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FRAMEWORK FOR KEY ECOSYSTEM LEGITIMIZATION ATTRIBUTES

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FOREWORD

Technologies are shaped by the ecosystems that deploy them. Our understanding of these ecosystems, in turn, arose initially from studies of competition in high-tech industries, where the decisions of third parties, such as complementors, helped grow the scale and scope of ecosystems and determined the outcome of competition between rival ecosystems. Since then, they have been studied more carefully by academics. These studies have shown the importance of underlying factors, such as network effects, where the value of an item depends, in part, on whether others already have it. The influence of technical standards has also been important to the emergence of ecosystems. These standards help reduce complexity in a technological system and enable that system to evolve more fluidly, with a broader set of contributors.

These early studies were conducted primarily from the perspectives of innovation economics and technical complexity. Since the time of those studies, many ecosystems have grown to a size that far exceeded the expectations of earlier scholars. More recently, particularly in the case of digital technologies, some of these same ecosystems are now showing signs of retreat—even the possibility of collapse. To understand these new dynamics, a more sociological set of factors has emerged that complement our earlier understanding of ecosystems. These sociological factors center around social acceptance, or legitimacy, rather than concepts of profit and loss or scale and scope. It is now clear, for example, that many of the social networks that provide digital services to consumers are now running into limits in their ability to continue operating and growing. Any further growth will arise only if and when the underlying social legitimation of these digital services is renegotiated.

The importance of a sociological lens for understanding legitimacy in ecosystems is further reinforced by the expansion of the scope of many ecosystems. Rather than being only big, these ecosystems now offer a variety of services and products that span several industries, connecting sectors that have so far remained disconnected or unrelated. Many offer services, such as those in health and well-being, that transcend the boundaries of economic transactions and intermesh with the everyday lives and activities of individuals, organizations, and groups. It has become clear by now that the role digital technologies play in ecosystem emergence and growth is more than offering technical support or connectivity. Ecosystems are also shaped by the digital technologies adopted. Some technologies may evolve toward a more decentralized system of governance, while others may show opposite tendencies. As such, a sociological lens also

contributes to a better comprehension of the dynamics of these ecosystems. Including technologies in the study of ecosystem legitimacy complements our earlier understanding of ecosystems and sets the stage for the study of ecosystems in an increasingly digitized society.
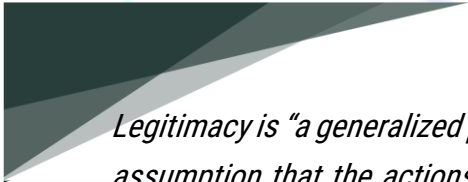
This report adopts this sociological perspective, as the EINST4INE project examines questions of innovation, grand challenges, and the possibilities of open innovation and sustainability. Inside, you will find several case studies that are underway, and you will see how social legitimation processes are informing the rise of these new practices. There will undoubtedly be failure cases along the way, and these too will likely require a sociological dimension to understand their lack of acceptance in society.

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1. INTRODUCTION

Legitimacy concerns the reputation and status of any organization in the eyes of different individuals, audiences, and broader society. Therefore, legitimacy is important for different types of innovation ecosystems and their leaders, as it reflects external stakeholders' views of whether the actions of the ecosystem fit with the expectations of those stakeholders. If the expectations of those stakeholders are not met, the ecosystem's legitimacy is compromised, and it is unlikely to be able to (co)create or capture value with the stakeholders who make this judgment of inappropriate action (Hakala et al., 2017).

Legitimacy is *"a generalized perception or assumption that the actions of an entity **are desirable, proper, or appropriate** within some **socially constructed** system of **norms, values, beliefs**, and definitions"*

Suchman, 1995:574

Ecosystem legitimacy is of interest not just to the ecosystem actors themselves but also to a variety of stakeholders within society. For example, societies are exposed to ill-intended economic behavior by organizations and ecosystems, such as false claims about sustainability or misleading marketing messages.

Actions such as government interventions against organizations that act against society's interests are strong signs of the loss of legitimacy for those organizations and indicate inappropriate behavior. In addition, individual customers will jump off as users of different products and services if their perceptions of those actors are negative. Therefore, judgments about legitimacy by different audiences act as guidelines for keeping an innovation ecosystem aligned with appropriate actions and expectations. The evaluation of legitimacy is subjective; hence, not all evaluators will necessarily make the same judgment. However, willingness to collaborate with the ecosystem is strongly linked to the perceived legitimacy of the ecosystem.

Example: The importance of legitimacy is illustrated by the recent controversies surrounding the ecosystems of Facebook and Twitter.

Facebook is among the most adopted digital platforms in the world, and its user base ranges across all countries and continents. The legitimacy of Facebook was contested in the well-documented incident, where the personal data of users were collected without consent from a consulting agency, Cambridge Analytica, and this information was used for political campaign advertising.

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More recent controversies surround Twitter, which was acquired by an investor group led by billionaire Elon Musk. The new centralized ownership and staff layoffs have contested the legitimacy of Twitter and resulted in some advertisers (at least temporarily) stopping advertising on the platform, leading some users to exit the platform.

Actors and stakeholders in innovation ecosystems need clarity in their communications and activities to establish legitimacy successfully and avoid these challenges. Using this framework, we aim to illustrate how legitimacy is created in different industrial environments and contexts. We discuss what it takes to establish legitimacy in an innovation ecosystem and why it is not easy to build legitimacy. The lack of legitimacy is a crucial challenge, especially when innovation ecosystems are new; in other words, ecosystems need to establish legitimacy in the beginning in order to become plausible and credible actors. Once legitimacy is established, it tends to persist, even during reputational crises. Ecosystem actors need to be aware of the effects of their actions on internal and external audiences, as well as how the ecosystem is judged by society at large. Orchestrators of innovation ecosystems need to be aware that it is important to comply with social expectations and benefit from being informed about key social rules, practices, regulations, and standards.

As individuals, we make judgments about social issues, facts, and other individuals, groups, or organizations. However, in the social sciences, legitimacy refers to a society's *collective perception*[1] that the behavior and actions of a particular organization are desirable and in alignment with social norms and values; this standard is often, not always, beyond the requirements set by legislation.[2] In other words, legitimacy is socially constructed, as it results from a continuous process of social judgments and negotiations among multiple and diverse actors in a given society (Suddaby et al., 2017).

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[1] Collective perception refers to members of a given society having a similar or shared perspective on a specific issue.

[2] In jurisprudence and international law literature, the word legitimacy may have different meaning and connotation than it has in the social sciences and management literature.

Main academic definition of legitimacy:

Legitimacy is "a generalized perception or assumption that the actions of an entity **are desirable, proper, or appropriate** within some **socially constructed** system of **norms, values, beliefs**, and definitions" (Suchman, 1995:574).

Societal perspective:

Legitimate behavior corresponds to prevailing **social rules and laws**. Behavior that is legitimate agrees with ordinary, representative**, cultural behavior, and expectations**, according to local views of what is appropriate and acceptable.

Legitimacy refers to a society's perception and evaluation of the behavior of an organization that is suitable, rightful, and acceptable. If an organization's behavior corresponds to social views of what is respectable, tolerable, and adequate, it is in line with the expectations of society. The behavior then is legitimate.

The evaluation of the behavior of organizations is made by society based on observation and experience. An organization is seen as legitimate by a large group of people through an honest, fair, and unbiased assessment of its behavior. This assessment is made by many people in society, often based on stories, narratives, discussions, numbers, and facts. An organization has legitimacy (as evaluated by society) or does not have it. The decision about whether legitimacy is given or not is made and supported by many and is thus an established matter and unquestioned (Suchman, 1995).

Individual perspective:

The creation of legitimacy happens in people's minds. This means that every individual makes up their own mind about whether something is suitable, adequate, and acceptable (Suchman, 1995).

Institutional perspective:

Legitimacy is a condition **reflecting perceived consonance with relevant rules and laws**, normative support, and alignment with cultural–cognitive frameworks, which are displayed in a way that is visible to outsiders (Scott, 2013).

2. LEGITIMACY IN ECOSYSTEMS

An ecosystem is a community structure of independent participants (e.g., organizations, individuals, and non-profits) who depend on each other in order to accomplish a mutual goal or purpose. Together with other members of an ecosystem, participants collaboratively create value propositions that require complementary inputs from multiple ecosystem participants.

Example: ResQ Club is a Finnish-based platform ecosystem that focuses on food waste reduction by connecting the users of its application with luncheons that can sell leftover food to those users at a discounted price. The legitimacy of the ResQ club has increased due to its joining a broader societal movement related to food waste reduction. While the low price of food is a major attraction to its users, this 'higher purpose' helps it to increase its legitimacy among multiple stakeholders. The legitimacy is further increased as more users and luncheons join the platform—driving both network effects and legitimacy, as the platform appears more and more a plausible alternative and gives increasing options to choose a different variety of food and more potential customers for providers of those food items.

Advances in digital technologies *have transformed* modern organizations, institutions, and ways of working and have led to the emergence of different ecosystems and platforms. Digital technologies enable us to do more complex things at a much faster pace and to be less dependent on geographical proximity in more interconnected ways than before. In this increasingly digital world, as individual actors, we also become more interdependent, and we often have to coordinate our own actions with the actions of others in the same community. Ecosystems enable us to do things we could not do before, such as remote communication with large audiences, and they help us achieve a level of cooperation and scaling that was not previously possible.

For an ecosystem to succeed, its members need to have a common and motivating goal for all parties; however, there is more nuance to it. Even if the different parties share a goal, there is still a lot of alignment that has to happen or be in place for successful' collaboration. So, even if every party agrees that, for example, we need to reduce carbon in our society, the different parties might approach the same goal very differently and have completely different priorities, schedules

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for action, etc.; all this might leave little to no common place for collaboration. To achieve this necessary alignment for succeeding in their common goals and collaborative endeavors, ecosystems employ various governance or orchestration mechanisms.

Alignments in ecosystems are often, but not always, realized through platform facilitation (i.e., by setting and enforcing the rules of the platform for platform users). While not all ecosystems are platform-based, many other governance mechanisms exist to achieve alignment. This involves the definition of roles, the creation of mutually beneficial structures, and the setting up of incentives or actions that serve to complete each other's tasks.

Members of an ecosystem contribute to a joint value proposition that benefits the clients and stakeholders (participants) of that ecosystem.

Example: Apple's ecosystem is an example of how various companies collaborate for a shared offer; in this case, the offers consist of Apple products and services. Apple, Cisco, Aon, and Allianz have strong ties, illustrated by the thick lines, as they have strong contractual relationships to help Apple with its cybersecurity and insurance. In contrast, app developers do not have strong alliance ties (dotted lines) with Apple and are regulated only by the formal rules set in place by Apple. Adobe, DropBox, and Microsoft are examples, as they need to create complementary products and services and adapt their technical infrastructure to work on Apple's platform. In turn, Apple needs to improve its iOS toolkit to help app developers. Finally, Office Depot does not have any formal or informal relationship that goes further than a buyer–supplier relationship *(Shipilov & Gawer, 2020)*.
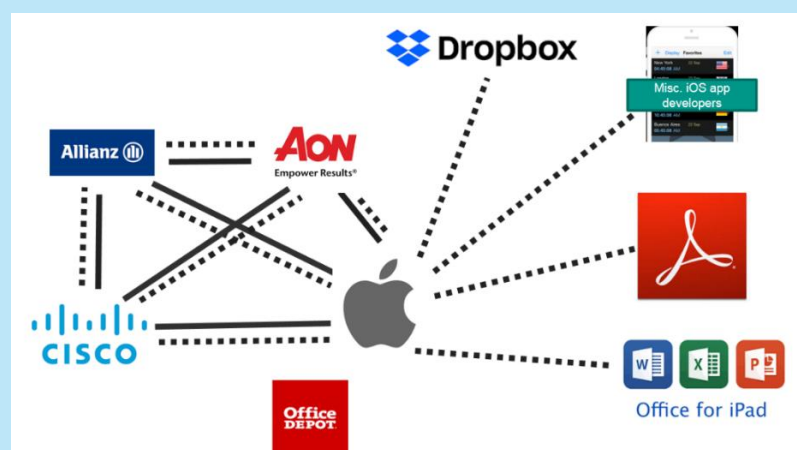
_____ Network relationships *(within and between organizations)*

. . . . . Mutually benefitting or improving connections *(complementarities)*

Visualization: Apple ecosystem; source: Shipilov and Gawer (2020).

Building legitimacy is one of the most challenging aspects of building an ecosystem. When ecosystems are initially built or set up, they naturally lack legitimacy. Being unknown and unfamiliar is the main disadvantage of a new ecosystem. This results from the fact that public perceptions do not yet exist. When ecosystems are being built, they do not have much visibility or status. Unknown and unrecognized ecosystems suffer from "the liability of newness" (Thomas & Ritala, 2022). However, legitimacy is particularly important during the starting phase of a new ecosystem. Just as a new product needs to be introduced to a market, the market audience needs to become aware of a new ecosystem. As potential participants, clients, or buyers of a product or service from that ecosystem, we want to know what its product or service looks like and what it does or can do. It needs to become known before it is acknowledged as an appropriate, suitable, and desirable community (i.e., before legitimacy is built).

Let's imagine that a company wants to set up an ecosystem around it. They have a name for it and possibly a core value proposition that consists of combating climate change, for example. They want to create an environment that promotes the interaction and exchange of knowledge between actors to become more sustainable. However, the media does not say much about this company, even less so about its ecosystem. Their website, social media activity, and presence on other channels are still nonexistent or minimal and therefore gather very little attention. Increasing awareness (e.g., by enhancing its media presence) and the ties of the ecosystem across different industries and societies (e.g., by building synergies across sectors) could allow a company and its nascent ecosystem to overcome this level of unfamiliarity.

The more information the audience can find about the ecosystem's purpose and goals, the better they can evaluate its legitimacy. When the audience agrees with those purposes and goals, they are more likely to judge the ecosystem as legitimate. Communication is therefore a key issue in ecosystems becoming better known to their environment and hence affects how it is evaluated in terms of legitimacy.

2.1 ECOSYSTEM LEGITIMATING ACTORS AND ACTIONS

Legitimacy is not just about communication; it is actually more about the 'real' actions of various actors inside and outside the ecosystem and how they are communicated. While an ecosystem's value proposition is often seen as being built mainly by the orchestrator and the complementary actors, legitimacy is affected not only by the actions of ecosystem members but also by those of its external environment.

Actors in ecosystems are participants, and people involved in or affected by the actions of the ecosystem (*stakeholders*) play an important role in the construction of legitimacy. Yet, how do different actors inside an ecosystem (such as users and participants) and actors outside an ecosystem contribute to its legitimacy?

Four different groups in and around ecosystems can be distinguished:

- **Orchestrator(s)**
- **Complementary actors**
- **Users**
- **External actors (including media, policymakers, etc.)**

Orchestrator(s) of an ecosystem play a central role. An orchestrator shapes the design, identity, and goals of an ecosystem. Sometimes, orchestrators are also called 'ecosystem leaders,' 'hubs,' or 'keystone actors.' In newly set-up ecosystems, orchestrators' activities are particularly important. A new and unknown ecosystem lacks legitimacy. Therefore, it is an orchestrator's task to reassure participants that advantages and benefits will be created by the ecosystem. At the same time, an orchestrator also needs to create enthusiasm for users and external actors and convince them of the ecosystem's potential, stability, strength, and staying power. Both actions contribute to an ecosystem's legitimacy.

The task of an orchestrator is to promote the advantages of an ecosystem to audiences inside and outside of it. In this way, they influence other participants' ability to connect with one another. By connecting participants, complementary actors, and users, an orchestrator supports actors in establishing and maintaining relationships inside and outside the ecosystem. Orchestrators use different governance mechanisms to facilitate the shared goals of an ecosystem.

Ultrahack [3] is an orchestrator of hackathons. They create temporary innovation ecosystems that are formed for the duration of the hackathon events and that last for a few days. Ultrahack orchestrates actors in temporary innovation ecosystems and facilitates the generation of innovative ideas and solutions. Ultrahack promotes the advantages of hackathons for corporate and SME (Small and Medium-sized Enterprise) clients to embed digital innovations into their strategies. Having established relationships in over 12 countries, they are known internationally for their hackathon events. As part of a Finnish start-up ecosystem, they have successfully executed more than 150 challenges through their hackathon processes. Ultrahack's expertise, relationships, and international presence promote its legitimacy and enable clients to experience and make use of open innovation mechanisms through hackathons.

Orchestrators also need to create legitimacy for themselves. As the coordinating figure/actor in an ecosystem, they need to take strategic action to be recognized as the central actor who has the duty and right to decision-making. If an orchestrator acts against the ecosystem's rules and expected behavior, the audience may not take its orchestration activities seriously. In such cases, the legitimacy of the orchestrator is lost, and ecosystem complementors, as well as the end customers, might desert the ecosystem.

Self-organizing actions, without an orchestrator, are another possible form of organizing ecosystem leadership when participants organize an ecosystem with collective processes. Participants then interact and develop the ecosystem together in a bottom-up manner. In Section 3, you will find three illustrative cases of the orchestrator's role in different contexts.

Complementary actors (or complementors) provide their inputs, innovation, and resources to the ecosystem. In an ecosystem, complementary actors are needed to formulate, develop, and deliver the ecosystem's value proposition to outside communities and audiences.

Complementary actors in ecosystems bring assets that are essential to the ecosystem—they help bring the ecosystem alive. Collectively, the complementors can be very important for the ecosystem offering—but less so individually. These assets are of benefit to other ecosystem

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[3] A fast-paced innovation challenge consultancy company, Ultrahack provides development opportunities for innovation across the globe. Ultrahack was founded in 2015 and is based in Espoo, Helsinki (Finland). Refer to their website https://ultrahack.org/about-us to learn more about this case.

participants and can demonstrate an ecosystem's ability to be operational. They also show an external audience that an ecosystem can survive. Complementary actors, therefore, play an important role in ecosystem building. Their participation in an ecosystem and their assets benefit the ecosystem as a whole and support the ecosystem's legitimacy.

Users of an ecosystem benefit from its value proposition. Users can be inside or outside an ecosystem and, therefore, can also be perceived as external actors. They contribute to its legitimacy by demonstrating its viability and, in the end, by attracting more users to the ecosystem. The bigger the number of ecosystem users (e.g., individuals using a service or a product) and the stronger the relationship with different user groups, the larger the potential to attract more users and the better the effect on ecosystem promotion. Users often act as signals for those evaluating the legitimacy that an ecosystem can produce useful benefits. The way users perceive specific characteristics of a new ecosystem and its benefits plays an important role in its promotion and success. User perceptions of what makes an emerging ecosystem's offer unique are also crucial to its success.

For instance, Google search capabilities benefit not only the core search engine but also all product offerings (e.g., YouTube, Google Maps, etc.). Because so many people use Google, the company is able to extend and improve its features and functions, which in turn increases its legitimacy. Most platforms today have benefited from the word-of-mouth of satisfied customers, which has contributed to the legitimacy of businesses and their growing ecosystems.

As a second example of how users help legitimacy, consider Ultrahack, which has built relationships with a large community of hackers. When a hackathon is joined by many hackers, this helps to promote or confirm legitimacy. However, there are also drawbacks to the registration of a large number of hackers for an event. A considerable number of hackers registered for a hackathon can demotivate other hackers to join the hackathon. This can be counterbalanced by promoting the hackathon contest ahead of the event (Hu et al., 2022).

External actors—such as the media, authorities, market competitors, and financial and other analysts—can facilitate the build-up of legitimacy for a new ecosystem. They also support the maintenance of legitimacy once the ecosystem is established.

Media, both traditional and social, have been found to have journalism, and its published articles play an important role in validating our legitimacy judgments and how we perceive and interpret different issues, challenges, and opportunities (e.g., Bitektine & Haack, 2015). Just think of how positive media reviews might affect your choice of restaurant, car, or holiday destination? Similarly, endorsements and labels awarded by external actors, such as credit ratings, fair trade labels, or accreditations, affect how legitimate we evaluate organizations. Additionally, simply the home country of the organization may have effects (think technology, e.g., made in Germany vs. made in Russia). Even competitors might help legitimize an ecosystem; for example, when an established market actor makes changes to its offerings in response to the offering of the new entrant, it also acknowledges the legitimacy of this entrant.

A variety of actions contribute to ecosystem legitimacy. Some of these legitimizing actions include collective action and actions of the ecosystem leaders, such as orchestrating.

Collective action refers to a group of people taking action together to enhance their condition and achieve a common objective. For ecosystem legitimation, this provides a means of overcoming the disadvantages of a newly set-up ecosystem. As ecosystem identity building happens through social movements, when feelings of unity can be promoted through participant discourse, collective action contributes to the build-up of an ecosystem's identity.

As previously mentioned, the ResQ Club platform ecosystem was able to effectively build legitimacy by responding to food waste concerns, a generalized perception held by society; therefore, users and participants could quickly understand and resonate with the sustainability mission that they wanted to support.

Innovation contests, such as hackathons, are examples of organized collective action (see the Ultrahack case in Section 3.1). Hackathon events happen in an organizational space outside of a traditional firm, and they often have several firms participating in them. The hackathon participants are loosely connected actors who form a temporary social group organized as an innovation ecosystem. Participants are mobilized to take collective action as a team, without the need for a long-lasting structure, such as an established company. During a hackathon, teams self-organize, take action collectively,

and create an output. Participants and other actors present at the event get a sense of community. When a hackathon event has ended, the teams dissolve, and the outputs can be found in new services or products for existing problems. Another output is communication to specific audiences or the general public via social media, websites, or other media channels.

Hackers' changing emotions influence the temporary structure of a hackathon and contribute to value creation. Participants' emotions are an important driver in the organization of hackathons. Emotions also play an important part in holding hacker communities together. Hackathons take place in changing locations and are organized in nonhierarchical, informal ways. The events exemplify a new form of work as they make use of the blurring of barriers between work life and free time and socializing. As temporary innovation ecosystems, hackathons are also seen as opportunities for emotional experience and connection, learning, and networking (Endrissat & Islam, 2022).

A different example is the citizen engagement hackathon CITIZENSHACK2022.[4] In the experiment that took place in February 2022, the goal was to combine the characteristics of a hackathon model with citizen-driven knowledge valorization. Knowledge valorization refers to the creation of value from knowledge and to the transformation of ideas and knowledge into innovative solutions that benefit society at large. Through different channels for knowledge valorization, the European valorization policy supports knowledge transformation, including start-ups, spinoffs, intellectual property management, and citizen engagement. One of these valorization channels is industry–academia collaboration, which promotes mutual exchange between knowledge creators, such as researchers and actors from the business side. This advances industry competitiveness, encourages private research investment, and leads to growth in patents and inventions. It can facilitate knowledge and talent flows and boost the entrepreneurial culture.[5]

A bottom-up approach was used, and citizens who participated could define the challenges. Citizens could collaborate with researchers to solve issues that affect their lives. It showed that citizens often define the challenges they want to address to improve their lives in a realistic way. In CITIZENSHACK2022, the hackathon formula was adapted

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[4] European Commission, Directorate-General for Research and Innovation. (2022). Valorising research through citizens' engagement : how to run hackathons with citizens, (I,Pottaki,editor) Publications Office of the European Union. https://data.europa.eu/doi/10.2777/83875

[5] European Commission, Directorate-General for Research and Innovation. (2021). Valorisation policies : making research results work for society : industry-academia collaboration, Publications Office. https://data.europa.eu/doi/10.2777/573275

to a citizen-driven innovation process to test how value can be effectively co-created between researchers and citizens. Seen as a starting point of an innovation process, a citizens' hackathon can be a useful tool to boost creativity and to develop and test ideas.

Orchestration is a form of leadership often used effectively in a situation where the actors in an ecosystem are independent, yet they depend on each other and need to align to a certain extent in order to achieve highly complex common goals. The task of orchestration is usually taken by individual, usually powerful actors; however, each ecosystem actor can potentially take that role and influence the whole ecosystem. Moreover, ecosystem members can collectively take action to drive changes in the ecosystem. Such actions usually lead to the mobilization of resources and actors and to legitimation.

For instance, ARENA2036 [6] can be considered orchestrators driving change in the industrial ecosystem of Baden-Württemberg. Alongside the other participants in the ecosystem (partners from science, industry, and government), they are shaping the future of work and technological change for the automotive and production industry. This has been enabled by providing an industrial, flexible factory as an open co-working space where diverse partners, such as Daimler, Bosch, and Fraunhofer (to name a few), can co-create the future of production and mobility.

Ultrahack orchestrates temporary innovation contests. Many different actors participate in a hackathon ecosystem, and they are aligned by Ultrahack's orchestration. With its partners, Ultrahack provides and orchestrates opportunities for physical on-site or online communication, learning, collaboration, and idea development and presentation.

Similarly, Enel[7] has orchestrated a viable ecosystem around sustainable energy and renewable resources. By building a platform (e.g., OpenInnovability.com) and having physical meeting points (e.g., innovation hubs), the company and its ecosystem partners are able to connect physically and virtually, which helps the ecosystem generate new ideas and solutions regarding activities related to sustainable energy production.

Various actions are taken by a wide range of actors inside and outside an ecosystem. Many different actors contribute in a variety of ways to an ecosystem's legitimacy.

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[6] A research campus based in Baden- Württemberg (Germany) that provides an innovation platform for cooperation between science and industry with a main focus on future mobility. Refer to Section 3.2 and its website www.arena2036.de to learn more about this case.

[7] Founded in 1962, Enel is now one of the world's largest player in renewable energy sector, targeting SDG goals for a more sustainable future. Refer to Section 3.3 and its website www.enel.it to learn more about this case.

2.2 DISCURSIVE LEGITIMATION: PROMOTION OF ACCEPTANCE AND COMPREHENSIBILITY

Discursive legitimation aims to build a shared understanding of the ecosystem's purpose. Legitimation takes place through communication with the goal of advancing the ecosystem's acceptance by the public or different audiences and encouraging actors' ambition to participate in it. Communicating for legitimation is also done by developing, announcing, and circulating designs, logos, emblems, or images between the ecosystem and the broader environment, as well as the public. Legitimation through communication is thus achieved by motivating and convincing stakeholders to familiarize themselves with the ecosystem, view it favorably, and potentially participate in it.

Discursive legitimation in ecosystems involves four processes by different actors.

Framing is an activity that an ecosystem orchestrator can do to improve how ecosystem actors and society at large perceive the ecosystem.

➢ *Familiarity* – strategically framing a new ecosystem as similar to existing and well-known ecosystems demonstrates familiarity. This can help shape audiences' perceptions of a new ecosystem as legitimate.

> **Example:** When audiences perceive a new tool or device as familiar, they are more likely to adopt it. The history of inventions clearly shows the importance of users perceiving an invention to be similar to an existing technology. Electric light as a technology was not known at first. However, when light bulbs were given a shape similar to flames, they were perceived as familiar and therefore acceptable. This suggests that technical superiority alone is not enough to make a new device legitimate (Suddaby, 2017:21).

➤ *Public interest* – frames can focus on gaining legitimacy from society in general and overcome resistance by building the offering on or selling the offering as an existing public interest.

> **Example: Ultrahack** frames many of its innovation contests in the context of broader societal goals and Sustainable Development Goals (SDGs). It highlights the impact on specific SDGs or areas. This increases its legitimacy. In its public communication and the set-up of hackathon events, Ultrahack strengthens its legitimacy by creating links to leading public agencies that promote broader societal interests. Examples are Ultrahack's publicly communicated collaborations with agencies such as EIT Digital, HUS, the City of Espoo, the City of Helsinki, and hackathon challenges that address SDGs.
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> Another example is presented by the JFE Engineering Corporation, which publicizes its collaboration activities with **NextChem,**[8] one of the leaders in the transformation of waste products into chemicals. The public announcement of this collaboration aims to address several SDGs.
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➤ *Market leadership* – depending on the market, ecosystem leaders can strategically build their position as a leader in order to legitimate the perception of themselves, and the ecosystem as a result.

> **Example:** When the software-as-a-service market was not well established yet, Salesforce[9] made use of its social position as a 'market leader' to increase media exposure, user satisfaction, and access to resources and therefore legitimate itself (Snihur et al., 2018).

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[8] NextChem is a subsidiary of Maire Tecnimont, created to focus on Green Chemistry and Energy Transition technologies. Refer to Section 3.3 and its website nextchem.it to learn more about this case.
[9] www.salesforce.com

Sensemaking is done by ecosystem participants (such as complementary service or content providers) who cooperate to create, understand, and make sense of what the ecosystem offers to its users. Participants develop and share their views on the ecosystem. They understand the potential for action through intense collaboration, and together, they find out what is possible and desirable to achieve. For instance, complementary ecosystem participants make sense of the ecosystem by finding out more about technologies, tools, and the potential value of the emerging ecosystem.

Sensemaking is intensified through shared stories, appealing talks, speeches or commentaries, and powerful ways of describing shared qualities. The emphasis on predictability, control, and the power to perform support sensemaking and acceptability. Organizing outreach activities or events, such as workshops and conferences, strengthens sensemaking, inspires collaboration, and shows possibilities for future action.

For instance, ARENA2036 consistently hosts workshops, events, and conferences in its facility, which contributes to a range of sensemaking opportunities for ecosystem participants. To illustrate a few ways that this happens, partners from 'different worlds' (engineers, managers, students, etc.) are able to connect and interact on a personal level at breakfasts or coffee talks, giving external actors a guided tour of the space so that they can see the technology and co-working in action, allowing partners to share and present their work at conferences and project status days, so there is a higher level of visibility and comprehensibility.

Furthermore, Ultrahack provides informational webinars for hackers before the deadline for registration. This gives potential participants, the hackers, the chance to understand in more detail what the innovation contest is about. Ultrahack gives the hacker community the opportunity to make sense of the hackathon before they make the decision to join.

Lastly, Enel also organizes regular conferences and local events around its core themes of sustainable energy. With its innovation hubs spread across different parts of the world, Enel aims to create a shared space for start-ups and other actors to connect, creating a community around renewable energy technologies.

Positioning is when the characteristics of an ecosystem are decided by its users. It is different from sensemaking, which consists of collective experiments and an understanding of the value proposition by complementors. Positioning is done by the users (such as individual customers) of the ecosystem, who collaboratively determine the purpose of the ecosystem's value proposition. Users' evaluation of an ecosystem's offer needs to consider emotional and symbolic aspects of user perception as well as functional and economic aspects. The distinctiveness of an ecosystem's offer is decisive for its perception as a legitimate ecosystem.

For example, many of Amazon's users decide that its offering is very valuable when they enjoy the benefits of a very broad marketplace, low prices, and often very fast delivery. This proposition is reliable, which makes it easy and convenient as opposed to spending time, energy, and more money to find these items in stores or from less reliable competitors—it is generally known to the user that they can trust they will receive a good product on time. Similarly, potential users actually refuse to use the marketplace despite this, based on more emotional considerations, since Amazon has sparked a number of controversies related to the exploitation of their employees and the damage it causes to the environment.[10]

Recognizing an ecosystem from the perspective of external actors—such as the media, regulators, or governmental actors—is important for legitimation. Recognition of an ecosystem can happen through awards or being referenced in a lexicon, by releasing books, or by being mentioned in the press.

For instance, Amazon.com was thoroughly analyzed and covered in the press during the dotcom period, with differing opinions about it. The intense press coverage was a signal to investors of its legitimacy. Thus, the outsiders of an ecosystem, such as the media, regulators, or analysts, have an important influence on the evolution of ecosystem legitimacy.

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[10] https://www.businessinsider.com/why-you-should-and-shouldnt-feel-good-supporting-amazon-2019-7?r=US&IR=T

2.3 PERFORMATIVE LEGITIMATION: CONCRETE ACTIONS

Performative legitimation is a process in which ecosystem legitimacy emerges through ongoing and concrete actions conducted by the ecosystem orchestrator, complementors, users, and external actors. In other words, an ecosystem needs to show its audiences that it is able to live, grow, and develop in a viable way.

Performative legitimation in ecosystems appears via the following four processes.

Strategic action takes place when participants and clients take action to prove that joining the ecosystem will result in better performance. They point out the benefits to others and show why it is better if they joined the ecosystem than if they did not join. To achieve this, the ecosystem orchestrator, complementors, and participants can take action to show the value of the ecosystem. This demonstrates to others that being part of the ecosystem is beneficial and that the ecosystem itself is superior to other forms of collaboration, which helps build legitimacy.

Organizations actively engage in various forms of strategic action,[11] including:

➢ *Voluntary disclosure of information* – contributes to the transparency of firms in their ecosystem. A firm might either choose to disclose a code that other actors can use, for example, in the case of Tesla, or a firm can choose to disclose some information about its financial health, which tells about its general market position and growth. Based on which information firms choose to disclose (internally and/or externally), they might shape the opinions of ecosystem members and the wider society to increase their legitimacy.

Example: Firms such as Tesla[12] have voluntarily released and opened some of their software in the hope that other car manufacturers will make electric vehicles. When building a company around sustainable driving, creating patents would block other manufacturers from doing the same. For Elon Musk, the founder of Tesla, this goes against the idea of sustainable change. By being transparent and disclosing some of its technology, Tesla is able to create sustainable relationships with other actors and strengthen the purpose and identity of the company.

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[11] https://corpgov.law.harvard.edu/2022/10/13/whats-esg-got-to-do-with-it/

[12] https://www.tesla.com/pt_PT/blog/all-our-patent-are-belong-you

➢ **Signaling of performance** – of a firm or an ecosystem, which can also improve its position and overcome legitimacy issues.

> **Example:** Companies in the renewable energy sector often participate in rankings and sustainable performance comparisons, acquire certificates of excellence, and advertise their medals in their company profile. These symbolize their positive achievements and development.

➢ **Voluntary reporting** – global regulations are shaping the environmental, social, and governance (ESG) disclosure landscape of companies. Regulations require increasing disclosure, especially in terms of ESGs from firms, to assess, align, and comply with institutional goals.

> **Example:** Some voluntary reporting of ESGs can be done through the publication of sustainability reports and advertised through press releases. Other examples can be letters from the board, diversity, equity, and inclusion reports, etc.

➢ **Adhering to standards and norms** – on an institutional level, firms can adhere to standards and norms by complying with current regulations. Many ecosystems of firms have adopted sustainability goals for their core value proposition, adopting the United Nations SDGs, for example. Others comply with certain regulations set by approved associations that appoint labels and seals to inform about a company's compliance with certain health regulations, for instance. Adhering to these standards sets a readiness to comply with and grow alongside the standards of society.

> **Example:** Firms that label their products with organic seals, such as the "USDA organic," "ECOCERT," and the EU organic logo, aim to increase their perceived value by consumers, as these symbolize the ethical practices of the firm.

Value realization is achieved by an ecosystem when it delivers a more applicable/workable/feasible solution than other offers do. The offering of an ecosystem is successful when it is more effective and better at addressing user needs. As a collective, an ecosystem generates value for its users through the activities of the orchestrator and complementors. An ecosystem's value offering changes over time, and value realization is thus an ongoing process.

Adoption of the ecosystem by its users improves legitimacy as the ecosystem grows and becomes more prominent. For instance, in social media platforms (e.g., Instagram, Twitter, and WhatsApp), the number of users demonstrates to potential new users that the ecosystem is broadly legitimate. Moreover, increasing adoption concretely improves the value of a (platform) ecosystem for its users via the well-known mechanism of network effects: the more users, the more valuable a platform ecosystem (just think of Facebook or Instagram, for instance). Similarly, if other already legitimate organizations join or use these platforms, this further signals their viability and performance.

Intervention by external actors, such as financiers, has a strong influence on ecosystem legitimacy. Being able to raise investments, get loans, issue stocks, or accomplish a successful Initial Public Offering sends strong signals for legitimacy to the audience and environment. Other external interventions are competitions in which quality and certifications are awarded by analysts or by the media.

Example: The Marine Stewardship Council (MSC), the world's largest fisheries certification program, is an example where its legitimacy has been criticized in the public eye. Previously, the MSC label was an indicator of reliability that consumer goods displaying the iconic blue label had been sustainably and responsibly sourced. A controversial Netflix documentary, Seaspiracy, accused it of certifying fisheries with a high level of "bycatch," whereby sea life, such as dolphins and turtles, is caught in fishing nets. Here, the media, particularly social media, played a major role in exacerbating the coverage of exposure in a highly emotive and provocative way, contributing to the social movements of concerned citizens regarding overfishing and the health of our oceans. The result reignited a fierce debate among users as to what it means when you see a blue MSC label on a fish package in the supermarket.

3. THE WALK AND TALK OF LEGITIMACY: CASE STUDIES

3.1 ULTRAHACK: ORCHESTRATORS OF IDEA GENERATION

ULTRAHACK

Figure 1: Ultrahack innovation contest (source: Ultrahack)

Idea generation through hackathons

Hackathons are digitally enabled temporary events, and participation in them is free and voluntary. They happen outside an organization (firm), and they are organized by a hackathon-organizing company. Participants in hackathons are often students or postgraduates, engineers, business analysts, data scientists, and professionals with different backgrounds, as well as start-ups and corporate teams. Participants join a hackathon on their own or as a team. Individuals joining a hackathon are matched and assigned to a team by the organizer. In their teams, hackers create prototypes or Minimum Viable Products and present their solutions to an audience (Endrissat & Islam, 2022).

Ultrahack is a firm that organizes hackathons and facilitates innovation through idea generation. They combine hackathons, innovation platforms, and accelerators. Ultrahack collaborates with industry, public organizations, and Non-Governmental Organizations. The company is based in Helsinki, Finland. Its mission is to build a community where technology talent and industry partners can meet and collaborate during a hackathon event. By leveraging the latest technologies, tools, and Application Programming Interfaces, Ultrahack enables future innovation for its clients.[13]

Ultrahack uses collaboration tools, such as Zoom, Microsoft Meet, Miro, Slack, and others, for the delivery of their hackathon events. This makes the interaction between companies and hackers effective both online and in hybrid or physical events on-site. Through their innovation contests, Ultrahack provides an innovation space, forms teams, delivers mentoring, and facilitates idea generation. They create collaboration spaces for their clients from both industry and the public sector. During a hackathon event, Ultrahack facilitates technological knowledge exchange between participants, mentors, and partners.

[13] www.ultrahack.org

XR, MR, and 5G mmW hackathon

The goal of the XR and 5G mmW Hackathon Challenge was to create new services utilizing the new XR and fast 5G mmW network at Nokia Arena. Augmented reality (AR) and virtual reality (VR) technologies offer a range of new experiences to the user, and the same underlying technologies power extended reality (XR). XR is an umbrella term. It includes AR, VR, mixed reality (MR), and anything in between. Like smartphones today, mobile XR has the potential to become one of the world's most widely used technologies.[14]

XR + 5G MMW HACKATHON CHALLENGE

POWERED BY
ULTRAHACK

Figure 2: Ultrahack innovation contest (source: Ultrahack)

The incentives for participants in the XR hackathon included the chance for participants to get to know the "state of the art MR and 5G mmWave connectivity can transform the way we live." In the hackathon, the participants could demonstrate their "skills to quickly develop XR concepts using real data sets," and they had the chance to "collaborate with global technology leaders Qualcomm, Nokia, Elisa, CGI, and the city of Tampere."[15]

Importantly, hackathon participants got the chance to get their hands on state-of-the-art smart glasses and the fastest commercial 5G mmW network in Europe to develop their ideas. In a unique combination, the hackathon brought together real-city datasets from Tampere City, AR, and 5G mmW technology in one place. The hackathon inspired new use cases and application concepts.

Figure 3: XR + 5G mmW hackathon (source: Ultrahack)

TEMPORARY INNOVATION ECOSYSTEMS

As temporary innovation challenges, hackathons are organized in the form of events. During a hackathon event, a temporary space is provided for diverse groups of actors, such as engineers and firms, to interact directly and solve problems. They create a supportive environment in which hacker teams can collaborate and co-create. A hackathon event usually lasts around two to three

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[14] https://www.qualcomm.com/research/extended-reality
[15] https://ultrahack.org/xr-5g-hackathon-challenge

days. Hackathons often take place over a weekend, so participants need to be willing to spend their free time in the event and to do intense work without any financial compensation.

Location

Each hackathon happens at a different location. They can take different formats, such as on-site, where they bring ecosystem actors together locally, in hybrid mode, or fully online. During the last three years, many hackathon events have been held solely online. In the summer of 2022, the first on-site hackathons were held again after the pandemic. Nowadays, hackathons often take place in a hybrid format, giving participants and mentors the option to join online or on-site.

An important effect of the event taking place on-site or in hybrid mode is the opportunity for direct, face-to-face interaction and the community feeling and social bonds that come along with it. A key focus for Ultrahack is thus matchmaking activity and community building.

Legitimacy building in temporary ecosystems

A hackathon event sets up a temporary ecosystem. The hackathon participants, mentors, complementary actors, and sponsors are usually not the same for each event; they change with each hackathon. Ultrahack, as the

orchestrator, creates the innovation challenge with its clients (i.e., the sponsors of the hackathon, whose problems the participants will solve). Due to the temporary nature of the event, a new event-specific temporary innovation ecosystem must be set up for each hackathon by the orchestrator. Legitimacy must be created through communication, such as organizing marketing campaigns and reaching out to potential participants. Naturally, some of the legitimacy of Ultrahack as an orchestrator, and its hackathon events, will carry over to the next hackathons, especially if future participants have heard about past events or the organization.

Ultrahack, as the orchestrator, must use persuasion and negotiation techniques to encourage actors to participate during their free time. Building strong relationships with participant communities is part of Ultrahack´s legitimacy creation; they regularly reach out to them. Through this strategic action, Ultrahack builds long-lasting relationships and legitimacy with the hacker community and thus manages to regularly attract participants to its events.

The creation of positive feelings during a hackathon event leads to social bonding among the actors. Legitimacy is successfully built when the hackathon is joined by many participants who spend their free time at the event without being compensated for it.

3.2 ARENA2036: THE INNOVATION PLATFORM FOR THE FUTURE OF PRODUCTION AND MOBILITY

ARENA2036 stands for "**A**ctive **R**esearch **E**nvironment for the **N**ext generation of **A**utomobiles" and is one of nine research campi of the funding initiative "Research Campus – Public-Private Partnership for Innovations" in Germany. Acting as an innovation hub, they have fostered an

ecosystem around developing and shaping technological change for the future of mobility and production. This has been brought about by establishing and linking the industrial sector with the sciences and providing a co-creative and collaborative workspace for them. To be clear, the 'platform' that they refer to is a physical space and not a digital platform.

Figure 4: ARENA2036 Shop Floor (source: arena2036.de)

> " For me, ARENA2036 is a platform where creativity is born, ideas grow and finally find themselves in real products. Through cross-industry and cross-technology cooperation, a unique working atmosphere is created, which contributes to the success of projects and establishes connections. "
>
> Peter Froeschle – CEO, ARENA2036

Orchestrators must create and sustain legitimacy to foster and support an ecosystem. At ARENA2036, this is managed by a skilled and dynamic research coordination team. To bring together diverse partners, they harness their competencies in developing close relationships to have a deep understanding of their goals and needs, as well as to create a beneficial environment in which to co-create. A key strength of their model is an inspiring collaborative space and institutional infrastructure to foster trust and safety between complementors and users, who are often competitors or have largely differing goals.

At present (November 2022), ARENA2036 can be considered in a 'later-stage startup' phase since its establishment in 2012. During this 10-year period, a number of key attributes led to the creation of their legitimacy and thus contributed to their success. On the next page, we provide an overview of the key ecosystem actors and their legitimating contributions to date.

MAPPING THE ECOSYSTEM ACTORS

Orchestrator ARENA2036

- Shapes goals enabling easier connections between complementors and users (predominantly between science and industry)
- Reassures participants that value will be cocreated (influencing acceptance)
- Provides the platform that is used as the coordinating framework

Users 40+ partners (startups, SMEs, MNCs, research institutes)

- Being a member of the ecosystem (increasing adoption and comprehensibility)
- Deriving benefit from the ecosystem (new technological advances, testing, use cases, research outputs, etc.)

Complementors DLR Deutsches Zentrum für Luft- und Raumfahrt German Aerospace Center — DAIMLER — DITF DEUTSCHE INSTITUTE FÜR TEXTIL+FASERFORSCHUNG — BASF We create chemistry — University of Stuttgart Germany — BOSCH — Fraunhofer

- Provides complementary inputs (knowledge and technology transfer) to the ecosystem value proposition (shaping technological change)
- Enhances the ecosystems comprehensibility by association
- Contributes to the viability of the ecosystem through collective competencies.

External Actors Federal Ministry of Education and Research — PtJ Projektträger Jülich Forschungszentrum Jülich — EFRE Investition in Ihre Zukunft. — FORSCHUNGS CAMPUS öffentlich-private Part für Innovationen — and more.

- Signal to other stakeholders the value of the ecosystem (via portfolio of investors and funding)
- Contribute to ecosystem viability and visibility (through partner public relations and media coverage)
- Establish and enforce standards to the ecosystem and its societal role (by the Federal Ministry as a "Research Campus – Public-Private Partnership for Innovation" initiative)

3.3 ENEL & MAIRE TECNIMONT: ECOSYSTEM FORMATION FOR A SUSTAINABLE ENERGY TRANSITION

Since the early 2000s, as companies have increasingly departed from traditional pipeline business models to more modern forms of strategy, they are also increasingly opening up firm boundaries to leverage the power of digital transformation and collaboration. While the energy and manufacturing industry has been a late adopter of digital technologies, more and more companies are investing in leveraging the power of digital technologies and shifting their activities to more sustainable ones.
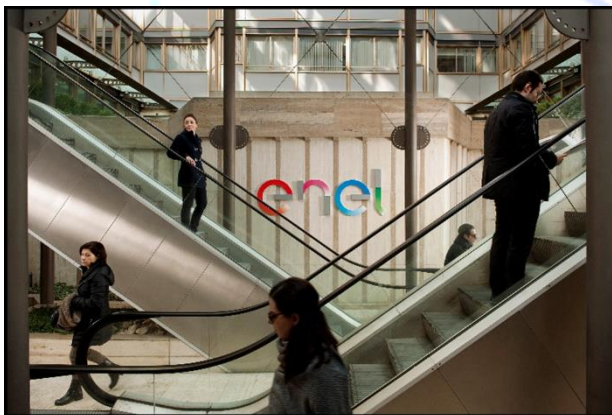

Figure 5: Enel headquarters, Rome (source: Enel Group)

In 2019, Enel was the largest private network operator in the world and the world's largest player in renewables. With its headquarters in Rome, Italy, Enel shifted the company to an *Open Power Strategy*, meaning that while addressing climate change, Enel would contribute to the green and ethical energy transition while also encouraging the cooperation of people within and outside the organization.

Enel's vision is to tackle some grand challenges addressed by the SDGs. Specifically, Enel mostly aims to address SDG 7 and 13:

Enel's strategy pursues shared value creation by ensuring the prosperity of the community in which the company is embedded. By effectively addressing societal challenges, companies can generate value for businesses and the wider society. Through its *Open Innovability model*, combining sustainability and innovation, Enel connects all areas of the company with start-ups, industrial partners, SMEs, universities, and research centers.

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Ecosystem infrastructure:

OpenInnovability.com crowdsourcing platform and global innovation hubs

Enel tells its partners in its innovation ecosystem about the innovation challenges that arise within the group. The ecosystem (comprised, for instance, of entrepreneurs, companies, venture capital investors, universities, regulators, etc.) then works together to create new solutions for many different uses, such as e-mobility, microgrids, energy efficiency, and the industrial Internet of things. The managers of each innovation hub are responsible for caring for the relationships between the innovation partners.

Another channel for sharing innovation challenges with partners is the Openinnovability.com platform, where the company launches challenges and invites submissions of project proposals. Successful proposals gain access to the hubs and can scale up their solutions across Enel's ecosystem.

For Enel and its ecosystem, innovation challenges are closely tied to the company's top strategic goal, which is to speed up the global energy transition by making energy use less carbon-intensive and more electric.

Enel is not a new company; thus, the "liability of Newness" did not need to be overcome at first when the ecosystem emerged. Laying the ground for legitimacy, Enel already had some partnerships and collaborations in different international locations. Through its platform, Enel was able to extend and reinforce its sustainable business core with the help of an already existing and long-standing legitimate energy business, as well as legitimate connections and cooperation with institutions that they have been caring for since the 2000s.

MAIRE TECNIMONT

NextChem
Maire Tecnimont for Energy Transition

More recently, another Italian company active in sustainable energy production is Maire Tecnimont. Maire Tecnimont is an international leader in the engineering and construction of industrial plants with a strong technological attitude. The company was founded in 1983, slowly growing through strategic acquisitions over the years.

A trend in society materialized—there is now a willingness to pay for biodegradable plastic, as advances in technology have also reduced the price of "green" products. Maire Tecnimont saw an opportunity and launched NextChem, a subsidiary that specializes in green chemistry. Through it, the company was able to gather many of its dispersed technologies and experiences in one place, with a focus on a wider exchange of ideas and resources, ultimately orchestrating a viable ecosystem around environmentally sustainable production, waste reduction, and a circular economy.
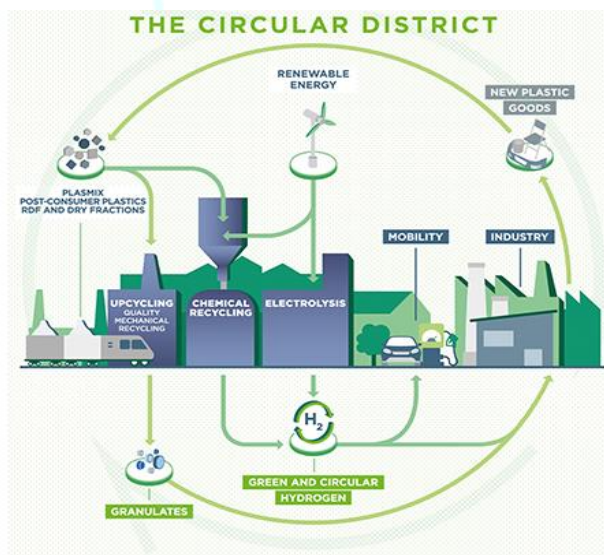

Figure 6: NextChems Green Circular District model, integrating technologies for decarbonization and recycling. Source: NextChem

Founded in 2018, NextChem is already part of local ecosystems, such as the MIND ecosystem and Open Italy. These are aimed at sharing technologies regarding sustainable development.

In March 2022, the Maire Tecnimont Group strengthened its position among the leading companies in the energy transition and sustainability sector by obtaining, in March 2022, the rating "AA" from Morgan Stanley Capital International Research and the rating "Gold" from Ecovadis; it is is among the leading ESG rating agencies, which assesses the ESG performances of the major companies around the world.

There has not yet been an assessment of NextChem's ecosystem. However, the subsidiary has benefited the company group as a whole, glowing with positive, sustainable returns, as mentioned in the sustainability reports. It has earned good ratings and positive labels and associations, helping to gain legitimacy in broader business and societal contexts. Furthermore, it is part of various established ecosystems, such as the MIND and Open Italy ecosystems. NextChem can benefit from the legitimacy of the other actors that equally contribute to the overall legitimacy of the ecosystem.

Challenges linked to legitimacy for sustainable ecosystems:

1. Societies are very skeptical about companies being largely profit-oriented. In particular, the energy industry is a very lucrative business for many; the challenge is for companies to have their sustainable goals perceived as legitimate.
2. Through general media outlets, many cases of companies not reaching their emission goals or those with green-washing scandals are being outed. For these companies, establishing or entering a sustainable ecosystem might be a challenge.
3. Some "new" sustainable technologies (solar panels, wind turbines, etc.) are also met with criticism in local communities. Cooperation of the environment and community trust are viable aspects to consider for ecological projects.

Societal and environmental challenges do not go unheard and are met with a great deal of scrutiny by the larger institutional public. Thus, legitimacy relies on the fact that numbers speak louder than promises:

1. As a *voluntary reporting strategy*, Maire Tecnimont and Enel equally publish sustainability reports showing their sustainable practices (also through media reports, articles in the press, interviews, etc.).
2. As a *signaling strategy*, both companies take part in various rankings and publish their rankings (e.g., Maire Tecnimont and the Gold rating from Ecovadis). They attend and organize events for an exchange of innovation and sustainable practices (e.g., innovation hub events).
3. In terms of *adhering to standards and norms*, the companies have integrated SDGs into their strategies. Furthermore, both companies have created foundations aimed at better communicating and understanding the social aspect, as well as contributing to a better society (i.e., meeting the needs of the community and access to affordable energy). This increases legitimacy in society.
4. Lastly, NextChem, for instance, is part of larger, already established ecosystems. This can help new entrants gain legitimacy faster.

4. CONCLUSION

Ecosystem legitimacy is a complex matter. It differs from organizational legitimacy, where the legitimacy is granted by 'others' by the factor that the evaluators of legitimacy are, to a larger extent, both inside and outside of the ecosystem. Legitimacy is a phenomenon that involves the diverse legitimation efforts of multiple actors at different levels. For example, the following questions need to be explored in further research and practice:

- How do ecosystem orchestrators construct legitimacy? What are the key practices and mechanisms to achieve this?
- What are the roles of other ecosystem actors in gaining legitimacy? Are there, for instance, powerful complementors that can either make or break the legitimacy challenge for new ecosystems?
- How can ecosystems facilitate legitimacy by joining different social movements and institutional causes, such as sustainable development, a circular economy, or the battle against poverty?
- How does legitimacy affect organizations' decisions to form, join, stay in, or exit digital ecosystems?
- How can digital technologies be deployed to improve and expand the legitimacy of ecosystems?
- How do digital technologies affect the dynamics of legitimacy?

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ABOUT THE EINST4INE PROJECT

The European Training Network for InduStry Digital Transformation across Innovation Ecosystems (EINST4INE) is a consortium of universities, research organizations and industry partners working in the domain of industrial digital transformation. EINST4INE aims to develop new concepts, approaches, and methods in the area of digital transformation and brings together a unique group of world-leading experts in the areas of Open Innovation, Industry 4.0, digital transformation, and innovation ecosystems.
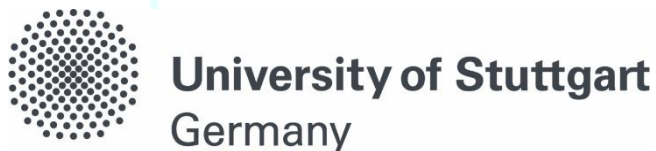
Work Package 4: Orchestrating innovation ecosystems

This Deliverable 4.1 is part of Work Package 4 in the EINST4INE project. This Work Package has the objective to understand the orchestration of innovation ecosystems in an increasingly digital organizing environment. It will develop a knowledge base on how to develop, facilitate, manage, and scale innovation ecosystems, and on the role of open innovation mechanisms in orchestrating innovation ecosystems to address environmental sustainability.

The authors of this deliverable are all collaborating through this work package which includes three ESRs (Early-Stage Researchers) and their supervisors who are leading experts in these fields. More information about the project and research team can be found on https://www.einst4ine.eu

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