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Article

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Administrative Sciences

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Suggested Citation: Elia, Gianluca; Margherita, Alessandro; Ciavolino, Enrico; Moustaghfir, Karim (2021) : Digital society incubator: Combining exponential technology and human potential to build resilient entrepreneurial ecosystems, Administrative Sciences, ISSN 2076-3387, MDPI, Basel, Vol. 11, Iss. 3, pp. 1-16,
<https://doi.org/10.3390/admsci11030096>

This Version is available at:

<https://hdl.handle.net/10419/275214>

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Article

Digital Society Incubator: Combining Exponential Technology and Human Potential to Build Resilient Entrepreneurial Ecosystems

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Abstract: Although exponential technologies promise to bring unprecedented value at the socio-economic and policy levels, the social acceptability and preparedness for the technological “singularity” should be carefully considered. In particular, whereas digital innovation is able to drive an extraordinary development of entrepreneurial ventures, a number of challenging issues and the ongoing pandemic crisis have increased the need to investigate how technological breakthrough and human capital can be effectively combined in order to build resilient socio-technical and entrepreneurial ecosystems. This paper offers a synopsis of the major investigation areas and a reflection on the themes associated with the emergence of a digital society and the affirmation of digital entrepreneurship ecosystems. The research process follows a systematic literature review and a conceptual development approach aimed to introduce both the concept and a model of the digital society “incubator”. The proposed model identifies the actors, values, flows, and processes that are required to support the construction of a resilient entrepreneurial ecosystem. In this perspective, the study proposes a new focus by hybridizing and integrating both entrepreneurial and technology-related dimensions into a single unifying model. The study also lays the groundwork for further studies aimed at identifying the environmental and institutional factors required to support a smooth and effective transition towards a resilient entrepreneurial and technology-driven society.

Keywords: digital ecosystem; digital society; entrepreneurial ecosystems; exponential technology; human capital; incubator; resilience



Citation: Elia, Gianluca, Alessandro Margherita, Enrico Ciavolino, and Karim Moustaghfir. 2021. Digital Society Incubator: Combining Exponential Technology and Human Potential to Build Resilient Entrepreneurial Ecosystems. *Administrative Sciences* 11: 96. <https://doi.org/10.3390/admsci11030096>

Received: 31 July 2021

Accepted: 1 September 2021

Published: 7 September 2021

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1. Introduction

Exponential technological innovations, like artificial intelligence, biotechnology, 3D printing, advanced robotics, and nanotechnology, are offering significant opportunities for the advancement of human welfare, as they bring societies closer to finding solutions for complex long-standing human challenges and sustainable development goals. In particular, digital technologies represent a large family of general-purpose technologies, which enable most of the emerging disruptive technological advancements. The digital revolution is fundamentally transforming our society and is challenging existing paradigms in a rapidly changing reality.

Concepts such as digital markets, digital companies, digital business, digital education, digital organizations and digital society increasingly dominate the scientific, social, and policy discourse, and are attracting the interest of leading research institutions and public organizations who are engaged to study the social impact of what is “digital”. Examples include the MIT IDE–Initiative on the Digital Economy (<https://ide.mit.edu>, accessed

on 6 September 2021), the EU DESI-Digital Economy and Society Index (<https://digital-strategy.ec.europa.eu/en/policies/desi>, accessed on 6 September 2021), the Digital Society Initiative of the University of Zurich (<https://www.cas-mda.uzh.ch/en.html>, accessed on 6 September 2021), and the Digital Society action of Fondazione Bruno Kessler (<https://ict.fbk.eu/areas/digital-society>, accessed on 6 September 2021).

Although digital technologies promise to bring in unprecedented value in terms of social wellbeing, business profitability and policy effectiveness, a number of potential risks and issues still require specific consideration, such as social acceptability, environmental impacts, ethics, and security drawbacks. If technology is exponential, humans are mostly linear, and the speed and pace of the disruptions should align with the social preparedness for such technological singularity. Exponential growth creates a widening gap between technology and ourselves. In his essay “Future Shock”, Toffler (1970) stated that “too much change in a too short period of time” can determine a future shock in individuals and entire societies. Technological change is today accelerating and the way of living in a society changes radically during the lifespan of one person, with the increasing multiplicative factor of technology.

Since the scale and speed of these changes affect us as consumers, citizens, and workers, and because digital innovation is able to drive extraordinary development in entrepreneurial ventures, there is a need to investigate how technological breakthrough and human capital can be effectively combined in the scenario of the digital society. There are three main reasons to conduct such a research effort. Firstly, whereas the ongoing pandemic scenario has increased the relevance of leveraging technologies for the purposes of social good, this should be based on the development of new human capabilities and expertise. Secondly, maximizing the benefits of technological innovation requires full awareness across the society of the potential and risks associated with such innovation dynamics. Thirdly, exponential technology and linear humanity should be integrated and intertwined to drive the construction of resilient entrepreneurial ecosystems.

Building on a systematic literature review, this paper presents a synopsis of the major reflection themes associated with the emergence of a digital society. This systematic review aims to bring a cross-disciplinary perspective to the entrepreneurial and technological dimensions of the digital society. This supports a conceptual development approach aimed to introduce the concept and the component elements of a digital society incubator as a virtuous combination of exponential technology and the human potential to build resilient entrepreneurial ecosystems. The proposed model identifies the actors, values, flows, and processes that are required to support the construction of a resilient entrepreneurial ecosystem. In this perspective, the study proposes a new focus, by hybridizing and integrating both entrepreneurial and technology-related perspectives into a single unifying framework. The study also lays the groundwork for further studies aimed at building approaches, methods, and processes which have the potential to support the smooth and effective transition towards a resilient entrepreneurial and technology-driven society.

The remainder of the paper is structured as follows: Section 2 introduces the main literature streams on digital entrepreneurship ecosystem and resilience. Next, Section 3 describes the conceptual development work, whereas Section 4 presents the digital society incubator framework. Section 5 then discusses the theoretical and managerial implications of the study. Finally, Section 6 concludes the paper with the research limitations and a future research agenda.

2. Literature Review

2.1. *The Digital Entrepreneurial Ecosystem*

The transition from a traditionally managed economy towards the emerging entrepreneurial economy is an essential step for maximized societal wealth creation and economic growth (Lux et al. 2020; Audretsch 2009). The driving resources of such an entrepreneurial economy become the knowledge, creativity, and innovation that flourish within entrepreneurial ecosystems.

Entrepreneurial ecosystems are dynamic, local, social, business, institutional, and cultural processes aiming at cultivating and supporting new venture creation and business growth (Shrader and Siegel 2007). An entrepreneurial ecosystem can be characterized by three key features: (1) it is geographically bounded, (2) it encompasses many different actors (institutions, companies, individuals, etc.), and (3) it is open to include new entities that want to contribute to enhance the overall ecosystem performance (Audretsch 2015).

Initially, Spilling (1996) defined the entrepreneurial ecosystem as a complex set of diverse actors, roles, and environmental factors that interact to determine the socio-economic development of a region or territory. Ten years later, Cohen (2006) defined an entrepreneurial ecosystem as a set of inter-dependent actors within a geographic region that influence the formation and eventual trajectory of the entire group of actors and potentially the economy as a whole. In the same vein, Isenberg (2010) focused on the actors that form an entrepreneurial ecosystem and identified the key stakeholders, including potential customers and suppliers, universities and research centers, social and cultural operators, institutions and policy makers, large companies, innovative startups and entrepreneurs, experts and professionals, investors, and a pool of talented people (Isenberg 2010; Cohen 2006). From a complementary perspective, Autio and Levie (2015) emphasized the characteristics of the environment that hosts the entrepreneurial processes, encompassing self-organization, scalability, sustainability, and interactivity as enablers for entrepreneurial attitudes, abilities, and the aspirations of individuals to undertake entrepreneurial action. Based on the driving force and role of the main actor engaged, entrepreneurial ecosystems can be industry-driven, university-driven, entrepreneur-driven, or public-driven (Elia et al. 2016).

Actually, the concept of the entrepreneurial ecosystem represents both the place and space where individuals and organizations discover, evaluate, and exploit opportunities to create new goods and services (Shane and Venkataraman 2000; Venkataraman 1997), by leveraging and coordinating institutional support, networking processes, personal attributes, and environmental factors within a geographic region (Mason and Brown 2013; Stam 2015).

Several studies have focused on the core components of an entrepreneurial ecosystem (e.g., Cohen 2006; Isenberg 2010; Suresh and Ramraj 2012; WEF-World Economic Forum 2013; Global Entrepreneurship Monitor 2017). Spigel (2017), for instance, identified eight key components, namely, government policy, access to capital and markets, access to labor and human capital, access to professional services, physical infrastructure, university engagement, local culture and attitudes toward entrepreneurship, and access to mentors. All such elements could be grouped into three categories: (a) resources (entrepreneurs and support resources), (b) interactions (stakeholders' connection and network), and (c) governance (policy tools) (Pita et al. 2021).

The success of an entrepreneurial ecosystem, in terms of regional economy enhancement, new venture creation, and existing venture development (Jungcharoensukying et al. 2020), is not the result of a linear receipt that can be replicated by anyone in any place. In this sense, replication or imitation strategies often fail, since the orchestration of a complex bundle of factors is connected to local conditions (Colombelli et al. 2019).

Investigating entrepreneurship ecosystems is becoming an important area of research (Borissenko and Boschma 2016; Isenberg 2010) and is gaining increasing attention from policy-makers, academics and practitioners, although the phenomenon itself remains undertheorized (Autio et al. 2018; Li et al. 2017). With the advance of digital technologies and the Industry 4.0 paradigm, existing and new potential entrepreneurs have the opportunity to shape new configurations of resources, processes, and relationships in order to ideate, develop, and implement entrepreneurial projects and innovative businesses.

In fact, digital technologies can innovate the offering or support the execution of an entrepreneurial task, thus enlarging both the breadth and depth of related action and effect (Elia et al. 2020). From this perspective, digital technologies fuel new forms of innovation and cultivate new entrepreneurial initiatives across traditional industry boundaries (Huang

et al. 2017; Rayna et al. 2015; Srinivasan and Venkatraman 2018; von Briel et al. 2018). In the first case, either existing products or services are enhanced by new technological features, or new technological startups arise. In the second case, entrepreneurs can rely on digital services to accomplish an entrepreneurial task more rapidly and effectively (e.g., access to crowdfunding portals to raise money, consultation of online communities to validate or enhance a business idea, or joining a marketplace to implement online sales).

In this sense, the entrepreneurship ecosystem evolves as multi-actor and multiscale environment (Brown and Mason 2017) in which local and global stakeholders are engaged and interact in both physical and digital settings, for the purpose of developing networking strategies, promoting learning processes, and performing business activities (Elia et al. 2020).

The resulting digital entrepreneurial ecosystem encompasses both the presence of entrepreneurial opportunities based on the exploitation of digital technologies (a product-based view), and the execution of entrepreneurial activities supported by the use of digital technologies (a process-based view) (Elia et al. 2020; Li et al. 2017). Hence, a digital entrepreneurial ecosystem combines digital-enabled collaboration with a digital-based offering, thus overcoming the resource limitations of a single firm and accelerating the creation of digital offering and digital startups (Li et al. 2017; Du et al. 2018).

In this view, digital technologies enhance the entrepreneurial ecosystem through a higher level of openness, affordances, and generativity (Nambisan et al. 2018). Openness is a significant factor because digital technologies facilitate the participation of more actors (including citizens), who can provide further contributions—through a more flexible process—to make better performing outcomes. Affordances are significant, as participants can exploit the potential of digital technologies in multiple ways, according to the context, object, or objective of use. Generativity is significant because digital technologies enable easy recombination among components and actors, and between rapid prototyping and coordination.

More recently, Ali et al. (2021) undertook a study of entrepreneurship ecosystem performance in Egypt based on the Global Entrepreneurship Index (GEI), whereas Pita et al. (2021) studied entrepreneurial ecosystems and entrepreneurial initiatives by building a multi-country taxonomy. Hajikhani (2020) also studied the impact of entrepreneurial ecosystems in smart cities by undertaking a comprehensive assessment of social media data. Finally, Satalkina and Steiner (2020a, 2020b) analyzed digital entrepreneurship through a theory-based systematization of core performance indicators, as well as the role of digital entrepreneurship in innovation systems. Vinichenko et al. (2021) discussed the concept of the semi-digital society and the development of an open innovation culture, whereas Tiron-Tudor and Deliu (2021) and Tiron-Tudor et al. (2021) analyzed the disruptive effect of big data and blockchain on organizations and job profiles.

2.2. Resilience and Entrepreneurial Ecosystems

Digital innovation is reshaping our economy and industries at a scale and speed like never before, offering unimaginable entrepreneurial opportunities in many areas, including health services, transportation, energy, agriculture, manufacturing, retail, public administration, and policy making. On one hand, technological innovation is driving the emergence of new entrepreneurship processes and new entrepreneurial ecosystems. On the other hand, the disruptive impact of technology on society requires investigation into how human capital can be prepared for this technological singularity and how technologies can be effectively adopted or developed in order to create sustainable ventures and resilient societies.

On the top of this, the COVID-19 emergency has particularly affected us as individuals and communities. This has highlighted the increasing importance of enhancing our resilience and leveraging in relation to digital transformation, in order to thrive in a time of complex and uncertain change by safeguarding citizen's rights, and enforcing inclusion, accountability and transparency.

Resilience is a popular topic amongst organization and social science researchers. It has been conceptualized as a process that enables organizations to recover from disruptions (Klibi et al. 2010), and it is often associated with adaptability, flexibility, and innovation. In the entrepreneurial endeavor, Korber and McNaughton (2017) identifies six research streams at the intersection of entrepreneurship and resilience. These include: (1) resilience as traits or characteristics of entrepreneurial firms or individuals; (2) resilience as a trigger for entrepreneurial intentions; (3) entrepreneurial behavior as enhancing organizational resilience; (4) entrepreneurial firms fostering macro-level (regions, communities, and economies) resilience; (5) resilience in the context of entrepreneurial failure; and (6) resilience as a process of recovery and transformation.

Entrepreneurs are expected to jump several hurdles before they can create a sustainable new venture. Along with resilience, the concept of persistence was also identified as an important trait of an entrepreneur, as some of such hurdles are high and attempts to overcome these must be made a few times before reaching an entrepreneurial objective (Cardon and Kirk 2015). Persistence was defined by Hallak et al. (2018) as the continued effortful action by entrepreneurs, regardless of the adversities and challenges they experience during the entrepreneurship process. Ayala and Manzano (2014) defined resilience as a dynamic adaptation process that gives entrepreneurs the edge to continue focusing on their aspirations, regardless of market and economic adversities and other conditions that may continuously cause unrest to the business. Resilience is a key factor in creating a sustainable business venture. It is a construct with multiple dimensions that transcend one specific characteristic. It is, instead, seen as a combination of a wide range of attitudinal and behavioral qualities possessed by an individual, although it is difficult to come up with a practical and operational definition or measure of this construct (Ayala and Manzano 2014).

The understanding of the relationship underpinning resilience and digital entrepreneurship ecosystems is twofold in this paper. Building on Korber and McNaughton (2017) ideas first, digital technologies represent crucial drivers of entrepreneurial behavior, which enhances organizational and business resilience. Secondly, digital entrepreneurship ecosystems, which are a clear example of the emerging digital society, are able to cultivate macro-level (i.e., regions, communities, and economies) resilience throughout the process of recovery and transformation. The next section introduces the conceptual development process aimed at defining the concept of the digital society incubator along its related framework.

Based on the analyzed literature, there are two main research themes that deserve further attention, and which constitute the focus of this article: (1) how to apply the entrepreneurial concept of “incubator” within the context of the digital society, and (2) how to structure, based on its component elements, a digital society incubator in order to maximize the impact of disruptive digital innovation on the resilience of social and entrepreneurial ecosystems. The following sections describe the approach adopted to address these research orientations, as well as outlining the main research findings.

3. Research Method and Materials

The article was based on a conceptual development approach grounded on a systematic literature review. In particular, the research process was designed to build a synopsis of the major investigation areas and reflection themes associated with the emergence of a digital society. This includes a threefold focus on the following characterizing themes: (1) the concepts of digital entrepreneurship and the digital entrepreneurship ecosystem; (2) the theme of resilience, as applied to socio-technical systems and entrepreneurial ecosystems; and (3) the idea of the incubator and the application of the same, within entrepreneurial and non-entrepreneurial contexts.

The systematic review follows a detailed process aimed at minimizing bias through exhaustive literature searches of published studies, and intended to provide an audit trail of the reviewers' decisions, procedures, and conclusions. In their seminal paper, Tranfield et al. (2003) highlighted the value of the systematic review methodology as a theory building

tool in management research, in order to produce transparent, high quality, and relevant reviews of the literature that are supported by documented evidence.

We looked at extant studies and worked to ensure a comprehensive and replicable review of the literature scoped on the basis of our research questions, which allowed us to delimit the search by focusing on the following relevant keywords: *digital society*, *digital incubator*, *digital ecosystem*, *entrepreneurial ecosystems*, and *resilience*. The keywords were generated based on the experience of the research team, as well as the literature related to the identified fields. We used the Scopus[®] database to obtain relevant research articles following the initially defined topics, and we generated a long list of articles, which was then reduced to 80 research works, following relevance and quality assessment criteria. The final list is reported in the reference section of this paper.

We then conducted a more in-depth review of the selected papers to identify the concepts and perspectives of investigation. We defined a coding protocol to extract concepts and annotate them into framework design tables. The protocol included constructs, classifications, approaches, methods, and processes mentioned with reference to digital society and the resilience of techno-entrepreneurial ecosystems. For each article, we annotated the identified concepts into our design tables. The following section describes the outcomes of the conceptual extraction and aggregation process.

4. Results: Digital Society Incubator

This section is devoted to presenting a Digital Society Incubator model, conceived as a knowledge hub involving people and technologies that build synergies and interact to address sustainable development challenges and nurture competition within industries. The model, created and proposed by the authors following the results of the systematic literature review, transforms knowledge inputs as extracted from the literature on entrepreneurial ecosystems and digital innovation into an organized model which includes the elements and initiatives through which the incubator can become a driver of social and business value.

4.1. How: From Venture Incubation to Society Incubation

Disruptive technological innovation is bringing forth a number of major reflection questions that need to be addressed, such as: (a) what are the effects (known and undesired) of digital innovation on individuals, organizations and the society at large?; (b) how sustainable is technological change and the multiplicative effect of technology?; (c) what is the role of exponential technologies in solving the big challenges of the humanity?; (d) how can entrepreneurs become change agents in the new scenario and ever-changing environment?; and (e) what new professional profiles emerge as a consequence of the digital revolution?

The emergence of a digital society, and the criticism associated with the limitations and risks of exponential technological innovation, are indeed raising a cross-disciplinary debate on the most effective configuration of the social and economic system to leverage the advantages of the ongoing digital transformation. In particular, we contend that, in order for societal systems to be fully prepared for the unprecedented impact and potential of technological innovation, a form of “incubator” is required which hybridizes and integrates the dynamics of human capital development in the scenario of technological transformation.

In the business and entrepreneurial world, an incubator is an organization that helps startup companies and individual entrepreneurs to develop their businesses by providing a full-scale range of services starting with management training and office space, and ending with venture capital financing. A more recent phenomenon is represented by social incubators, which are focused on start-ups with a significant social impact and which give more attention to social impact measurements, business ethics, and corporate social responsibility, as compared to other incubators (Sansone et al. 2020).

We assume that a digital society incubator is a knowledge hub performing a critical analysis of real-time impacts of digital transformation on how individuals, organizations, and societies work, interact, and live. The incubator is an open conversation, research, and education platform for scholars and practitioners interested in understanding change and driving positive transformations by co-creating and sharing knowledge that contributes to a better future. The incubator gathers intelligence on the digitalization of our society, democracy, science, communication, and economy through new forms of social discourse, and shapes these processes in a forward-thinking manner. Its purpose and scope are to bridge competing objectives, build shared interests, common commitments, and forge new research coalitions and solution-driven policy recommendations to accelerate the benefits that advances in technology can offer to societies across the world. The next section presents a model of digital society incubator, with its key pillars and subsystems.

4.2. What: A Model of Digital Society Incubator (DSI)

The Digital Society Incubator (DSI) is a knowledge catalyst that draws on a cross-disciplinary approach, bringing together management, policy, and technology communities to help forge a common understanding and jointly address the challenges that exponential technologies present in our societies. At the same time, the DSI aims at realizing a virtuous matching between technological enablers (i.e., machine-based intelligence) and human capital assets (i.e., human-based intelligence) to address sustainable development challenges (i.e., environmental, societal, and economical challenges) and reinforce the positioning of organizations within the competitive arena (i.e., industrial dynamics and regulatory frameworks).

As a knowledge catalyst, the DSI leverages on a network of key actors, contributes to promoting and diffusing core values, and activates local and global flows to support a set of key processes strictly associated with the key initiatives to be implemented. The actors that are involved, both formally and informally, in nurturing the DSI belong to the following categories:

- *Policy*, including regional and national governments, local and global institutions, and policy makers that support digital transformation initiatives as carried out by new ventures and technology entrepreneurs. This happens through plans or regulations that provide incentives or support funding, or through guides and support during the execution of each step of the entrepreneurial process (Cohen 2006).
- *Human Capital*, including both individuals (e.g., experts or professionals) and institutions (e.g., universities or research centers) engaged in developing skills and competencies in every area of expertise, as well as in identifying, cultivating, and mentoring talents with entrepreneurial attitudes able to actively participate in the ecosystem (Stam 2015; van Rijnsoever 2020);
- *Finance*, including capital service providers (e.g., early-stage investors, banks, business angels, venture capitalists) that guarantee the access to funding opportunities to support the incubation of innovative ideas and ventures (Isenberg 2010; Stam 2015; Murad 2020);
- *Culture*, including operators of cultural industry, but mainly relating to successful performers and entrepreneurs who contribute to creating a culture that tolerates risks and uncertainty, encourages ambition, inspires new entrepreneurs, and develops a mindset that considers failures to be learning events (Isenberg 2010; Roundy 2019; Tiba et al. 2020);
- *Supporting Services*, including private and public operators that offer both physical and intangible services, as requested by entrepreneurs in order to develop their initiatives and attract young entrepreneurs (e.g., legal and accounting service providers, immigration offices, infrastructure providers, incubators, accelerators, and technological parks), beyond the presence of the informal network of family and friends that provides initial advice and funding to establish the new venture (Cohen 2006; Spigel 2017; Sarma and Sunny 2017);

- *Market*, including both existing companies in industries that are interested to explore possible collaborations or commercial relationships (e.g., startups, innovative firms, large corporations, partners of the supply chain, and distributors), and early customers who are open to provide the first feedback in order to enhance the offering and reach more customers (Isenberg 2010; Murad 2020);
- *Social Community*, including actors and organizations engaged in addressing societal and environmental challenges by providing both material and intangible contributions, and by sensitizing the social and business community to the relevance of such themes while stimulating them to communicate their needs, expectations, and ideas (Fernandez-Guadaño et al. 2020; Schaltegger et al. 2018);
- *Engagement Events*, which contribute to building networks of trusted relationships within the ecosystem by promoting pitching days, hackathons, boot camps, calls for ideas, business plan competitions, etc., that create shared intentions and patterns of thinking to encourage entrepreneurial behaviors (Roundy et al. 2018).

Such categories of actors need a set of core values that work as key principles, inspiring their thoughts and actions. Such core values are identified from the literature on creativity and innovation, and embrace both contextual conditions and operational issues. They are synthetically listed and described as follows:

- Digital technologies as an enabling backbone that supports interactions and collaborations among all of the actors involved in the entrepreneurial process, by providing support to organize and access resources, design products, and match demand and offer (von Briel et al. 2018; Elia et al. 2020).
- Talented people as change champions and promoters, capable of integrating creativity, open-mindedness, and technical skills to ideate and implement innovative and challenging projects (Guinan et al. 2019).
- Technology startups as drivers of socio-economic development that may influence the growth strategy and patterns of a whole territory by leveraging the value creation potential of new technology ventures (Murad 2020).
- Collaboration as a working mindset, through balancing cooperation and competition to search for and identify the most valuable partners, technologies, and networks (Kolk et al. 2018);
- Open innovation as a development and growth strategy that allows for, on the one hand, overcoming the lack of resources, and on the other hand, exploiting the opportunities deriving from complementarities (Spender et al. 2017);
- The network as an organizational and relational model that allows for achieving high-performance outcomes by experimenting with new ways of managing people (Gittel et al. 2010);
- Intellectual property rights as durable and inimitable knowledge assets for the sustainability of achieved competitive advantage (Greco et al. 2013);
- Diversity and multi-culturalism as enriching and encouraging the conditions to foster creativity and innovation, thus supporting communication and opening new opportunities at the global level (Gassmann 2001).

The combination of actors that operate coherently with the aforementioned principles makes possible the emergence of interactive and multi-directional flows that leverage on information- and competence-based assets, such as:

- Knowledge exploitation and exploration enhanced through the use of digital technologies in order to foster the commercialization process (Audretsch et al. 2020), and to generate a positive impact on the entire innovation ecosystem (Centobelli et al. 2019).
- Data sharing and communication that fuel new digital and trustworthy business models, thus causing changes, both in the industries' dynamic and in consumer behavior (Richter et al. 2017) while leveraging the open innovation paradigm and platform strategy (Nambisan et al. 2018).

- Learning support and nurturing that both contribute to shaping the learning task which characterizes every prospective entrepreneur, during the incubation phase and also the market launch, for the purpose of mastering the individual, industrial, environmental and managerial dimensions (Cope 2005).
- Trust development at the institutional and personal levels that contribute, both directly and indirectly, to developing entrepreneurship and business growth (Welter 2012).
- Competence enhancement to equip prospective entrepreneurs to help them identify and recognize opportunities, seize and organize resources, cultivate and manage relationships, and launch and grow their businesses (Fastré and Van Gils 2007).

From an operational perspective, the DSI combines actors, principles, and flows to design a set of initiatives and processes constituting the working agenda of the entire ecosystem, which includes:

- *Project ideation and development* to support the conceptualization and definition of entrepreneurial projects, as well as the gathering and organizing of internal and external resources, as required, to demonstrate the technical feasibility, the market and environmental sustainability, the economic viability, and the social acceptability of the entrepreneurial initiative.
- *Field experimentation* to show the value of the innovative proposal, to test the functional and behavioral features, to collect feedback and enhance the solution, to engage early adopters and enlarge the customer targets, to explore new partnerships and to start new projects.
- *Startup incubation* to provide new ventures with services, space, facilities, relationships, mentorship, and funds, as required, to build solid businesses and allow them to grow with a larger market scale and scope.
- *Capacity building* to equip the founding team with the knowledge, competencies, and skills required to fulfil any knowledge gaps and complete the configuration of the entrepreneurial team, thus ensuring that the management and growth of the new business in both national and international contexts, but also to develop awareness among potential customers for the purpose of accelerating market adoption and penetration.
- *Technology awareness* to sensitize the business and social community, and the society at large, about the potential value embedded in new technologies, and prepare them to be open and adopt enthusiastically the innovative offering launched by the local and global business community.
- *Talent cultivation and discovery*, to identify within companies, universities, schools, institutions, and any other entities talented people (both young people and adults), capable to conceive, initiate, and lead initiatives and experiment with incremental, radical, or breakthrough innovations.
- *Network development* to support and promote the creation and expansion of business and social relationships that have the potential of contributing to information sharing and knowledge exchange as useful assets to complement the entrepreneurial project.
- *Intellectual property protection and exploitation* to find the right way to defend and valorize, at the national and global levels, the knowledge assets upon which the entrepreneurial project is built.
- *Technology transfer* to explore possible alternatives in the market to valorize the intellectual capital, while preserving intellectual property rights, guaranteeing convenient rewarding mechanisms, and ensuring promising business development.
- *Open collaboration and development* to offer space for opportunities whereby companies, startups, large corporations, research centers, experts, institutions, and social communities can meet, discuss, share information, and design common patterns for knowledge exploitation and entrepreneurial development.

Figure 1 shows the model of the Digital Society Incubator, including its component elements, namely, Actors, Flows, Processes and Values.

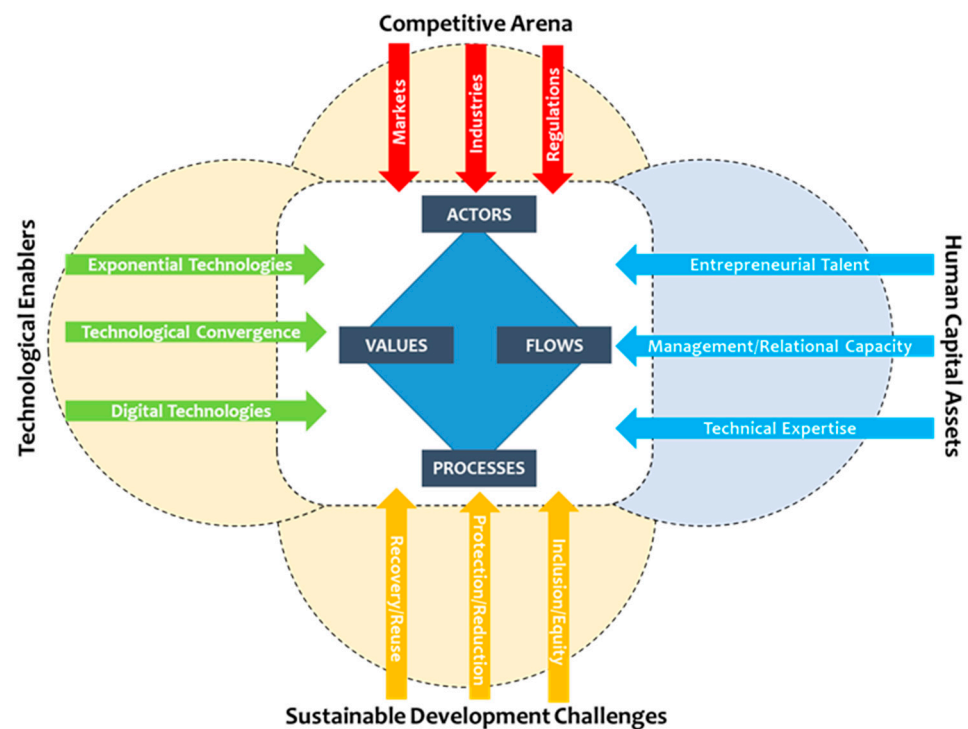


Figure 1. Model of Digital Society Incubator [Authors' Elaboration].

The model proposed in Figure 1 may encompass both physical and digital incubators, thus revealing a powerful instrument for conceiving and ideating collaborative spaces, which allow for debating and building social innovation. The components indicated in the model (i.e., actors, principles, flows, and initiatives) can be identified in numerous “incubators” aimed to cultivate promising ideas and projects which address societal needs and sustainable development issues. Some examples include the MIT Climate CoLab, that aims at creating proposals for reaching global climate change goals, and the Community Innovators Lab of the MIT Department of Urban Studies and Planning, that focuses on engaging students to be practitioners within a community to achieve sustainability goals.

Other cases are the OpenIDEO, that has created a worldwide community working on big societal issues by combining virtual collaborations and physical proximity, and the EIT Crisis Response Initiative, created by the European Institute of Innovation and Technology, which both finances innovation projects addressing the COVID-19 pandemic and sustains innovative startups facing the COVID-19 crisis. Finally, the hackathon EUvsVirus, led by the European Innovation Council, aims to connect civil society, innovators, partners, and investors across Europe and beyond in order to develop innovative solutions to coronavirus-related challenges. All of these examples can be analyzed by adopting the lenses of the Digital Society Incubator model, for the purpose of identifying the founding elements and the process dynamics of such initiatives.

5. Discussion

The relevance of the digital transformation of industries, organizations and the whole society, along with the economic and entrepreneurial ecosystem implications of the same, has been clearly framed at the literature, practitioner and institutional levels (e.g., [European Commission 2015](#); [Isenberg 2011](#); [Nambisan et al. 2019](#); [WEF-World Economic Forum 2016](#)). In fact, digital technologies can be considered to be a driver of economic growth, and the enabler of the digital economy ([Afonasova et al. 2019](#)).

The purpose of the Digital Society Incubator is to stimulate creativity and innovation, and professional and market knowledge in order to nurture the entrepreneurial behavior of individuals, organizations, and institutions thereby addressing crucial digital economy and

societal challenges (Afonasova et al. 2019). By leveraging exponential technologies and the entrepreneurial potential and expertise of prepared human capital, the DSI is intended to initiate debates by providing trusted evidence, provoking thoughts and insightful analyses, and sparking innovative conversation on relevant trends.

In particular, this article proposes a conceptual framework for a Digital Society Incubator that, in contrast to other models, combines the entrepreneurial ecosystem view with digital technology hybridization, in order to design and implement initiatives that have a social impact and a sustainable development dimension.

The model is aligned with discussion in the literature on national systems of entrepreneurship, entrepreneurship ecosystems and the Triple Helix approach to local development (e.g., Acs et al. 2014; Brem and Radziwon 2017; Brown and Mason 2017; Guerrero and Urbano 2017). In fact, by primarily leveraging the entrepreneurial attitudes and economic environment factors as both main pillars of the entrepreneurial ecosystem (Acs et al. 2018) and the most significant drivers of economic growth, especially in the context of sustainability (Ali et al. 2021), the proposed model aims to cultivate digital start-up initiatives and transform them into agents of social innovation (Faludi 2020). The model also aims to facilitate competence and skill development processes, thus contributing to shaping and building mindsets to lead the exponential evolution of society that is driven by technological disruption, and the renewed capacity to support technology-driven startups and ecosystems (e.g., Cohen et al. 2017; Sussan and Acs 2017). In addition, the model includes all of the key founding components of a typical ecosystem, fostering innovation and entrepreneurship goals, as the six critical domains proposed by Isenberg (2010) or Morant-Martínez et al. (2019), and thus maintaining strong connections with local assets (Audretsch and Belitski 2017). Furthermore, the implementation of the DSI model allows for experimenting digital social entrepreneurship; an emergent form of entrepreneurship that uses digital technology as both a key element of the business model and a powerful booster for better and maximized social impact (Ghatak et al. 2020).

As a knowledge catalyst, the DSI may operate as an influencing community that works in two key directions. From one side, the DSI works by developing and sharing research findings and publications to increase collective knowledge and propose working agendas. From the other side, the DSI works by identifying relevant groups of stakeholders that are impacted by the ongoing technological trends and are interested in bringing their viewpoint to the collective discussion. In this regard, the DSI model operationalizes a collective intelligence approach for developing technology entrepreneurship ecosystems (Elia and Margherita 2016), thus involving a group of interconnected actors and activating a set of interactive processes which foster entrepreneurship at the individual, organizational and territorial levels (Brown and Mason 2017).

The ultimate goal of such a community is to create a multi-dimensional environment which connects intelligence and hybridizing management, technology and policy issues in order to analyze and discuss, collectively, both problems with their issues and solutions with their impacts. The relevance of multiple contributions and stakeholder roles during innovation ecosystem genesis has been clearly discussed in the literature (e.g., Geissinger et al. 2019), as well as the enabling role that cities play in driving digital entrepreneurship and institutional change (e.g., Dedehayir et al. 2018).

Such an interactive space of virtuous connections allows participants to implement projects by developing partnerships, cultivating competencies, executing actions and piloting policy interventions in order to build inclusive digital societies. On the flipside, the DSI has the potential to influence policies and strategies by providing public managers and key decision makers with relevant knowledge assets and tools useful for shaping decisions for the public good. In such a way, the proposed model includes the three core determinants of a digital entrepreneurial system, which are the entrepreneur, the entrepreneurial process, and the external network of infrastructure and institutions (Satalkina and Steiner 2020a, 2020b).

This would enhance the endogenous capability of the ecosystem to develop resistance, recovery and adaptability capacities, which makes the ecosystem more resilient (Thieken

et al. 2014). In particular, resistance relates to the negative and direct impacts of an event by mitigating effects or transferring risks; recovery relates to the ability of the ecosystem to re-establish the pre-crisis conditions; and adaptability is linked to the learning process activated by the crisis that makes the ecosystem better prepared to face future critical situations (Hudson et al. 2020). The DSI approach is in line with attempts to hybridize resilience and entrepreneurship discussions (e.g., Korber and McNaughton 2017) into an evolutionary view of entrepreneurial ecosystems (e.g., Mack and Mayer 2016) and a social view of incubators beyond the traditional business understanding (e.g., Sansone et al. 2020). In this way, the DSI may become a subsystem of a wider innovation system that encompasses business, social and institutional communities (Satalkina and Steiner 2020a, 2020b).

Furthermore, by leveraging the information associated with the components of the ecosystem, it is possible to design a canvas by combining roles (e.g., leaders, stakeholders), assets (e.g., resources, infrastructure), and values (e.g., culture, community engagement) to make the ecosystem more committed to facing the challenges of digital society (Hwang and Horowitz 2012).

In such a process, the focus of public policy is mainly oriented towards enabling the emergence of the entrepreneurial society by blending institutions, culture, the historical context, and the socio-economic conditions that are conducive to entrepreneurial activities (Audretsch 2009). Besides, the choice of a governance model based on a multi-stakeholder relational structure (vs. a hierarchical structure) is revealed as more coherent and effective in such dynamic and continuous changing environment, especially when the objective is to consolidate the ecosystem, rather than initiate it (Colombelli et al. 2019).

The implications of this study are twofold. At the policy level, this paper provides a systemic model to shape and cultivate digital ecosystems addressing societal challenges, enabling the design, in a participative way, of policies and initiatives for a more inclusive and resilient society. At the research level, this study offers useful development venues to fine-tune an analysis model of digital ecosystems, as strictly engaged in societal issues, and to collect best practices and derive common development patterns that can be shared for contextualization, both in other territories and while coping with other challenges.

6. Conclusions

Although a number of exponential technologies promise to bring in unprecedented value at the individual level as well as in terms of social wellbeing, business profitability, and policy effectiveness, a number of potential risks and issues still need to be considered, such as social acceptability and preparedness for technological singularity. The current COVID-19 emergency has particularly affected individuals and communities, while increasing the importance of enhancing our resilience and leveraging technology for social wellbeing. In particular, the disruptive impact of digital technologies should be investigated along two directions: (a) their enabling role in driving the creation of high-performing entrepreneurial organizations and socio-technical systems, and (b) the requirements at the human capital level as part of a comprehensive roadmap towards a more sustainable digital society. This paper explores such investigation dimensions and proposes a number of key reflection questions and a conceptual synopsis of the major themes associated with the emergence of the digital society. Building on such conceptualizations, this paper proposes the model of a digital society incubator (DSI) which aims to combine exponential technology and linear humanity with the ultimate goal to drive the construction of resilient entrepreneurial ecosystems. This paper presents some limits that can open up opportunity for further studies. We believe that the proposed DSI model still requires empirical and field validation to test its underlying assumptions while interpreting and describing existing ecosystems that are committed to ideate and drive digital innovations for a better digital society. Moreover, a detailed analysis of the examples of the “incubators” which are provided at the end of Section 4 is required to fully validate the proposed model and generate further implementation details and key success factors that could be crucial for future applications.

Finally, further research is also needed to better understand the role that exponential technologies may have during the design phase of the ecosystem, while exploring their relevance with respect to the macro-level (i.e., the environment and sustainable development related issues), meso-level (i.e., industry-related issues), and micro-level (i.e., organizational or individual related issues).

Author Contributions: Conceptualization, G.E. and A.M.; methodology; G.E., A.M. and K.M.; framework development and discussion G.E., A.M., E.C. and K.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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