SOLUTION SPACE AND CONCEPT VALIDATION

THOMAS DE MEESTER

GEERT WILLEMS

JORIK VAN DEN BOSCH
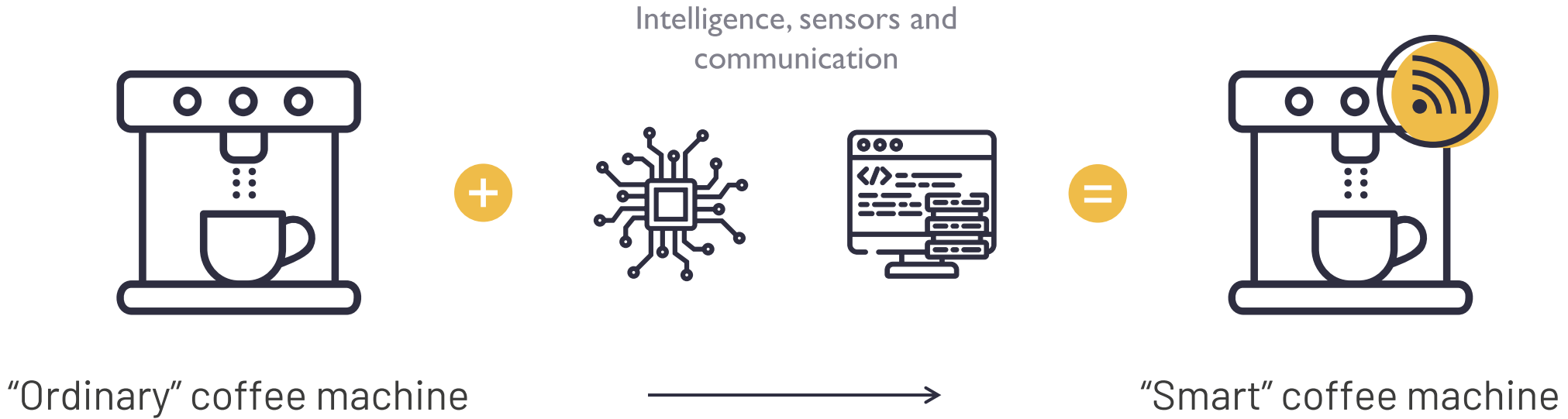
With support from:

AGENTSCHAP
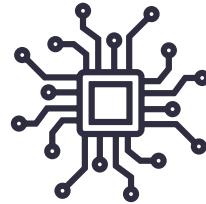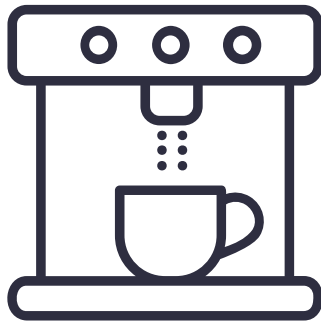INNOVEREN &
ONDERNEMEN

INNOVATION CHALLENGE
SMART COFFEE MACHINE

Intelligence, sensors and communication

"Ordinary" coffee machine

"Smart" coffee machine

INNOVATION CHALLENGE
SMART COFFEE MACHINE

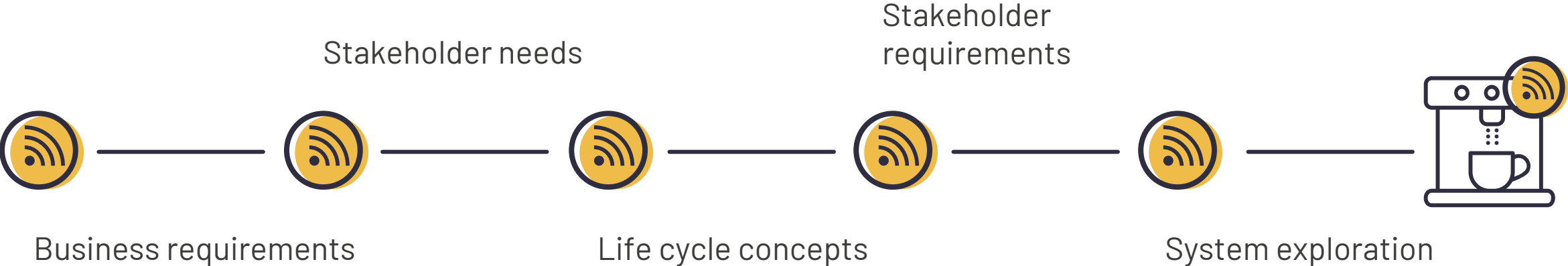Intelligence, sensors and communication

"Ordinary" coffee machine

- Competences
- Customers
- Suppliers
- Partners
- Business Model

"Smart" coffee machine

- *New* Competences
- *New* Stakeholders
- *New* Suppliers
- *New* Partners
- *New* Business Model

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PRODUCT EXPLORATION AND CONCEPT VALIDATION

Stakeholder needs

Stakeholder requirements

Business requirements

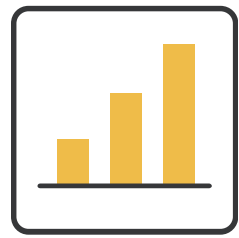Life cycle concepts

System exploration

PRODUCT EXPLORATION AND CONCEPT VALIDATION

Validated concept = create the whole story

- Identify stakeholders / customer and characterize the stakeholder needs

- Company fit and business model

- Define the mandatory capabilities and characteristics of solution(s)

- Technology, supply chain and enabling systems

- Scenarios for solution options *(throughout the product life cycle)*
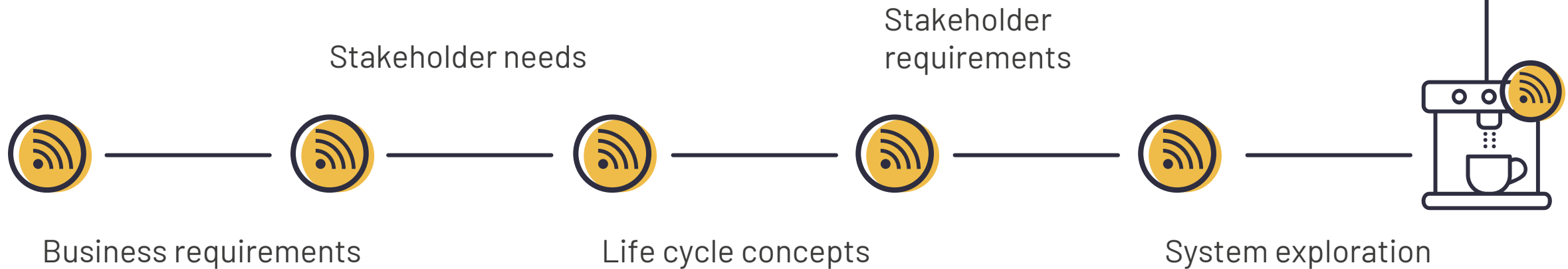
Stakeholder needs

Stakeholder requirements

Business requirements

Life cycle concepts

System exploration

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PRODUCT EXPLORATION AND CONCEPT VALIDATION

Business

What and **how** will we do it?

Concept validation

Is it the **right thing** to do?
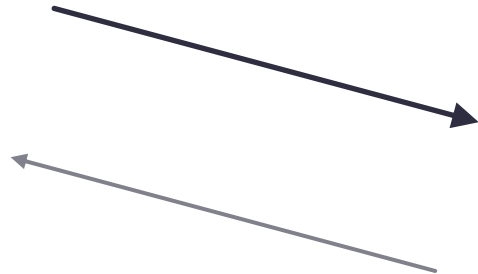
Stakeholder needs

*For **whom** do we do it?*

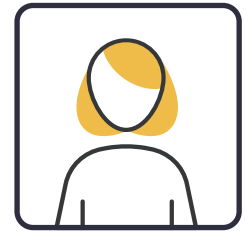# PRODUCT EXPLORATION AND CONCEPT VALIDATION
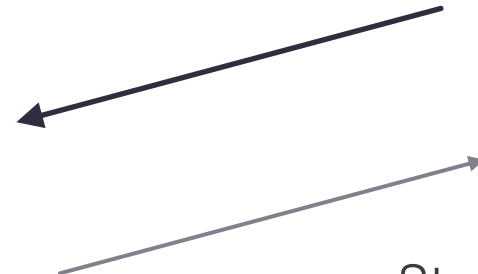
Business
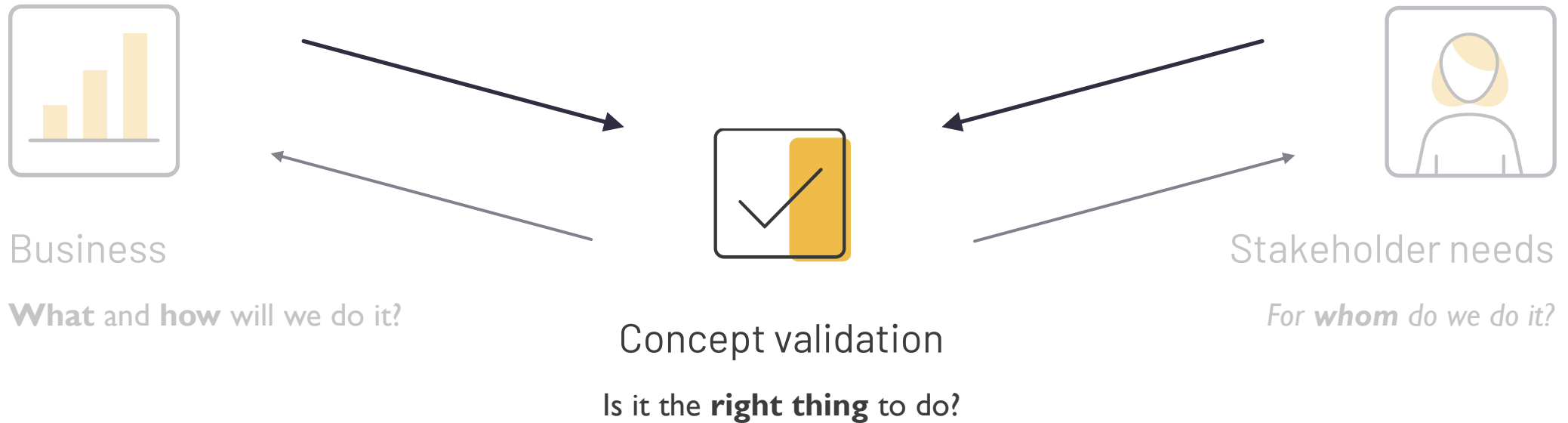
What and **how** will we do it?

Concept validation

Is it the **right thing** to do?

Stakeholder needs

*For **whom** do we do it?*

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LIFE CYCLE CONCEPTS

During this phase, we perform in-depth studies to evaluate multiple candidate concepts. The key objectives are to provide confidence that the business case is sound and the proposed solutions achievable.

Verify the feasibility of concepts, aid the understanding of stakeholder needs, explore architectural trade-offs and explore risks and opportunities.

Stakeholder needs

Stakeholder requirements

Business requirements

Life cycle concepts

System exploration

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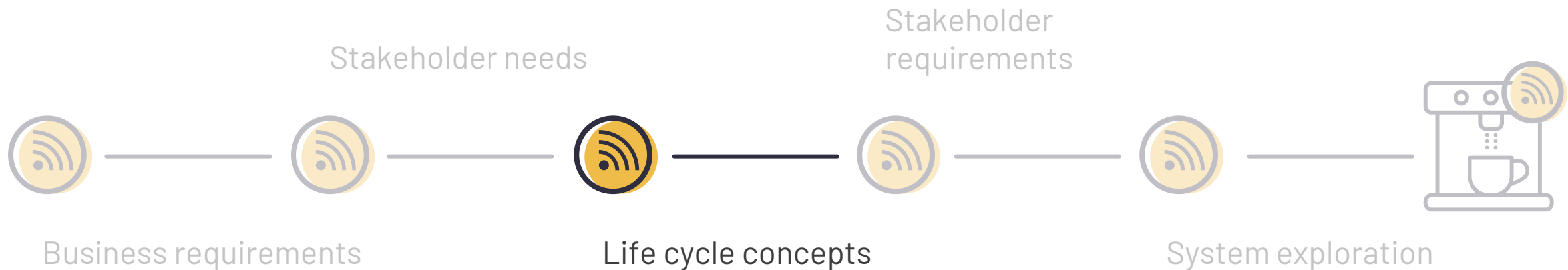
LIFE CYCLE CONCEPTS

Validate whether the concept is...

Desirable

Do people want it?

Feasible

Can we make it?

Viable

Can we earn money with it?

STAKEHOLDER NEEDS

SOLUTION SPACE

PROBLEM SPACE

DESIRABILITY
Stakeholder needs
& requirements

VIABILITY
Organization,
its business &
capabilities

Product & business
FEASIBILITY

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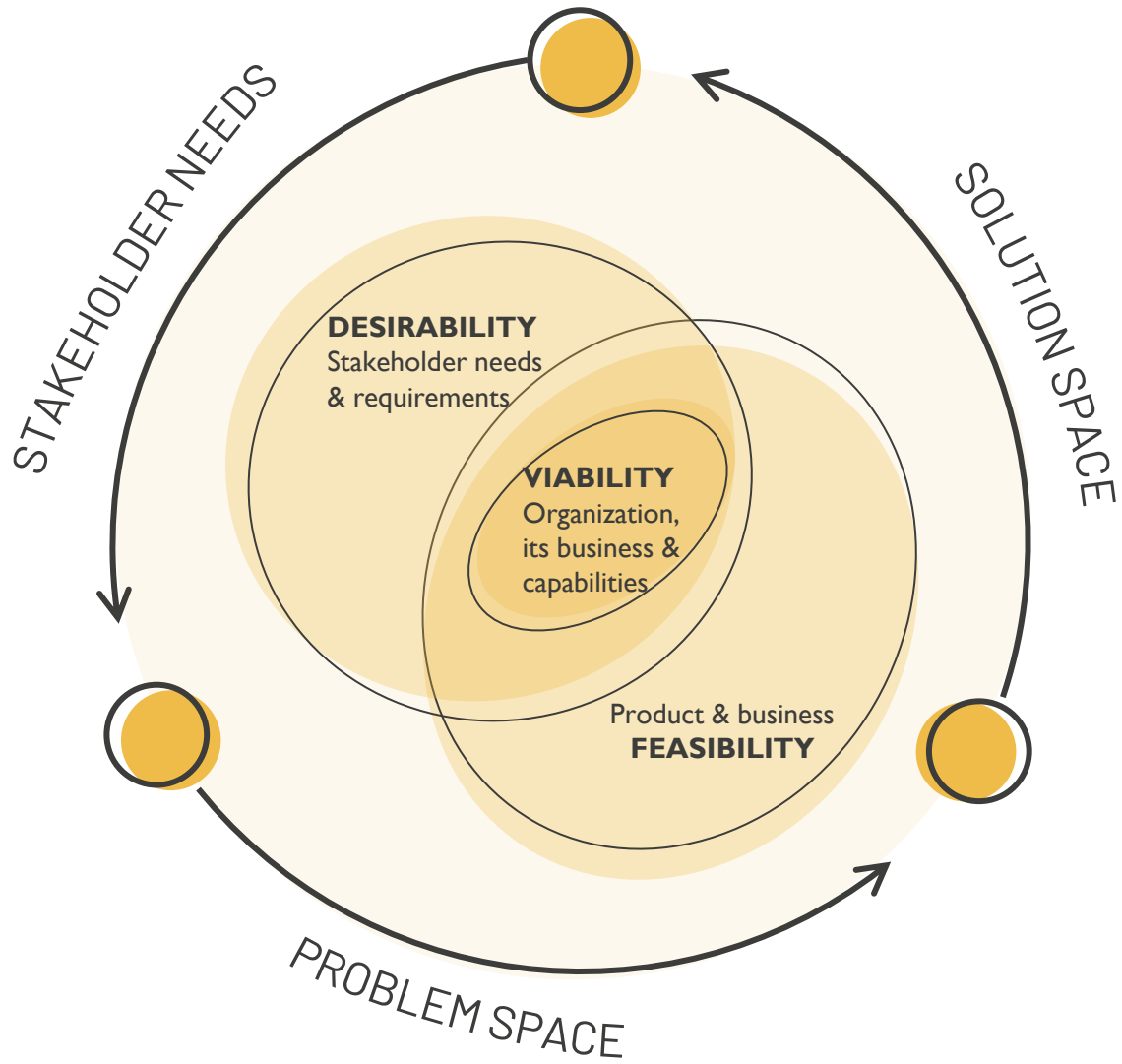
LIFE CYCLE CONCEPTS

Identifying risks

Concept
validation

Living Lab
validation sprint
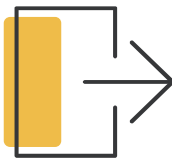
Business
modelling

Stakeholder needs

Stakeholder
requirements

Business requirements

Life cycle concepts

System exploration

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LIFE CYCLE CONCEPTS
IDENTIFYING RISKS

IDENTIFYING RISKS

Risk (or threats) are events that if they occur, can influence the ability of the project to succeed.
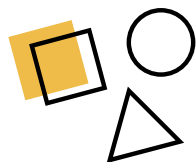
Identifying risks

Risks has 2 components:

| Likelihood | VS | Consequence |

Types of risk:

| Technical | Cost | Schedule | Programmatic |

Risk is inherently part of innovation.

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LIFE CYCLE CONCEPTS
IDENTIFYING RISKS

IDENTIFYING RISKS

Risk (or threats) are events that if they occur, can influence the ability of the project to succeed.

Identifying risks

How to treat risks

- Feasibility studies to establish evidence & explore alternatives

- Control the risk (e.g. by expending budget to reduce the consequence)

- Avoid the risk through change of requirements / redesign

   - Scrubbing (reduce requirement)

   - Selection of alternative option

   - Staffing

- Accept the risk

- Transfer risk to another party

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LIFE CYCLE CONCEPTS
## IDENTIFYING RISKS

IDENTIFYING RISKS

Risk (or threats) are events that if they occur, can influence the ability of the project to succeed.

TECHNIQUES

Identifying risks

Expert judgement / interviews	Identify risks in their area of exerptise and quantify these judgements to take appropiate action
Failure Mode and Effects Analysis	A process of reviewing as components to identify potential failure modes, their causes and effects.
Fault Tree Analysis	An exercise to examine the undesired states of a system and determine the event rates.
Monte Carlo simulation	A probabilistic simulation to model phenomena with significant uncertainty to determine the likelyhood of an event.
Root cause analysis	A process for identifying root causes of problems or events and an approach to respond to them
Delphi method	A request for information sent to project stakeholders anonymously to list their requirements

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LIFE CYCLE CONCEPTS
CONCEPT VALIDATION
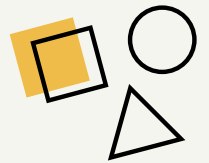
CONCEPT VALIDATION

(Low-cost) exploration, evaluation and validation techniques aimed at obtaining as much information (as needed / possible) to answer product concept risks / opportunities.

Concept
validation

During this step were are strictly concerned with exploring/validating technical, market and business aspects of the solution concepts.

We focus on aspects, technology or functional elements that are of key importance. The objective is to (rapidly) establish evidence that can support decision-making & requirement definition.

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LIFE CYCLE CONCEPTS
CONCEPT VALIDATION

CONCEPT VALIDATION

(Low-cost) exploration, evaluation and validation techniques aimed at obtaining as much information (as needed / possible) to answer product concept risks / opportunities.

Concept validation

ELECTRONICS

MATERIAL

PRODUCTION

LOOK & FEEL

APPLICATION

SERVICE

USER INTERFACE

DIMENSIONS

MECHANICS

REGULATORY

ENCLOSURE

INTEGRATIONS

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LIFE CYCLE CONCEPTS
CONCEPT VALIDATION

CONCEPT VALIDATION

(Low-cost) exploration, evaluation and validation techniques aimed at obtaining as much information (as needed / possible) to answer product concept risks / opportunities.

Concept validation

Triangle prototype classification model (Houde and Hill, 1997)

ROLE
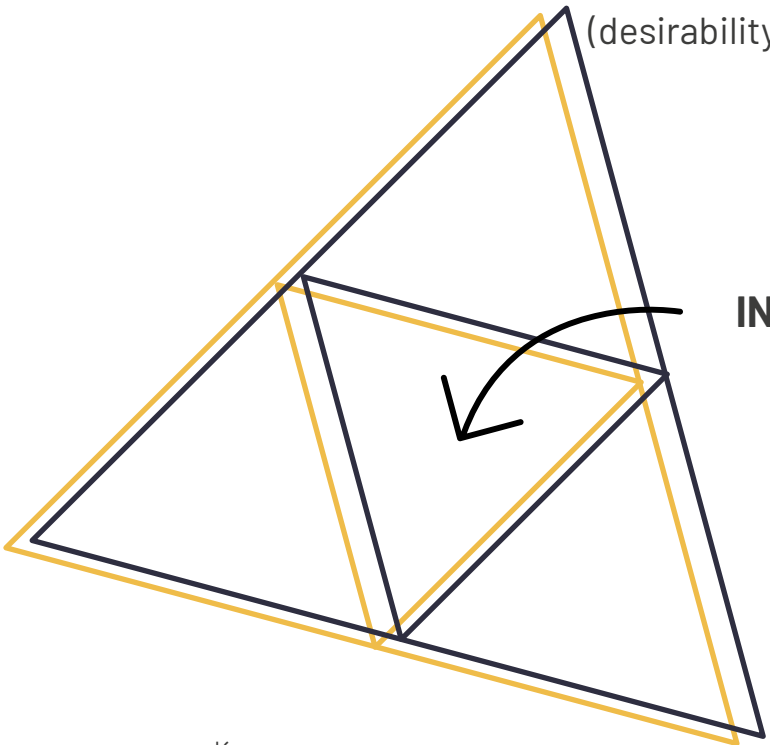Addresses how the solution concept will serve the user (desirability)

INTEGRATION

IMPLEMENTATION
How will the product actually be made to function (technical feasibility)
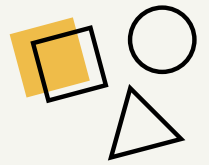
Explore form, interaction and usability.
LOOK & FEEL

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LIFE CYCLE CONCEPTS
CONCEPT VALIDATION

CONCEPT VALIDATION

(Low-cost) exploration, evaluation and validation techniques aimed at obtaining as much information (as needed / possible) to answer product concept risks / opportunities.

FIDELITY

Concept validation

Fidelity is the degree to which the made design resembles an imagined, manufactured product. .

IDEA	LOW FIDELITY	MEDIUM FIDELITY	HIGH FIDELITY	MANUFACTURED PRODUCT

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LIFE CYCLE CONCEPTS
CONCEPT VALIDATION

CONCEPT VALIDATION

(Low-cost) exploration, evaluation and validation techniques aimed at obtaining as much information (as needed / possible) to answer product concept risks / opportunities.
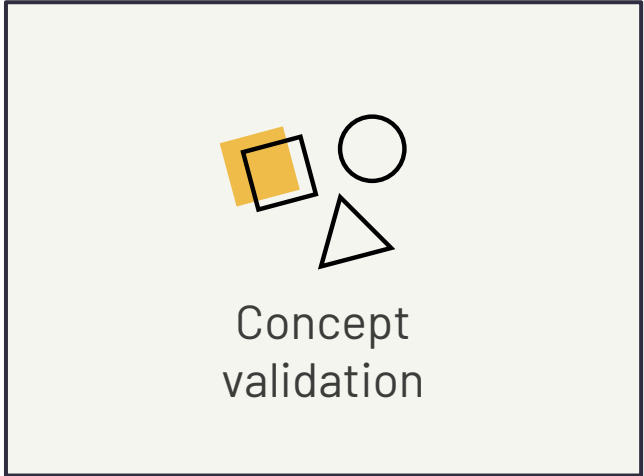
Concept validation

FORMULATE HYPOTHESIS

INSIGHTS BASED ON DATA

PRODUCT CONCEPT

DESIGN EXPERIMENTS

TEST & VALIDATE

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STAKEHOLDER NEEDS
LIFE CYCLE CONCEPTS

WHAT

Imec's innovation canvas that helps to gather and validate your most critical innovation assumptions.

Concept validation

Customer Segment
Needs
Current practices
Value proposition
Solution
Key Partners
Value Capture
Barriers

Reason from your most important stakeholder segments

Map your innovation's assumptions under each of the criteria

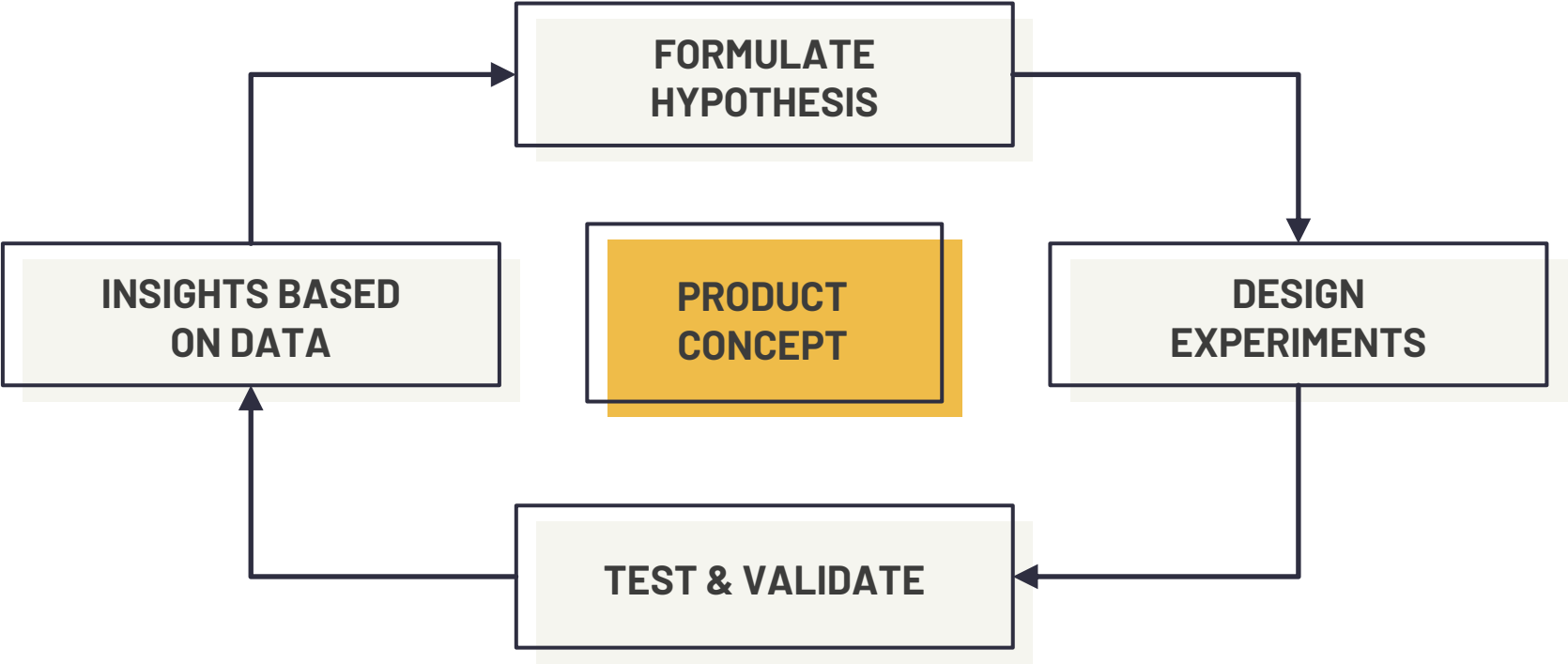**Identify** your critical assumptions and (in)validate them step by step

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LIFE CYCLE CONCEPTS
CONCEPT VALIDATION

CONCEPT VALIDATION

(Low-cost) exploration, evaluation and validation techniques aimed at obtaining as much information (as needed / possible) to answer product concept risks / opportunities.

TECHNIQUES: ROLE

Concept validation

Storyboarding	A visual activity that shows the user's interaction & experience with a product via sketches or stories
Observation	Learn how your solution is being used, by observing users without explanation
Service ads / Landingpage tests	Visuals of a service concept to investigate how users interpret them.
(Clickable) mockups	A design of a service or product that appear to be working used for demonstration.
Role play	Perform a hypothetical service experience using a physical set-up the service situation with the mock-ups and people
"Rapid prototype" Hardware	Test vehicles intended to validate specific stakeholder needs related questions

FIDELITY

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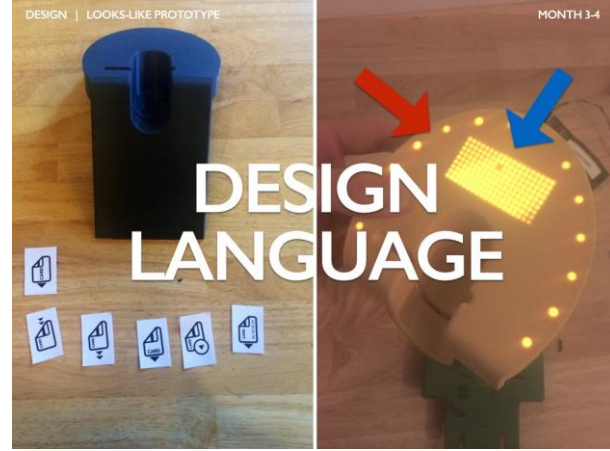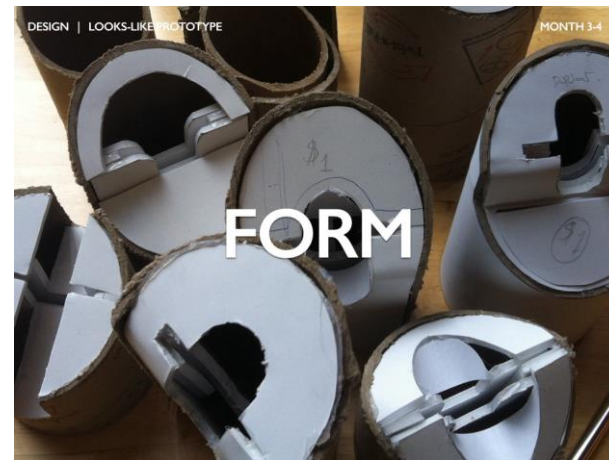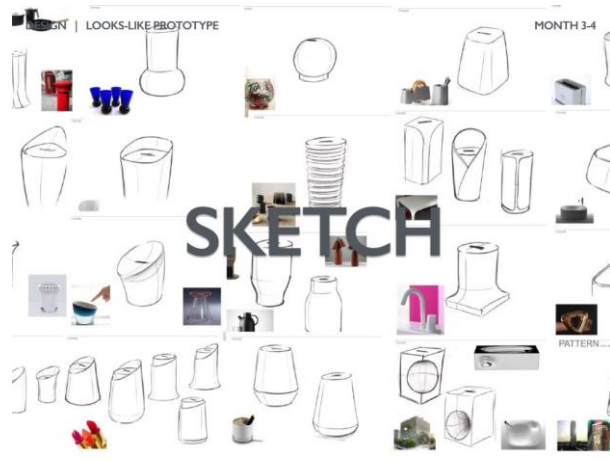
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LIFE CYCLE CONCEPTS
CONCEPT VALIDATION

CONCEPT VALIDATION

(Low-cost) exploration, evaluation and validation techniques aimed at obtaining as much information (as needed / possible) to answer product concept risks / opportunities.

TECHNIQUES: LOOK & FEEL

Concept validation

Sketches	Explorative visualizations or representations of the product or service via drawings.
Physical Mockups	Prototypes made from cheap, lightweight materials such as lego, foam, cardboard, wood, tape, .
Paper prototyping	Sketched representations of the user interface typically used to test and validate usability / ux
Desktop walkthrough / Wireframes	Low fidelity representations of the service or digital interface
Computer based 3D model / (clickable) mockups	A digital representation of the product / application's look & feel
Rapid prototyping hardware	Additive and subtractive manufacturing techniques to create a physical model of the product

FIDELITY

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APP/WEB

SKETCH

FORM

SIZE

UX

DESIGN LANGUAGE

CMF

FINAL RENDERS

SW/WEB MOCKUPS

PACKAGING

FINAL LOOKS-LIKE PROTOTYPE

LIFE CYCLE CONCEPTS
CONCEPT VALIDATION

CONCEPT VALIDATION

(Low-cost) exploration, evaluation and validation techniques aimed at obtaining as much information (as needed / possible) to answer product concept risks / opportunities.

TECHNIQUES: IMPLEMENTATION

Concept validation

Technique	Description
Development kits	Reusable, easy to use development boards (Arduino, Raspberry Pi, ..) to create functional prototypes
Off-the-shelf software & components	Create and develop functional prototypes by using and integrating COTS software & hardware such as open-source libraries, sensors, breadboards, …
3D printed mechanical parts	Use rapid prototyping techniques to iterate on the mechanical design (material, finishing, mechanics, ...)
Low code / no code development	Create application software through graphical user interfaces and configuration (rather than code)
Simulations	Calculate key parameters that are not observable or easily tested (e.g.strains mechanical structures)
Customized HW / SW	Custom designed PBA, mechanics, firmware or core-software.

FIDELITY

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CORE FUNCTION

COMPONENTS

PCB

METAL

PLASTICS

FEEL

ASSEMBLY

# $5 FINAL WORKS-LIKE PROTOTYPE

LIFE CYCLE CONCEPTS
CONCEPT VALIDATION

CONCEPT VALIDATION

(Low-cost) exploration, evaluation and validation techniques aimed at obtaining as much information (as needed / possible) to answer product concept risks / opportunities.

TECHNIQUES: TESTING

Concept validation

Experiments / Field testing	Validation of certain product concept aspects in a controlled / in-situ environment
Wizard of Oz	A method where participants interact with a system that they believe to be autonomous, but in reality, is controlled by an invisible human operator
Living Labs	A systematic user involvement approach in research and development (exploration, co-creation, testing).
Usability / UX testing	Evaluate the ease of use of a (digital) product by testing it on users
A/B testing	A randomized controlled experiment, in which two samples of a single variable are compared
Simulations	Calculate key parameters that are not observable or easily tested (e.g.strains mechanical structures)

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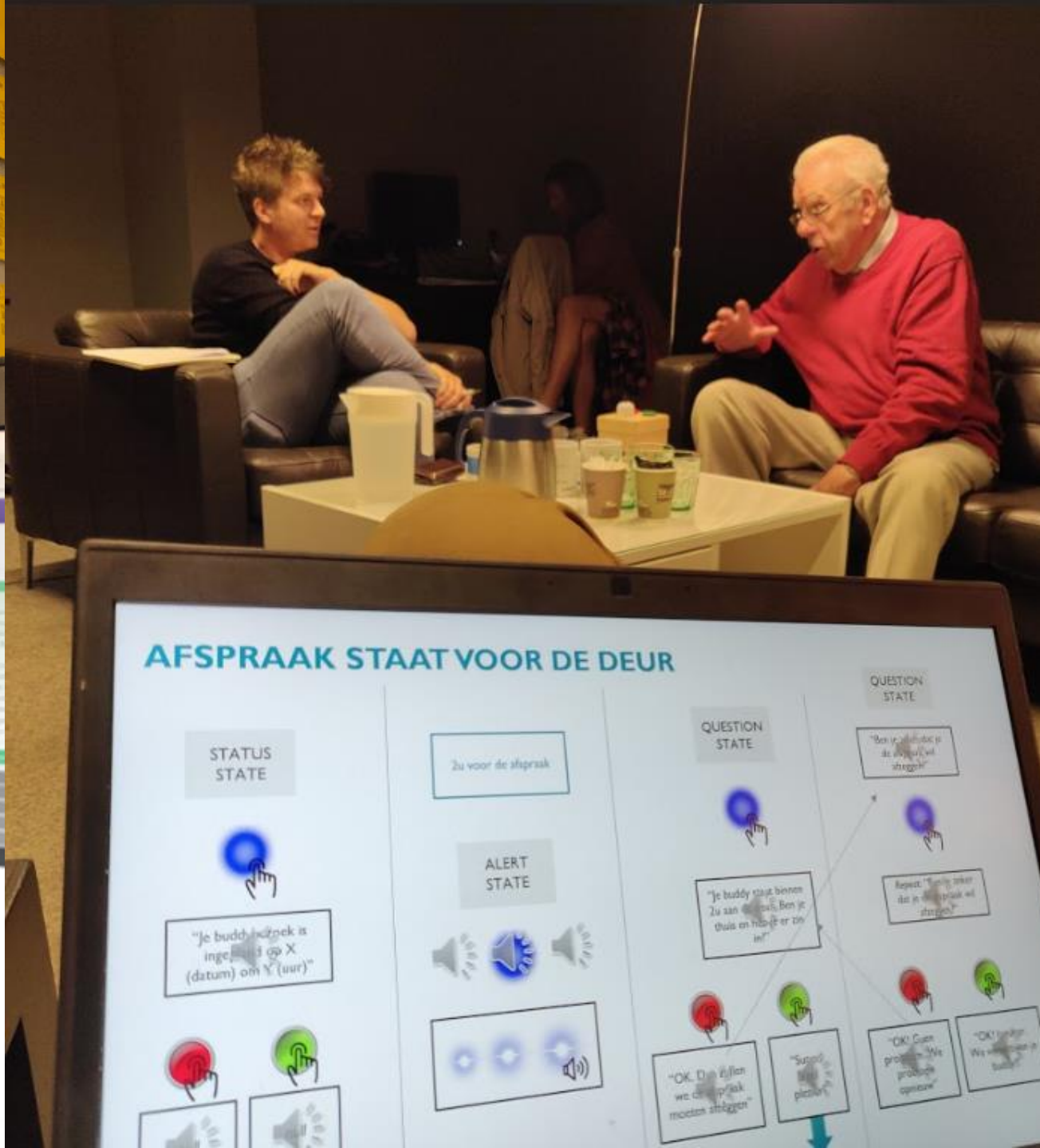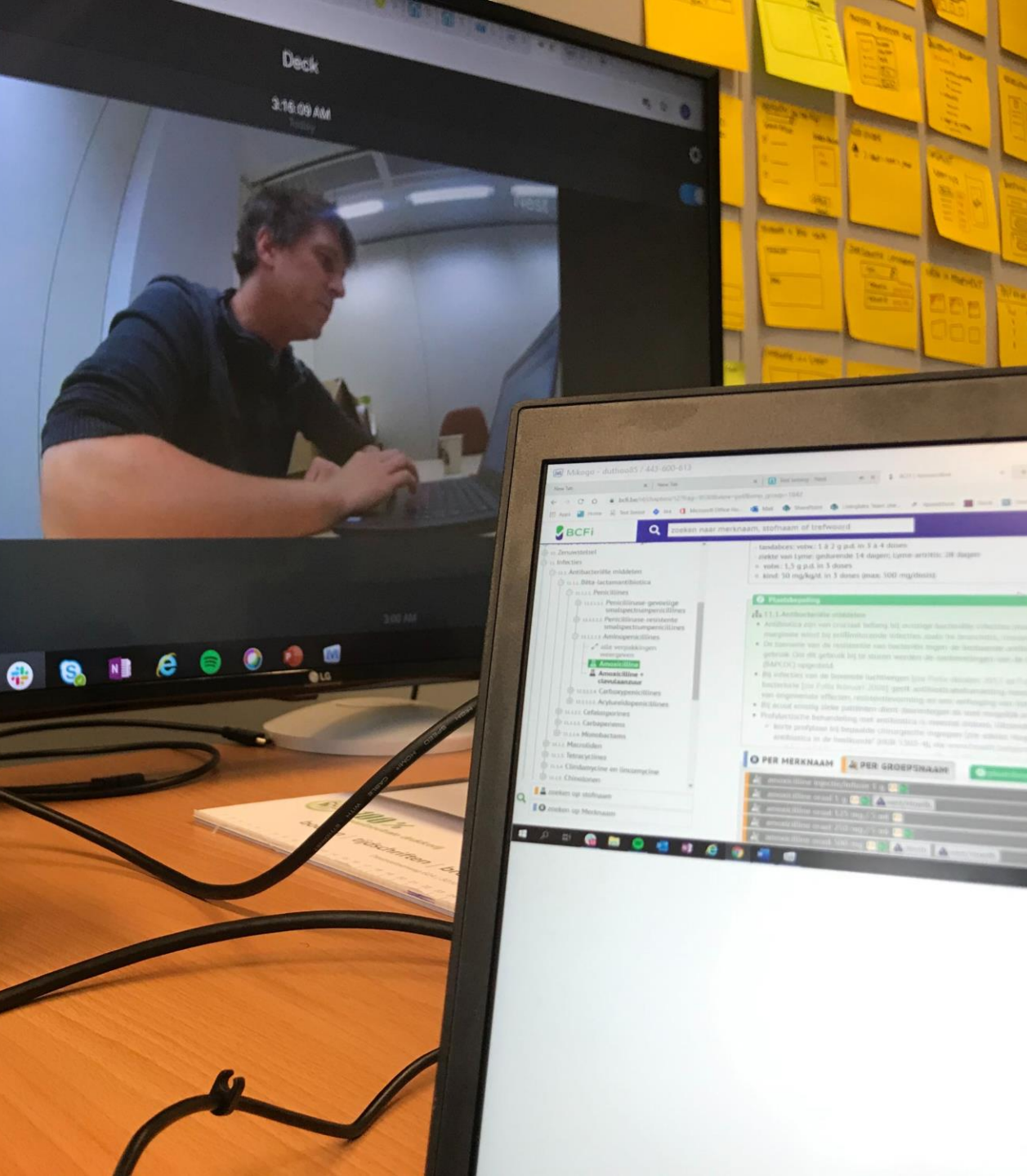
AFSPRAAK STAAT VOOR DE DEUR

STATUS STATE

QUESTION STATE

QUESTION STATE

2u voor de afspraak

ALERT STATE

"Ben je definitief of de afspraak wil afzeggen?"

"je buddy bezoek is ingepland op X (datum) om Y (uur)"

"Je buddy staat binnen 2u aan de deur. Ben je thuis en hoe of er zin in?"

Repeat "Ben je zeker dat in afspraak wil afzeggen"

"OK. Dan zullen we de afspraak moeten afzeggen"

"Super! Prettig!"

"OK! Dan programmeren we een andere afspraak opnieuw"

"OK! Wij zullen We afspraak opnieuw maken"
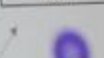
LIFE CYCLE CONCEPTS
LIVING LAB VALIDATION SPRINT

LIVING LAB VALIDATION SPRINT

A co-creation process in which a design challenge is explored and validated in a living lab, involving all relevant stakeholders.

Living Lab validation sprint

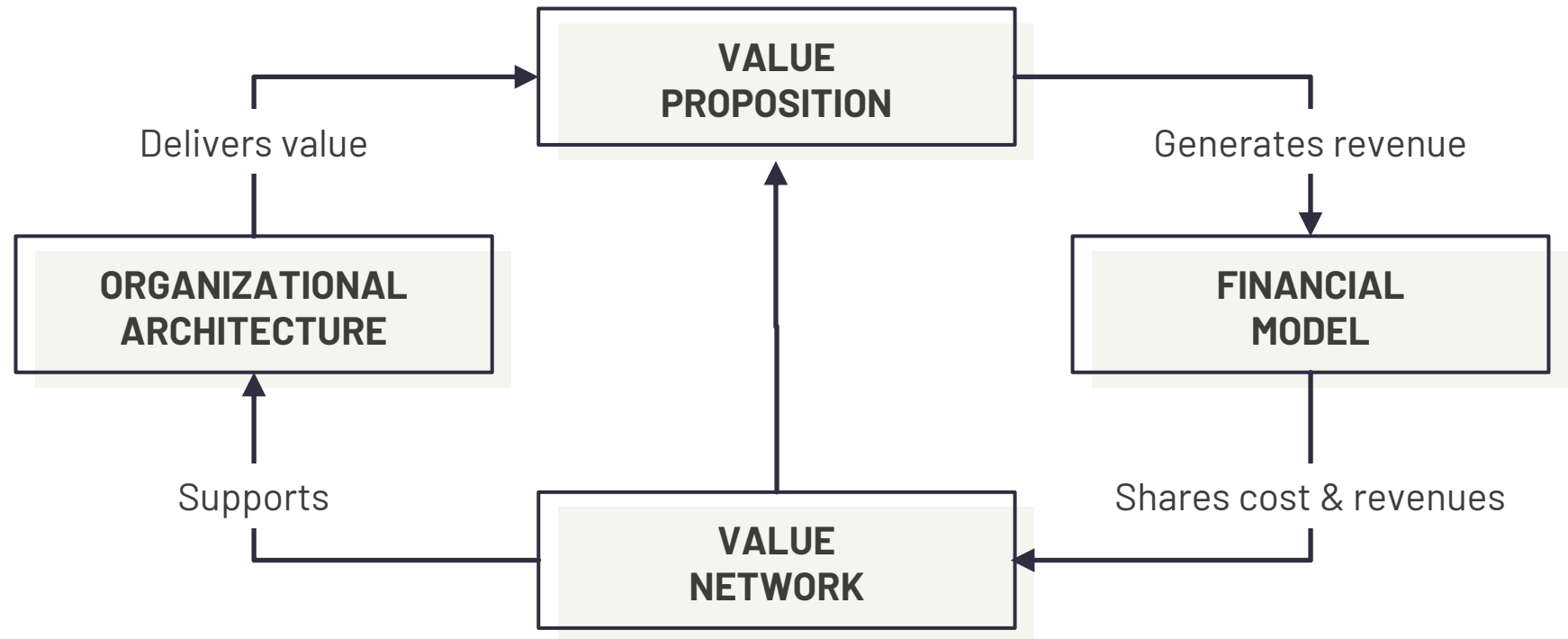| FOCUS	ANALYZE	CO-CREATE	PROTOTYPE & TEST	STUDY & LEARN
What problem do we focus on? Formulate the hypothesis. Who are the stakeholders & users?	How is this problem solved today? What technology is available? What design constrains are there?	Which examples can inspire? What should the solution look like?	Can we simulate / prototype the solution? Test with real users and/or in a real environment?	What have we learned? What are the next steps?
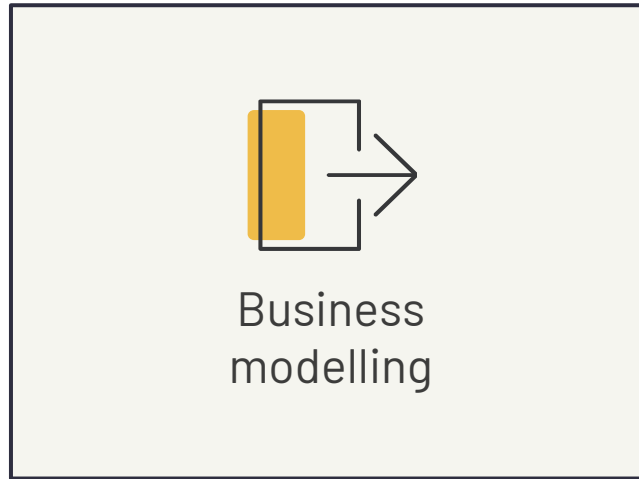
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LIFE CYCLE CONCEPTS
BUSINESS MODELLING

BUSINESS MODELLING

Define what you will offer, to whom and why and how to organise yourself to do this in a financially viable manner.

Business modelling

VALUE PROPOSITION

Delivers value

Generates revenue

ORGANIZATIONAL ARCHITECTURE

FINANCIAL MODEL

Supports

VALUE NETWORK

Shares cost & revenues
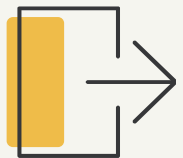
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LIFE CYCLE CONCEPTS
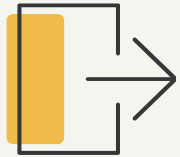## BUSINESS MODELLING

BUSINESS MODELLING

Define what you will offer, to whom and why and how to organise yourself to do this in a financially viable manner.

TECHNIQUES: FRAMEWORKS

Business modelling

Business Model Canvas	A framework used for developing new business models and documenting existing ones
Innovatrix	Imec's innovation canvas that helps to gather and validate your most critical innovation assumptions.
Value proposition canvas	A framework thats helps ensure that a product or service is positioned around the customer
Lean Canvas	A business modeling tool to deconstruct a business idea into its key and most risky assumptions.
Validation Board	A framework that gathers and validates assumptions around customer, problem and solution.
Customer Journey	A visual representation of the journey a customer takes when interacting with your product / service

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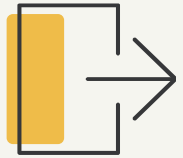# LIFE CYCLE CONCEPTS
BUSINESS MODELLING

BUSINESS MODELLING

Define what you will offer, to whom and why and how to organise yourself to do this in a financially viable manner.

TECHNIQUES: MARKET

Business modelling

TAM SAM SOM	Use the TAM, SAM, SOM principle to estimate the market size
Desk research	Use online search engines to find (historic, macro-economic) data on market size
Own sales	Use data from earlier selling efforts to estimate market size
Surveys	Create questionaires to deduct willingness to pay for a certain product to estimate the market size.
Market segmentation	Divide customers into groups that share similar characteristics to relate (better) to each segment.

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LIFE CYCLE CONCEPTS
BUSINESS MODELLING

BUSINESS MODELLING

Define what you will offer, to whom and why and how to organise yourself to do this in a financially viable manner.

TECHNIQUES: MARKET SIZE

Business modelling

Total Addressable Market

Total Market for your product

Serviceable Obtainable Market

Percentage of SAM you can realistically capture

Serviceable Available Market

Portion of the market you can acquire based on your business model / targets

TAM

SAM

SOM

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LIFE CYCLE CONCEPTS
BUSINESS MODELLING

BUSINESS MODELLING

Define what you will offer, to whom and why and how to organise yourself to do this in a financially viable manner.
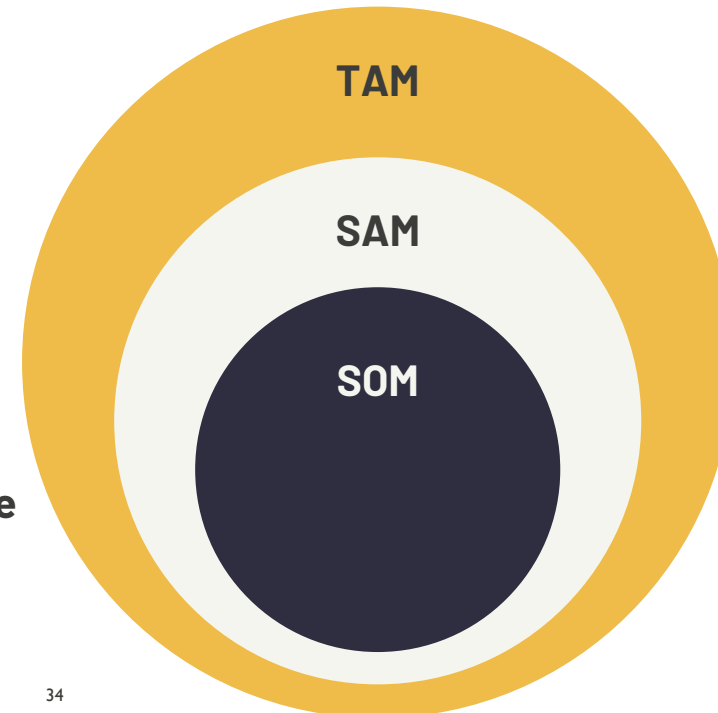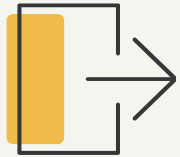
TECHNIQUES: VALUE PROPOSITION

Business modelling

Value proposition canvas	A framework thats helps ensure that a product or service is positioned around the customer
Landingpage tests	Experiment with different landingpages to test which message connects best with the customer
Infographics	Create an infographic to visualize your value proposition and do story telling
Competitive Analysis	Position your value proposition to that of your competitors
Value propositon builder	A framework to create a value proposition based on 6 customer-centric elements

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LIFE CYCLE CONCEPTS
BUSINESS MODELLING

Business modelling

BUSINESS MODELLING

Define what you will offer, to whom and why and how to organise yourself to do this in a financially viable manner.

TECHNIQUES: VALUE PROPOSITION

The elements of value (Bain & Company)

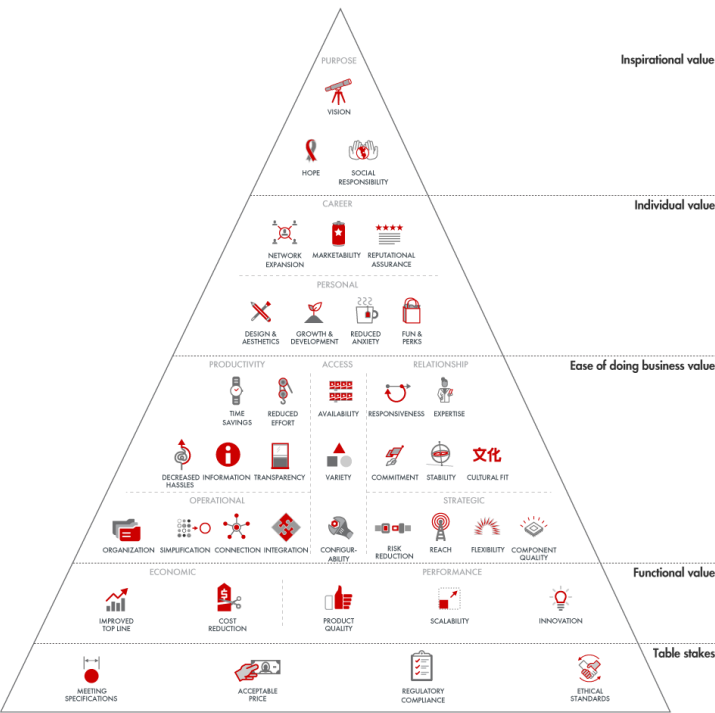B2C
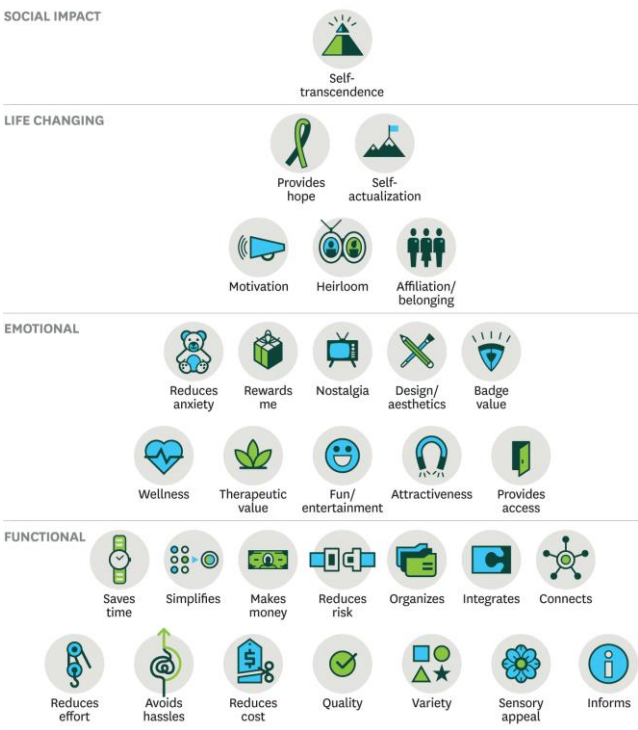

B2B

LIFE CYCLE CONCEPTS
BUSINESS MODELLING

BUSINESS MODELLING

Define what you will offer, to whom and why and how to organise yourself to do this in a financially viable manner.

BUSINESS MODELS

Business modelling

- Product sales
- Software sales
- Service sales
- X-As-A-Service
- Licensing
- Leasing/Renting
- Franchising

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LIFE CYCLE CONCEPTS
BUSINESS MODELLING

BUSINESS MODELLING

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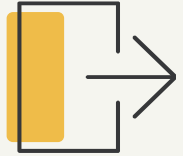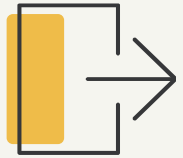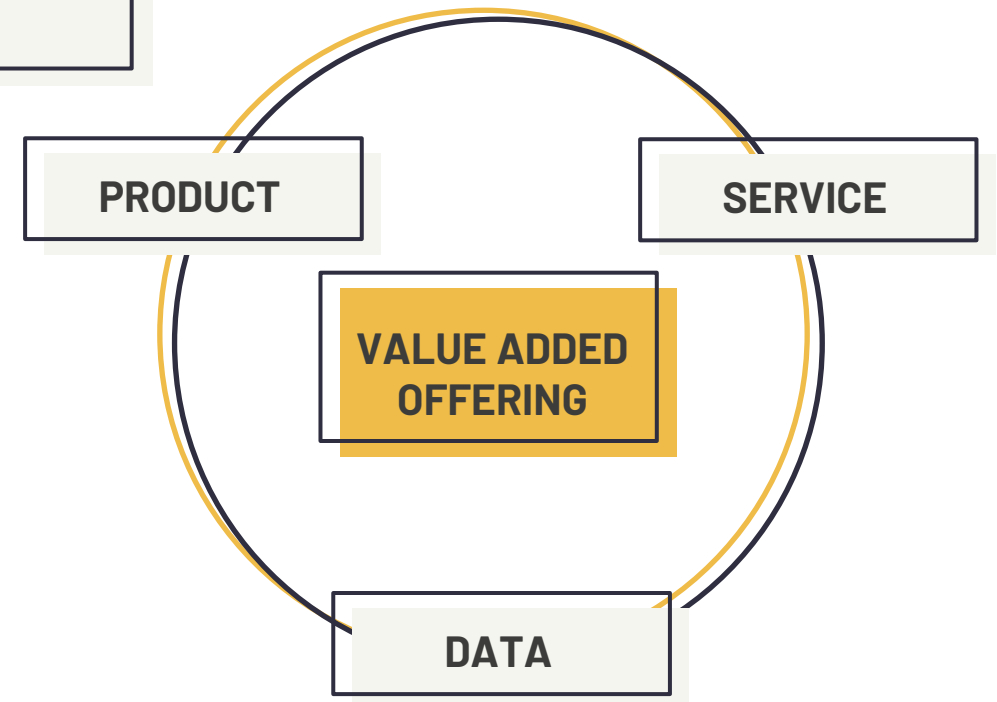
REVENUE MODELS

Business modelling

- One off sales
- Pay per use
- Subscription
- Freemium
- Hidden revenue
- Razor & Blade

PRODUCT

SERVICE

VALUE ADDED OFFERING

DATA

STAKEHOLDER REQUIREMENTS

Requirements should provide a complete description of the key features your product or service should have and that are feasible to develop.

The objective is to describe out what **must happen** to meet the need. It's an abstraction exercise from a user / business / contextual need or to a requirement for the system.

Stakeholder needs

Stakeholder requirements

Business requirements

Life cycle concepts

System exploration

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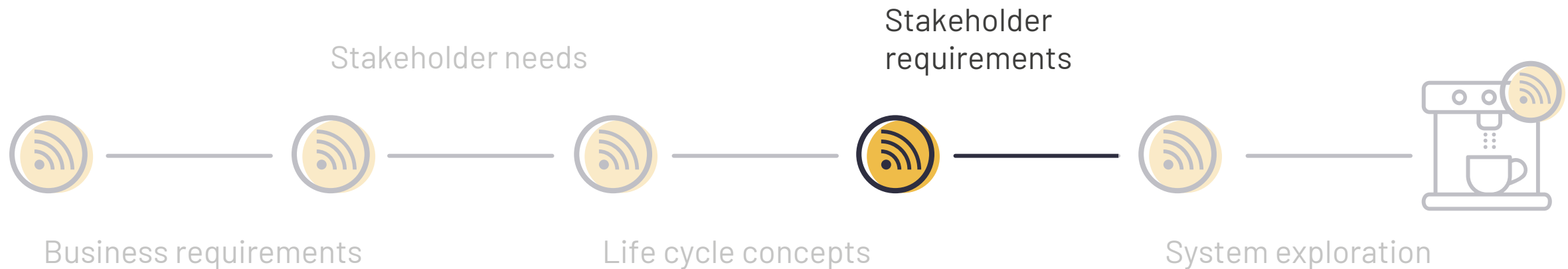
LIFE CYCLE CONCEPTS
STAKEHOLDER REQUIREMENTS

STAKEHOLDER REQUIREMENTS

Product requirements represent the characteristics your solution must meet to be successful in order to address a need expressed by the stakeholders.

Stakeholder requirements

It's an iterative and balancing effort that works both top-down as bottom-up.

- Standards

- Utilization environment (e.g. water/dust proof, heat, safety, …)

- Design considerations (e.g. user experience, safety, integration, environmental impact, …)

- Design constraints (e.g. weight, form, resources, …)

ALLOCATE TO DESIGN CATEGORIES

Deriviation

Decomposition

REQUIREMENTS

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STAKEHOLDER REQUIREMENTS
TRANSLATING NEEDS

STAKEHOLDER REQUIREMENTS

Product requirements represent the characteristics your solution must meet to be successful in order to address a need expressed by the stakeholders.

Stakeholder requirements

NECESSARY	CONFORMING	ACHIEVABLE
IMPLEMENTATION INDEPENDENT	REQUIREMENTS	SINGULAR
COMPLETE	VERIFIABLE	UNAMBIGUOUS

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STAKEHOLDER REQUIREMENTS
TRANSLATING NEEDS

STAKEHOLDER REQUIREMENTS

Product requirements represent the characteristics your solution must meet to be successful in order to address a need expressed by the stakeholders.

Stakeholder requirements

Example expressed need: "device should be handheld"

- Physical characteristcs
  - Weight & dimension constraints
  - Ergonomics & human factors
  - Durability & reliability
- Battery operated
  - Power supply & battery life
  - Charging ports
- Device functionality
- Etc...

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STAKEHOLDER REQUIREMENTS
TRANSLATING NEEDS

Stakeholder requirements

STAKEHOLDER REQUIREMENTS

Product requirements represent the characteristics your solution must meet to be successful in order to address a need expressed by the stakeholders.

TECHNIQUES

User Story Mapping	A visual exercise to identify and prioritize characteristcs and features a product must have
Benchmarking	Compare requirements to those of comparable organizations or products
Delphi Method	A request for information sent to project stakeholders anonymously to list their requirements

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STAKEHOLDER REQUIREMENTS
TRANSLATING NEEDS

Stakeholder requirements

STAKEHOLDER REQUIREMENTS

Product requirements represent the characteristics your solution must meet to be successful in order to address a need expressed by the stakeholders.

USER STORY MAPPING

User Story Mapping employs a concept of user stories, that communicate the requirement in a format that captures the value for its (end) user.

AS A **[TYPE OF USER],** I WANT TO **[ACTION]** SO THAT **[BENEFIT]**

By visually mapping out these user stories, product teams tell the story of the customer journey and break it into parts. This helps them design and build functionality that is focused on desired customer outcomes.

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STAKEHOLDER REQUIREMENTS
TRANSLATING NEEDS

STAKEHOLDER REQUIREMENTS

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USER STORY MAPPING

Stakeholder requirements

Story mapping consists of ordering user stories along two dimensions.

User Journey (activities & tasks)

User stories

The map arranges the user's activities along the horizontal axis, visualizing the behavior of either the user or the system (often chronologically). Along the vertical axis, the stories represent increased sophistication and detail.

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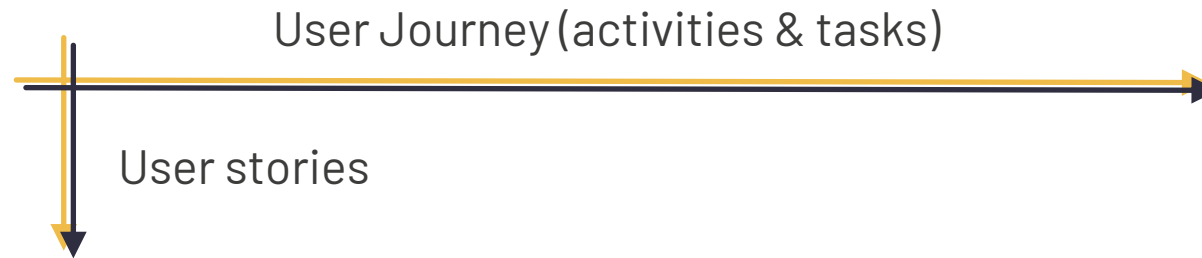# STAKEHOLDER REQUIREMENTS
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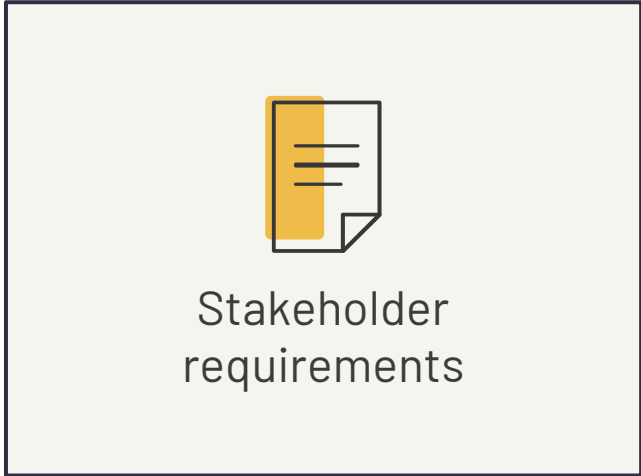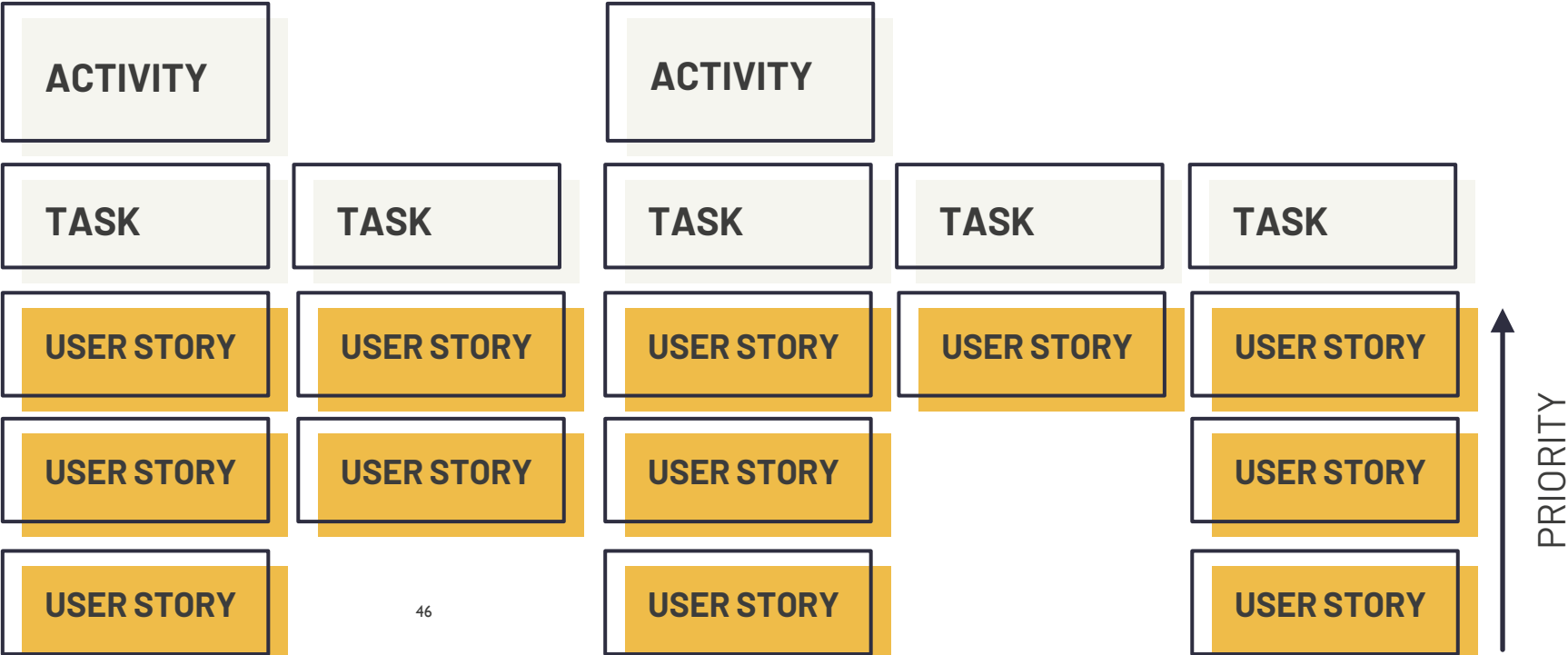
USER STORY MAPPING

ACTIVITY		ACTIVITY		
TASK	TASK	TASK	TASK	TASK
USER STORY	USER STORY	USER STORY	USER STORY	USER STORY
USER STORY	USER STORY	USER STORY		USER STORY
USER STORY		USER STORY		USER STORY

PRIORITY

SYSTEM EXPLORATION

The goal of this phase is to explore, assess and validate various options that can meet the requirements.

- Enabling systems & competences necessary
- Technologies & system elements assessment
- Preliminary system concepts (incl. architectural concepts)

Stakeholder needs

Stakeholder requirements

Business requirements

Life cycle concepts

System exploration

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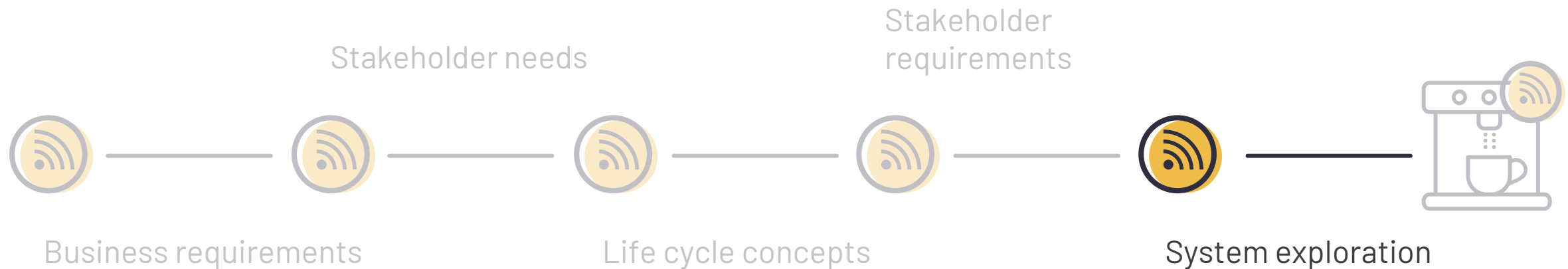
IMPLEMENTATION – INDUSTRIEPARTNERSCHAP

ORIENTATION
2 DAYS

Exploring problem / opportunity space regarding integration of a (smart) technological component in your company's offer or business processes

70 % subsidized
981 € excl. VAT

CONCEPT VALIDATION
3 DAYS

Validation of the solution space: build a roadmap for your innovation track with referral to potential partners and requirements for validating the concept.

70 % subsidized
1.612 € excl. VAT

IMPLEMENTATION – CONTACT US

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