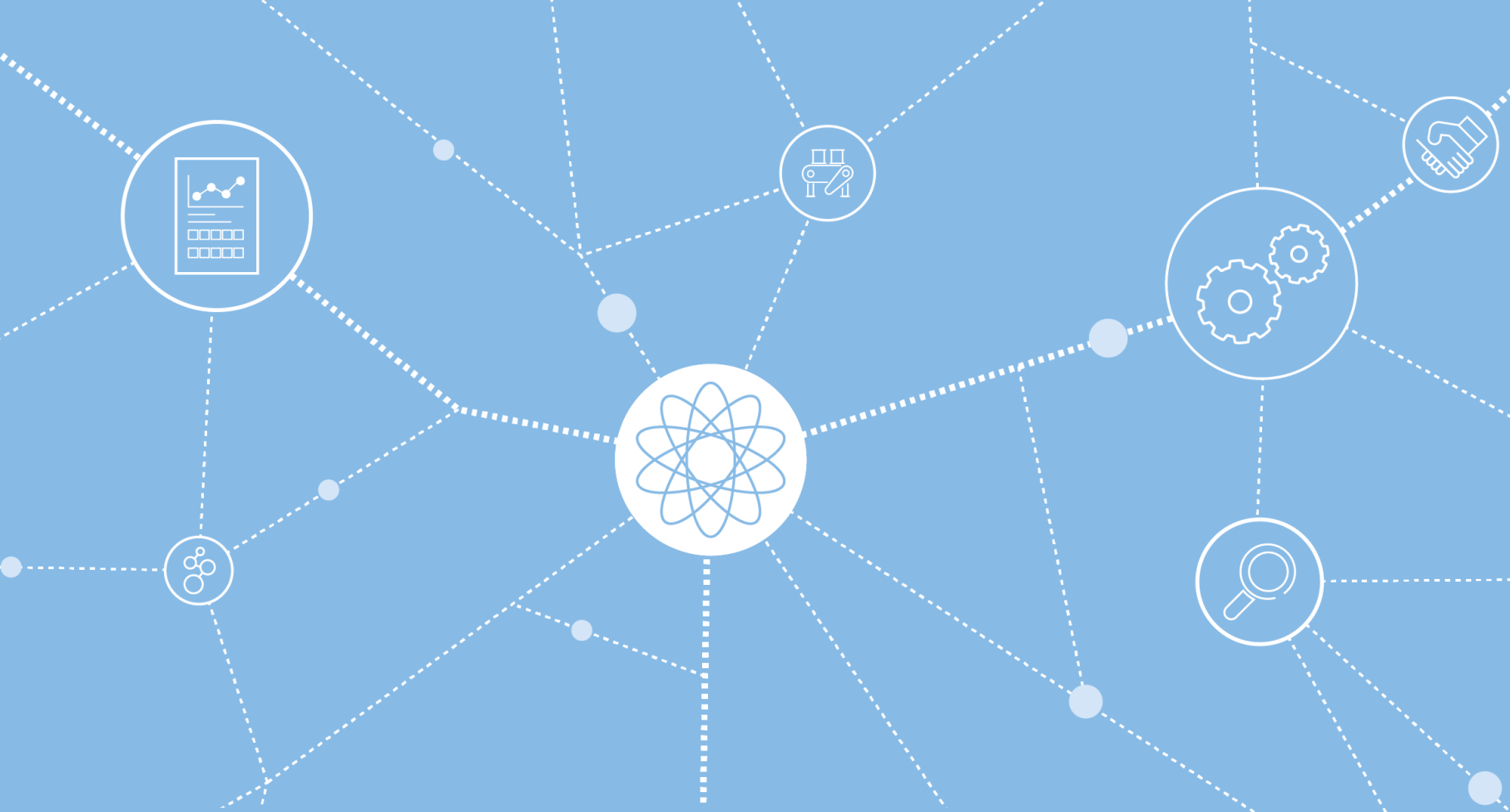

DATA BUSINESS IN ECOSYSTEMS

Handbook for the development of data-driven services

Can Azkan I Lennart Iggena I Alevtina Krotova

Markus Spiekerman I Boris Otto (publ.)

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Note: The use of the masculine form when referring to roles or persons does not constitute a gender-specific definition. Members of all genders are addressed equally.

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Prologue

Data is a key economic resource in the value creation process of companies that is becoming increasingly important and is confronting the economies of the entire world with a fundamental structural change. Just as capital changed our economies from agricultural to industrial societies, data will reform our economies in the new data society. The self-driving car or the intelligent refrigerator that automatically orders new products and learns the preferences of its owners are just some of the visions of the future that lie ahead of us.

Data can either enable new products and services (data-driven business models) or optimise existing products, services and processes (process mining) or supplement them (predictive maintenance). The overall value creation potential of data is immense and of increasing importance. The intelligent handling of data will be decisive for the implementation of this potential.

Against this background, this handbook is intended to provide guidance on the internal use of data within companies and to offer assistance in promoting new data-driven products and services. In doing so, these findings are based on current research results from scientists within the framework of the BMWi-funded „Data Economics and Management of Data-driven business (DEMAND)" project. In this way, a contribution is to be made to ensuring that German and European companies can also play a role in the markets of the future.

Dortmund, 2021
Boris Otto, Michael Hüther

Prof. Dr.-Ing. Boris Otto
Managing Director of the Frauhofer Institute for Software and Systems Engineering

Prof. Dr. Michael Hüther
Director and Member of the Executive Board of the German Economic Institute

Contents

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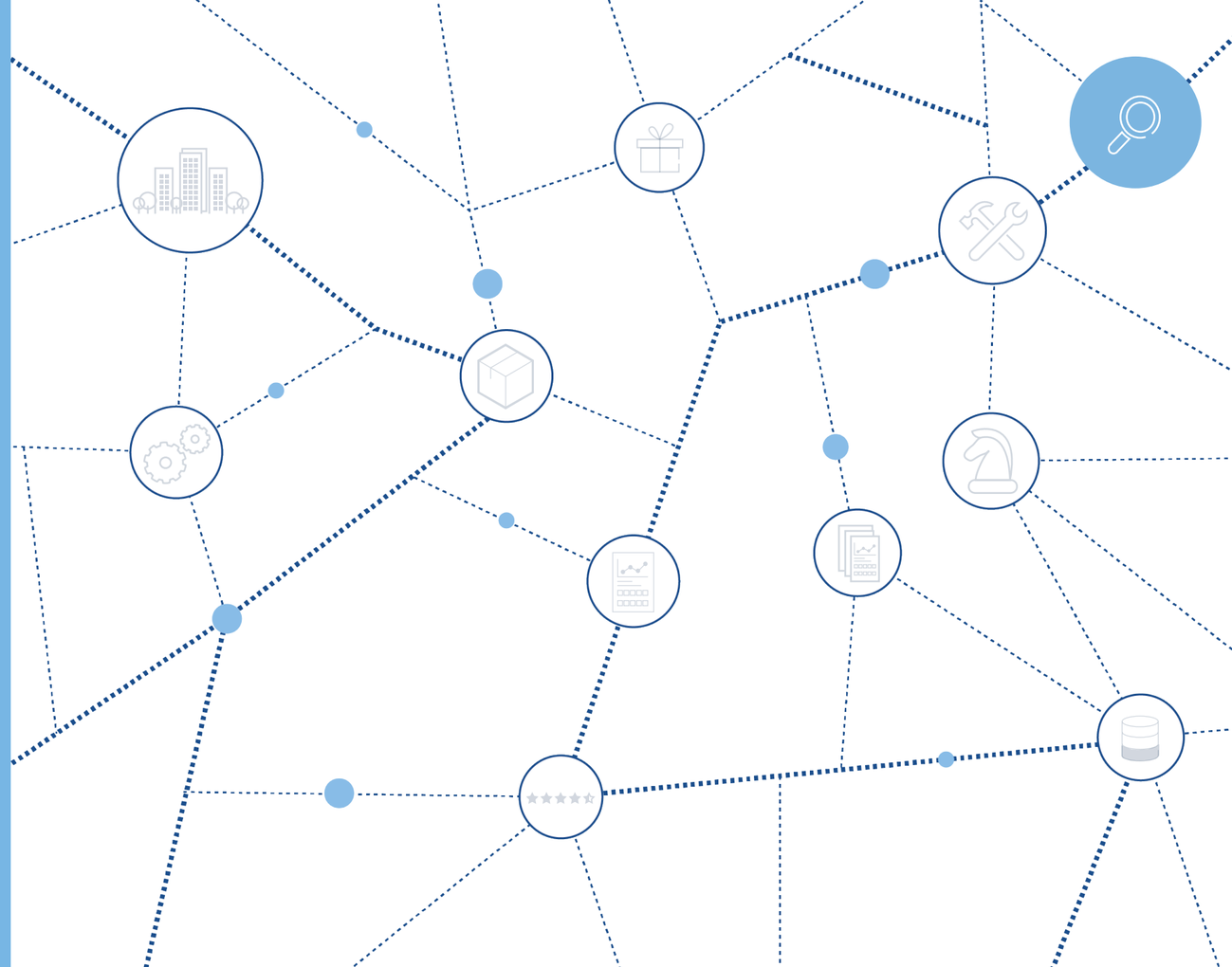
Introduction

The first chapter of the handbook „Data Business in Ecosystems“ presents the DEMAND-Project and the associated milestones that served as the basis for the creation of this handbook.



1.1 The DEMAND-Project

Along with digitalisation, the development of data-driven business models and emerging data ecosystems, the importance of data as a resource is growing and will ultimately become a decisive competitive factor for companies. Against this background, the efficient management of data is an essential factor for the success of the digital transformation of companies.

To this end, the **»DEMAND - ® Data Economics and Management of Data-driven business«** project, funded by the BMWi, was launched as a lighthouse project. The aim of this project is to develop a fundamental structure of a future-oriented data management approach and to enable companies to effectively manage the resource of data.

The basis for this is the idea of the sovereign data architecture of the International Data Space for building data ecosystems. The internal requirements for data management, such as integration conception, data governance, value determination and structured realisation of data-driven business models, are developed across industries through the implementation of concrete use cases within the project.

1.2 Milestones in the DEMAND-Project

DEMAND White Paper
Data Economy - Status Quo of the German Economy & Fields of Action in the Data Economy

2019

DEMAND Use Case Report
Prospects for the data economy - Mechanisms of action and value creation in data ecosystems

2020

Scientific publications
Over 40 scientific publications have been published in the DEMAND-Project

2020

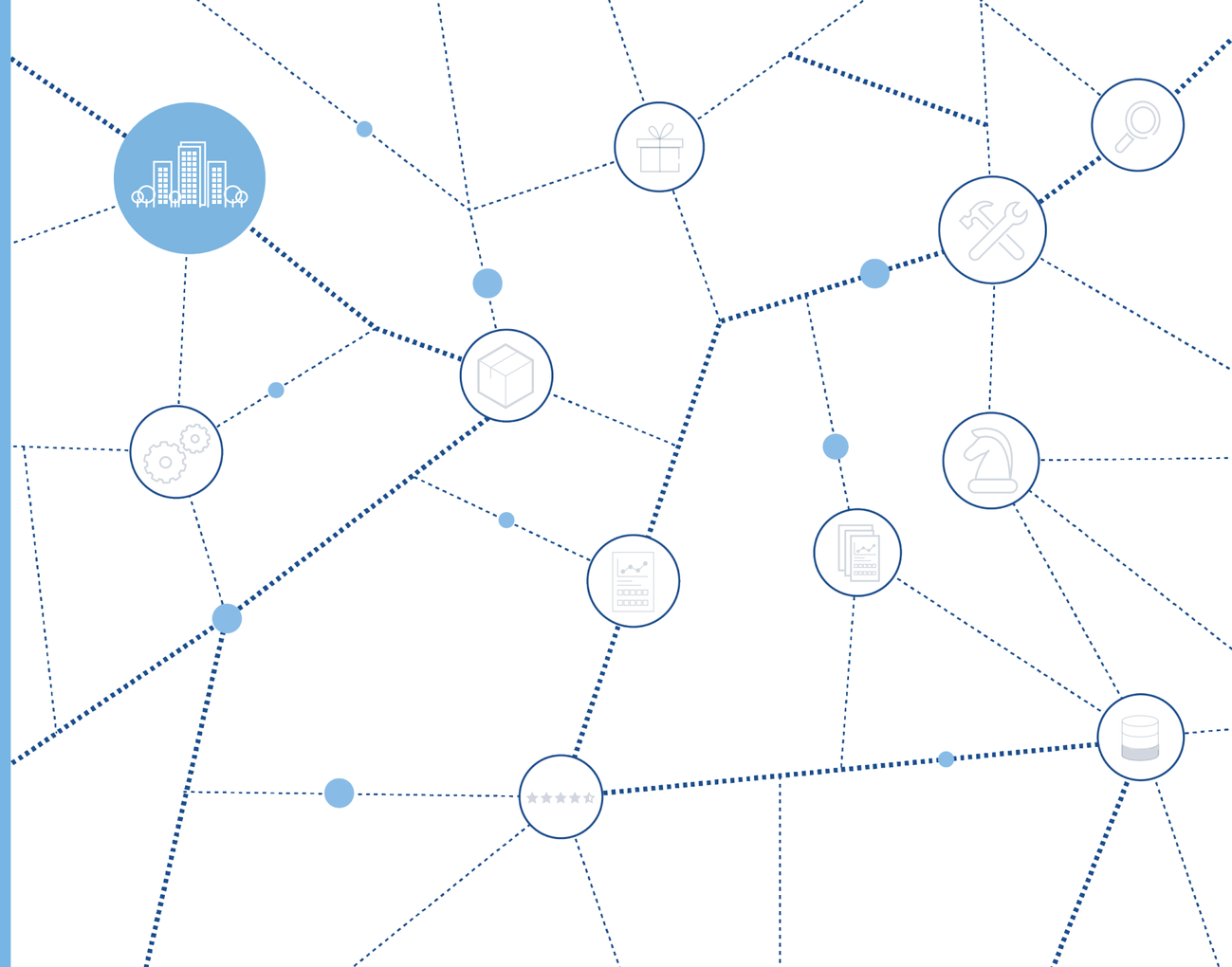
Data Business in Ecosystems
Handbook for the development of data-driven services

2021

2

Outline

The handbook serves as a guide for the systematic development of data-driven services. It supports you along the innovation process with tools and methods and transfers knowledge from over 40 scientific publications that have been validated in close cooperation with our industry partners.



2.1 Introduction and Structure

Progressive digitalisation is changing the economy and society in equal measure and is leading to exponentially **growing amounts of data.**

Data offers every company numerous opportunities to break down outdated patterns, drive innovative ideas and develop new types of **business models.**

Customers play a central role in this. Changing customer behaviour and increased demands with regard to products and services offered are tempting companies to become more agile and innovative. They must fully exploit their digital potential in order to sustainably secure their market position and differentiate themselves from competitors. The use of data and analytics leads to so-called **data-driven services.**

These are services that use data as a **key resource** to support the customer's decision-making process based on data and analytics-driven features and experiences.

These can be provided as a standalone offering or bundled with an existing product or service. In creating data-driven services, companies usually rely on business partners. Together with customers, suppliers and other stakeholders involved, they form **ecosystems** in which the participants act together and manage the core resource of data appropriately.

Companies are therefore faced with the challenge of using both internal and external data in a targeted manner to generate innovative **added value** and create expanded or entirely new business models for their customers..

This handbook provides a **cross-sector toolbox** that offers practical and illustrative support for the systematic design of data-driven business models.

Within the DEMAND-Project, iterative and successive methodological tools were iteratively developed to make the potential of data recognisable and to provide companies with assistance in the **initiation and conception** of data-driven services through workshops.

The **structure of the book** is as follows:

Part 1: A theoretical introduction to the concept of business models and the ecosystem concept provides a basic understanding for the use of the book. Concrete success stories of data ecosystems from practice are explained using the business model dimensions and highlight the opportunities and innovations of data-driven activities.

Part 2: The second part addresses the preparation and implementation of the company workshops. The individual methods are presented and the handling is shown step by step. The use of practical examples makes it easy to see how to use each canvas. A corresponding questionnaire offers optimal preparation for the respective workshops.

2.2 Content Classification of the Manual

The **innovation process** begins with an idea and ends with the successful introduction of a service into the market. A distinction is made between **stages** and **gates**, which divide the often complex and chaotic process into smaller sections (stages) and the results as input for the next stage (gates).

At the gates, serious **decisions** are made about the continuation of the project. The widely used stage-gate model for innovation and product development maps all pre-development activities (customer perspective, feasibility study), development activities (engineering, marketing and creation) and commercialisation (market launch and controlling) in one complete process.

This **Data Business in Ecosystems HANDBOOK** can be assigned to the area marked green and supports you during the first four stages: As a creative tool for idea generation up to the concretisation of a business case.

1 Generation of ideas

Advance work to identify new business opportunities and generate new ideas

>> Idea filter

2 Probing

First quick investigation and Exploration of the project

>> Extended filter

3 Creation of a business case

Initial research activities (customer, market) which lead to a business case that includes project definition and project justification

>> Development

4 Development

Detailed design and development activities of the new service

>> Testing

5 Testing & validation

Testing of the generated concepts and iterative improvement

>> Market launch

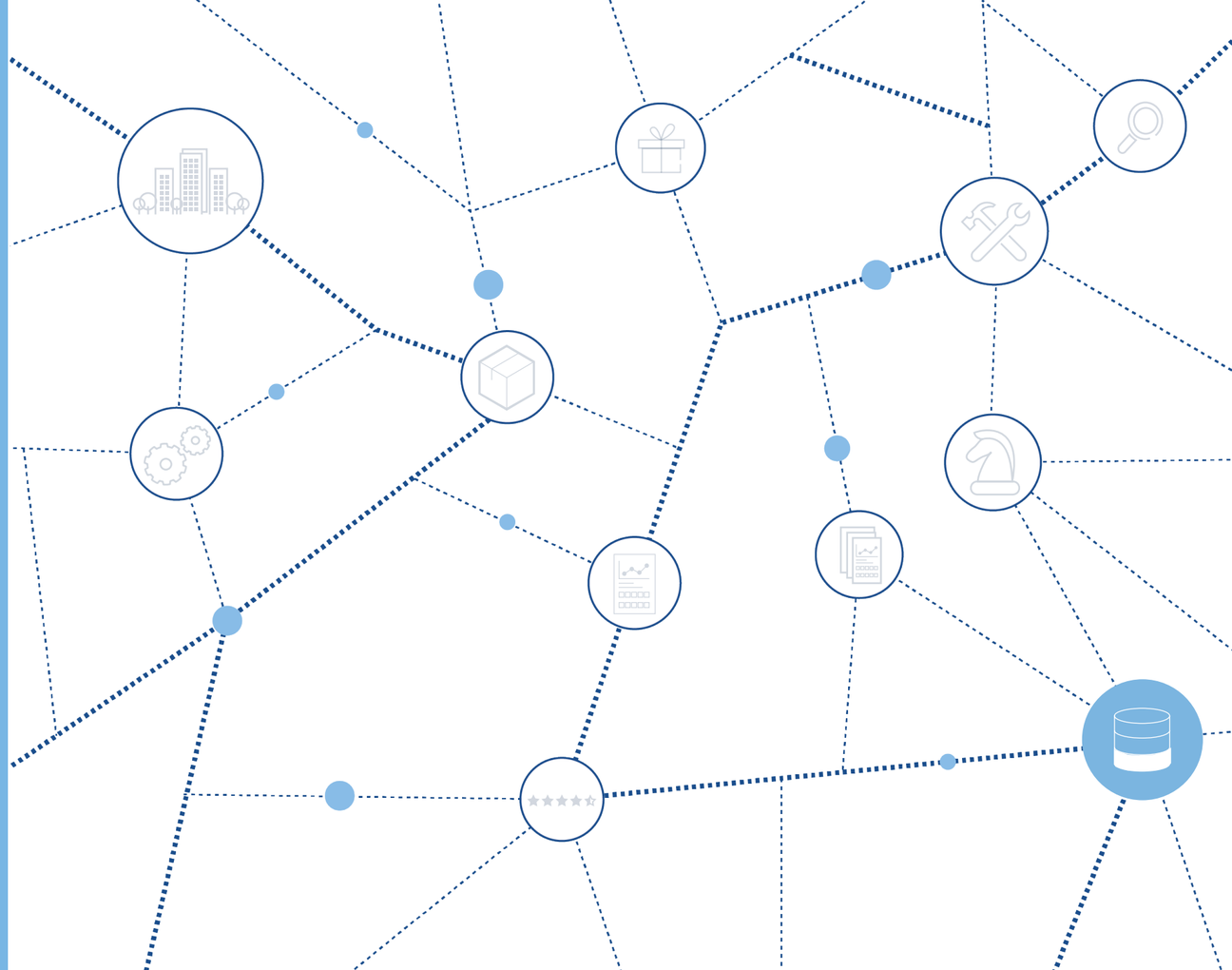
6 Market launch

Realisierung des Geschäftsvorhabens sowie Dokumentation und Bewertung zur Sicherung der Erfahrungen für zukünftige Projekte

3

Fundamentals

In the following, we will look at the concept of business models, which can be used to describe the basic functioning of a company. When several companies interact and cooperate, value-adding collaborations in the form of ecosystems are created, which generate new innovative service offerings for customers.

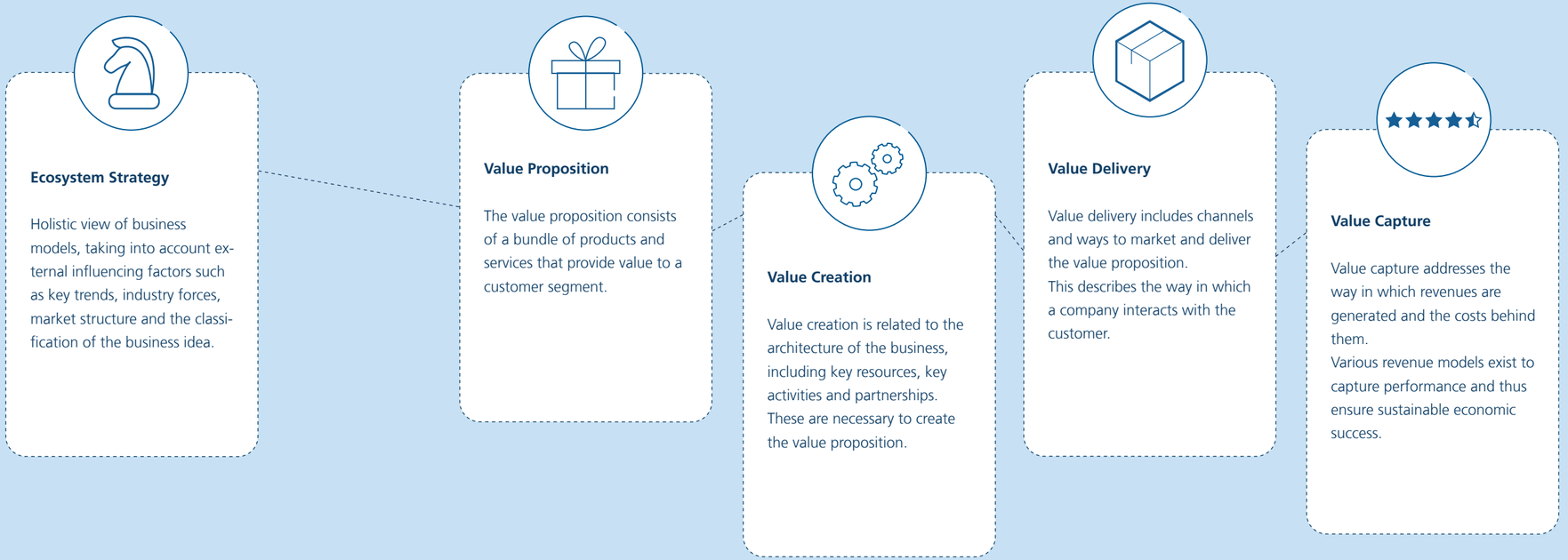


3.1 Business Models

A **business model** is a model representation of the logical relationships of how a company creates value for customers. In the following, we will look at the concept of business models, which can be used to describe the basic functioning of a company. When several companies interact and cooperate, value-adding collaborations are created in the form of ecosystems, which generate new innovative service offerings for customers.

- **Value Proposition**
- **Value Creation**
- **Value Delivery**
- **Value Capture**

For a holistic view of business models in ecosystems, the area of **Ecosystem Strategy** was added. This focuses on the analysis of various external influencing factors and the holistic consideration of the business model in an ecosystem.



3.2 Data Ecosystems

A current trend is the emergence of **ecosystems** - and thus a shift from linear value chains to holistic value networks.

An ecosystem describes a form of organisation and coordination between organisations and individuals that pursue a common goal, reinforcing complementary skills and competences as a whole.

The ecosystem approach illustrates a **fundamental change in the digitalised economy:** innovations increasingly take place in ecosystems consisting of several companies, research organisations, intermediaries in the form of electronic marketplaces, public authorities as well as customers.

A **data ecosystem** is one in which data is the strategic resource for the success of the entire system.

Data is understood as an **independent economic good (data asset)** and is exchanged and managed within the ecosystem. While traditional business models are based on concrete, tangible goods, data exchange offers new growth opportunities through networking with other participants and acts as a driver for innovative services and novel customer experiences.

Data Ecosystem Structure

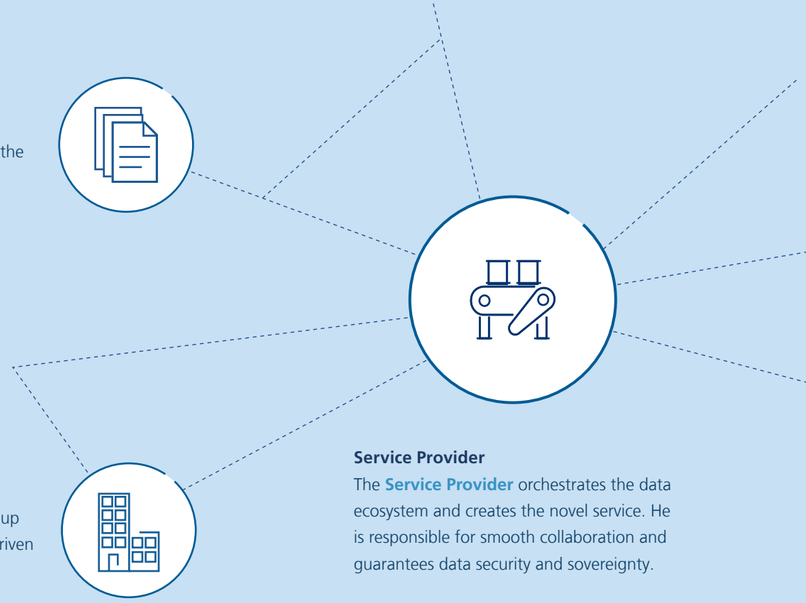
A data ecosystem links different **actors and roles** together. It enables an efficient exchange of value propositions as well as data and empowers the building of long-term relationships.

The core role of an ecosystem is comparable to that of an **orchestrator.** It brings different stakeholders together to enable the exchange of offerings. The role of the orchestrator can be taken by any stakeholder, but most often the service provider takes the significant responsibility for the functioning of an ecosystem. Therefore, the roles of an orchestrator and a service provider are equated in this manual.

In our methodology, **five roles** are distinguished, each of which has specific functions. **Not all** of these **roles** need to be filled in an effective data ecosystem, but some are essential for its functionality.

Roles in a Data Ecosystem

The roles marked in grey are optional roles. Data ecosystems are diverse and can represent different cooperations, so the constellation of roles differs from case to case.



Data Provider
The **Data Provider** provides the key resource of the ecosystem, the data assets.

Service Customer
The **Service Customer** represents the target group of a service provider and uses the created data-driven service for his purposes.

Service Provider
The **Service Provider** orchestrates the data ecosystem and creates the novel service. He is responsible for smooth collaboration and guarantees data security and sovereignty.

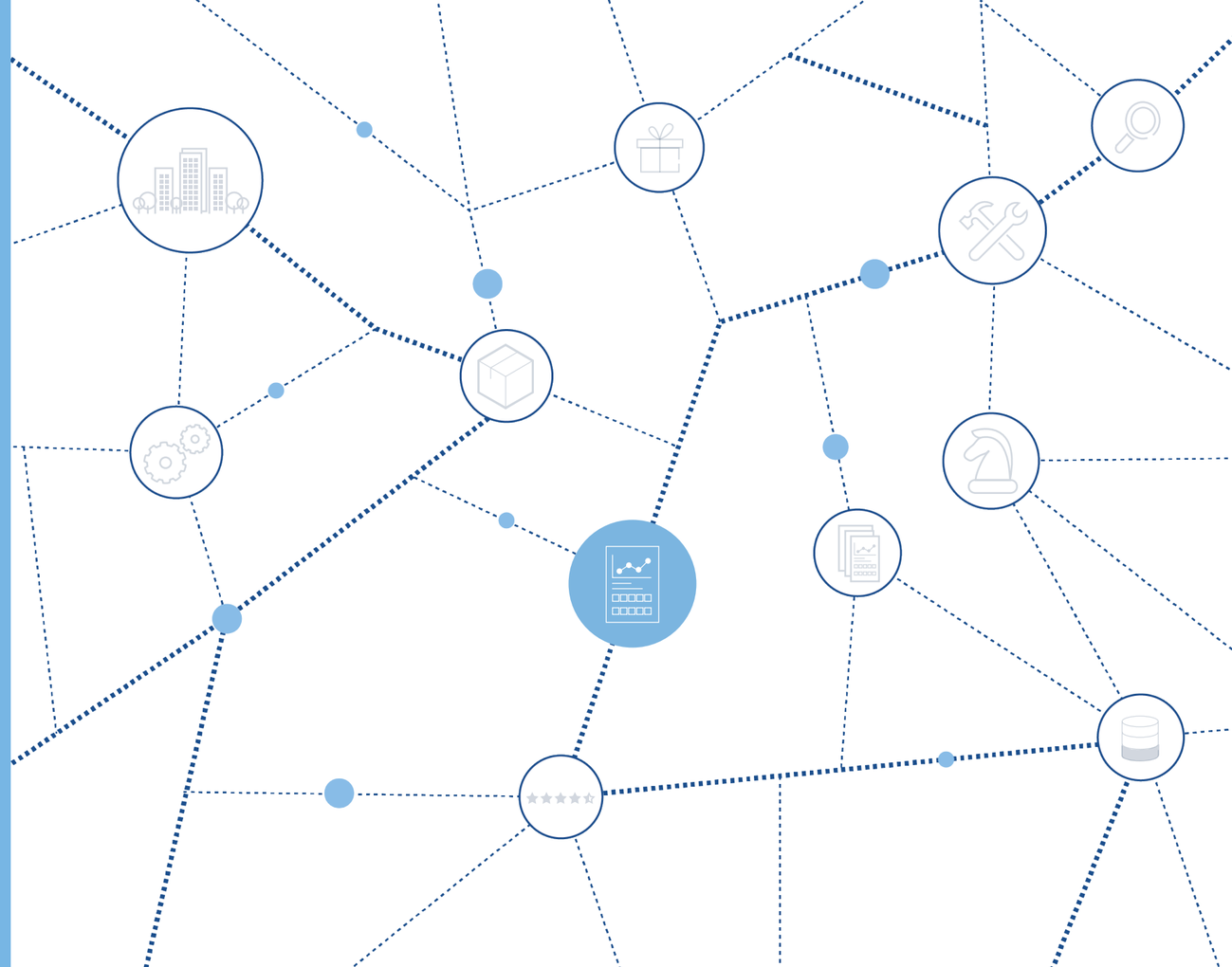
Partners
A service provider can use various **Partners** to create its data-driven value proposition. These can be, for example, analytics experts or technical infrastructure providers; this creates supporting services.

Data Marketplace Operator
In order to create or optimise the data-driven service, (further) external data products can be obtained. These can be acquired and utilised via a data marketplace, which results in the role of **Data Marketplace Operator**. On the one hand, a data marketplace facilitates the search for relevant data sets through a platform approach. On the other hand, offering is simplified for data providers, thus ensuring effective mediation between data supply and demand.

4

Use Cases

With examples from industry, the concept of data ecosystems is explained in more detail below.



4.1 Use Case: Mechanical and Plant Engineering

By analysing process and product data as well as external data (e.g. weather data), a data-driven service can be created with the aim of **improving production performance** and **increasing machine availability.**

In the specific example, **thyssenkrupp Industrial Solutions AG,** as a plant manufacturer, offers a data-driven service for its customers in the cement industry.

Value Proposition: The value proposition includes **condition monitoring** enabled by data, which allows plant operators to monitor the performance of their machines and initiate appropriate measures for optimisation.

Value Creation: Advanced **analytics algorithms** are used to analyse the aggregated data and combine it with domain-specific expertise to generate in-depth insights. These are used, for example, to reduce downtime or improve the quality of the products produced.

Value Delivery: The results are made available to customers in the form of **systematic reports** via the specially developed platform.

Value Capture: For the service provider, this results in an extended value proposition for its existing products. Through the data-based service component, **new sources of revenue** can be developed as well as stronger **customer loyalty** and better anticipation of **customer needs**. In addition, the new type of **knowledge** about the machinery and equipment flows into internal development processes and promotes understanding about the performance of the machinery and equipment.

As a **Service Provider,** thyssenkrupp orchestrates the entire data ecosystem. The plant operator as customer takes on the role of both **Data Provider** and **Service Customer**. Other **Data Providers** are weather stations that provide useful weather data, allowing the parameter settings of the machines and plants to be adapted to the ambient conditions.

This data is obtained via the data marketplace from Advaneo as **Data Marketplace Operator.**

Microsoft Azure, as provider of the Cloud Platform-as-a-Service, is the **Partner** for the infrastructure and thus ensures a reliable workspace.

4.2 Use Case: Logistics

The efficient design of both procurement and distribution logistics offers enormous potential for **saving costs** and satisfying the **needs** of partners and customers.

In the steel sector, **thyssenkrupp Steel Europe AG** operates steel production and manufactures flat products from quality steel. Data-based solutions are developed to achieve internal optimisations and to improve entire processes within inbound logistics.

Value Proposition: A **data-based calculation of the Estimated-Time-of-Arrival** of the trucks leads to an optimisation of the planning and handling processes and reduces the waiting time of the arriving forwarders.

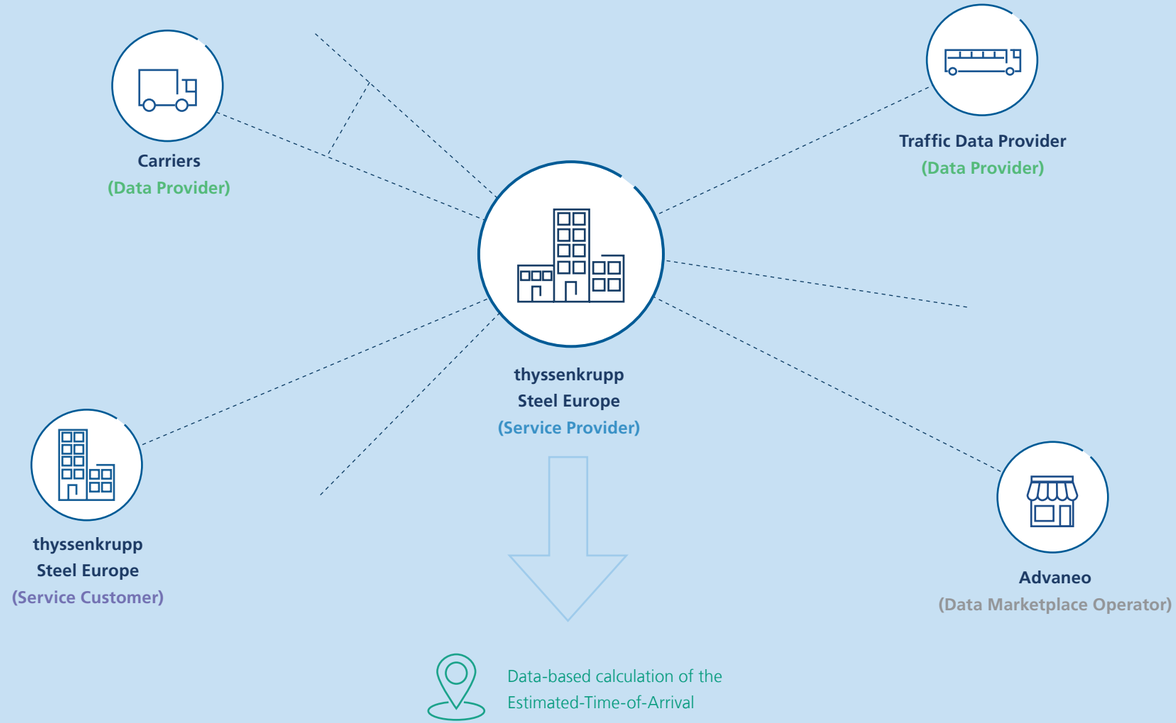
Value Creation: By **transmitting the position data** of the trucks and enriching it with traffic data, the arrival time of the vehicle is calculated automatically.

Value Delivery: By transmitting the position data of the trucks and enriching it with traffic data, the arrival time of the vehicle is calculated automatically.

Value Capture: Through reliable advance planning, the work steps can be optimally coordinated and unnecessary work can be avoided. This results above all in a **reduction of costs**. Logistics control also gains **transparency** over the entire transport chain and can accordingly identify bottlenecks in advance and initiate problem solutions promptly.

As a **Service Provider**, thyssenkrupp orchestrates the entire data ecosystem. Since internal optimisations are involved, thyssenkrupp is also the **Service Customer** of the data-driven offering..

The necessary data is mainly transmitted by the freight forwarders as **Data Providers**. Further data providers are traffic **Data Providers** who can provide the data via Advaneo's data marketplace. Advaneo thus acts as a **Data Marketplace Operator.**



4.3 Use Case: Data Marketplace

A completely **new business model** in the data economy is the data marketplace. A data marketplace can be understood as a digital platform on which data products are traded. This creates new value propositions in previously non-existent markets.

The **Advaneo Data Marketplace** forms an innovative platform for efficient exchange, processing and analysis of data.

Value Proposition: The value proposition comprises **data** from different providers, **analysis tools** and **algorithms**, from which users can create new data-driven services.

Value Creation: By **bringing together** different data providers and users on one platform, diverse data assets are exchanged and different data sources are networked. In addition, many helpful analytical tools are made available.

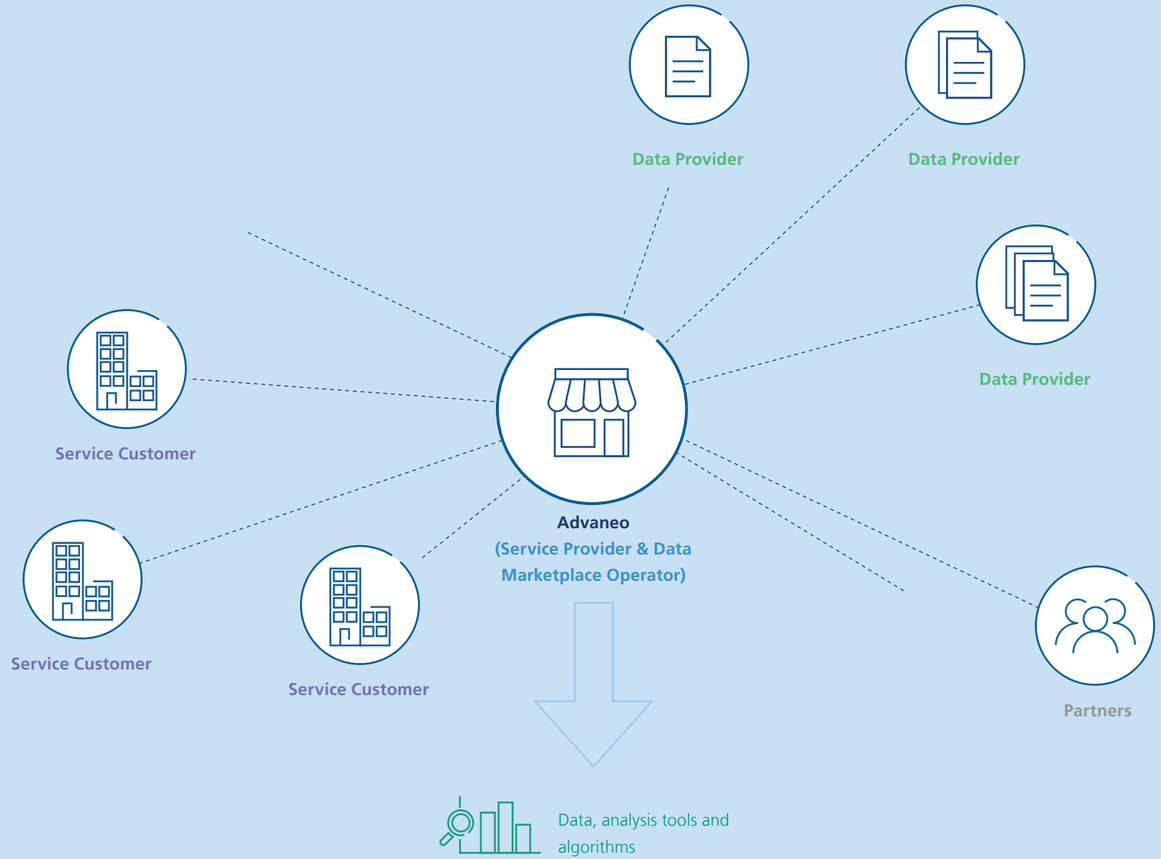
Value Delivery: The platform offers technological, industrial and manufacturer-specific independence and enables secure data exchange as well as maximum data sovereignty based on the **International Data Spaces*.**

Value Capture: **Monetising data** for trade and distribution and offering additional services leads to effective revenue streams. The platform is highly scalable due to **network effects.**

The **Data Marketplace Operator** in this case is Advaneo. At the same time, the role of **service provider** is assumed and the overall system is monitored as an orchestrator. This results in diverse **Data Providers** and **Service Customers**. In a marketplace, players from different industries with different intentions come together and benefit from participating in the ecosystem.

The marketplace-centric data ecosystem offers numerous **Partners** an additional opportunity to place their product or service and thus functions as a separate sales channel. These include, above all, far-reaching analytical tools.

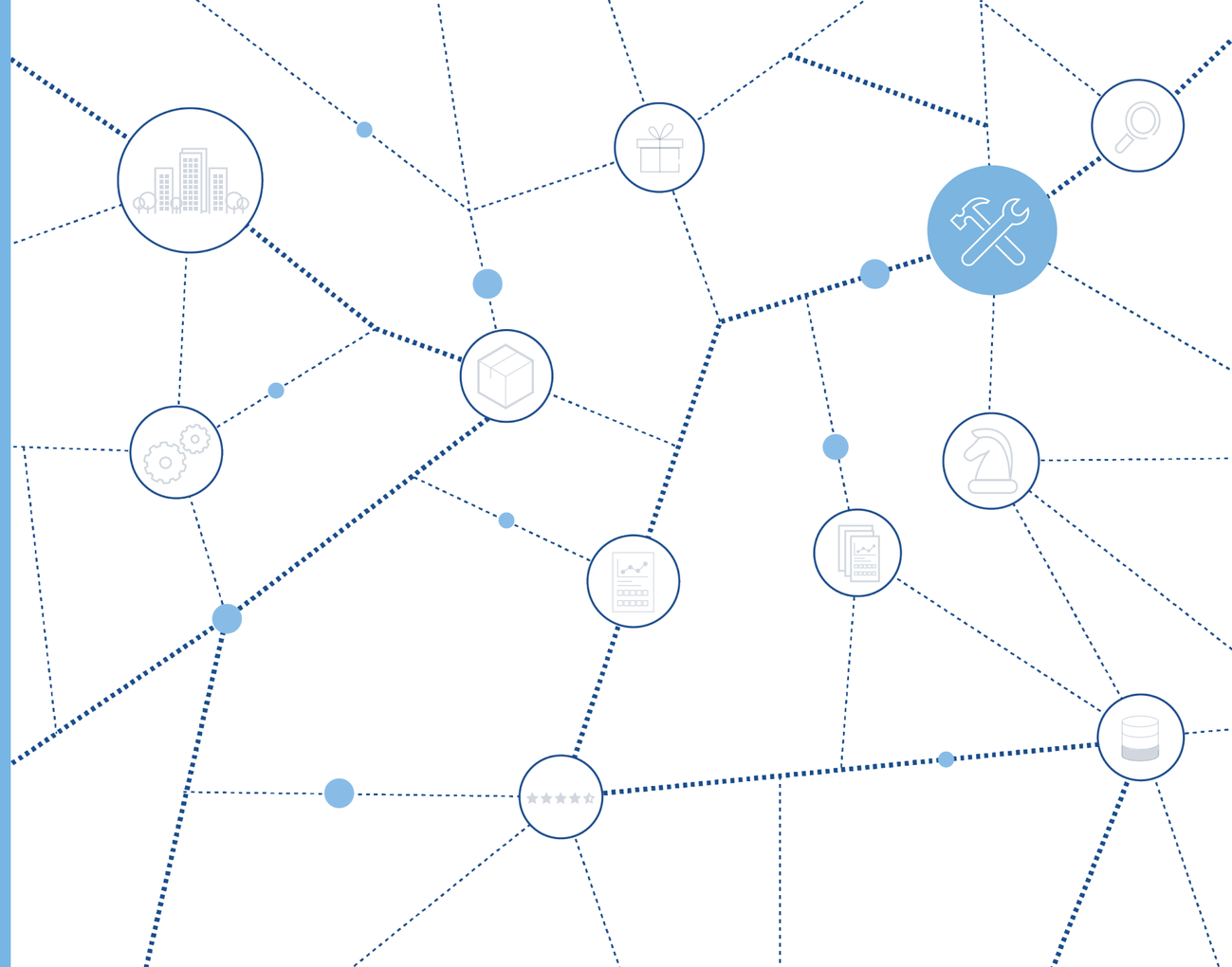
*The International Data Spaces initiative aims to create a **secure data space** that enables companies across industries and of all sizes to **sovereignly manage** their data assets.
https://www.internationaldataspaces.org/



5

Tool box

The toolbox is separated into two sections, as previously stated. First, a set of canvases for a strategic view of new data-driven business opportunities is presented. Then, along the parameters of a business model, different canvases are used to systematically formulate and iteratively build a business idea.



Canvas Overview

Guide to using the Canvas

These strategy-building canvases serve as an initial orientation for new data-driven business opportunities.

If you do not yet have a concrete business idea in mind, start with the first Canvas and work iteratively through all the other Canvas.

Note

If new questions arise while working through the canvas, you can also jump directly to the respective canvas that can support you in answering the question.

With these canvas, a deeper understanding of the individual business model dimensions is achieved.

If you already have initial ideas, you can start directly with one of the canvases listed below, depending on your needs, and thus carry out a targeted analysis of individual components.

Explanation of the legend

In some of the following canvases you will find different abbreviations and labels, which are colour-coded. These reflect the roles in a data ecosystem and are as follows:

Examples

SP: Service Provider (marked blue)
DP: Data Provider (marked green)
SC: Service Customer (marked purple)
Others: weitere potenzielle Akteure (marked grey)

Participants

For each canvas, the required expertise is specified and thus the participants to be included. Depending on the canvas, an internal company perspective is aimed for (service provider only) or an ecosystem perspective in which other roles (data provider, service customer, etc.) are integrated.

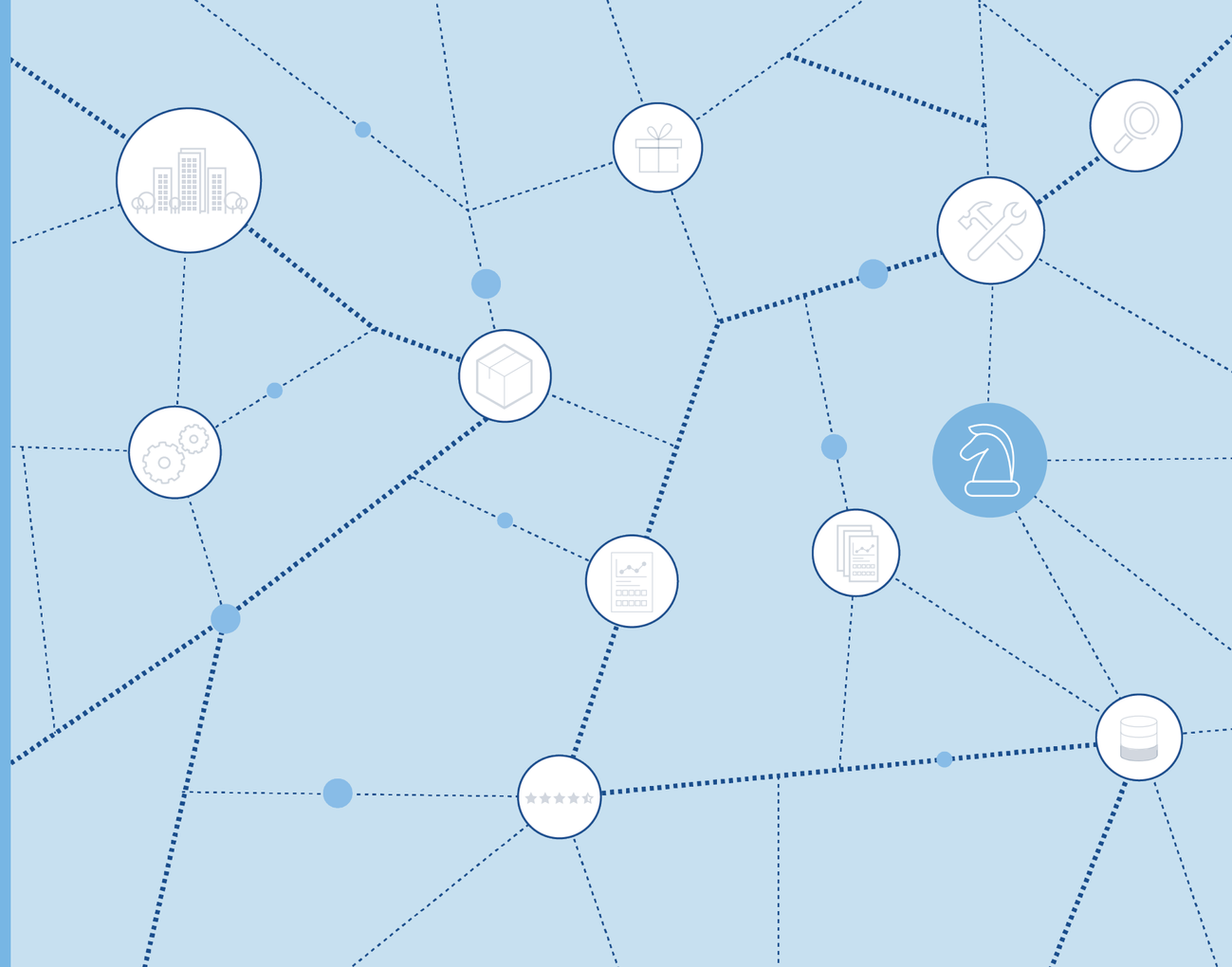
For each canvas, a completed canvas is provided in addition to a blank canvas. The examples are intended to simplify the use of the respective canvas and serve as food for thought. A fictitious case study of a machine and plant manufacturer is run through for all canvas and thus a holistic view of a data-driven service is presented as well as the complete development path.

5.1

Ecosystem Strategy

Relevant external impacting elements are identified using the following canvas, and an aggregated representation of the new company idea is made possible. The construction of the essential ecosystem is aided by the consideration of potential partners.

I. Environment Canvas
II. Data business Canvas
III. Data ecosystem Canvas



I. Environment Canvas

Introduction

Motivation and goals of the Canvas

Before a data-driven ecosystem can be built, it is advisable to describe the environment and the external conditions for the project. Many ideas fail at the very beginning because too little attention is paid to the external factors that influence the business idea. This canvas offers you the opportunity to combine your position in the industry and the market with the needs of your customers as well as current trends, so that you get an overall picture of your environment and can derive the first draft of your business idea from it.

Structure of the Canvas

The Environment Canvas consists of four auxiliary fields (industry forces, market structure, key trends, customer perspective) and the core field **business idea**. The order in which the fields are filled in is arbitrary. The business idea be developed from the situation on the market and in the industry, taking into account the customer perspective and key trends. Conversely, a business idea can emerge first, for which the environment is described with the help of the Canvas.

Questionnaire for Preparation

Before conducting the workshop, the following questions about the Environment Canvas should be completed by the participants:

1. What is my business objective?
   - What is my current core business and in which industry?
   - What business am I aiming for?
   - What role does data play in this?

2. What is the current situation in my industry?
   - Who are my main competitors?
   - What digital services are already being offered?

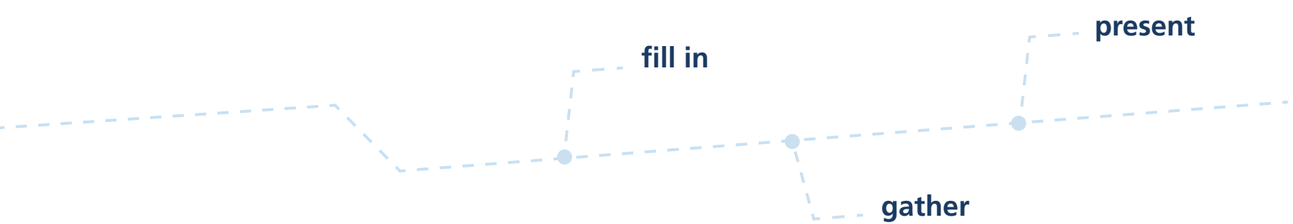
3. What is the structure of the market?
   - Are there many or few companies in the market?
   - Is it easy for new companies to enter the market?
   - Do I have much influence in the market?

4. Who are my customers?
   - Which customer segments do I address?
   - How well do I know my customers and their needs?
   - Can I appeal to other customers through my offer?

5. What are the key trends affecting my business?
   - What technological, digital, regulatory and economic trends can influence my business or are currently influencing it?
   - How digitised is my industry?

Workshop Procedure

At the workshop, each participant fills out their canvas with the help of the answered questions. The participants either first fill in the auxiliary fields (market structure, industry forces, key trends, customer perspective) in any order to arrive at a business idea (core field) from the findings. Or they start with a first business idea (core field), which can then be used to discuss and fill in the remaining areas (auxiliary fields).



Expertise required:
Strategy developer, industry & technology expert (service provider)

Duration of the workshop:

Introduction and explanation	30 minutes
Completing the Canvas	20 minutes
Consolidating the results	5 minutes per participant
Concluding discussion	open end

Follow-up:
After the workshop, further questions arise that need to be answered in order to determine whether the business idea developed has a potential for success in the existing environment:

1. Does the market and my position in the market offer suitable conditions for my business idea?
2. Can my business idea attract enough potential customers to offer me financial added value?
3. Can I realise the business idea alone? Which partners, if any, are necessary for the realisation?

Materials

- ☐ One Environment Canvas in large format (A0) to consolidate the results
- ☐ Several in small format (A4) for each participant
- ☐ Markers
- ☐ Pens
- ☐ Sticky notes

I. Environment Canvas

Project Name: **Company:** **Date:**

Branch Forces

What is my core business?
What digital services are already offered?
What are the challenges in the industry?

Business Idea

What problem do we want to solve?
Which data-driven services should be offered?

Market Structure

Do I have many competitors or only a few?
Is it easy for new companies to enter the market?
What market share do I have in the market?

What technological, regulatory, digital and economic trends can influence or are currently influencing my business?

Key Trends

Which customer segments do I address?
How well do I know my customers and their needs?
Can I also appeal to other customers through my offer?

Customer Perspective

DEMAND

www.demand-projekt.de/ec_en

Project Name: Smart Maintenance **Company:** OEM **Date:** 15.07.2020

Branch Forces

Cement and Plant Industry

First predictive maintenance solutions

Increasing number of competitors in digital services

Business Idea

Increase plant availability at the customer

Data-driven Service 1: Smart Control

Data-driven Service 2: Condition Monitoring

Data-driven Service 3: Predictive Maintenance

Market Structure

Less relevance in the area of digital services, Not yet established

Many small competitors in the service sector

Existing customers, plant operators of competitors, new cement manufacturers

Lock-in Effects

fast Digitisation

Smart Production

Cloud Computing

Green Industry

DEMAND

www.demand-projekt.de/ec_en

II. Data Business Canvas

Introduction

Motivation and goals of the Canvas

After the environment of your company has been illuminated and new business ideas have been generated, a focus should now be placed on the business activities within your company and necessary partnerships. The Data Business Canvas offers an initial overview of fundamental aspects and combines all the tools that follow in a simple form. This creates an initial view of your new business model in a data ecosystem.

It is a summary of the following canvases. Accordingly, the individual business model dimensions are considered in detail within the further canvas and provide further possibilities for analysis.

Structure of the Canvas

The Data Business Canvas is divided into four business model dimensions: **Value Proposition, Value Creation, Value Delivery** and **Value Capture.** For each dimension there are three or two fields to be filled in. The canvas is filled in from left to right, so that one dimension is always worked through completely before jumping to the next. Core questions are answered in each case, whereby a business model is mapped iteratively.

Questionnaire for Preparation

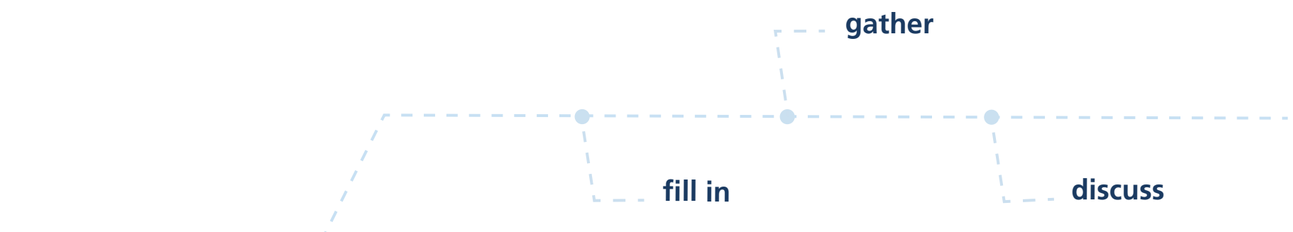
Before the workshop, participants should complete the following questions on the Data Business Canvas:

1. Which customers do I want to address with the new business idea?
2. Why should customers use the service?
3. What benefits do I expect for myself?
4. Which data resources are to be used?
5. Which partners are needed for the development?
6. How do I provide the service? What are the technical requirements?
7. How can I generate revenue with it? What costs will arise?

Workshop Procedure

Procedure of the workshop
In the first step of the workshop, each participant works on his or her own canvas. The participants fill in the fields for each business model dimension, starting from left to right. They use their own ideas and expectations.

Afterwards, the results are compared and merged. A subsequent discussion round is intended to create a consensus and facilitate the processing of the other canvases.



Expertise required:
Strategy developer (service provider)

Duration of the workshop:

Introduction and explanation:	20 minutes
Completing the Canvas	20 minutes
Consolidating the results	5 minutes per participant
Concluding discussion	open end

Follow-up:
After the workshop, further questions arise that need to be answered:

1. Are there significant differences of opinion between the participants? How can these be resolved?
2. What risks are expected in the creation and provision and provision of the service.

Materials

- [ ] One Data Business Canvas in large format (A0)
- [ ] Several in small format (A4) for each participant
- [ ] Markers
- [ ] Pens
- [ ] Sticky notes

II. Data Business Canvas

The Data Business Canvas serves as an overview of all relevant business model dimensions. For more in-depth analyses, the respective specific canvas must be worked on so that it is possible to jump back and forth between these and the data business canvas.

Project Name: **Company:** **Date:**

Customer Segments
Which customers do I address?

Value Creation Activities
How can I create services?

Customer Relations
Do I have fewer clients with individual support or many clients with less support?

Revenue Concept
Which fixed prices are suitable for my business idea?

Do I expect high investment costs?

Added Value for Customers
What is the value proposition for the customer? What is the USP?

Data Resources
What data do I need?

Distribution Channels
Through which channels can I communicate with my customers?

How can new customers be acquired?

Cost Structure
Which platform services have to be offered in addition in order to be able to maintain the operation?

Benefits for Service Providers
What benefit do I derive from the service?

Key Partner
Which partners are needed?

Technical Requirements
What are the technical requirements?

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Project Name: Smart Maintenance **Company:** OEM **Date:** 15.07.2020

Customer Segments
Which customers do I

Existing Customers

Value Cre
How can I cre

Data Analysis

Custo
Do I hav
or many

few clients with intensive support

ual support

Revenue Concept
Low Investment Costs

Fixed Prices

Customers
on for the customer?

Cost and Time Saving

Sensor Data

Machine Data

Workshops

Sales Repre-sentative

Cost Structure
Which platform servic
addition in order to b

Edge-Devices

B Providers
W n the service?

Improved Customer Loyalty

Key Partner
Which partners are

Infrastructure Provider

Data Security

Stable Data Transmission

IT Infrastructure

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III. Data Ecosystem Canvas

Introduction

Motivation and goals of the Canvas

Several actors are usually involved in the realisation of a business idea. Each of these actors brings their own motivation and fulfils a specific role in the ecosystem that has been formed. Only when the motivation of all actors is clear and comprehensible and the roles are clearly distributed can the collaboration in the ecosystem be started. The Data Ecosystem Canvas therefore serves to identify all actors involved and their roles in the ecosystem and offers you the opportunity to find your place in the data ecosystem.

Structure of the Canvas

A Data Ecosystem Canvas is an extension of the general structure of a data ecosystem. The central roles of Service Provider, Data Provider, Service Customer, Partners and Data Marketplace Operator can be found here. This canvas breaks down the individual actors into two fields: **Motivation/Reasons** and **Role**. For each actor, their motivation and reasons for participating in the ecosystem must be defined, and their primary role in the ecosystem must be described. In each ecosystem, there can also be several actors fulfilling the same role (e.g. several data providers). However, their motivation may differ from each other.

Questionnaire for Preparation

Before the workshop, participants should complete the following questions on the Data Ecosystem Canvas:

1. What is the main reason for my participation in the data ecosystem?
2. What are my / my company's goals in participating?
3. What role do I envisage for my company in the ecosystem?
4. What tasks do I associate with participation in the data ecosystem?
5. Do I know all the other actors in my data ecosystem?

Workshop Procedure

In the first step of the workshop, each participant fills in their canvas. The actors first enter their own motivation and role. Then they fill in the fields for the other actors in the defined data ecosystem. In doing so, they can use the information they know in advance as well as their own assumptions and thus formulate requirements for the other actors. Afterwards, all the participants' findings are compiled on the large canvas and compared. This should make it clear whether each role in the ecosystem is clearly defined and all actors have a clear motivation in the ecosystem. A final discussion round should help to harmonise and round off the data ecosystem.

Expertise required:
Representatives of all stakeholders in the ecosystem (all necessary roles)

Duration of the workshop:

Introduction and explanation	20 minutes
Filling in the Canvas	20 minutes
Bringing together the results	5 minuten per participant
Final discussion	open end

Follow-up:
After the workshop, further questions arise that need to be answered for further collaboration in the ecosystem:

1. Is the data ecosystem complete or are some important roles still unfilled?
2. Are the functions of the actors in the ecosystem clearly separated or do they overlap?

Materials

- ☐ One Data Ecosystem Canvas in large format (A0)
- ☐ Several in small format (A4) for each participant
- ☐ Markers
- ☐ Pens
- ☐ Sticky notes

III. Data Ecosystem Canvas

Project Name: **Company:** **Date:**

Actor:
motivation / reasons for participating in the ecosystem:
role in the ecosystem:

Actor:
motivation / reasons for participating in the ecosystem:
role in the ecosystem:

Actor:
motivation / reasons for participating in the ecosystem:
role in the ecosystem:

Actor:
motivation / reasons for participating in the ecosystem:
role in the ecosystem:

Actor:
motivation / reasons for participating in the ecosystem:
role in the ecosystem:

Actor:
motivation / reasons for participating in the ecosystem:
role in the ecosystem:

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Project Name: Smart Maintenance **Company:** OEM **Date:** 15.07.2020

Actor: Weather Station
motivation / reasons for participating in the ecosystem:
Data Provider
Parts of data as open source

Actor: Plant Operator
motivation / reasons for participating in the ecosystem:
Data Provider
Need for expert analysis of existing data

Actor: OEM
motivation / reasons for participating in the ecosystem:
Service Provider
Expansion of the service portfolio
Better customer retention

Actor: Plant Operator
Better knowledge about the condition of the machines
Plant optimisation
Service Customer

Actor: Data Marketplace
motivation / reasons for participating in the ecosystem:
Data Marketplace Operator
Expansion of the user base

Actor: Microsoft Azure
Expansion of the user base
Infrastructure Provider

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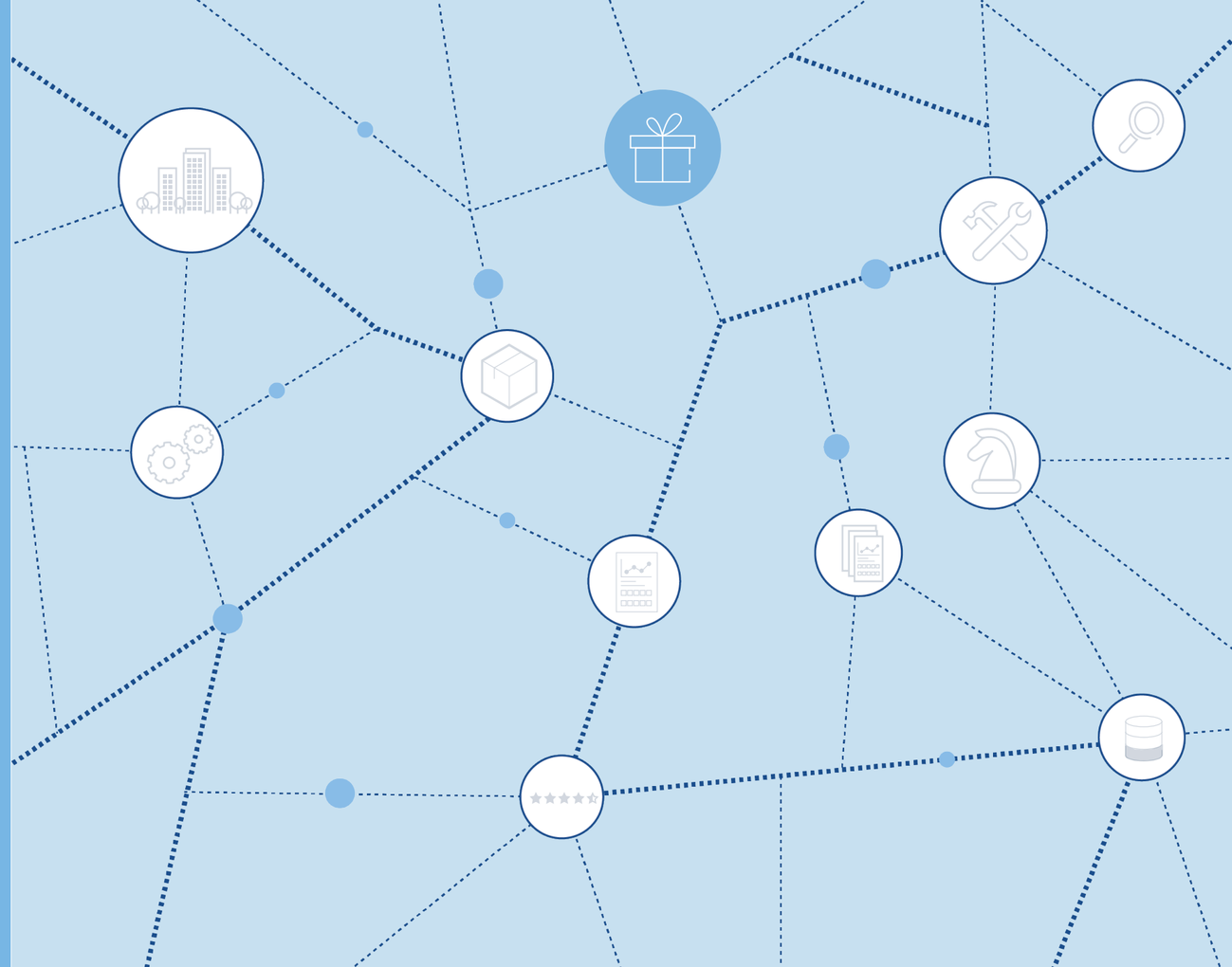
5.2

Value Proposition

The value proposition is the central element of a business model and represents the solution to a customer problem. The value proposition canvas identifies possible solutions taking into account customer needs and thus helps to avoid undesirable developments.

IV. Value Proposition Canvas



IV. Value Proposition Canvas

Introduction

Motivation and goals of the Canvas

The central element of any business model is the value proposition. The importance of this is shown by the fact that more than 70% of product innovations fail because customers have been insufficiently involved in the product development process.

For this reason, it is essential to always keep the wishes and requirements of customers in mind when developing data-driven services. The aim of this canvas is therefore to determine, together with the customers, which problems exist and to what extent the service to be developed provides added value for the company and solutions to the customers' problems.

Structure of the Canvas

The Value Proposition Canvas can be divided into two sections, the Service Provider and the Service Customer. The process starts with the description of the target group Service Customer Profile. What are their tasks, daily challenges as well as goals? Based on this, the **pain points** are identified, which in turn are satisfied by the **solutions** of the service provider. These solutions offer added value for the target group. An essential task is to clearly highlight this added value and thereby establish the need for the service offer.

Questionnaire for Preparation

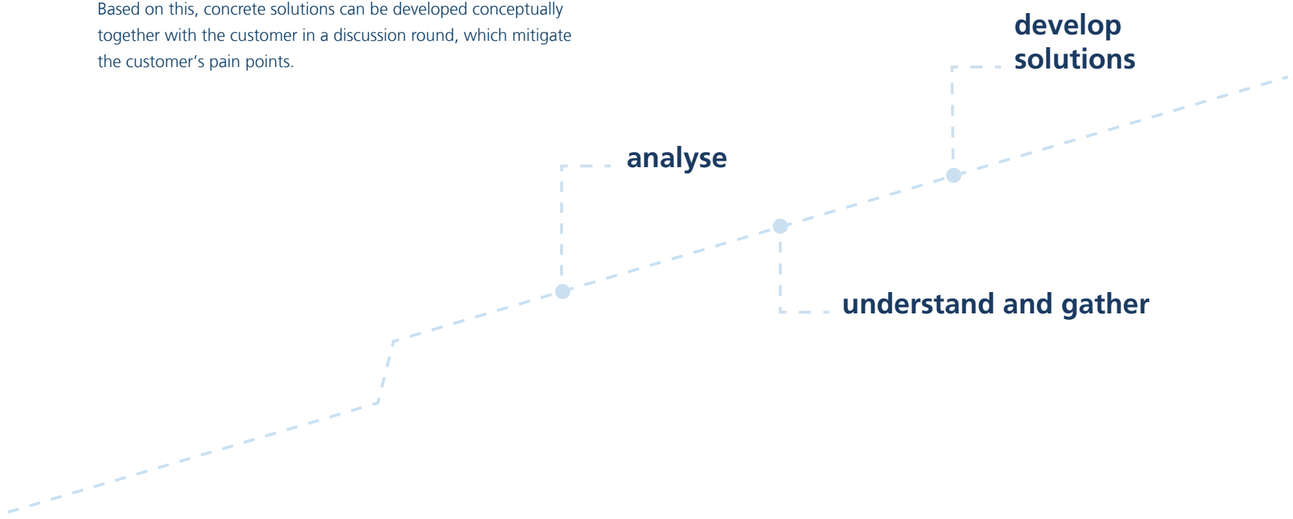
Before conducting the workshop, the following questions about the Value Proposition Canvas should be completed by the participants:

1. What are the customers' problems and pain points?
2. Do I have suitable solutions for the customers' needs?
3. What is the added value of the offered solutions for the customer?
4. How can one differentiate one's own offerings from those of the competition?

Workshop Procedure

To develop data-driven services, the customer's problems and pain points are analysed in the Value Proposition Canvas. In the workshop, the service provider must understand the customer's business processes and work with the customer to find solutions.

Based on this, concrete solutions can be developed conceptually together with the customer in a discussion round, which mitigate the customer's pain points.



Expertise required:
Strategy developer (service provider), customer representative (service customer)

Duration of the workshop:

Introduction and explanation	20 minutes
Completing the Canvas	20 minutes
Consolidation of results	5 minutes per participant
Concluding discussion	open end

Follow-up:
After the workshop, further questions arise that need to be answered:

1. What do I need to develop the solution?
2. What are the hurdles/risks in creating the data-driven offer?
3. Can I create the data-driven offer on my own? Which partners are needed to create the offer?

Materials

- [ ] One Value Proposition Canvas in large format (A0) to consolidate the results
- [ ] Several in small format (A4) for each participant
- [ ] Markers
- [ ] Pens
- [ ] Sticky notes

IV. Value Proposition Canvas

Project Name: **Company:** **Date:**

Service Customer

Profile

To whom are the data-driven services offered?

Are they existing or new customers?

In which industry are they being addressed?

What are the everyday challenges of the customers?

Pain Points

What pains do the consumers have?
Does the pain relate to specific processes or unused potential?

Are there specific problems?

Added Value

How does the solution help the customer?
Can cost, time or resource savings be made?

Service Provider

Solutions

What is the added value of the solution offered?
Does the technology deliver specific benefits?
Is there a USP?

Data Services

What data-driven service should be offered?

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Project Name: Smart Maintenance **Company:** OEM **Date:** 15.07.2020

Service Customer

Pro

Plant Operator

Are they existing or new customers?

In which industry are they being addressed?

What are the everyday challenges of the customers?

System failures, high operating costs

Existing customers with machines from your own company

Pain Points

What pains do the consumers have?

low plant availability

high maintenance costs

Added Value

How does the solution help the customer?

Cost, time savings, higher income

Low Energy Consumption

Service Provider

Solutions

What is the added value of the solution offered?
Does the technology deliver specific benefits?
Is there a USP?

Visualisation of the production processes

Machine failure prediction

Real-time Monitoring

Proactive Production Control

Data Services

What data-driven service should be offered?

Condition Monitoring

Predictive Operations

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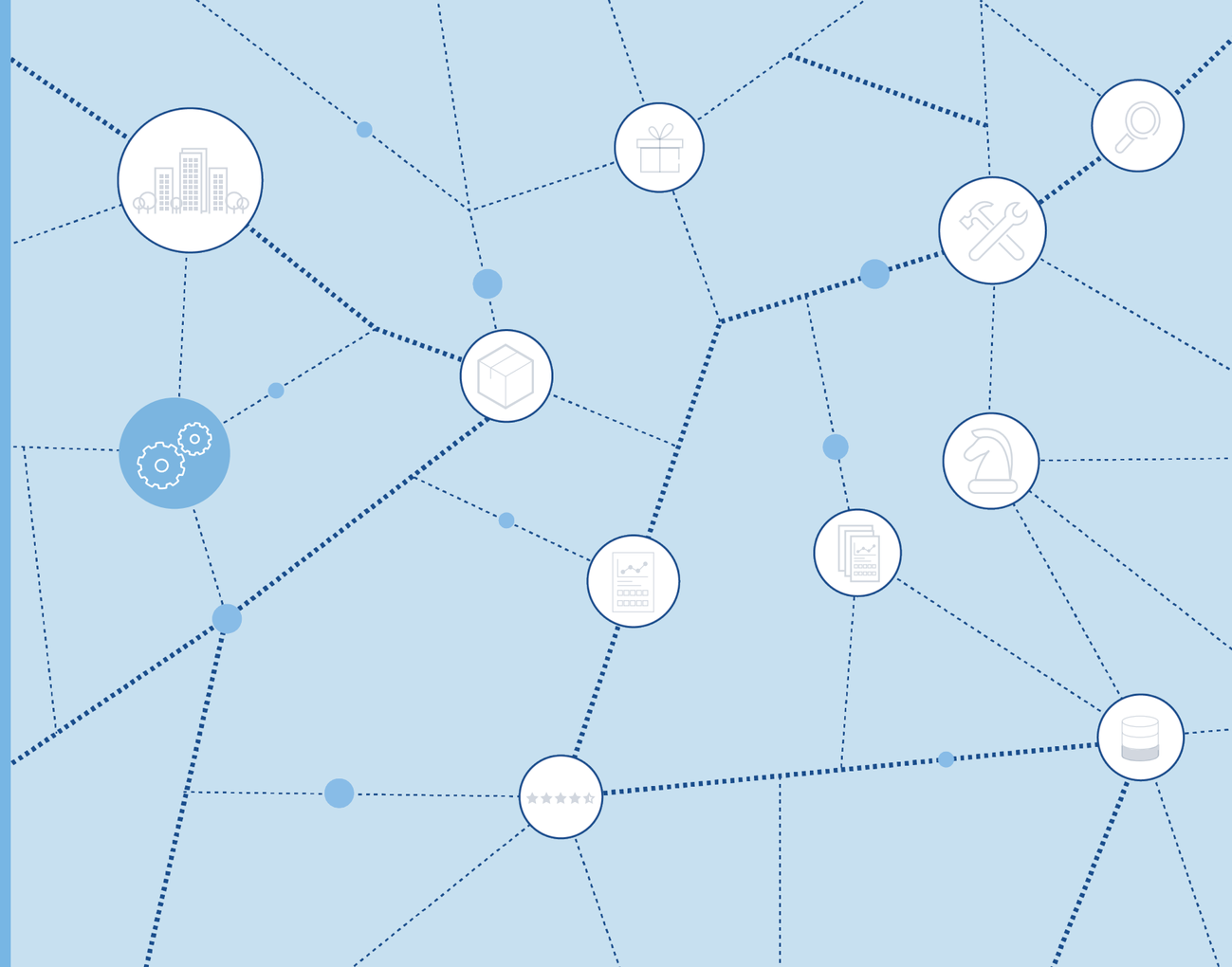
5.3

Value Creation

The core but also the most complex building block of any business model is value creation, i.e. the creation of the service. Three canvases are provided in this manual to serve as a basis for planning and realising the value creation process.

V. Data Resources Canvas
VI. Data Value Chain Canvas
VII. Data Governance Canvas



V. Data Resources Canvas

Introduction

Motivation and goals of the Canvas
Resources are needed to create any service. The most important resource of a data-driven service is data. Every service provider faces the challenge of determining from which source data can be obtained. In addition, data from different sources often has different formats or quality, making it difficult to use and combine with other data. Data providers, on the other hand, face the problem of not knowing what potential consumers there are for their data.

The Data Resources Canvas helps you to determine which data are needed by the service provider to create the service, which data can be obtained from data providers or from public sources, and which properties these data have.

Structure of the Canvas
The Data Resources Canvas is made up of a three-dimensional property matrix. Individual data resources required for the production of the service offer are categorized based on their properties: What type of data is sourced, how often it is sourced, and how good it is. The workshop can allocate who added the related data resource to the canvas using colored annotations.

Typical data quality criteria

- **Correctness:** How accurate and reliable is the data?
- **Consistency:** Do several versions of the data agree with each other in terms of format, presentation, etc.?
- **Completeness:** Are all values of a data set completely available?
- **Up-to-dateness:** Does the data correspond to the current circumstances at all times and is the data adjusted when they change?
- **Availability:** Is the data easily accessible to users at any desired point in time?

Questionnaire for Preparation

Before the workshop, the following questions about the Data Resources Canvas should be completed by the participants:

From the service provider's perspective:

1. What data is needed by the service provider to create the service for the clients?
   - How often is the data needed?
   - How processed does the data need to be (raw data, processed data or processed data)?

2. Which of these data does the service provider already have internally? What data can be obtained from data.providers?

3. What additional open or freely available data can be used to improve or expand the service?

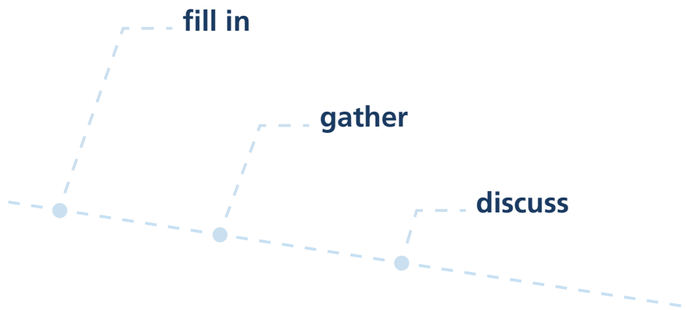
From the data provider's point of view:

1. What data can be provided by the data provider to the service provider?
   - How frequently can the data be provided?
   - To what extent is the data processed (raw data, prepared or processed data)?

Workshop Procedure

For the most comprehensive picture of the available data resources, an interdisciplinary composition in the workshop is advantageous. In the first step, the participants fill out their canvas individually. In the second step, the results are compiled on the large Canvas. The data resources that a service provider has collected in the first step are first placed on the large canvas. The service provider can also enter and colour-code data that originates from the service customer. Data providers then add their data resources to the canvas in a different colour.

In the subsequent discussion round, the participants clarify whether the data resources that the service provider needs from the data providers have the same properties as the data that the data providers can actually provide. Furthermore, it can be discussed whether additional data (open data, platform data, etc.) can improve the service provider's service offering. These are added in a different colour in the table and in the matrix.



Expertise required:
Data experts (service providers, data providers)

Duration of the workshop:

Introduction and explanation	20 minutes
Completing the Canvas	20 minutes
Consolidating the results	5 minuten per participant
Concluding discussion	open end

Follow-up:
After the workshop, there may be further questions that need to be answered in order to capture all the data resources needed:

1. Are there differences between service provider requirements and data provider characteristics?
2. In which cases is there still a need for adaptation?
3. Which other data providers can usefully expand the ecosystem with their data resources?

Materials

- [ ] One Data Resources Canvas in large format (A0) to consolidate the results
- [ ] Several in small format (A4) for each participant
- [ ] Markers
- [ ] Pens
- [ ] Sticky notes (colourful)

V. Data Resources Canvas

Project Name: | Company: | Date:

SP DP SC others

Processing \ Frequency	One-Time	As Required	Regular	Continuous
Raw Data	high data quality low data quality	high data quality low data quality	high data quality low data quality	high data quality low data quality
Processed Data	high data quality low data quality	high data quality low data quality	high data quality low data quality	high data quality low data quality
Meta Data	high data quality low data quality	high data quality low data quality	high data quality low data quality	high data quality low data quality

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Project Name: Smart Maintenance | Company: OEM | Date: 15.07.2020

SP DP SC others

Processing \ Frequency	One-Time	As Required	Regular	Continuous
Raw Data	high data quality low data quality Location Data	high data quality low data quality	high data quality Weather Data	CO2 / NOx Data Further Sensor Data
Processed Data	high data quality low data quality	high data quality low data quality	low data quality Vibraton Data	high data quality Torque Data Temperature Curves
Meta Data	Meta-Machine Data	Meta-Facility Data low data quality	More Machine Data low data quality	high data quality low data quality

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VI. Data Value Chain Canvas

Introduction

Motivation and goals of the Canvas

The value chain depicts in individual steps how products or services are created from invested resources. The Data Value Chain Canvas helps you to map the activities in a data-driven value creation in your company and to divide them into individual phases. This gives you the opportunity to give the handling of data a clear structure and to identify potential optimisation points in the creation of your service.

Structure of the Canvas

When filling out the Canvas, proceed from left to right: From the generation of the data to the use of the knowledge generated by data in the company. In **each step**, you outline the process in bullet points. Not **all steps** necessarily have to take place in your own company. For each activity, note where and by whom it is carried out. Different roles are colour-coded. Requirements and necessary skills are derived from each listed activity and are indicated below for each step in the value chain. The notation with a „tick" shows that the requirement or capability already exists in the ecosystem. An „X" identifies those requirements or capabilities that still need to be built - this can be done through further partnerships, for example.

Questionnaire for Preparation

Before the workshop, the following questions about the Data Value Chain Canvas should be completed by the participants:

1. How is data generated/collected?
   - How and where is the data needed for the data-driven offer generated?
   - Can it be generated directly or are partners needed?
   - How is data stored?

2. How is the data processed? Are data checked for certain quality criteria?
   - Does a data model exist?
   - Does data have to be prepared for further processing?
   - Is there a quality catalogue for data?

3. How is data processed?
   - Is data analysed?
   - Are the technical requirements in place?
   - Is data linked to other data?

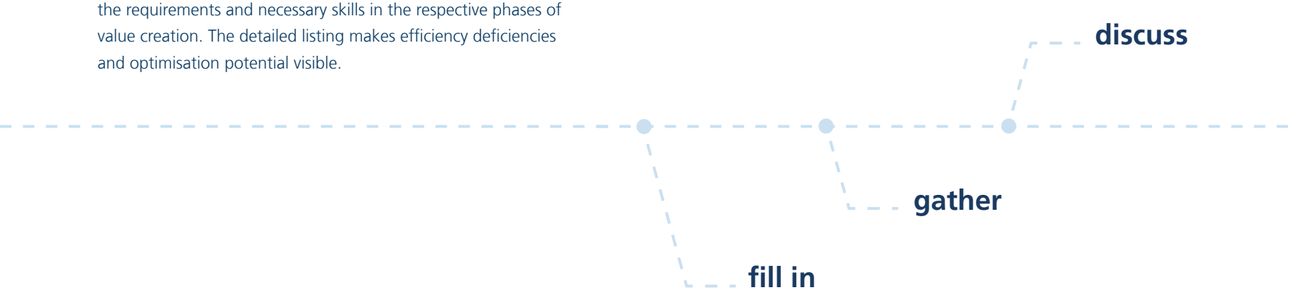
4. is data integrated into business activities (internal/external) and combined with experience (internal/external)?

5. where is the generated knowledge used (internally, externally, collaborative)?

Workshop Procedure

In the first step, the participants fill out their canvas individually. In the second step, the results are compiled on the large canvas. Different roles (service provider, data provider or others such as infrastructure provider) are given different colours. This makes it clearer which steps in the value creation process are assigned to which role in the ecosystem.

In the subsequent discussion round, the participants are given the opportunity to evaluate the activities in the value chain and define the requirements and necessary skills in the respective phases of value creation. The detailed listing makes efficiency deficiencies and optimisation potential visible.



Workshop participants:
Persons responsible for processes (service providers, data providers)

Duration of the workshop:

Introduction and explanation	30 minutes
Completing the Canvas	20 minutes
Consolidating the results	10 minutes per participant
Concluding discussion	open end

Follow-up:
After the workshop, further questions may arise about the value chain:

1. Is the value chain detailed without any gaps or inefficiencies?
2. Can all requirements be met?
3. Are there other data-related activities in the business model that were not mapped in the canvas?

Materials

- [ ] One Data Value Chain Canvas in large format (A0) to consolidate the results
- [ ] Several in small format (A4) for each participant
- [ ] Markers
- [ ] Pens
- [ ] Sticky notes (colourful)

VI. Data Value Chain Canvas

Project Name: **Company:** **Date:**

SP
DP
SC
others

Generation/ Capture	Preprocessing/ Curation	Analysis	Bundling of Information	Use of generated Knowledge
How is data generated/ collected?	How is the data prepared? Are data checked for certain quality criteria?	How is data processed? Are they consolidated with (other) data?	Is data integrated into business activities and combined with experience?	Where is the generated knowledge used?
Requirements and Skills				

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Project Name: Smart Maintenance **Company:** OEM **Date:** 15.07.2020

SP
DP
SC
others

Generation/ Capture	Preprocessing/ Curation	Analysis	Bundling of Information	Use of generated Knowledge
Plant Acquisition of data via sensors and control elements	Edge Device Preprocessing of the data	Analysis Experts Parameterisation of data	Creation of reports with recommendations for action based on the analysis results	Plant Operator Derivation of measures based on the reports/data on the platform
	Transfer and processing of the data on the platform	Analysis of the data of the respective plant	Creation of dashboards on the platform	Plant Optimisation
Requirements and Skills				
Consent of Customers Machine Equipment	Provision of the IT infrastrueture	Provision from the edge device and platform Internal Expertise	Internal Expertise Provision of Access	Externe Expertise

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VII. Data Governance Canvas

Introduction

Motivation and goals of the Canvas
Digital business models and the development towards a data-driven organisation reinforce the need to understand data and use it in a targeted manner. Data governance takes on a high priority here, as it creates the necessary structures for managing data as a resource.

The field of tension of a data ecosystem becomes greater with increasing complex information flows, which is why the consideration of data governance in the context of inter-organisational relationships is necessary.

The Data Governance Canvas supports you in creating transparency in the data ecosystem by annotating relevant actors, their roles and responsibilities.

The process view of the data life cycle additionally enables the identification of critical data resources. The target picture serves as the basis for creating a framework with the necessary role interactions for the provision of your services.

Structure of the Canvas
Similar to the Data Value Chain Canvas, the Data Governance Canvas is based on the five-stage **data life cycle** (generation/capture, pre-processing/curation, analysis, bundling of information, use of generated knowledge). Each stage includes the formulation of relevant activities with regard to data and the roles designated for them. In addition, there are cross-level tasks and the roles responsible for them. The lower section of the canvas is intended for this purpose. The colour coding of the roles helps to distinguish the different actors and to quickly identify the respective tasks in the process step.

On the following page you will find an overview of the most important data governance roles, which you can transfer to the canvas as needed.

Note: The Data Governance Canvas should be worked on after or in combination with the Data Value Chain Canvas due to the required knowledge about the structure of the business model in order to achieve the most meaningful results.

Questionnaire for Preparation

Before conducting the workshop, we recommend answering and discussing the following questions.

1. Who is responsible for data resources in my company? What tasks are associated with this?
2. Is there an external person responsible for data resources? What tasks are associated with this?
3. Who in my company has overall responsibility for the data-related processes along the value chain? What tasks are associated with this?
4. Who outside my company has overall responsibility for the data-related processes along the value chain? What tasks are associated with this?
5. Who is responsible for data security in my company? What tasks are associated with this?
6. Is there an external person responsible for data security? What tasks are associated with this?
7. Who in my company is responsible for compliance with rules and guidelines (such as data protection)? What are the related tasks?
8. Is there an external person responsible for data protection? What are the associated tasks?

Data Governance Roles

Data Steward

Represents operational data management in the company, is responsible for recording and evaluating professional and technical requirements for and problems with data. His area of responsibility includes, among other things, the development of business rules for data, the development of data models and data architectures, the implementation of data management processes and participation in data committees.

Data Owner

Describes employees from the department or business unit who are responsible for the data and who set the technical requirements for the data (e.g. the necessary data quality).

Data-Committee

Acts as the central decision-making body for data governance. It defines the principles for handling data in the company and harmonises the interests of data owners and data stewards in uniform corporate goals.

Data Architect

Represents the technical experts for data in the company. It defines how data is stored, consumed, integrated and managed by different data entities and IT systems, and defines applications that process or use this data.

Data Customer

Refers to employees in the company who utilise data in the various business and decision-making processes. It forwards requirements to data owners and is an important source of quality control throughout the data lifecycle.

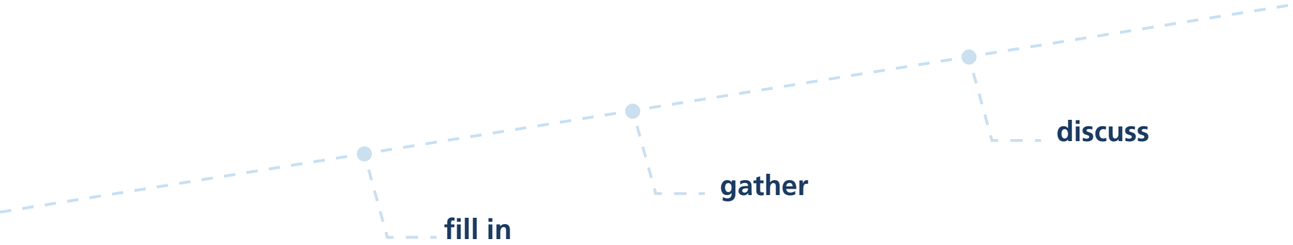
Chief Data Officer (CDO)

Represents a new management function responsible for the practical implementation of data governance in the company. The CDO represents data management at executive level and represents the goals of data management through the strategic direction of the company.

Workshop Procedure

In the first step, the participants fill out their canvas individually. In the second step, the results are compiled on the large canvas. During the compilation of the results, duplications and ambiguities in the allocation of roles and tasks within and outside the company can be identified.

The subsequent discussion round serves to analyse and, at best, clarify identified problem areas so that a collective understanding of the business model under consideration is developed at the end.



Expertise required:
Data experts (service providers, data providers), IT experts (service providers, data providers)

Duration of the workshop:

Introduction and explanation	20 minutes
Completing the Canvas	20 minutes
Consolidating the results	5 minutes per participant
Concluding discussion	open end

Follow-up:
After the workshop, further questions may arise regarding data governance:

1. Is the data governance structure in the ecosystem transparent enough so that a contact person is known for each area?
2. If not, who is responsible for improving the structures? What tasks are associated with this?
3. Which roles and tasks have not yet been filled, but are necessary for the creation of the service? Who takes responsibility for filling these roles and for the division of tasks?

Materials

- ☐ One data governance canvas in large format (A0)
  to consolidate the results
- ☐ Several in small format (A4) for each participant
- ☐ Markers
- ☐ Pens
- ☐ Sticky notes (colourful)

VII. Data Governance Canvas

Project Name: **Company:** **Date:**

SP DP SC others

	Generation/ Capture	Preprocessing/ Curation	Analysis	Bundling of Information	Use of Generated Knowledge
	How is data generated/ collected?	How is the data prepared? Are data checked for certain quality criteria?	How is data processed? Are they consolidated with (other) data?	Is data integrated into business activities and combined with experience?	Where is the generated knowledge used?
Tasks					
Roles					
Overarching					

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Project Name: Smart Maintenance **Company:** OEM **Date:** 15.07.2020

SP DP SC others

	Generation/ Capture	Preprocessing/ Curation	Analysis	Bundling of Information	Use of Generated Knowledge
	How is data generated/ collected?	How is the data prepared? Are data checked for certain quality criteria?	How is data processed? Are they consolidated with (other) data?	Is data integrated into business activities and combined with experience?	Where is the generated knowledge used?
Tasks	Conception and Conclusion of user contracts for data with customers	Collect requirement from customers for the platform Ensure the functionality of the Edge Device	Data processing and disclosure	Responsibility for the dashboards on the platform	Utilisation of information from the reports/dash-boards
Roles	Data Steward Data Owner	Platform Data Owner and Data Steward Edge Device Data Owner /Architect Data Customers	Data Customers/Owner	Data Customers/Owner	Data Customers/Owner Data Customers
Overarching	Platform Data Architect and Data Steward	Data management on the platform	Answering data protection questions Data Protection Officer		Ensuring data security AP in case of breaches/ problems IT Stewards

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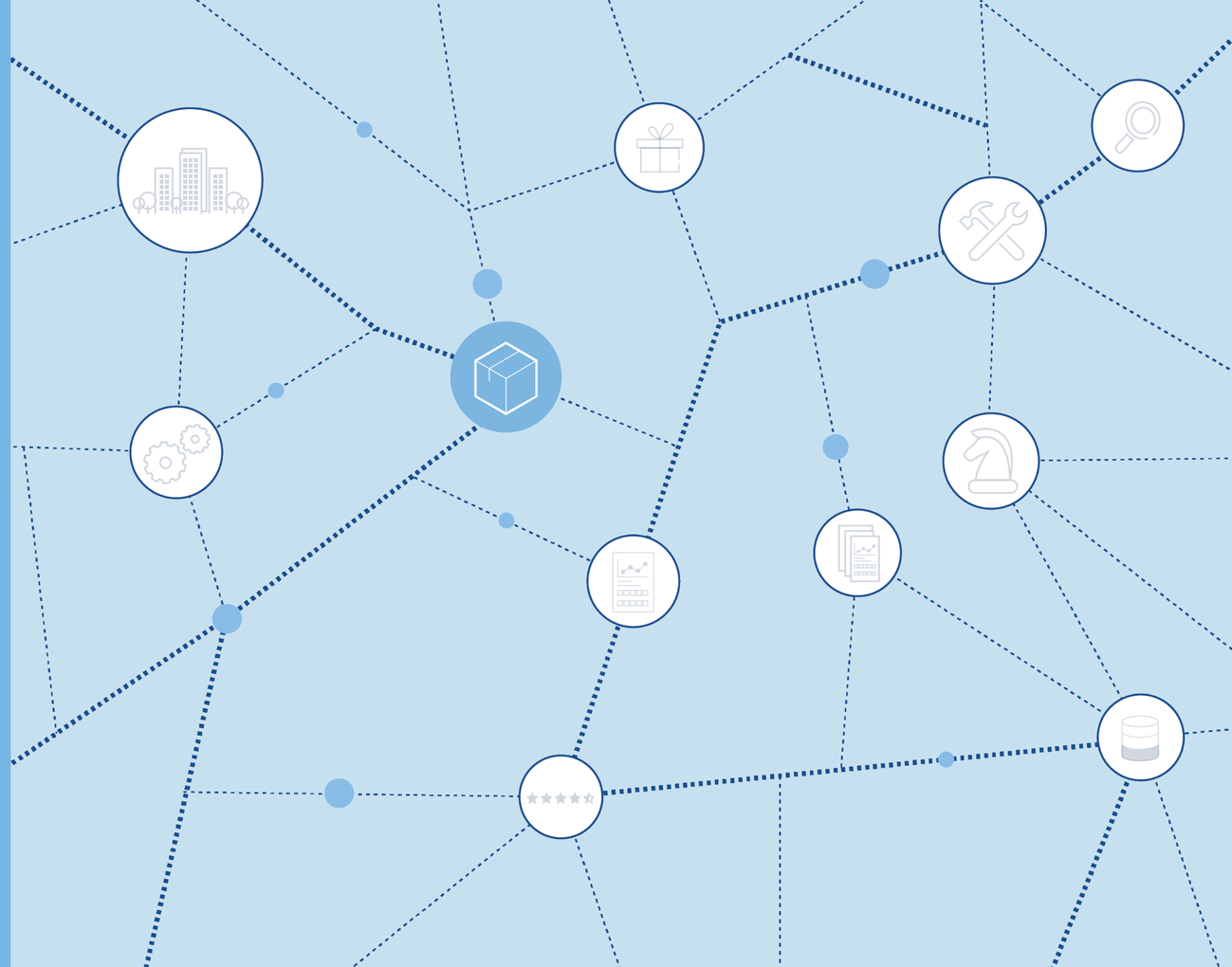
5.4

Value Delivery

A new data-driven value proposition needs to be delivered to customers in a simple and intuitive way (Value Delivery). The Value Delivery Canvas helps you to conceptualise an appropriate service delivery.

VIII. Value Delivery Canvas



VIII. Value Delivery Canvas

Introduction

Motivation and goals of the Canvas
There are three options for delivering the developed service:
The Value Delivery Canvas is about deciding on the most suitable option for the service and working out how this delivery form must be designed. Both technical and economic aspects are considered.

Note
For the download option, it is not mandatory to fill in all the fields, as this is a simple form of service delivery. For the development of a software or platform, however, far-reaching considerations are necessary so that the service offer can exist and ensure sustainable success.

- On the one hand, a special **software** can be developed that is made available to the customer. This has the advantage that the customer can use the service independently and his data remains internal.
- Furthermore, a **platform** can be developed that is accessible via web interfaces. Such a cloud solution enables easy scalability and dynamics, and changes on the part of the service provider can be implemented quickly. This makes it possible to address several customer segments and achieve sustainable interaction. However, the development is associated with effort and technical requirements as well as security aspects must be taken into account.
- The simplest option is in the form of **downloads.** The service customer can manually access the result of the service (reports, etc.) with a web browser, and then when it is necessary for him. The development effort is eliminated, but this option is only suitable for less complex services such as analysis reports.

Structure of the Canvas
First, the fields have to be filled in one after the other, starting with the left column. This contains the business aspects of motivation and development. Then, in the middle, the **functions** that the solution will hold to deliver the service are highlighted and the right column covers the technical points. Based on the results, the optimal option can now be selected and ticked visibly for all.

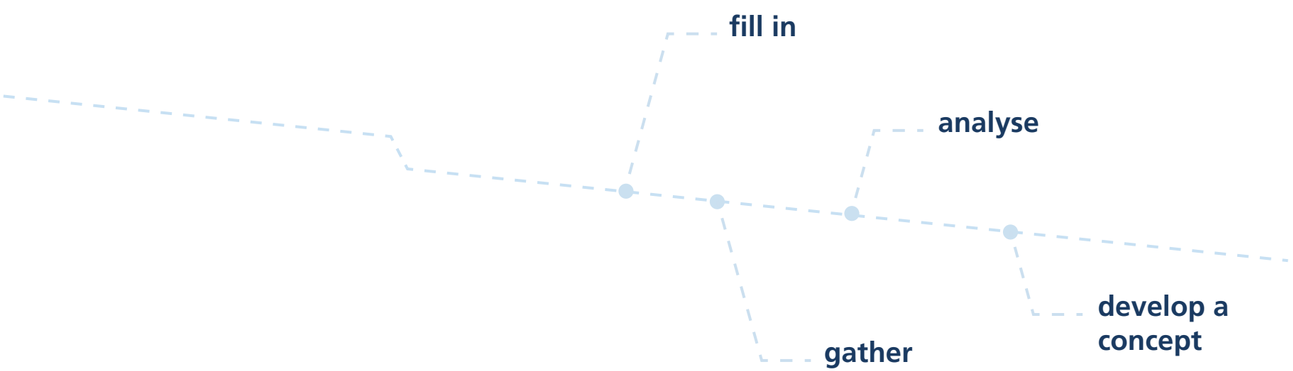
Questionnaire for Preparation

Before the workshop, the following questions about the Value Delivery Canvas should be completed by the participants:

1. Which transmission option is the most appropriate for my service?
2. What meets the requirements and wishes of my customers?
3. How should the user interface be structured?
4. What functions does the solution include?
5. Who is developing the solution (internal/external)?
6. What technical infrastructure is required?

Workshop Procedure

In the first step, the participants fill out their canvas individually. However, no cross is set with regard to a selection. In the second step, the results are compiled on the large canvas. Here, it is particularly important to consider all the selected provision options and to make a joint decision regarding the option to be selected.
The subsequent discussion round serves to analyse and, at best, clarify identified problem areas, so that in the end a first concept for the solution to be developed can be drafted.



Expertise required:
Strategy developers (service providers, infrastructure providers), IT experts (service providers, infrastructure providers)

Duration of the workshop:

Introduction and explanation	20 minutes
Completing the Canvas	20 minutes
Consolidating the results	5 minutes per participant
Concluding discussion	open end

Follow-up:
After completing the workshop, further questions arise that need to be answered in the context of service delivery:

1. What are the hurdles in providing the service?
2. How can I achieve network effects?
3. How will the development of the solution be financed?
4. Which distribution channels do I use to draw attention to my new service offer?

Materials

- [ ] One Value Delivery Canvas in large format (A0) to consolidate the results
- [ ] Several in small format (A4) for each participant
- [ ] Markers
- [ ] Pens
- [ ] Sticky notes

VIII. Value Delivery Canvas

Project Name: **Company:** **Date:**

Motivation

What do customers expect when using the solution?

How is intuitive use ensured?

Development

Who develops the solution? Is this done internally or externally?

Will existing technologies and providers be used?

Functions (Software/Platform)

How should the service be used?

What other functions should be offered?

What are the technical requirements?

Technical Interfaces

Which interfaces are required for operation?

How is data transmission and service retrieval carried out?

Technical Requirements

Which operating system is used?

What does the underlying database look like?

☐ Software ☐ Platform ☐ Download

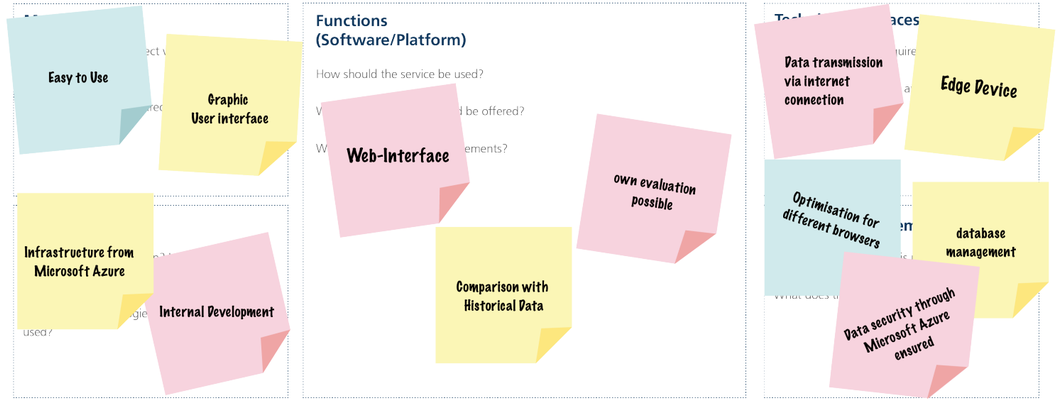
DEMAND

www.demand-projekt.de/vdc_en

Project Name: Smart Maintenance **Company:** OEM **Date:** 15.07.2020

Functions (Software/Platform)

How should the service be used?



☐ Software ☒ Platform ☐ Download

DEMAND

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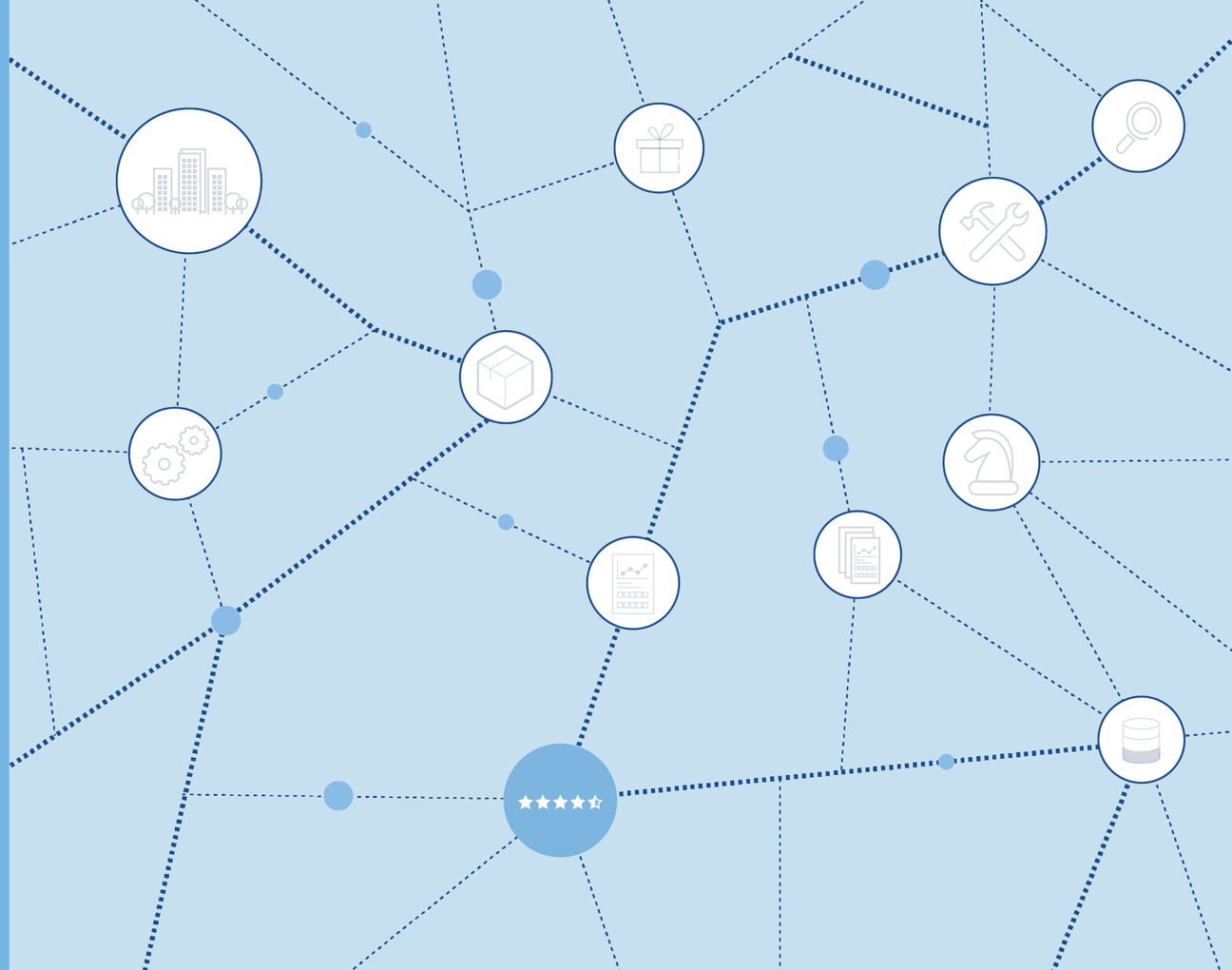
5.5

Value Capture

For a data-driven business model to be sustainably successful, **profitability** must be ensured (value capture). Accordingly, this requires a consideration of both the revenue and the cost side. Therefore, two canvases are provided in this manual to assist you in choosing a revenue model and including relevant costs.

IX. Revenue Model Canvas
X. Cost Structure Canvas



IX. Revenue Model Canvas

Einleitung

Motivation and goals of the Canvas

The main goal of any business model for companies is to generate revenue. Digitalisation not only creates new types of offers, but also innovative revenue models that open up new sources of revenue for companies. Finding the right model is anything but trivial, as many factors play a role. The Value Capture Canvas shows you various revenue opportunities that can be considered for data-driven services for both data providers and service providers. In order to help you find the right revenue model, the canvas provides guidance on which revenue models are more suitable in which cases.

Structure of the Canvas

- **Sale:** The service is sold to the customer for a monetary fee. A special modification is the **pay-with-data** revenue model. Here, the service is paid for with the customer's own data.
- **Subscription:** Temporary use of the service for a (monthly/annual) fee. **Freemium** models represent a special modification. In these revenue models, the basic services are provided free of charge, while additional options and services can be booked for a fee.
- **Pay-per-use:** In this model, the service is provided free of charge, while the customer only pays for the actual use of the service. The revenue model can be modified through **performance-based contracting (participation in revenues)**. The seller also provides the service free of charge, but is contractually entitled to a share of the revenues generated by the service.
- Online platforms often use the **commission-revenue model,** where they receive a commission fee from one or both players when the trade between two parties on the platform takes place. Some platforms modify their business and make the service free of charge for both parties, while funding themselves through third-party **advertising** on the platform.

Questionnaire for Preparation

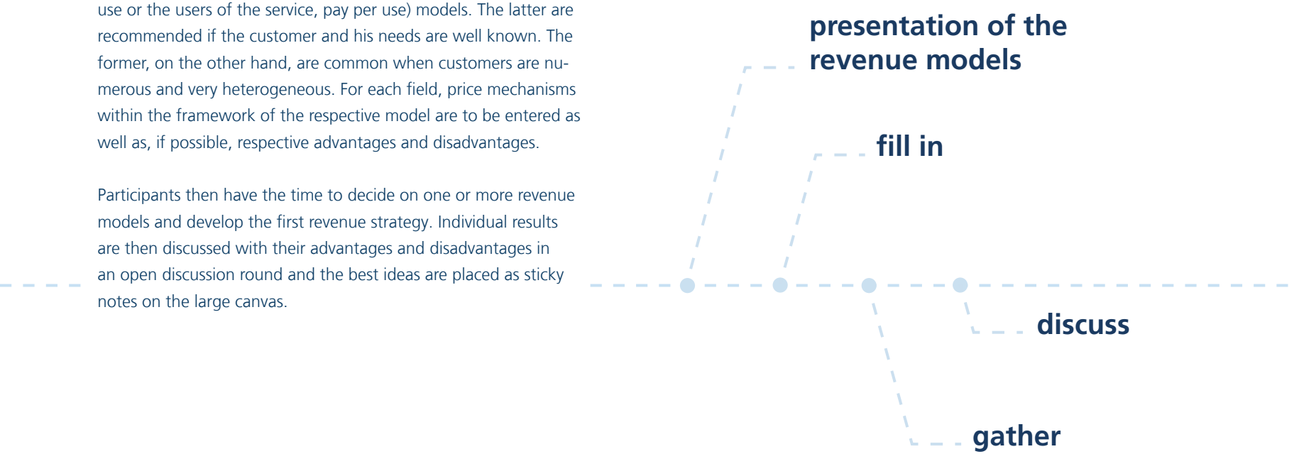
Before the workshop, participants should complete the following questions on the Value Capture Canvas:

1. Does data qualify as currency in your business?
2. How often do individual customers use your services (one-time, on-demand, regular)?
3. Are your services for long-term use or for one-time use?
4. Do you have or plan to develop an online platform for your business?

Workshop Procedure

At the workshop, all revenue models are first briefly presented. They range from product-oriented (revenues are oriented to the service, sales) to use/user-oriented (revenues are oriented to the use or the users of the service, pay per use) models. The latter are recommended if the customer and his needs are well known. The former, on the other hand, are common when customers are numerous and very heterogeneous. For each field, price mechanisms within the framework of the respective model are to be entered as well as, if possible, respective advantages and disadvantages.

Participants then have the time to decide on one or more revenue models and develop the first revenue strategy. Individual results are then discussed with their advantages and disadvantages in an open discussion round and the best ideas are placed as sticky notes on the large canvas.



Workshop participants:
Strategy developers (service providers)

Duration of the workshop:

Introduction and explanation	20 Minuten
Completing the Canvas	20 Minuten
Consolidating the results	5 Minuten per participant
Concluding discussion	open end

Follow-up:
After the workshop, further questions arise that need to be answered in the context of service delivery:

1. Which revenue model best fits my business model? Can several revenue models be combined?
2. What costs are associated with setting up the business model? Are the revenues generated sufficient to cover the costs of provision?
3. If I build a platform, can I reach a critical mass of users so that operating the platform does not become loss-making?

Materials

- ☐ One Revenue Model Canvas in large format (A0) to consolidate the results
- ☐ Several in small format (A4)
- ☐ Markers
- ☐ Pens
- ☐ Sticky notes

IX. Revenue Model Canvas

Project Name: **Company:** **Date:**

Revenue Models

Sale
Pay-with-Data

With very heterogeneous customers?
Is my service used once or irregularly?

Subscription
Freemium

Does my service provide for long-term use?
Is my service used continuously or regularly?

Pay-per-Use /
Performance-based Contracting

Does my service provide for long-term use?
Are my customers well known? Is there a trusting customer relationship?

Provision
Advertisement

Is (data) trade organised via a platform?

product-oriented — use/user-oriented

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Project Name: Smart Maintenance **Company:** OEM **Date:** 15.07.2020

Revenue Models

Sale
Pay-with-D

With very hete

Fixed price for a report/Consulting offer

Clients more interested in reports than raw data

Simple Price Calculation

Subscription
Freemiu

Does my servi
long-term use
Is my service us
regularly?

Raw data free of charge, reports/ consulting for extra charge

Retain Customers

Enough incentives for customers to pay on top?

Pay-per-Use /
Performance-based Contracting

Does my
long-term
Are my cu
there a tr
hip?

Cost savings with plant optimisation through service

Difficult to Quantify

Provision
Advertisement

Is (data) trade organised via a platform?

Not relevant, as only for platforms

product-oriented — use/user-oriented

DEMAND

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X. Cost Structure Canvas

Introduction

Motivation and goals of the Canvas
Every business model, no matter how promising in theory, must be feasible in practice. An important obstacle to the implementation of the business idea is the associated costs. Not all costs can be calculated in advance, which can delay or even seriously jeopardise the realisation of the business model.
The Cost Structure Canvas helps you to include the costs of your business model in your planning from the very beginning and thus to better assess the potential for success of your business idea.

Structure of the Canvas
The Cost Structure Canvas has the form of a **coordinate system** with two axes. The x-axis shows the volume of the costs, from low to high. On the following side, exemplary cost items are divided according to different areas. The y-axis maps the uncertainty factor associated with each cost. The coordinate system is divided into four fields so that the costs under consideration can be classified and the risk potential can ultimately be assessed.

Bottom left: Cost items that have a low cost and uncertainty factor are to be classified in the lower left field (low risk).

Bottom right: Cost items that are estimated to be rather large in terms of volume, but do not involve uncertainty, are to be placed in the bottom right (medium risk).

Top left: Cost items that are currently estimated to have a low cost factor, but are subject to high uncertainty, are to be entered at the top left (medium risk).

Top right:: Cost items that have both a high cost factor and high uncertainty should be placed in the top right (high risk).

After entering all major cost items, it can be identified whether the business model tends to be safe and profitable (costs tend to be in the lower left) or very risky and potentially too expensive (costs tend to be in the upper right).

Questionnaire for Preparation

Before conducting the workshop, participants should complete the following questions on the Cost Structure Canvas:

1. Consider the list of potential costs to be incurred. Which costs do you consider?
2. Which types of costs not included in the list are to be expected in your business model?
3. Are all upcoming costs already known?
4. Is the amount of all cost items already known?

Types of Costs

Organisation Costs

- Planning
- Acquisition decision
- Benefit assessment
- Development and management planning
- ...

Infrastructure and Equipment

- Network
- Hardware
- Sensors
- Computers
- Processors
- Working memory
- Main memory
- Cables
- Software
- Incidental costs (energy, electricity, heating, cooling)
- Licensing
- ...

Operating Costs/ Expenses

- Acquisition
- Personal
- Installation
- Maintenance
- Monitoring
- Education/Training
- Survey costs
- Travel costs
- Costs for workshops/ interviews
- Purchasing
- Consulting
- Development
- ...

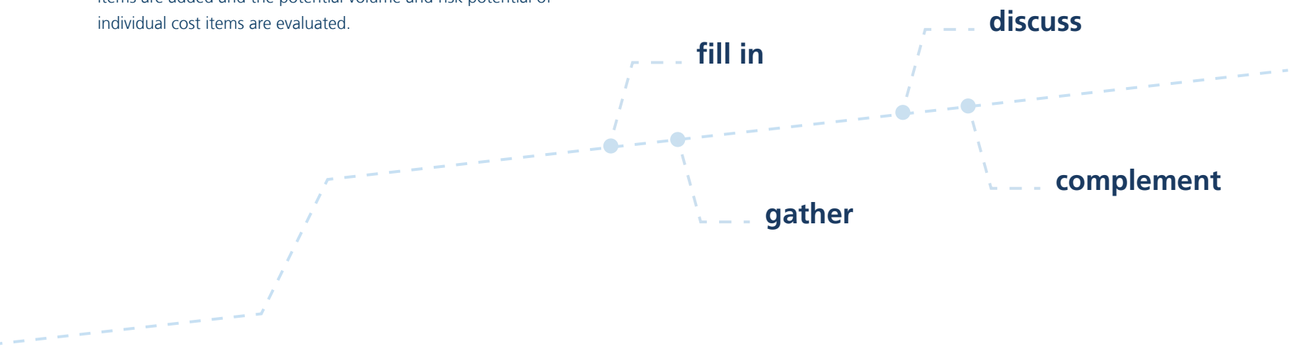
Iterative Processes

- Metadata management
- Data quality management
- Data protection
- Data Protection
- Compliance & Regulation
- ...

Workshop Procedure

In the first step, the participants of the workshop fill out their canvas, using the attached cost list as a guide.

In the second step, the results are consolidated on the large canvas. This is followed by a discussion round in which missing cost items are added and the potential volume and risk potential of individual cost items are evaluated.



Workshop participants:
Strategy developers (service providers)

Duration of the workshop:

Introduction and explanation	20 minutes
Completing the Canvas	20 minutes
Consolidating the results	5 minutes per participant
Concluding discussion	open end

Follow-up:
After the workshop, further questions arise that need to be answered:

1. Do uncertain/high costs dominate the business model?
2. Can the business model be financed?
3. Is the business model profitable when the potential revenue model is taken into account?

Materials

- [ ] One Cost Structure Canvas in large format (A0) to consolidate the results
- [ ] Several in small format (A4) for each participant
- [ ] Cost list
- [ ] Markers
- [ ] Pens
- [ ] Sticky notes (round)

X. Cost Structure Canvas

Project Name: **Company:** **Date:**

Cost / Uncertainty Factors

high uncertainty

medium risk

high risk

low risk

medium risk

high costs

low costs / uncertainty

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Project Name: Smart Maintenance **Company:** OEM **Date:** 15.07.2020

Cost / Uncertainty Factors

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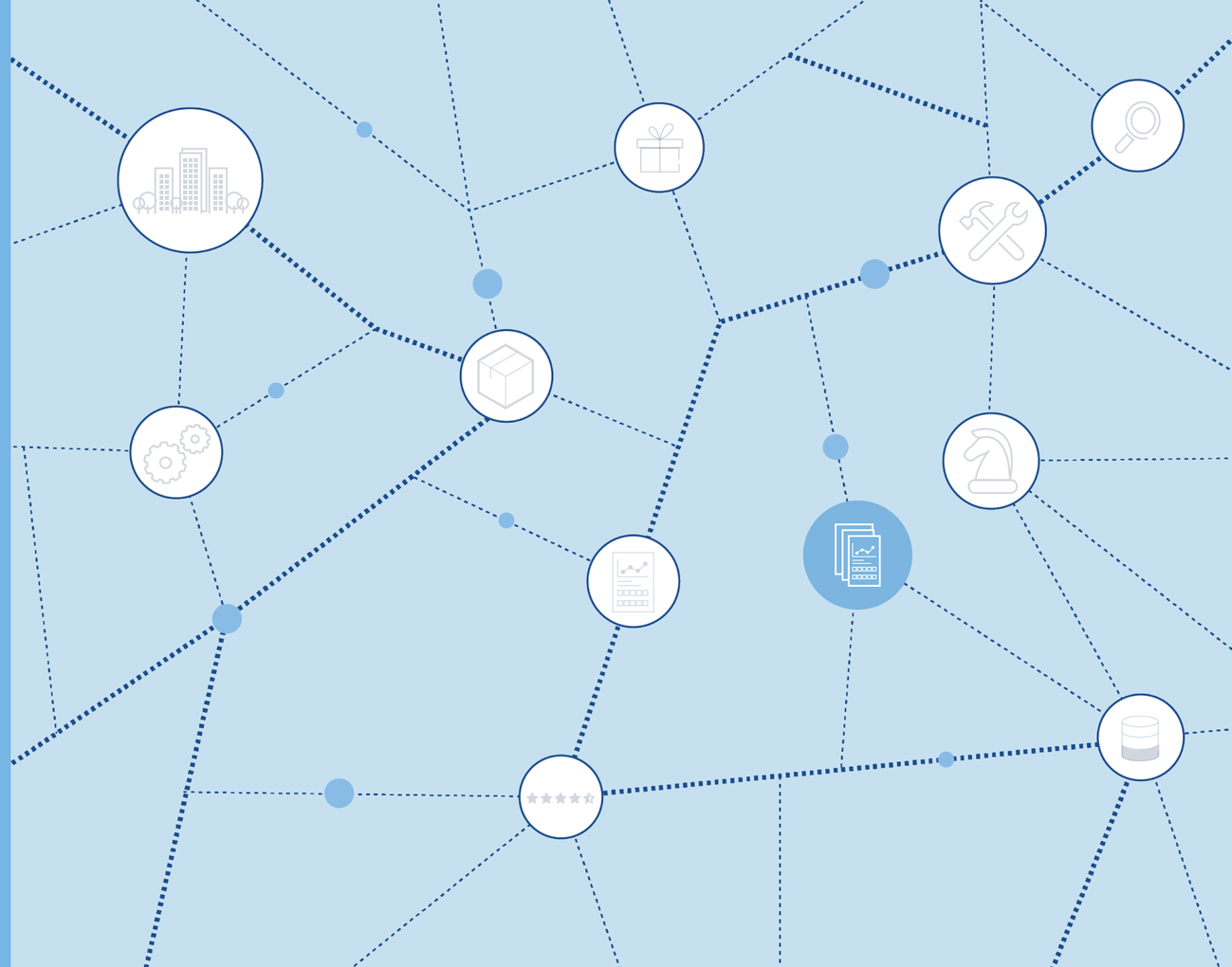
6

Further Information



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