Towards Dynamic Clustering: Capabilities and IT enablers

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Abstract

“Industry clusters” are systemic agglomerations of enterprises with common or complementary business interests. Firms in clusters benefit from sharing the fixed costs of common resources, such as infrastructure and services, skilled labor pools, specialized suppliers, and a common knowledge base. These sources of productivity lie outside of individual firms, and economists refer to them as “external economies of scale” (Marshall, 1920). Given that these factors are geographically concentrated, the benefits of clusters are traditionally associated with spatial proximity. But in the 21st century, one can posit a new way of clustering based on networking of knowledge and competencies that goes beyond geographical proximity and that overcomes the “inward looking” nature associated with traditional clusters and Italian “industrial districts”.

This paper sets forth emerging forms of “virtual” clusters that transcend location, focus on international markets, operate as ad-hoc business networks, are IT-enabled and based on dynamic aggregation of capabilities of different (often small) firms. The working hypothesis is that these new organizational arrangements, which in this paper are called “extended dynamic clustering” (EDC), can help small companies position themselves better in terms of global market access and innovation. The paper also discusses roles for information technology applications, and suggests a research agenda and potential policy implications.

Business Networks: Cluster Precursors

A decade ago, networks were the policy of choice for increasing industrial competitiveness. Major networking programs were promoted, supported, and studied by United Nations Industrial Development Organization, the World Bank, USAID, the European Union, and Organization for Economic Cooperation and Development (Rosenberg, 2005). The transition from policies to build networks to policies to build clusters—and to a large extent back to networks—is a story of evolving economic development practices.

In the 1980s, when international competition and rapid technological change forced massive restructuring across industries, Miles and Snow (1986) introduced their view of enterprise networks as a flexible, fluctuating and dynamic structure. Within the trend toward disaggregation and looser coupling, managers experimented with various organizational arrangements. Instead of using plans and schedules, and transfer prices to coordinate internal units, they turned to contracts and other exchange agreements to link together external components into various network structures. The “flexible manufacturing network” was rediscovered in western Europe—particularly in northern Italy—where inter-firm collaboration was documented and explained by researchers (Brusco 1982, and Sabel 1989) and supported by organizations such as the National Confederation of Artisans in Emilia Romagna and the Steinbeis Foundation in Baden Wurttemburg. The idea was simple: companies would join together to achieve economic goals unattainable by an individual organization on its own. They would network to produce more complex goods, extend their market reach, acquire costly resources or services, or simply reduce costs.

In 1990, the Danish Technological Institute in Århus designed what became the standard policy model to increase networking among small and mid-sized enterprises (SMEs). It consisted by five steps: 1) publicizing the concept among SMEs; 2) training network brokers
to organize and facilitate networks; 3) training “multipliers” (e.g., accountants, consultants, and lawyers) to identify potential network opportunities; 4) creating a three phase grants program as incentives for organizing networks that agreed to collaborate on hard business opportunities, developing plans, and implementation; and 5) evaluating the outcomes. The goal was to create a program that would change the behavior of SMEs and create the culture of cooperation observed in northern Italy.

Numerous network typologies can be found in the literature (Powell, 1990). Proposals range from strategic hub-and-satellite networks as in the automotive industry (Kerwood, 1995), clan-like structures as in Japanese Keiretsus (Ouchi, 1980) and regional networks up to temporary networks and dynamic virtual organizations. Some distinguish between “soft” and “hard” networks (Williams, 1996). “Hard networks” are relatively small groups of companies that have been established to achieve concrete business objectives such as entering new markets, joint product development, co-production, or co-marketing and are likely to require formal agreements for sharing profits or resources. Hard networks are thus formed with a specific “bottom line” motivation. Firms in “soft networks” also expect to make money but not necessarily through contractual business ventures. The soft networks have open membership, tackle generic issues, and provide some general services. They depend on membership fees for part of their funding, and thus tend to be quite large. Their goals and structures are similar to trade associations.

Most research on business networks has focused on the general characteristics of organically evolved networks, and on their structure and development processes. Less attention has been paid to intentionally developed nets and their management, with the notable exceptions of the work of Jarillo (1993) and Parolini (1999) on value nets, and the emerging theory of network governance in economic sociology and strategic management (Amit and Zott 2001, Gulati et al 2000, Jones et al., 1997). The challenges involved in operating in a complex network remain fairly unarticulated. Relevant issues in this context are: the coordination of tasks and processes within networks, the allocation of orders, the measurement of surplus or utility and the distribution of profits. Future research should aim at the development of network management. Such research could integrate notions from Industrial Network Theory and the Dynamic Capabilities View (Moller et al., 2002) in order to identify the basic capabilities required in managing different types of strategic networks, and to elaborate their characteristics and interrelatedness.

**Perspectives on Regional Clusters**

Like networks, clusters are composed of firms that co-locate around a variety of common interests or needs. But, unlike networks, neither “membership” in an organization nor cooperation is required to be “in” a cluster. “Free riders,” simply by virtue of geography, are able to realize non-exclusive external economies that accrue to members of cluster associations, including access to information that flows informally.

Regional clusters are examples of external economies derived from industrial localization. They are self-reinforcing agglomerations of technical skill, venture capital, specialized suppliers, infrastructure, and spillovers of knowledge associated with proximity to universities and informal information flows (Hall and Markusen, 1985; Arthur, 1990). Porter’s identification of local agglomerations, based on a large-scale empirical analysis of the internationally competitive industries for several countries, has been especially influential, and his term “industrial cluster” has become the standard concept in this field (Porter, 1998, 2010). A cluster includes groups of companies and/or services and all of the public and private entities on which they depend, including suppliers, consultants, bankers, lawyers, education and training providers, business and professional associations, and government agencies.
2001). Also, the work of Krugman (1991, 1996) has been concerned with the economic theory of the spatial localization of industry. Both authors have argued that the economic geography of a nation is key to understanding its growth and international competitiveness.

Clustering gives businesses an advantage over more isolated competitors. It provides access to more suppliers and support services, to experienced and skilled labor pools, and to the inevitable transfer of knowledge that occurs where people casually meet and talk business. Clustering enables companies to focus on what they know and do best; they need not do things they do not do well. Firms also benefit from synergy. Companies able to operate more or less as a system can use their resources more efficiently and collectively produce more than the sum of their individual outputs.

Among the advantages of clustering, none is as important as access to innovation, knowledge, and know-how. Industry-specific knowledge and know-how is created and diffused through entrepreneurial initiatives and innovative companies. Firms gain from greater access to tacit knowledge, the movement of knowledge that occurs intentionally among friends and colleagues and unintentionally when employees change jobs. This perspective suggests a social network model of clusters. A social network approach provides insights into the structure and dynamics of regional clusters by focusing on the relationships between firms and the social structures and institutions of their particular localities (Powell, 1990; Nohria and Eccles, 1992). This view has been used to explain the divergent trajectories of Silicon Valley and Boston’s Route 128 economies (Saxenian, 1994).

The Challenges of Globalization: Small firms within and beyond clusters

The trend towards globalization of the economy poses a number of challenges to the smaller firms in traditional clusters. Often, due to size, scale, specialization and not least regulatory and legal impediments, SMEs lack the capacity to respond adequately to market opportunities or participate in tenders in international procurement contracts. This shortcoming is related to both the conditions that SMEs face and the operation of geographically based clusters. More specifically, one can distinguish ‘internal’ reasons (specific to the SMEs) and ‘external’ reasons (specific to clusters and insufficiently developed cross-border and cross-regional collaboration mechanisms among clusters):

- **Internal reasons** have to do with limited resources and competences. SMEs often do not possess all the relevant skills and competencies, and cannot afford the specialized human resources (e.g. legal, and technical expertise) required to participate in collaborative cross-border or cross-region processes for the co-creation and delivery of products and services;

- **External reasons** span from the perceived complexities of international contract negotiation, to trust and financial issues, as well as the perceived disadvantages in terms of size and skills (e.g. SMEs may rule themselves out when they know that some large competitors will be bidding). External reasons include also regulatory and legal gaps that create roadblocks to cross-border collaboration, contract negotiation, intra- and inter-cluster governance policy and institutional issues which hinder the formation and efficient operation of cross-border and cross-regional collaborative networks.

From these two perspectives, a fundamental challenge is how to facilitate linkages, not only among SMEs within a given cluster but also how to build such capacity across clusters and networks of SMEs. This challenge involves building ‘internal’ capabilities by enhancing the organizational, knowledge and technological capacity of SMEs to enter into cross-border and cross-regional collaborative processes for jointly producing and delivering products and services. It also involves building ‘external’ capacity in the environments in which SMEs and
their clusters operate. In other words, if the ‘internal’ set of issues refers to the business challenges SMEs face, the ‘external’ issues concern the ‘enabling framework’ that will facilitate cross-border and cross-regional collaboration among SME clusters.

The Extended Dynamic Cluster: a New Paradigm

For the purposes of this paper, “extended dynamic” clusters are conceptualized as virtual clusters that transcend location, focus on interregional or international markets, are IT-enabled, operate as ad-hoc business networks that can aggregate and reconfigure capabilities from different firms. “Dynamic” clusters can integrate SMEs involved in different production processes or operating in different markets. The advantage is that the resulting “extended dynamic” cluster is much more responsive and enjoys a steep learning curve.

Changes inside the cluster (e.g. changing or adding a key new partner) can bring significant changes in the ability to respond to opportunities in the market. This involves a knowledge-transfer process. Let’s consider, for example, a cluster specialized in producing mechanical parts and tools for the automotive sector. They decide to respond to a tender from an aerospace company, and, because they lack some necessary skills, they decide to include in the cluster a supplier operating in the aerospace sector. The added competence of this new partner gives the cluster the possibility not only to go to the new market place, but to learn “by immersion” in a new industrial environment. This “full immersion learning” is learning not only from the new partner, but also from all the players in the aerospace environment, i.e. customers, competitors, suppliers, the regulatory agency, etc. Thus, in a short period of time, the cluster learns and evolves into a “new” type of cluster that now can operate in a new sector. Repeating this process several times improves the dynamic capabilities and thus the flexibility of the cluster to innovate, incorporate new technologies and tackle new markets.

One way to understand the notion of “extended dynamic” clustering is by positioning this new construct against traditional forms of business agglomeration, e.g. industrial clusters, and business networks. The diagram in figure 1 shows the two dimensions that characterize this evolved cluster form.

![Figure 1: Clustering typology](image)

The horizontal dimension is based on the typology found in the literature on business networks that differentiates “dynamic” from “static” business relationships. Miles and Snow (1986) introduced their view of enterprise networks as flexible, fluctuating and dynamic structures. They point out that, while some networks bring suppliers, producers, and
distributors together in long-term stable relationships (i.e. “stable networks”), other networks are much more dynamic, with components along the value chain coupled contractually for perhaps a single project or product and then decoupled and reconfigured to be part of a new value chain for the next business venture (i.e. “dynamic networks”).

The vertical dimension represents the geographic reach of the network, i.e. the space in which a given (extended) cluster operates. This dimension can be operationalized essentially as the average geographic distance between the networked firms. In practice, it may be useful to differentiate between local, regional, national, and transnational domains. This differentiation may be particularly important for network governance. Both governance issues and policy recommendations are likely to differ at local, regional, national and supra-national level.

**Capabilities for Dynamic Clustering**

The strategic management literature has traditionally focused on analyses of firm-level strategies for sustaining and protecting extant competitive advantage, but has performed less well with respect to assisting in the understanding of how and why certain firms build competitive advantage in regimes of rapid change. To address this problem, researchers have focused on “dynamic capabilities” which are defined as the “ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (Teece et al., 1997).

Dynamic capabilities reflect “the ability to learn new domains” (Danneels 2002). Hence, their value lies in the configurations of functional competencies they create (Eisenhardt and Martin 2000, Zott 2003). For example, by spotting market trends and accordingly revamping functional competencies, dynamic capabilities can prevent rigidities (Leonard-Barton 1992) and competency traps (March 1991). Also, by replacing outdated configurations of functional competencies and architecting more relevant ones, dynamic capabilities can create better matches between the new configurations of functional competencies and environmental conditions (Teece et al. 1997).

Reconfiguration is generally viewed as the ultimate outcome of dynamic capabilities. Most studies in the dynamic capabilities literature stress the importance of reconfiguring existing resources into new configurations of functional competencies. For example, reconfigurability refers to the timeliness and efficiency by which existing resources can be reconfigured (Galunic and Rodan 1998, Zott 2003). It refers also to the concept of ‘combinative capabilities’ (Kogut and Zander 1992) that describes the novel synthesis of existing resources into new applications. Eisenhardt and Brown (1999) refer to the ability to “quickly reconfigure resources into the right chunks at the right scale to address shifting market opportunities”. Applied to extended clusters, the concept of “dynamic capabilities” implies that SMEs networks can re-deploy their existing competencies to build new products or services through innovative, aggregated competencies that better match emerging market and technological needs.

The dynamic capabilities and related literatures describe four processes that drive reconfiguration for innovation:

- Sensing the environment (market orientation): Sensing helps understand the environment, identify market needs, and spot new opportunities (Zahra and George 2002).
- Learning: Learning builds new thinking, generates new knowledge, and enhances existing resources (Zollo and Winter 2002).
- Coordinating Activities: Coordinating helps allocate resources, assign tasks, and synchronize activities (Teece et al. 1997).
Integrating Resources: Structuring interactions among partners and integrating resources helps implement architectural innovations (Grant 1996, Henderson and Clark 1990).

While dynamic capabilities can reconfigure all resources (Prahalad and Ramaswamy 2004), it is important to stress the role of knowledge as an intangible resource (Galunic and Rodan 1998). Leonard-Barton (1992) argues that as resources become less tangible, but explicitly codified, they will be easier to reconfigure.

The Role of Information Technology

Much has been made of the potential of ICT to enable a de-spatialization of economic activity. Cairncross (2001), among others, posits that with the introduction of the Internet and new communications technologies, distance as a relevant factor in the conduct of business is becoming irrelevant. She contends that the “death of distance” will be the single most important economic force shaping all of society over the next half century.

Indeed, the advent of the Internet and overnight delivery reduces the value of localization economies, i.e., access to the lower cost intermediary inputs to production, including parts, services, and information at a distance. Proximity still matters for critical components that are knowledge intensive and depend on interactive research and design or special expertise for assembly or utilization, but many of the sectors included in standard cluster maps are of diminishing economic advantage. Future research will thus have to look at “extended” clusters as geographically proximate complex organizational systems of learning and economic and social activity that are globally networked and enabled by the effective application of IT. These are some of the key questions:

- How will IT affect traditionally perceived needs for physical proximity and introduce “virtual” proximity as a complement to physical proximity?
- Can “virtual” clusters be expected to emerge and/or develop, in part, as a result of the widespread application of IT?
- What combinations of physically proximate and “virtual” arrangements best augment the social and economic performance of networked clusters?

One way to address these questions is by focusing on the processes that enable “extended” and “dynamic” clustering as identified above and envisioning different ways in which IT can play a relevant role. The following sections discuss potential roles of information technology to enable clustering capabilities along the two dimensions identified earlier, i.e. virtual proximity capabilities and dynamic clustering capabilities.

IT and Virtual Proximity

In traditional clusters, the need for physical proximity has led to regional agglomerations. The geographic boundaries of these clusters are set by the distances that those in firms and entrepreneurs are willing to travel for informal face-to-face meetings and by how far employees are willing to travel to work. But relying exclusively on physical proximity limits the available talent pool and the access to specialized facilities. So there is a strong case for taking advantage of IT to link to remote professionals and resources, and to other organizations through ties such as alliances, partnerships, and information-exchanges. The underlying assumption here is that geographical proximity, collegiality, and group membership does not bound communication. Indeed, employees rely increasingly on information from outside their group and outside their organization for accomplishing their tasks, (Wellman 2001, Hargadon and Sutton 1997).
These boundary-spanning links make organizations more open systems whose boundaries are more permeable to information from the outside. They function as interconnectors between multiple networks, providing access to new information and more creative problem solving (Jarvenpaa and Ives 1994). For example, Robin Teigland (2000) has shown that boundary-spanning information exchanges led to higher levels of creativity, and information obtained from online communities increased workers’ performance.

Some researchers argue, however, that knowledge cannot be shared or absorbed independently of the processes through which it is generated (Roberts, 2000). But, if greater stocks of knowledge can be circulated across electronic networks and used in ways that effectively support learning, then the importance of geographical clustering and physical presence may indeed be reduced.

Figure 3 shows a relationship between the degree of codification of knowledge and the speed and extent of its diffusion within a target population (O’Callaghan and Andreu, 2006). The figure highlights a tradeoff between codification and reach. The shape of the curve indicates that more people can be reached per unit of time with knowledge that is codified (explicit) than with knowledge that remains uncodified (tacit). As the size of the target population that one seeks to reach increases, the message needs to be more highly codified to reach that population quickly, and much of the contextual richness of the message must be sacrificed for the sake of communicative efficiency.

New IT applications can change the nature of this trade-off between loss of context and speed of diffusion. By increasing data processing and transmission capacities, they enable more data to reach more people, whatever the level of codification chosen, as indicated in the figure 2. This is shown by a horizontal shift in the curve.

The horizontal arrow shows how at a given level of codification, the population to which a message can be diffused increases. But, the vertical, downward pointing arrow also shows something else: it suggests that, for a given size of population being targeted, a message can be sent at a lower level of codification than in the absence of IT, i.e. the message can transmit more of its context, thus restoring some of the context-specific interpersonal qualities usually sacrificed to codification.

Early generations of knowledge management solutions focused on explicit knowledge in the form of documents and databases, but as the above figure suggests, there is a need to expand the scope of the solutions to integrate technologies that can support tacit knowledge (Marwick 2001). Future applications will have to address the following needs:

- IT to assist teams share experiences: build and share tacit knowledge
- IT to help groups work effectively together: group support and collaboration
- IT for electronic meetings and trust building: e.g. high definition videoconferencing
- IT to identify individuals with the right knowledge: expertise locator
- IT to elicit help from experts and the community: forums and bulletin boards
- IT to support the formation of new tacit knowledge from explicit knowledge: portals, taxonomies, knowledge mapping, etc.

**IT and dynamic capabilities**

The following paragraphs focus the potential role of IT to enable or support dynamic clustering capabilities. The discussion is structured around the four constructs identified above: market orientation, absorptive capacity, coordination, and collective mind. This is illustrated in figure 3 that depicts a model for IT applications used to overcome distance barriers, enable virtual proximity, and support dynamic capabilities.

**Figure 3: Role of IT in Extended Dynamic Clustering**

**Remote collaboration** → **Innovation and Market access**

**Overcoming distance**:
- Distant partnering
- Virtual presence
- Knowledge transfer

**Information Technology** → **Dynamic Capabilities** → **Reconfigurability**

**Dynamic Capabilities**:
- Market orientation
- Ability to learn
- Coordination ability
- Integration ability

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“**Market Orientation**” reflects the ability to sense the environment and understand customer needs and competitive dynamics. It is defined as ‘the process of generating, disseminating, and responding to market intelligence about customer needs’ (Kohli and Jaworski 1990). These processes can be supported with the following IT applications:

- IT for capturing market intelligence, e.g. external communication links for sensing market trends or discover new market opportunities.
- IT for disseminating market intelligence to the appropriate parties in the business network / virtual cluster
- IT for analyzing and interpreting market intelligence
- IT for responding to market trends, e.g. by enabling processes and supporting operations that capitalize on market intelligence

The literature refers to “**Absorptive Capacity**” as the ability to learn by identifying, assimilating, transforming and exploiting existing knowledge resources to generate new knowledge (Cohen and Levinthal 1990, Zahra and George 2002). Regarding IT, the relevant IT applications are:

- IT to help acquire or “broker” knowledge
- IT to help assimilate knowledge (e.g. knowledge articulation and codification)
- IT to help transform knowledge, (e.g. in supporting new thinking, brainstorming, experimentation, and problem-solving)
- IT to help exploit knowledge (e.g. in new projects, identifying new solutions)

Coordination capability reflects the ability to manage dependencies among resources and tasks to create new ways of performing a desired set of activities (Crowston 1997, Malone and Crowston 1994). Pertinent IT applications are:

- IT for allocating resources (including distribution of knowledge)
- IT to help assign tasks among partners
- IT for appointing the right person to the right unit or project
- IT to help synchronize activities among collaborating partners
- IT for reaching synergies among tasks and resources

The literature refers to “Collective Mind” as the “ability to integrate disparate inputs through heedful contribution, representation, and subordination into a group system” (Weick and Roberts 1993). “Collective Mind” can also be conceptualised as the architecture for the whole system. In this respect, it helps implement a set of complex activities by specifying the organizing principles by which individual knowledge is integrated (Grant 1996). The IT-related questions are:

- IT to model and help structure the cluster/ network
- IT to monitor how partners fit in, interact, and their activities affect others
- IT to interrelate diverse inputs (including knowledge) from constituent firms to execute the collective activity of the cluster / network
- IT to help individual inputs contribute to the group outcome
- IT to support the sharing of knowledge among partners
- IT to keep network managers informed

Policy implications and future research

The research advocated in this paper calls for the development of a theoretically grounded framework for “Extended Dynamic Clustering” (EDC) in order to investigate how ICT infrastructures, collaborative systems, governance structures and other factors can influence clustering across borders and improve SMEs’ ability to innovate and access global markets.

The Extended Dynamic Clustering (EDC) paradigm may provide a new perspective for policy research and practice. To apply the EDC concept to policy, instruments have to be developed to identify extended dynamic clusters (or clusters that have EDC potential), as well as tools for improving inter-organizational structures and processes that facilitate dynamic clustering. Research should identify extended dynamic clusters in some countries or regions, and establish whether the regional / national economies can be effectively examined through the EDC lens; and, if so, whether policy makers can more accurately identify market imperfections of existing clusters, and determine what interventions might have the greatest impacts. To this effect, potential research products could include:

• Conditions for an outward-looking perspective on clusters with emphasis on the traditional economic strengths of regions but also on dynamic capabilities to respond to rapid economic changes and global competition.
• Conditions for reconfiguring clusters as ‘hubs’ and roles of institutions in helping build regional economic capacity (in terms of dynamic capabilities, networking and international connections) to enable regional SMEs to confront the challenges of being ‘hubs’ between a global economy and a regional business ecosystem.
• The effects of open-source IT platforms and tools that may support new methods of collaboration, and process integration within, between and across regional networks incorporating SME’s and large contracting organizations, as part of an end-to-end
supply chain.

- Domains for policy intervention in terms of regulation, legal measures, technology policy at supranational, national and regional levels for the creation and facilitation of dynamic clustering.

Extended dynamic clusters differ from traditional clusters in their extra-territorial reach, dynamic capabilities and the enabling role of IT. Information technologies provide a new means of linking up local places and regions within networks of organizations. Inclusion in the network requires an adequate local technological infrastructure, a system of ancillary firms and other organizations providing support services, a specialized labor market, and a system of services required by the professional labor force. Research outcomes should include guidelines for policy makers and civil society organizations in order to facilitate the transitioning of SMEs to extended dynamic clusters as well as the adoption and usage of related ITs. Research results could also inform, for example, ways for SMEs to reconfigure themselves from being simple members of a local cluster to being important nodes of a global network of business partners.

The new industrial spaces of today are complex networks with multiple nodes. They can be seen as geographically proximate, complex organizational systems of learning and economic activity that are globally networked with other systems. The spread of global, national, regional and local IT networks and information flows may fuel an “innovation ecosystem” (cross regional and trans-national), and act as a catalyst for social learning processes that give rise to successful economic and social development. If public policy makers proactively encourage the integration of advanced information technologies through “digital ecosystems” to link geographically clustered firms with other organizations within and beyond their immediate regional surroundings, there might be opportunities for a departure from the conventional pattern of regional development and a catalyst for growth.

Social and economic aspects of ecosystems: The next chapters

The next chapters in this book develop different aspects of “digital business ecosystems” (DBE), including economic, social, regulatory and trust-related issues. Darking’s chapter discusses the role of “governance” in ecosystems, and proposes six different “dimensions” of governance: 1) constitution and balance of interests, 2) culture of communication, 3) credibility, attunement and trust, 4) organization and synchronization, 5) licensing and regulation, 6) technological dimension. Cutting across organizational, regulatory and technological frameworks, these dimensions provide inter-related concepts for further research and discussion. The chapter of Rivera Leon provides a framework for assessing the cost and benefits of DBE with the aim to raise awareness among policymakers and encourage them to implement DBE in their regions. In another chapter, Berdou discusses two important characteristics of networks and communities of practice (knowledge and structural embeddedness) and indicates how they relate to the sustainability and scalability of Digital Ecosystems. Knowledge embeddedness relates to the dependency of knowledge on social context. Structural embeddedness refers to embeddedness of economic action in social relations and the way “the quality and network architecture of exchange relations influence economic activity”. In the last chapter, Tsatsou and Elaluf-Calderwood summarize research on the factors contributing to trust amongst small- and medium-sized enterprises (SMEs) in Digital Business Ecosystems. They describe a regulatory framework based on three building blocks: 1) Privacy and consumer protection, 2) e-signatures and security, and 3) jurisdiction and consumer protection, and discuss the development of the “Knowledge Base of Regulatory Issues” which is important in the context of the development of Free Software/Open Source (FS/OS) for commercial use within the European Union countries.
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