Digital Business Models

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IoT and service business models

Services (Lovelock & Wirtz 2007)

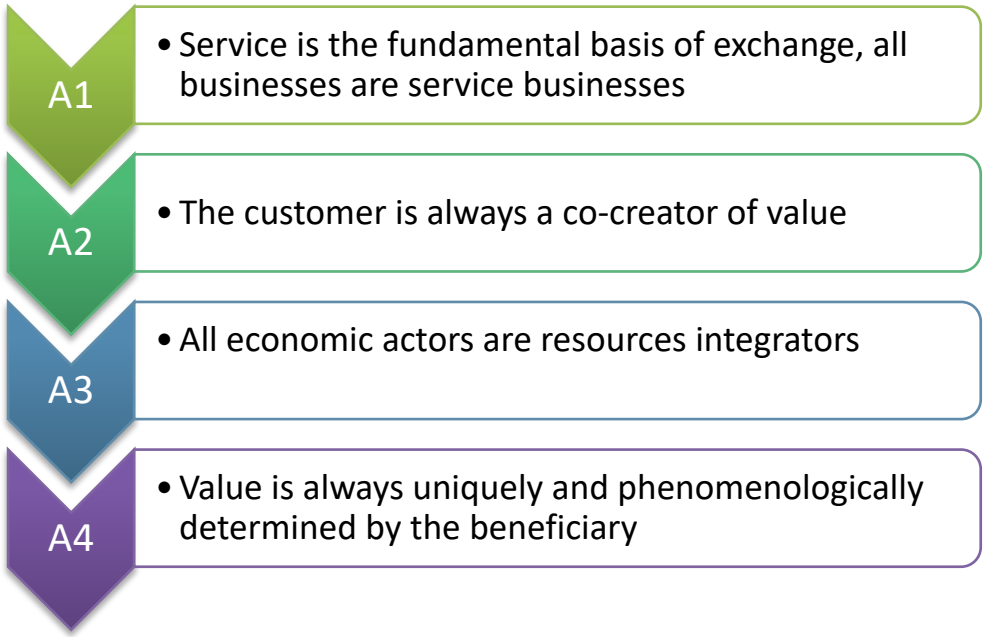
- Services are economic activities offered by one party to another, most commonly employing time-based performances to bring about desired results in recipients themselves or in objects or other assets for which purchasers have responsibility. In exchange for their money, time and effort, service customers expect to obtain value from the access to goods, labor, professional skills, facilities, networks, and systems; but they do not normally take ownership of any of the physical elements involved.

From services to service logic

(Vargo & Lusch 2004, 2014)

Service as a perspective: the application of competences for value co-creation

All products are service – they are appliances for service provision



Value co-creation
(Vargo & Lusch 2016)

- Value is uniquely and phenomenologically co-created with the beneficiary (customer).

- Viewed from a network perspective, value is co-created through the integration of resources, provided by many sources, including a full range of market-facing, private and public actors.

  - Organizations cannot pre-produce and deliver value to the consumer
  - Organizations can only make value propositions, with which customers co-create value

Service Systems

- Service systems are configurations of people, technology and other resources that interact with other systems to cocreate value (Maglio et al. 2008)

Service innovation

- Service innovation can be defined as the creation of new and/or improved service offerings, service processes, and service business models (Ostrom et al. 2010).

Service logic innovation

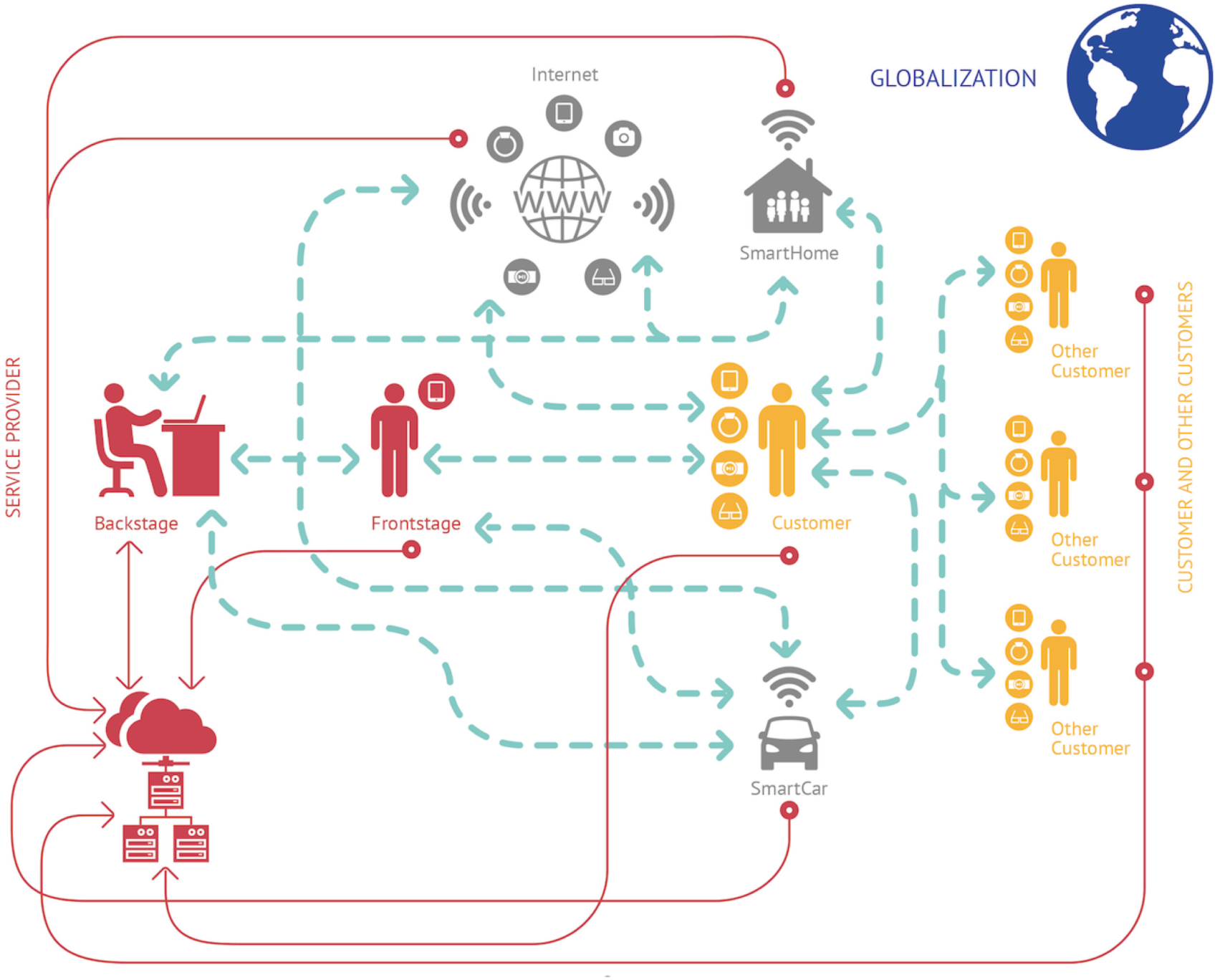
(Michel, Brown, Gallan 2008)

Innovation: changes in customer thinking, participation, and capabilities to create value.

”Altering value as it is defined and used by the customer, not value in production and exchange, defines innovation”

Business model innovation as value proposition design (Maglio and Spohrer 2013)

- Business model innovation requires systematic exploration of reconfigurations of resources and the consequences for value-proposition design
  - Improving existing offerings
  - Creating new offerings reconfiguring ecosystem partners
- *Service Science* as one of the 100 key IBM inventions in its 100 years of history



(Ostrom, Parasuraman, Bowen, Patrício, Voss, 2015)

IoT technologies and services

(Burkitt, 2014)

1. **Endpoints** - are the single-function sensors and actuators that reach out and touch the world around them, monitoring for changes and providing feedback to adjust to those changes (e.g. temperature sensor)
2. **Simple hubs** – devices that connect endpoints to broader networks (e.g. connected home thermostat)
3. **Integrating hubs** - relatively complex devices that connect simple hubs and outside connections, providing a diverse array of services are that fit more or less seamlessly together (e.g. home energy management system).
4. **Network and cloud services** - provide the infrastructure of the Internet of Things. They deliver the seamless and transparent connection to the Internet that hubs require, along with the cloud computing power needed to collect, store, and analyze vast amounts of data from myriad endpoints.
5. **Enhanced services** – services that make use of the information collected and analyzed by other platforms and services to deliver broad-based interactive functions (e.g. advanced systems that integrate and build upon the information of multiple hubs to develop more complex services, such as positive energy blocks)

IoT technologies and services

(Burkit 2014)

Exhibit 1: **Services Available through the Internet of Things**

This list of IoT services is arranged on two critical dimensions. The horizontal rows (from *monitor* at the bottom to *optimize* at the top) represent the value delivered to customers, in order of complexity. The columns (from endpoints to enhanced services) represent the technologies of the IoT as described in this article, in increasing complexity from left to right. (Network and cloud services are not shown because they are not typically oriented to end-users.)

NO/CLOSED NETWORKS	INTERNET OF THINGS		
	Endpoints	**Simple Hubs**	**Integrating Hubs**	**Enhanced Services**
Optimize			GE Software Predix and other industrial platforms for interconnecting analytics engines and business operations Large-scale digital city systems like those under development at MIT and in Barcelona	
Adapt	Stand-alone GPS navigation devices	Progressive Snapshot and other auto insurance telematics systems Smartphone apps that use location tracking	Apple HomeKit and other protocol-based platforms allowing diverse devices in a building to interconnect to one another and the Internet	Emerging systems for setting insurance rates based on health and driving behavior
Control	Motion- or light-responsive alarms and controls	Google Nest and other Internet-connected systems for heating, cooling, and ventilation Estimote Beacon, iBeacon, and other Bluetooth-enabled object identification sensor systems	WeMo and other systems for controlling lights and appliances through remote or mobile devices	Potential connected-car traffic management systems
Monitor	Simple thermo-stats and motion sensors	Jawbone UP, Fitbit, and other fitness activity sensors and hub systems	BodyGuardian and other medical wearables that feed data to online diagnostic platforms	

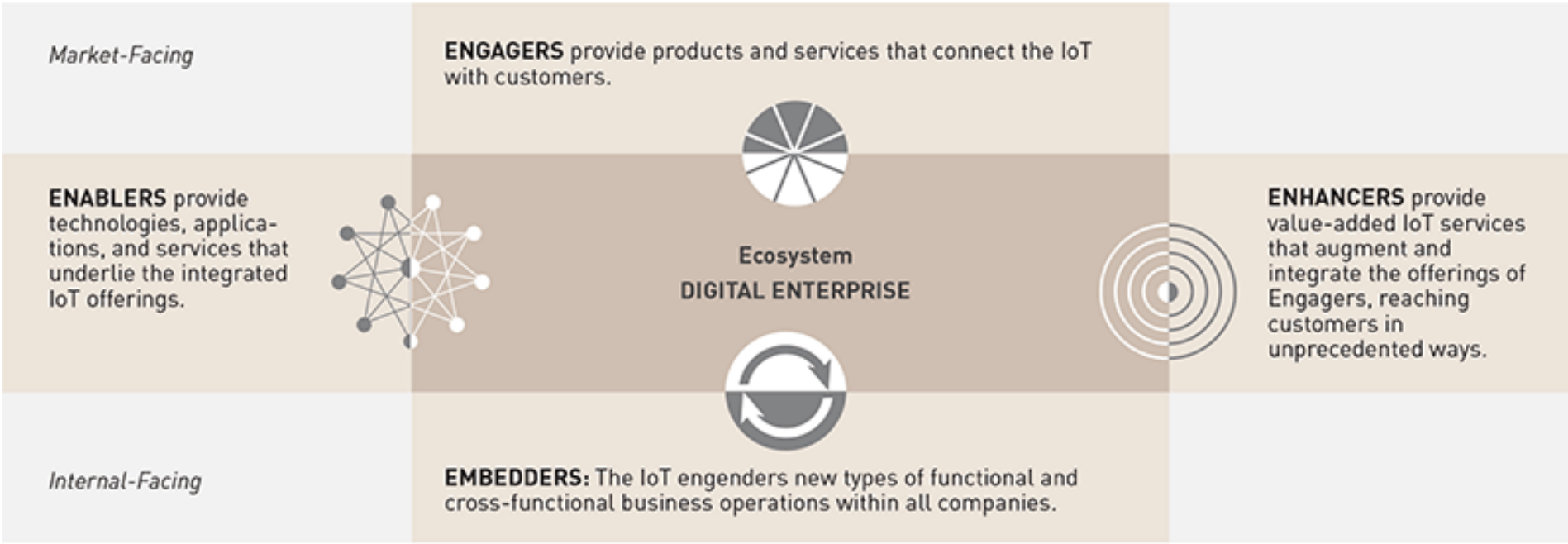
Source: Strategy&

IoT based business models

(Burkitt 2014)

Exhibit 2: **The IoT Ecosystem**

The overall IoT market will be divided among Enablers, Engagers, and Enhancers. These three kinds of companies will interact, working together to provide the technology and services needed by all—both to market the IoT and to deploy it for their own operations.



Source: Strategy&

Enablers: Building the Technology

- Primarily technology-oriented companies, such as Cisco, HP, IBM, and Intel.
- Build and maintain the critical IoT infrastructure that allows Engagers to create their own connected services.
- Their offerings include the endpoint, hub, and network and cloud service technologies: devices, connectivity hardware and infrastructure, computing and data storage systems, software platforms, and more.
- The systems they produce—intelligent endpoints, hubs, cloud services, and platforms—must not just provide connections, but manage and bill for those connections, and allow users to customize and develop their own services.

Engagers: Connecting to Customers

- Provide the direct link between the IoT and the market.
- They use the endpoint, hub, platform, and service offerings created by the Enablers to produce services for consumers and businesses (e.g. home energy management system providers, alexa).
- Engagers tend to be most active in hubs and connected services.
- They gain insight into customer needs and expectations, and use human-centered design to develop compelling services that change how customers behave.
- Moving beyond selling products to offering a powerful and attractive customer experience

Enhancers: Creating New Value

- Provide integrated services that reframe and repackage the products and services of the Engagers.
- Find new ways of creating and extracting value from the data, relationships, and insights generated from IoT activity (e.g. smart city solutions).

IoT technologies and services

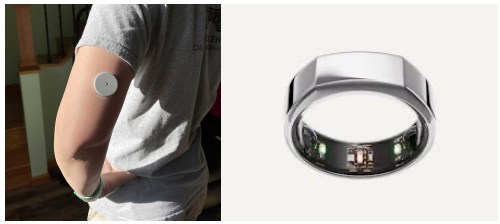
Enhanced systems
e.g. health insurance companies

aetna

Integrated hubs

Social media via network
and cloud services

Endpoints and simple hubs

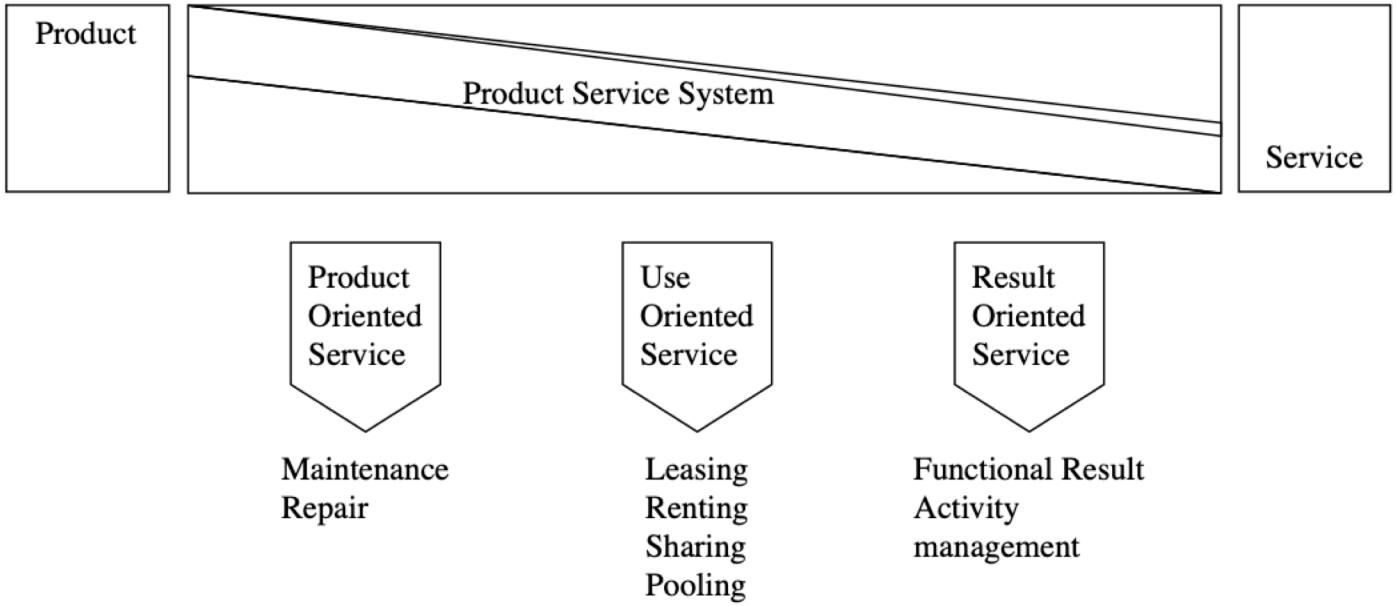


What is the impact of IoT on existing manufacturing companies?

Digital servitization (Kohtamäki, et al. 2019)

- the transition toward smart product-service-software systems that enable value creation and capture through monitoring, control, optimization, and autonomous function.
- concept of digital servitization reshapes the conventional idea of products as standalone concepts, instead emphasizing the connectivity between products (IoT) and between companies (manufacturers, operators, and customers)

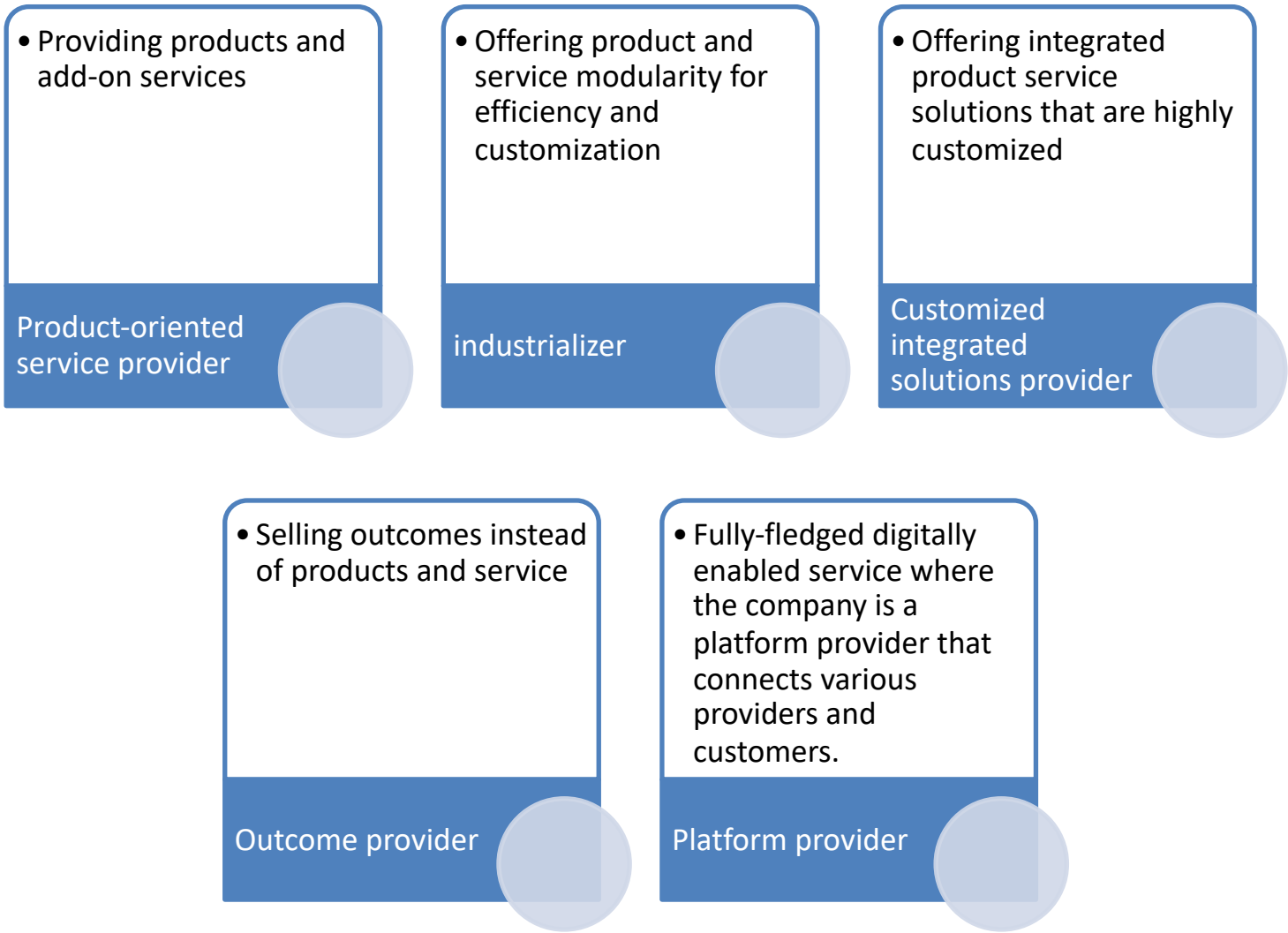
Product service systems



Source: Tukker (2004)

Figure 1.
PSS Classifications

Types of digital servitization business models (Kohtamäki, et al. 2019)



Product-oriented service provider

- Provides products and add-on services, with a traditional product business model.
- The role of remote diagnostics depends on the company technology strategy, but, in this definition, it does not affect product or add-on service pricing, which is still based on sold units.
- Focuses on capabilities and processes required for efficient design manufacturing, and delivery.
- The service portfolio is mainly based on basic offerings—so-called add-on services.
- Often, power is on the customer side, particularly in the case of simpler products and services where the manufacturer switching cost is low.
- Transaction costs are reduced by offering standard products and add-on services that are fairly easy to sell and purchase.

Industrializer

- Emphasizes product and service modularity to improve efficiency despite increasing demands by customers to customize offerings to their needs.
- Develops modularity to combine increase efficiency of product-service delivery and customization of solutions
- In terms of strategic capabilities, it focuses on combining effective solution customization with efficient order delivery by developing capabilities in modularity.

Customized integrated solution provider

- Offer integrated product-service solutions, often entailing relatively high levels of solution customization
- Provision of availability sets relatively high standards of remote diagnostics, requiring accurate data acquisition, analytics, and implementation.
- However, the customers of companies that apply this business model may still want to purchase integrated solutions with performance guarantees and availability instead of pure outcomes
- Some companies using this business model may offer monitoring, control, optimization and crewless autonomy as a service.
- This requires the development of capabilities in digitalization (e.g., capabilities in monitoring, control, optimization, and autonomous vehicles). These capabilities build on sales, design, and delivery of integrated lifecycle solutions.
- Development of integrated solutions requires in-depth knowledge of not only customers but also other partner company equipment and processes, as well as the integration of technologies (e.g., software beyond firm boundaries).

Outcome provision

- Solution providers that sell outcomes instead of products or services . Instead of selling products, providers retain ownership and sell the value created by the product (e.g. Rolls-Royce's power-by-the-hour concept).
- Offering such solutions requires the capability of accurately measuring the generated performance, often entailing accurate monitoring and control of the product or fleet of products.
- Being able to continuously measure and optimize the equipment or processes is a critical underlying requirement of outcome providers.
- Strategic capabilities to sell and implement outcome-based contracts, suggesting capabilities in detailed monitoring, control and optimization of even autonomous solutions.
- Implementation of these systems, require also in-depth collaboration between ecosystem actors.

Platform provider

- Fully-fledged digitally enabled service business model where the company is a platform provider that connects various providers and customers (e.g. car-sharing platform).
- This transformation entails a full transition from car manufacturer to provision of (car sharing) services and may require a software platform for multiple different providers and customers.
- Platform providers need the digital platform, numerous providers and customers, and, to achieve this, a strong brand name. A digital platform is needed not only to share information and facilitate exchanges but also to monitor, control, and optimize services and products.
- The power position of platform providers is potentially strong because of the data they collect on the usage of services. Platform

Types of digital servitization business models (Kohtamäki, et al. 2019)

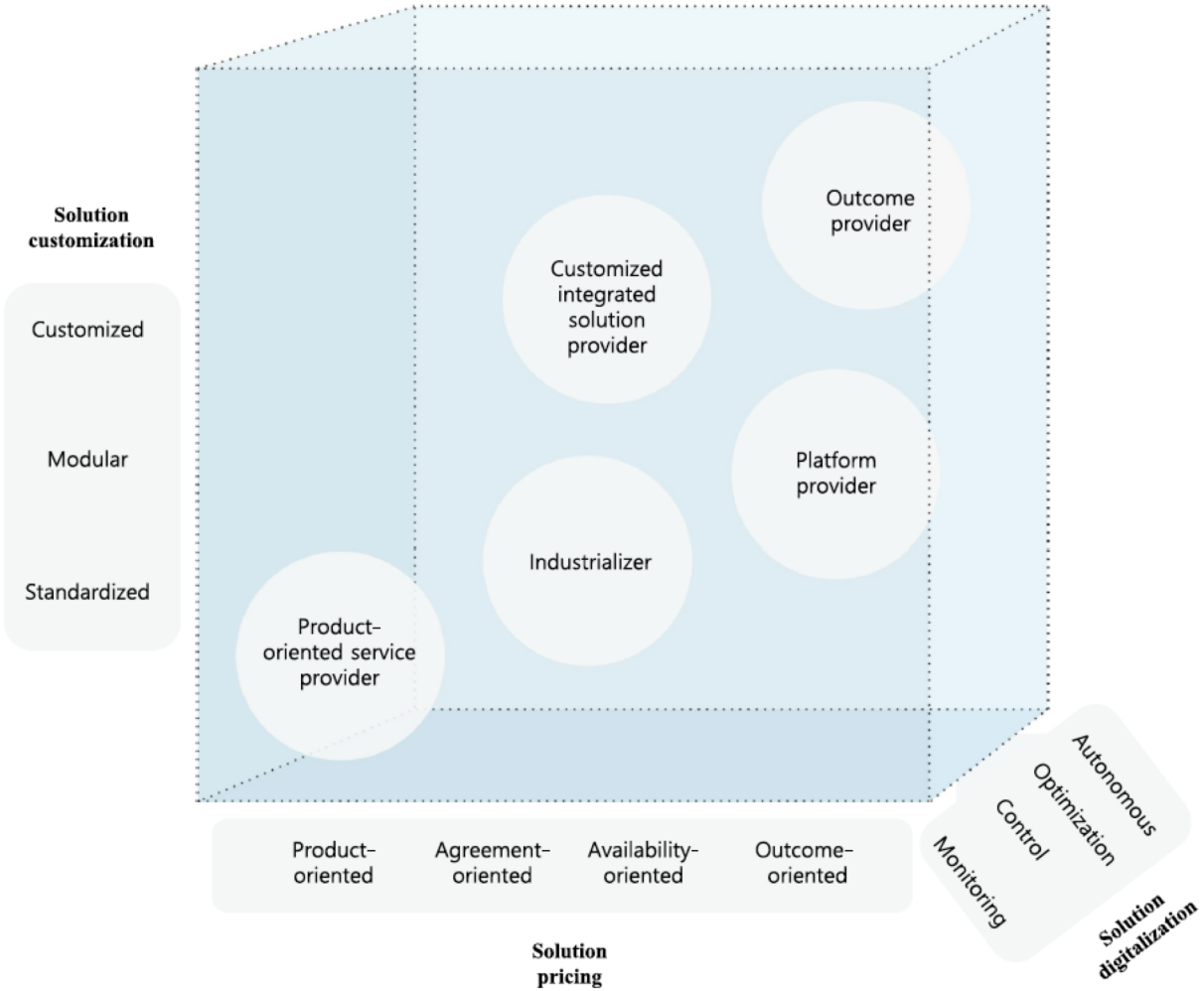


Fig. 3. Understanding the characteristics of solution offerings in digital servitization business models.

Energy Service Business Models
(Brown et al. 2022)

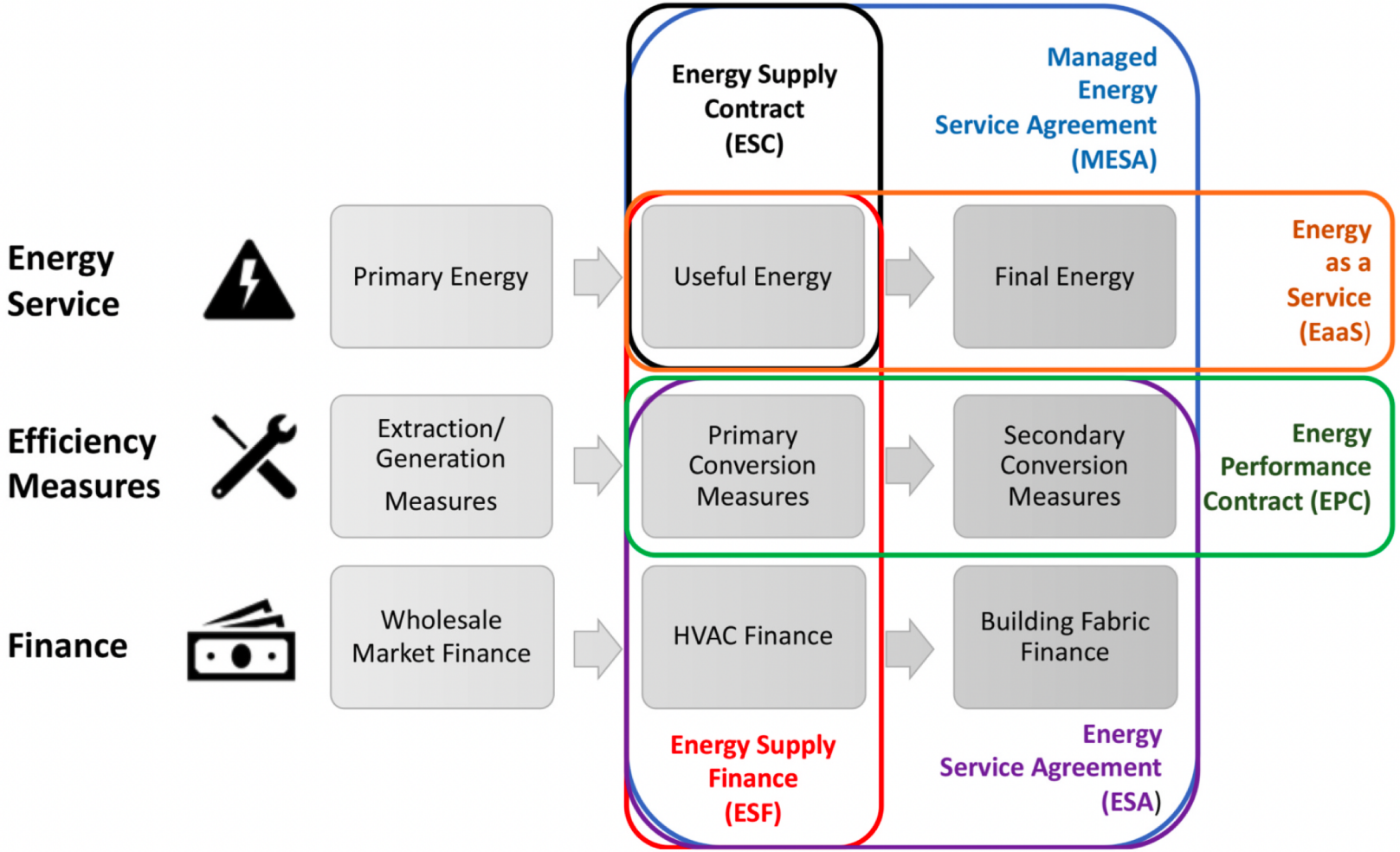


Fig. 9. Typology of ESBMs.

Energy service business models

- *Energy supply contract* – selling hot water or heat instead of the energy
- *Energy service financing* – acting as project developer, financing the primary conversion systems as well as taking responsibility for their O&M (but customers still keep ownership)

Energy service business models

- *Energy performance contracts* – providing guarantees for measured and verified performance savings from one or more final energy services such as heating or illumination.
- *Energy service agreement* - a variant of EPCs that involve integrated financing of energy saving measures, backed by a long-term performance guarantee (off-balance sheet)

Energy service business models

- Energy as a Service (EaaS) - models, bundling the upstream energy supply into a single final service payment, e.g., households may pay a comfort charge relating to room.

Digital Ubiquity

Iansity and Lakhani 2014

The Business Model Canvas

Designed for:	Designed by:	Date:	Version:

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
	Key Resources		Channels	

Cost Structure	Revenue Streams

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Traditional GE business model

The Business Model Canvas

Designed for:	Designed by:	Date:	Version:

Key Partners

Heavy reliance on external software vendors
Traditional providers in a more traditional value chain

Key Activities

Technical capabilities in the products offered
Specific software development capabilities
Asset based sale capabilities

Key Resources

Plants, equipment, technology

Value Propositions

State of the art equipment/ hardware that is world-beater in efficiency, productivity, and innovation in equipment / hardware

operational management of an asset, including preventive maintenance and repairs (service as an add-on)

Customer Relationships

Periodic contacts with customers by sales and technical personnel
Transaction-based relationship

Channels

Traditional sales channels
Lack of visibility of customer operations and lack of continuous interactions

Customer Segments

B2B segment
Companies in need of complex and high-tech equipment

Cost Structure

Revenue Streams

Sales transactions - selling equipment with transfer of ownership

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New outcome-based and Service based GE business model

The Business Model Canvas

Designed for:	Designed by:	Date:	Version:

Key Partners
Network of independent developers to build applications on GE's platform.
network of specialized suppliers, distributors, and developers
of related products and services that enable
and enhance GE's offerings.
Partnerships with customers and competitors

Key Activities
Data collection & analytics
Software development
crowdsourced
product development
outcomes-based sales capabilities

Key Resources
Technology equipment and plants; System of sensors and hubs connecting their equipment; Cloud-based platform; Software running equipment; software platform that works across the entire enterprise and with partners

Value Propositions
Customized integrated solution for performance improvement through providing data synthesis and analysis and designing real-time and predictive solutions to optimize the complex operations of its customers

Customer Relationships
Continuous interaction through IoT devices
Mutually profitable, deep and log-term partnership

Channels
Continuous interactions with sales personnel
Continuous interactions for customer data sharing to develop and deliver valued solutions

Customer Segments
B2B companies that need advanced technology equipment and operations and complex systems

Cost Structure

Revenue Streams
Revenue tied to outcomes and performance improvement : charging a percentage of the customer's incremental revenue from improved performance.

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THE EVOLUTION OF GE SERVICE MODELS