Firm Strategies in Open Internet of Things Business Ecosystems: Framework and Case Study

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Motivation

- Internet of Things (IoT) increases the connectivity around us
  - Devices are connected to each other in distributed “mesh” with open standards, organizations are connected through devices
- Data will not be intermediated by the platform owners, also other organizations can utilize the data
  - Data is detached from the service
- Owning the whole service system (i.e. technology platform + sensors + data) will no longer be the only best strategy
  - What other strategies there may be?
- The need for new frameworks to make sense of strategies in open IoT ecosystems (Yoo et al., 2010)
IoT increases connectivity in business ecosystems

- **Business ecosystems** are essential for market creation and growth (Moore, 1993)
- Firms are connected and interdependent through shared standards
- Central firms are technology platform owners specifying the standards (Teece, 2014)
- Complementors attach their offering to the platforms with technological enablers and interfaces (Gawer & Cusumano, 2008)
- Business ecosystems consist of overlapping **Service Systems** (Maglio & Spohrer, 2008) that are interconnected to **System of Systems** that resembles complex adaptive system (Karcanias & Hessami, 2010)
- **IoT System of Systems** may reach a higher level of synergy and efficiency through the connectivity of several service systems
Firms may orientate differently towards IoT ecosystem

- Strategic orientation reflects what set of actions a firm believes will lead to superior performance (Gatignon & Xuereb, 1997)
- Strategic orientations are the guiding principles on firms’ interactions with the marketplace (both customers and competitors) (Noble et al, 2002)
- Firms’ strategic orientations effects their business model adaptation (Saebi et al, 2016)
Strategic orientation in the ecosystem

Two key decisions that firms can make to differentiate their orientation in the ecosystem:

1. **Level of integration with the ecosystem**
   1. To benefit from controlling the value chain
   2. To benefit from participating in ecosystem

2. **Firm’s knowledge processing in relation to the ecosystem: Offering type**
   1. To benefit from either outside-in or inside-out processes, that is, internalization of external knowledge or externalization of internal knowledge (stand-alone offering)
   2. To benefit from co-creation of knowledge with the network actors (systemic offering)
## IoT Strategy Framework

<table>
<thead>
<tr>
<th>Offering focus</th>
<th>Level of integration</th>
<th>Value chain</th>
<th>Open ecosystem</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systemic</strong></td>
<td>SERVICE SYSTEM OWNER</td>
<td>Controlling value chain</td>
<td>SYSTEM OF SYSTEM FACILITATOR</td>
</tr>
<tr>
<td></td>
<td>Coupled knowledge processes</td>
<td></td>
<td>Coupled knowledge processes</td>
</tr>
<tr>
<td><strong>Stand-alone</strong></td>
<td>COMPLEMENTOR</td>
<td>Participating in value chain</td>
<td>MODULE PRODUCER</td>
</tr>
<tr>
<td></td>
<td>Inbound or outbound knowledge processes</td>
<td></td>
<td>Inbound or outbound knowledge processes</td>
</tr>
</tbody>
</table>

*Source: Aalto University, School of Business*
Data and methods
Data & analysis

- Qualitative case study with two large European projects, in the context of the European initiative of building an IoT Open Innovation Ecosystem
- 23 companies, representing a variety of value chain partners in IoT
- Narrative approach to capture the firms’ characterization of strategic orientations.
- Websites as primary data
- How do the texts and language describe firms’ goals and actions with IoT ecosystem?
  -> micronarratives with taking a stand on the framework dimensions
  -> cross-case analysis and descriptions of the strategic orientation types
Results
Service system owners

- operates in a closed or semi-closed proprietary system or controlled set of standards and with a bounded set of actors
- control over the partners and the growth of their service system
- the profit comes from the end-users
- increase the connectivity and the service offering of the ecosystem
- DrivCo,
  - a global manufacturer of automobiles and motorcycles
  - offers mobility services, makes the decisions of the collaborating partners in providing them
  - involvement of users of the services is crucial
Complementors

- sell tailored services or products through service systems owned by other companies or channels specific to a certain use case area, standard or a value chain
- profit from the sales of professional services, tailoring and maintaining their solution in the service system
- represent either hardware of software providers
- offer higher level of specialization and niche offering
- provide tailored services or products and aim of profiting from connecting their products in the service system

e.g. EnerCo offers stand-alone products for ventilation, but also seeks profits from the services related to the product
Module producers

- produce solutions that are interoperable and can be integrated into all kinds of technology platforms and service systems through standardized interface
- little control over the service system orchestration, and usually pay rent to different platform owners.
- Profit from collecting royalties or licensing fees
- Benefit from flexibility and mass customization
- Their stand-alone solutions can be integrated to any service system
  - For example, CyclCo offers solutions for product life cycle knowledge management
System of systems facilitators

- control and define interface standards that connect different independent technology platforms, typically on the API level
- enable others’ connectivity in the business ecosystem
- Maintain standards, act as repositories for open source code
- Non-profit business model; collect membership fees, provide education in the use of standards

For example, StandCo, a consortium of hundreds of member organizations, enables others’ connectivity in the ecosystem. They provide a platform for others to perform on and try to make their performance easier by co-creation of shared rules and boundaries for performance.
<table>
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<th>Complementor</th>
<th>Module Producer</th>
<th>System of Systems Facilitator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key actors</strong></td>
<td>A bounded set of actors, contractual connections with platform owner</td>
<td>Hardware and software providers, consultants and integrators with domain specific expertise</td>
<td>Product and service providers tapping into APIs and open standards</td>
</tr>
<tr>
<td><strong>Role</strong></td>
<td>To control the growth of the ecosystem</td>
<td>To react to requirements and changes</td>
<td>To screen new opportunities in agile manner</td>
</tr>
<tr>
<td><strong>Aims</strong></td>
<td>Grow scale and service offering for end customers</td>
<td>Provide and upgrade limited set of products and services to platform</td>
<td>Enjoy scale economics in several ecosystems with modular products</td>
</tr>
<tr>
<td><strong>Offering</strong></td>
<td>Offers total solution and tangibles</td>
<td>Offers service system specific solutions</td>
<td>Offers modular solutions to several systems</td>
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<tr>
<td><strong>Activities</strong></td>
<td>Orchestrates bounded sub-system</td>
<td>Tailored interfaces</td>
<td>Able to adapt to any service system</td>
</tr>
<tr>
<td><strong>Characteristics</strong></td>
<td>Closed system, controlled by owner</td>
<td>Products &amp; solutions. Tailored Partner</td>
<td>Open interfaces, API's, apps, plug-and-play products and services</td>
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Discussion & conclusions
Contribution

- The paper explains the changes that IoT causes in the fundamentals of the business ecosystems, and coins the future business ecosystems as systems of systems, complex adaptive systems (c.f. Karcanias & Hessami, 2010)
- The paper provides a framework to classify strategic orientations in the IoT context and contributes to the ongoing discussion about IoT business models (c.f. Dijkman et al, 2015)
- The paper contributes to open innovation research by illustrating not only the standalone knowledge processes but also the need for coupled knowledge processes (c.f. Gassman et al., 2010; Dahlander & Gann, 2010)
Managerial implications

- IoT changes the nature of competition inside and between business ecosystems
- Managing complexity for the benefit of the end customer, not intermediating data flows will become increasingly important
- Firms must be able to establish and sustain their presence as Service System Owners, Complementors, Module Producers or System of Systems Facilitators
- The framework implies that all roles are needed, and firms can change their roles over time and take several roles
Thank you!

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