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Business Model Innovation Archetypes for Industry 4.0

Jörg Weking, Chair for Information Systems, Technical University of Munich (weking@in.tum.de)
Sebastian Hermes, Chair for Information Systems, Technical University of Munich (sebastian.hermes@in.tum.de)

BUSINESS MODEL INNOVATIONS AS AN IMPORTANT ELEMENT OF INDUSTRY 4.0

The focus of traditional industries on the opportunities and challenges of digitization is often discussed by researchers and practitioners around the world. Initiatives such as "Industry 4.0" in Germany deal with the convergence of "classical" industrial production with IT and new technologies, such as the Internet of Things (IoT). The innovation of traditional industries is an indispensable prerequisite for securing the long-term competitiveness and economic prosperity of the industrial nations.

Studies show that not only product and process innovations but also business model innovations are essential for sustainable performance [2]. Some studies even show that business model innovators are more successful than pure product or process innovators. Often the provider with the best business model dominates the market and not the provider of leading technological solutions.

However, researchers and practitioners alike rather focus on the technological implications of Industry 4.0 instead of business models. Thus, there is a lack of research about business model innovation in Industry 4.0.

Therefore, the existing literature offers little conceptual guidance on the questions: What characterizes an Industry 4.0 business model? Which archetypes of Industry 4.0 business model innovations are there? However, these questions are important to assist manufacturing firms in remaining competitive and taking advantage of opportunities that arise.

In order to bridge gap, this article presents 13 archetypes for business model innovations towards Industry 4.0. We derive the archetypes based on 32 firms that transformed towards Industry 4.0.

Super-archetypes	**Sub-archetypes**			
Integration	Crowd sourced innovation	Production as a service	Mass customization	
Servitization	Life-long partnerships	Product as a service	Result as a service	
Expertise as a service	Product-related consulting	Process-related consulting	Broker platforms	IoT platforms

Table 1 – Archetypes of Industry 4.0 Business Model Innovations [1]

ARCHETYPES OF INDUSTRY 4.0 BUSINESS MODEL INNOVATIONS

We identified three super-archetypes and ten sub-archetypes of Industry 4.0 business model innovations. The super-archetype integration focusses on new processes, servitization on new products, and expertise as a service on both, products and processes. Table 1 shows all super- and sub-archetypes and their relations.

INTEGRATION – PROCESS-FOCUSED BUSINESS MODEL INNOVATIONS

Integration covers business model innovations of firms that cover or manage more parts of the value chain. It has three sub-archetypes: *crowd sourced innovation*, *production as a service*, and *mass customization*.

Crowd sourced innovation is shaped by new product development and design processes. Firms transform form a closed towards an open business model [3]. Innovation platforms as a key resource allows to integrate externals, individuals and partners into product development. Public communities can design products (crowd sourcing).

Production as a service focusses on transforming product ideas into physical goods. Firms take care of the whole production from design checking to shipping for their customers. Firms shift from producing custom-made, expert designed products to mass individualized, user-designed products. Customers become partners. Example firms are 3D printing service providers for products, often combined with design checking and shipping.

Mass customization integrates customers into the value chain. Firms shift from mass production to mass customization. With mass customization, customers can choose among a range of options and adapt the final product to their individual taste. Smart production enables profitable production of small lot sizes, even lot size one.

SERVITIZATION – PRODUCT-FOCUSED BUSINESS MODEL INNOVATIONS

Sensors enables the servitization archetype to provide product service systems instead of tangible products only. Servitization includes offering complementary services to product sales (*life-long partnerships*) and substituting product sales with services that contain a product (*product as a service* and *result as a service*).

Life-long partnerships use IoT connected products to evolve its service portfolio from repair after failure and maintenance to prevent failures with remote monitoring and predictive maintenance throughout the whole product life cycle. Manufacturer become solution providers with integrated product service solutions and a partner for customers for the whole product use phase.

Product as a service covers renting products with services instead of selling them. Customers pay for use and guaranteed availability of the product.

Result as a service sells the output or result of the product. This enables full-service packages and providers take even more responsibility for safe operations and compliance.

EXPERTISE AS A SERVICE – HYBRID BUSINESS MODEL INNOVATIONS

Here internally-build expertise of products or processes are offered as consulting services (sub-archetypes *product related* and *process related consulting*) or new digital products (sub-archetypes *broker platform* and *IoT platform*).

Product related consulting complements product sales with advice and consulting, which result from the manufactures own experiences with the products. Examples include system planning, energy saving consulting and helping customers to make optimal use of the product.

Process related consulting builds on experiences of internal processes. Firms offer this know-how as an advice and consultancy to customers without a tangible product. Examples include consulting in smart production and digital transformation.

Broker platforms cover firms that use experience from manufacturing and selling asset-intensive machinery to develop new digital products. Examples of our case study firms are cloud based platforms for trading goods and services among user groups, such as machine configurations.

IoT platforms describe firms that use experience on internal processes and smart production to develop and offer an IoT platform. This is the basis for a community-based two-sided market of customers and partners, who can develop and sell complementary products and services.

CONCLUDING REMARKS

In this paper we show how to use or build on Industry 4.0 technologies, such as Smart Manufacturing, Cyber Physical Systems and IoT. The 13 archetypes of business model innovations can be used to assess the Industry 4.0 readiness of a current business model. The archetypes further support ideation for business model innovations and discover business opportunities. Firms can use archetypes and related cases in an Idea phase of an innovation project to identify options for new digital business models and evaluate their implementation in the context of the organization.

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C1 Subproject Leaders:
Prof. Dr. Helmut Krcmar
krcmar@in.tum.de
Dr. Markus Böhm
markus.boehm@in.tum.de

Chair for Information Systems
Technical University of Munich
Boltzmannstr. 3
85748 Garching
Germany