Lancaster University
Management School

Theme: Value Creating Systems in the Digital Economy

Developing Valuable Capabilities for the Biosciences Digitalising Economy: The Incubation Activity Grid

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Executive Summary

The objective of this sub-project was to investigate how the incubation of biotechnology firms is delivered in practice. Based on the in-depth investigation of incubation at the Stevenage Bioscience Catalyst (SBC), this sub-project develops an 'Incubation Activity Grid' (IAG). The grid demonstrates the outcomes of incubation activities (capability development, opportunity creation and sustainability enhancement) as well as the level on which those outcomes occur (firm, network, eco-system). Based on a description of the IAG, this report proposes implications for further research but also makes suggestions how the IAG may be used in practice.

Key words: Incubation, Activities, Capability, Sustainability, Network, Eco-system

1. Introduction and project objectives

This project was delivered in collaboration with Stevenage Bioscience Catalyst (SBC). SBC is a joint venture between the Department for Business Innovation and Skills, GlaxoSmithKline, the Welcome Trust and Innovate UK. SBC subscribes to the idea of open innovation. It connects biotechnology start-ups and other players in the Pharmaceutical industry in order to create a catalyst for open innovation and develop innovative and ground breaking healthcare solutions.

This sub-project forms part of a collaborative project with Professor Katy Mason and Chris Ford at Lancaster University and addresses various facets of science incubation. Katy Mason's sub-project investigates digitally mediated business model development at SBC and Chris Ford's sub-project looks at the management of accountability and performance. Please refer to the NEMODE Outputs section for the reports of these sub-projects (www.nemode.ac.uk).

The objective of this sub-project is to investigate how the incubation of biotechnology firms is delivered in practice through the various actions of the companies involved. Prior research has already investigated the role of clusters and science parks, with a particular focus on the bio-sciences (Cooke, 2001; Hendry & Brown, 2006; Zeller, 2001). Also, prior research on the bio-pharmaceutical industry already makes the case that the development of young biotech firms is influenced by the provision and integration of knowledge and expertise across a variety of various stakeholders, such as Big Pharma, universities or specialist service providers (Baum et al., 2000; Friesl, 2012; Liebeskind et al., 1996; Maurer & Ebers, 2006).

In order to provide a more in-depth view on incubation, this sub-project takes an activity based approach (Johnson et al., 2003). Indeed, management and organisation research increasingly calls for more detailed attention to the everyday actions and interactions through which innovation actually happens (Felin & Foss, 2009; Felin et al., 2012; Salvato, 2009). Through in-depth interviews with staff at SBC as well as biotechnology firms that are part of the incubator, this project aimed to create a picture of how incubation is delivered through every day actions and interactions of people involved in the bio-science catalyst.

The findings of this project reveal that science incubation creates three important outcomes on the level of the individual firm, the catalyst as a whole as well as the wider bio-science eco-system: the development of capability on the level of tenant firms, the creation of new business opportunities but also contribute to the maintenance of sustainability of the entire bio-science eco-system.

Below the results of this project are described in greater detail. First, the Incubation Activity Grid is introduced. Based on that, implications for further research as well as implications for the management of science incubation are developed.

2. The Incubation Activity Grid

The findings of this research can be captured in an 'Incubation Activity Grid' (IAG). The IAG visualises impact of science incubation on the example of the Stevenage Bioscience Catalyst

(see Figure 1). Data analysis was based on the accounts of tenants (Biotechs at SBC) as well as SBC staff about the various actions and interactions they engage in as part of their daily work at SBC. The outcome of these activities can be classified based on two key dimensions: outcome type and outcome level.

Outcome type refers to whether activities result in the development of organisational capabilities, the creation of business opportunities or future sustainability and resilience. Our analysis also reveals that these outcome types occur on different levels: the level of the individual firm, the level of the network (SBC) and the level of the entire Eco-System (the Bio-Sciences and the commercialisation of research.

Figure 1. Incubation Activity Grid

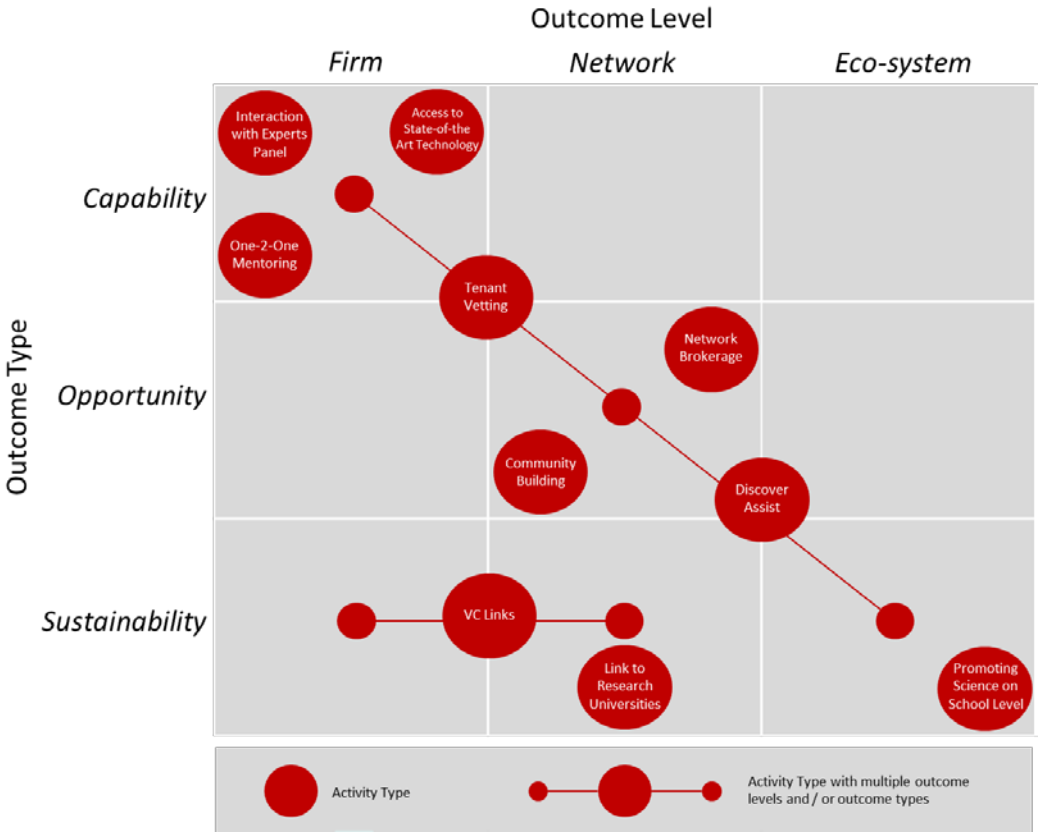

Figure 1 shows how activities for incubation at SBC create capability on firm level (e.g. the ability pitch to potential investors), opportunities on network level (such as potential collaborations) but also contribute to sustaining the entire eco-system of the commercialization of Bio-Sciences in the UK (for instance, by promoting bio-sciences in schools across the country). Moreover, it shows that SBC's activities also ensure the sustainability and resilience on firm and network level; for instance, by creating strong links to Venture Capitalists and other potential investors. Finally, the IAG also points to potential high impact activities that stretch multiple outcome levels and / or multiple outcome types.

Table 1 provides an overview of all activity types shown in Figure 1 as well as examples of the underlying micro-activities performed at SBC.

Table 1. Activity types and micro-activities involved in incubation at SBC

Activity Types	Examples of micro activities
Tenant vetting	▪ Selection of tenants based on mind-set: 'open innovation' ▪ Selection of tenants based on 'science' fit
Community building	▪ SBC Newsletter ▪ Shared coffee area ▪ Shared 'hub' space ▪ Events
Experts panel	▪ Identification of experts ▪ Maintenance of SBC experts network ▪ Presentation of key issues to experts panel
Discover Assist	▪ Regular visits to UK universities ▪ Relationship building with scientists across UK universities ▪ Help scientists frame 'science' in a commercial way
One-2-One Mentoring	▪ In-depth mentoring from SBC CEO ▪ Creation and improvement of business plan ▪ Dry run for investor pitches
Access to state of the art technology	▪ Access to technology via GSK (shareholder) ▪ Access to technology via GE (tenant)
Network Brokerage	▪ Establishment of networks to GSK ▪ Establishment of networks with other big pharmaceutical companies
Promoting Science on School Level	▪ Third mission part of SBC charter ▪ School visits ▪ Raising awareness for role of science in society ▪ Raising awareness for degrees in Bio-Sciences
Venture Capital (VC) Links	▪ Establishment of networks to financial community ▪ Organization of VC events
Link to top research universities	▪ Close liaison with Cambridge science transfer specialists

3. Implications for further research

The IAG has a number of implications for further research on science incubation and more generally the development of capability, opportunities and sustainability in complex networks. In particular, they point towards the performance implications of IAG foot-prints, the trade-off between different activity configurations and the role of digital technologies in enhancing the impact of activities (see Table 2).

Table 2. Implications for further research

Research Question	Explanation
What are the performance implications of different activity configurations?	▪ We can assume that science parks and catalysts differ on their IAG foot print ▪ They potentially also differ in the type of activities that underpin the various outcome types and outcome levels ▪ Further research could unpack the implications of these differences for the performance of science parks (for instance, measured by tenants' time to market, acquisition of venture capital investment or acquisitions)
What are the key tensions and trade-offs between different outcome types?	▪ Not all activities are complementary and synergistic on the level of the incubator ▪ For instance, activities on eco-system level only materialize in future while activities on network level create impact in the short or medium term ▪ Research could identify the different types of trade-offs between incubation activities (time span, resource investment etc.) ▪ Moreover, future research could investigate the ways in which staff in incubators deal with those challenges ▪ Such research could also further investigate the role of digital technologies for balancing such tensions
What could be the role of digital technologies for enhancing the impact of activities or create synergies among activities?	▪ Overall, there is scope for more detailed research on the role of digital technologies in science incubation. ▪ In particular, our findings indicate that digital technologies might increase the potential to create linkages between activities (such as discover assist and interactions with other stakeholders, such as schools)

4. Implications for management practice

Our findings also have implications for practice. In particular, the IAG is relevant for managers at science parks and universities, focused on the commercialization of science as well as companies that seek incorporate incubation activities into their R&D capability. We suggest three main implications: the use of the Incubation Activity Grid as a benchmarking tool, the use of the grid to screen for efficiency and finally, identifying potential ways to improve incubator level funding (see Table 3).

Table 3. Implications for practice

Research Question	Explanation
Incubation Activity Grid can be used as a benchmarking tool	▪ Science parks, universities and large corporations have in interest in identifying best-practice ▪ The IAG can be used to compare the activities across science parks to create benchmarks ▪ A further dimension of such a benchmarking exercise could be to complement the analysis by the amount of venture funding that different parks attract
Efficiency screening	▪ The IAG has also potential implications to screen for the efficiency of incubation activities. ▪ The grid gives an overview of which outcomes are achieved by which activity ▪ It provides an overview of overlapping and also potentially contradicting activities
Incubator level funding	▪ The IAG can be used to identify activities with potential impact on the sustainability of the eco-system ▪ Such activities can be leveraged to attract external funding

5. Conclusion

Incubators such as the Stevenage Bioscience Catalyst are an important interface between science and the commercialisation of science. Considering the hazards of the pharmaceutical value chain, in terms of investments as well as the long time to market large pharmaceuticals increasingly follow a 'network' approach to R&D. They try to tap into the innovative potential of small biotechnology firms by using their capabilities to enhance the likelihood of commercialisation. Studying the Stevenage Bioscience Catalyst allowed this project to shed more light on the activities involved in science incubation as well as the outcome of those activities.

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Dr Martin Friesl is a Senior Lecturer in Strategic Management at Lancaster University Management School and Director of the MSc in International Business & Strategy. Martin's research focuses on strategic renewal and strategy implementation and the development, change and replication of organizational capabilities in a variety of contexts such as Biotechnology, IT offshoring, Retailing, Franchising, Commercial Property Development, the Armed Forces and Financial Services. He received his Masters' degree in Business Education from LMU Munich and his Doctorate in Management from University Bw Munich. Martin has worked as a project manager for change management with Siemens AG, as a consultant, as well as in various finance roles in in the UK, Germany and China. Currently, Martin serves on the Board of the Strategy Practice IG at the Strategic Management Society. He is a member of the Strategic Management Society, the Academy of Management, the European Group of Organization Studies and is a Fellow of the Higher Education Academy in the UK. His work has received awards for its implications for practice and is published in leading peer-reviewed journals such as *Long Range Planning*, *British Journal of Management*, *Journal of Knowledge Management*, *Cross Cultural Management*, *Journal of Applied Behavioral Science* and the *International Journal of Management Reviews*. (Email: m.friesl@lancaster.ac.uk; Twitter: @martinfriesl)