Everything as a service?
Introducing the St.Gallen IGaaS Management Model

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Abstract
Manufacturing companies enhance increasingly their hardware products with services. The deployment of digital technologies intensifies the fusion of products and related services towards hybrid offerings consisting of smart products and smart services. If manufacturing companies can control all relevant performance measures of such hybrid offerings in use, they are at the edge to further transform their business.

At this stage, bundles of products and services merge into a single service offering. With such a service, customers may use the product while the supplier ensures the product’s functionality. This kind of offering is called Product-as-a-Service. Manifold industry-specific applications of this concept have emerged, such as Lightning-as-a-Service or Windpower-as-a-Service. In a broader sense, these offerings are subsumed under Everything-as-a-Service (XaaS). However, only few manufacturing companies offer XaaS, let alone the number of companies that are economically successful in this endeavor.

In contrast, software vendors show the successful transformation from selling on-premise solutions to offering Software-as-a-Service (SaaS). In order to do so, software companies had to restructure their offering. Far more than just adopting a new business model, switching to SaaS was a strategic move for software firms that entailed fundamental organizational changes. As software vendors demonstrate how profitable SaaS is, the underlying transformation path could be a didactic play for manufacturing companies.

Importantly, a comprehensive framework to transform a manufacturing firm towards XaaS is missing. In order to fill this lacuna, we propose a holistic management model. The four layers strategy, business model, operating model and enablers represent the main levers for turning the transformation towards XaaS into action.

Key words
Digitalization, Everything-as-a-Service, SaaS, Servitization, XaaS

INTRODUCTION
Historically, manufacturing companies were driven to mass-produce high quality products and distribute them on every possible channel with the impetus to increase sales volume and, in turn, revenue and profit. The increasing product customization and customer orientation required these companies to improve their flexibility, accompanied with reaping efficiency and effectiveness gains. Nevertheless, margins on hardware products are continuously shrinking, inter alia due to almost equal competition from low-cost regions. To encounter the decreasing margins, manufacturing companies adapt by adding high value services to their portfolio, following a transition to solution providers commonly referred to as servitization (Oliva and Kallenberg 2003, Vandermerwe and Rada 1988).
Besides the option to bundle products and services as a complete solution and sell it to the customers, companies now also look into the possibility of providing products as a service. Moving from transactional sell-and-forget approaches to leasing-alike pilots has been known for decades, but is again of rising interest in the era of digitalization. Back in 1962, Rolls-Royce started renting engines to their customers. Today, the technology-enabled easiness of remote tracing, monitoring and repairing the still supplier-owned products underlines the potential of “as-a-Service” offers.

A similar transformation has already occurred in the software industry. In Software-as-a-Service (SaaS) business models, software is not sold as perpetual license anymore, but customers pay a certain fee for its usage. More and more “as-a-Service” approaches emerged especially in the IT world. Examples include Platform-as-a-Service (PaaS) and Infrastructure-as-a-Service (IaaS) (cf. Porter and Heppelmann 2014), subsumed under the umbrella term Everything-as-a-Service (XaaS).

Besides software companies, manufacturers also move towards “as-a-Service” business models. They are able to draw on insights from the SaaS transformation. Yet, manufacturing companies generally cope with a more complex environment, which is likely to influence the path towards XaaS. This is because manufacturing companies are to some extent constrained by their hardware. They have to respect diverse regulations, approvals, longer innovation cycles and their supplier-distributor network. Manufacturing companies further have to foresee changes within various departments, such as the way the product is marketed or how it is sold. Accounting mechanisms are also subject to change. Overall, the combination of physical and digital elements renders the transformation more complex, compared to pure software products.

A new terminology is needed to account for the idiosyncratic conditions of manufacturing companies. So far, the umbrella term “XaaS” only encompassed software- and IT-related business models. However, these cannot be readily applied by manufacturing companies who serve industrial customers and operate under different conditions. The services provided are different, too. Thus, to designate “as-a-Service” business models offered by manufacturing companies in a business-to-business (B2B) environment, we propose the terminology Industrial Goods-as-a-Service (IGaaS).

The transformation towards IGaaS is an intricate phenomenon worthwhile of further study. Beyond being a new business model, IGaaS requires deep change within and across organizational boundaries of manufacturing companies. Yet, literature treating this specific topic is scarce. In consequence, we develop a holistic framework to guide managers in their endeavor to introduce and operate IGaaS.

The remainder of this paper is structured as follows. First, we demarcate IGaaS from existing concepts to put forward a tentative definition. Second, we introduce a holistic model for managing “as-a-Service” business models based on industrial goods. We finish with a conclusion and outlook.

Towards a definition of IGaaS

“As-a-Service” models have their origin in the field of information systems, which is why it has still a prominent role around the topic of cloud computing (Durao et al. 2014). Thus, the IT branch of XaaS has already been widely accepted and debated.

To discuss selected forms of XaaS business models, namely SaaS, PaaS and IaaS, we focus on two essential dimensions: the value package and the revenue model. Both elements construct the innovative value proposition of IGaaS and differentiate it from existing offers. Table 1 differentiates different XaaS business models according to their value package and revenue model.
Table 1: Value Packages and Revenue Models of XaaS business models

<table>
<thead>
<tr>
<th>Business Model</th>
<th>Value Package</th>
<th>Revenue Model</th>
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<tbody>
<tr>
<td></td>
<td>Core Services</td>
<td>Enabling Services</td>
</tr>
<tr>
<td>SaaS</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>PaaS</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>IaaS</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Leasing</td>
<td>x</td>
<td>(x)</td>
</tr>
<tr>
<td>Renting</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>IGaaS</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

*Blank: Not applicable. (x): Possible, but not necessary component. x: Necessary component.*

Any value package consists of a service package and a cyber-physical system. The service package reflects the customer’s perspective of the offering and is divided in two categories: the core service and enabling services (Grönroos 2010). The core service is the “basic customer benefit received”, facilitated by enabling services (Ozment and Morash 1994, p. 352). Cyber-Physical Systems (CPS) are integrated physical and computation processes (Lee 2008) for delivering the service package.

A revenue model details how a business model enables revenue generation (Zott and Amit 2008). The pricing model is the subdimension of the revenue model that permits to differentiate between business models.

Three pricing models are relevant for differentiation. Usage-based models, also known as pay-per-X or pay-as-you-go, tie payment to the customer’s use intensity of the service. In addition, there are two types of performance- or outcome-based contracts (OBC): eOBC focus on the economic value; aOBC focus on the availability (Grubic and Jennions 2018).

SaaS, PaaS and IaaS business models all offer a certain value proposition to the customers, defined as the core service. This core service is of digital nature in all cases and can be billed based on usage (e.g. number of users per month) or availability (e.g. 99.995% uptime). Only IaaS has a physical component included in the value package and may integrate further enabling services. Here, the pricing model can be based on a negotiated availability as well. The same holds true for certain PaaS business models.

In the manufacturing industry, “as-a-Service” concepts stem from leasing or renting business models. Consider the construction industry, where renting or leasing are common. Especially smaller building contractors prefer renting heavy duty machinery for the time required on the construction site, instead of tying up capital by buying these systems.

In the light of recent evolutions, manufacturers start to adopt “as-a-Service” concepts. Importantly, manufacturing companies evolve into solution providers. This is accompanied by the increasing diffusion of digital technologies, digital products and connectivity among industrial goods, often referred to as the Industrial Internet-of-Things (IIoT). The combination of physical and digital components changes the value package of such manufacturing companies radically and enables them to offer new pricing models. Due to this development, we suggest to include the proposed IGaaS business model in the IT-dominated XaaS world under a manufacturing branch.

IGaaS differs from other business models by its idiosyncratic value package and revenue model. A SaaS, PaaS or IaaS value package features four or less of the characteristic dimensions core and enabling services, physical and digital elements. In contrast, IGaaS value packages necessarily include all four components. As for the revenue model, eOBC are not applicable for SaaS, PaaS, IaaS, leasing or renting. Thus, IGaaS is the only business model with the potential to apply eOBC, where payments are tied to performance outcomes. Table 1 summarizes the differences between IGaaS and other business models.

In alignment with these peculiarities, we derive the following working definition for IGaaS:
IGaaS is a business model consisting of 1) a value package combining core services, enabling services, physical components and digital components, and 2) a revenue model that allows for usage-based, aOBC and eOBC pricing models.

Providing IGaaS has the potential to reap several benefits for the suppliers. It may lead to increased customer involvement and retention. Besides that, it offers opportunities for superior financial performance, as software vendors adopting SaaS business models industry experienced it.

However, providing IGaaS also provokes considerable changes within the whole organization. Responsibilities and tasks of existing roles are changing and new roles are added. Proven processes need to be altered or replaced by new ones. In addition, firms need new governance models.

Consequently, managing IGaaS is not trivial. Therefore, we propose a first approach to a holistic framework in the following.

**The St. Gallen IGaaS Management Model**

Managers need comprehensive guidance for introducing and operating IGaaS. So far, IGaaS has been discussed predominantly from a business model perspective. That is because the main novelty of IGaaS is an integrated value package, leveraged by innovative revenue models and close customer relationships. However, introducing such as radically new business model is a deliberate, strategic choice. Such decision can only be taken in consideration of the firm’s current strategic position, characterized by its objectives, portfolio and resources. In addition, operating IGaaS entails deep changes with regards to the organizational structure, processes and governance. Finally, a set of enablers fuels the introduction and operation of IGaaS. Amongst them, risk management and value network are the most prominent.

Against that backdrop, we introduce a holistic framework to manage IGaaS and name it the *St. Gallen IGaaS Management Model* (SGIMM). The SGIMM is composed of the layers Strategy, Business Model and Operating Model and supported by Enablers, as depicted in Figure 1.

*Figure 1: The St. Gallen IGaaS Management Model*

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Objectives</th>
<th>Portfolio</th>
<th>Resources</th>
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<tbody>
<tr>
<td>Business Model</td>
<td>Value Package</td>
<td>Revenue Model</td>
<td>Customer Relationship</td>
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<tr>
<td>Operating Model</td>
<td>Structure</td>
<td>Processes</td>
<td>Governance</td>
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<tr>
<td>Enablers</td>
<td>Risk Management</td>
<td>Value Network</td>
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**Conclusion**

This paper defines IGaaS as a new concept under the XaaS umbrella term. In the last decade, software companies have blazed a new trail for “as-a-Service” offerings. Manufacturing companies that aim at tapping into the new revenue opportunity of IGaaS need to drive organizational change.

More research is needed to operationalize the SGIMM. The framework’s objective is to provide managers in manufacturing companies comprehensive guidance for introducing and operating IGaaS. However, a plethora of questions arises in each of its layers that beg for inquiry. What additional resources do firms need to perform XaaS? Which revenue model fits best to the value package of a given XaaS offering? Are new policies as part of the corporate governance needed? What value network partners are able to absorb the risks underlying XaaS?

The Competence Center Smart Services at the University of St.Gallen’s Institute of Technology Management addresses these questions in a forthcoming study. The XaaS benchmarking project “Everything as a service? – Learning from software & manufacturing companies” starts in January...
The proven St.Gallen benchmarking approach combines quantitative and qualitative research approaches through surveys, interviews and site visits. Findings from this study will shed more light on how companies can successfully provide XaaS offerings and master the necessary strategic and organizational adaptions.

References


Further information is available at https://item.unisg.ch/xaas.