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### **Context and Objectives**

Over the last years, many actors from the medical technology (Medtech) industries have formed innovation ecosystems to foster technological as well as social innovation while facing demanding regulatory bodies to develop, commercialise, and sustain innovative technologies on the market. These ecosystems often bring into play small and medium-sized enterprises (SMEs), universities, hospitals, non-profit organisations, and end-users that collaborate to create valuable innovations. The heterogeneity and interdependencies among these actors require specific “orchestrating” activities to ensure value creation in the ecosystem. The purpose of this paper is to identify and characterize the capabilities required for actors to carry out these orchestration activities in Medtech innovation ecosystems.

The concept of “ecosystems” was first introduced by Moore (1993) and aimed at describing a new type of business environment in which actors collaborate while competing with each other (Adner, 2017; Moore, 1993; Thomas & Autio, 2020) and fulfil their own interests (Leten et al., 2013). Compared to other territorial models of innovation such as industrial districts, clusters and regional innovation systems, innovation ecosystems are more dynamic (Thomas & Autio, 2020; Valkokari et al., 2017) and evolve as market conditions change (Mercan & Göktaş, 2011). Besides, compared to biological ecosystems, artificial ecosystems do not develop solely on their own and a form of governance is required (Adner & Kapoor, 2010).

Past research has shown that “orchestration” is required to create and sustain innovation ecosystems over time (Autio, 2021; Chen et al., 2019; Yaghmaie & Vanhaverbeke, 2019). Ecosystem orchestrators are responsible for aligning actors towards common goals, providing stability, and ensuring a fair distribution of the created value (Lingens, Huber & Gassmann, 2021). Achieving ecosystem alignment requires orchestrating activities such as attracting, coordinating and aligning actors (Äyväri & Spilling, 2020; Linde et al., 2021; Lingens, Böger & Gassmann, 2021; Roijackers et al., 2013; Still et al., 2014), and creating and capturing value to ensure ecosystem renewal (Chen et al., 2019; Lingens, Huber & Gassmann 2021; Yaghmaie & Vanhaverbeke, 2019). However, when it comes to the capabilities required to perform these orchestration activities, empirical research is needed.

## Research Questions

This paper draws on the dynamic capabilities framework to explore orchestration capabilities in Medtech innovation ecosystems, defined as “*communit[ies] of hierarchically independent, yet interdependent heterogeneous participants who collectively generate an ecosystem output and related value offering targeted at a defined audience*” (Thomas & Autio, 2020, p. 38). At the firm level, dynamic capabilities refer to the “*ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environment*” (Teece et al., 1997, p. 516). At the ecosystem level, dynamic capabilities help stimulate value creation and the ecosystem renewal (Feng et al., 2019; Heaton et al., 2019; Helfat & Raubitschek, 2018; Linde et al., 2021). Following past research linking ecosystems and dynamic capabilities, this paper aims to answer the two following research questions:

1. How does the dynamic capabilities framework enable a better understanding of ecosystem orchestration activities?
2. How does the study of heterogeneous ecosystems such as the Medtech enrich the nascent literature on dynamic capabilities in ecosystems?

## Methodology

This research is part of “ANR Dynsanté”, a larger national research project investigating three Medtech innovation ecosystems in three different regions in France, namely Nouvelle-Aquitaine, Grand-Est and Bretagne.

In terms of context, the French Medtech innovation ecosystem is highly regulated. Regulation bodies and policymakers have an important influence on the innovation capabilities of the Medtech industries. As medical technologies are designed for human health, they must undergo a strict regulatory process before being commercialised (Klein, 2015). When accepted by regulatory bodies, Medtech innovations may also fail to find a market, for instance because the perceptions of potential users were not considered during the innovation process (Habib et al., 2017). As reported, the lack of integration of patients and health professionals during the innovation process weakens the understanding of the usage conditions of these innovative solutions in real life, as well as their desirability and global accessibility (Organisation Mondiale de la Santé, 2012).

As for the case selection, we focused on a single-case study (Yin, 2018) of the innovation ecosystem “Handicap Innovation Territoire” (HIT) in Bretagne, and particularly on

the history and development of one of its central actors called Cowork'HIT. Cowork'HIT is an innovation centre that collaborates with different partners to offer innovative solutions for patients with a handicap. Its mission is to guide and assist innovation and to reinforce the participation of users with a handicap in the innovation by co-developing products for, with and by the users. It aims at creating the conditions necessary to the development of an economic industry on the handicap, an industry that remains underdeveloped in France. This paper advanced the hypothesis that Cowork'HIT, and potentially other actors, carries out orchestrating activities in the HIT innovation ecosystem.

As for the data collection and analysis, the article drew on the single case study to identify the different capabilities of Cowork'HIT to perform orchestrating activities, either alone or along with other actors. Data collection involved semi-structured interviews as well as observation of and participation in the projects of Cowork'HIT. A thematic analysis was conducted to analyse the data (Miles & Huberman, 1994).

### **Expected Findings and Contributions**

Interviews with Cowork'HIT suggested an ability to sense opportunities by connecting actors when one needs complementary knowledge or when the ecosystem develops a shared innovation. Preliminary findings also demonstrated the importance of a common history among actors for reconfiguring the ecosystem and developing capabilities. The findings of this research will contribute to the recent literature that links dynamic capabilities with ecosystems (Feng et al., 2019; Heaton et al., 2019; Helfat & Raubitschek, 2018; Linde et al., 2021), by explaining how dynamic capabilities for orchestration can benefit an entire ecosystem rather than a unique actor. The research will also provide advice for orchestrators on the capabilities required to organise and sustain their ecosystems over time. The expected insights may also be relevant to policymakers and can help them to better regulate the emergence innovation ecosystems. This research can provide policymakers with a tool for establishing policies that foster the emergence of orchestrators, thus improving the coordination and performance of innovation ecosystems.

Following a temporal logic, three types of impact can be distinguished depending on the maturity of the innovation ecosystem. First, during the emergence phase, policies should be designed such that they promote and support actors to develop new technologies. By providing a description and the characteristics of potential orchestrating firms in innovation ecosystems, the research project can assist policymakers by giving them the tools to detect and eventually favour such firms, and indirectly improve the innovation capabilities of other ecosystem actors.

Then, during the growth phase of innovation ecosystems, means of control may become necessary. The future insights may enable policymakers to better control how innovation and coordination take place, to adjust regulations in order to promote inclusive innovation, and to better support this type of innovation. Stronger control over innovation ecosystems in the MedTech industry can attract investors that may be more confident in funding and investing in medical technologies projects.

By knowing the importance and role of orchestrators in innovation ecosystems, policymakers can help companies to improve their innovation processes by creating policies that ensure the innovative solutions are relevant and appropriate to users. Such policies would also ensure that the commercialised solutions find the right market, and thus, reduce the risk of failure. Finally, the insights from the research project can be relevant for policies designed for the sustaining phase of innovation ecosystems. This mostly refers to the indicators for the assessment of the performance of ecosystems mentioned earlier. Such an assessment could measure the impact innovation ecosystems have on a region and the added value it brings in terms of social and economic factors. Overall, the research can contribute to practical policymaking by providing insights on the design, follow-up, control, support, and assessment of innovation ecosystems thanks to a better understanding of how orchestrating firms manage the coordination of all actors within the ecosystem.

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