. It also provides a mapping of the digital ecosystem’s more than 1,000 digital tech-businesses to attract talent, investors, and consumers. Digital Hub Denmark also hosts meetings where innovation managers from all seven ecosystems join the CEO of Digital Hub Denmark, Professor Rosenstand, and special guests to plan the progress of the Danish digital ecosphere along the trajectory to the attraction phase, by selecting, combining, and cultivating national digital ecosystems where Denmark has a global stronghold. The aim is for Denmark to have significantly more global market shares in the industries represented by the Danish digital ecosphere than expected for the country’s size (0.8 million inhabitants).