Product Service System

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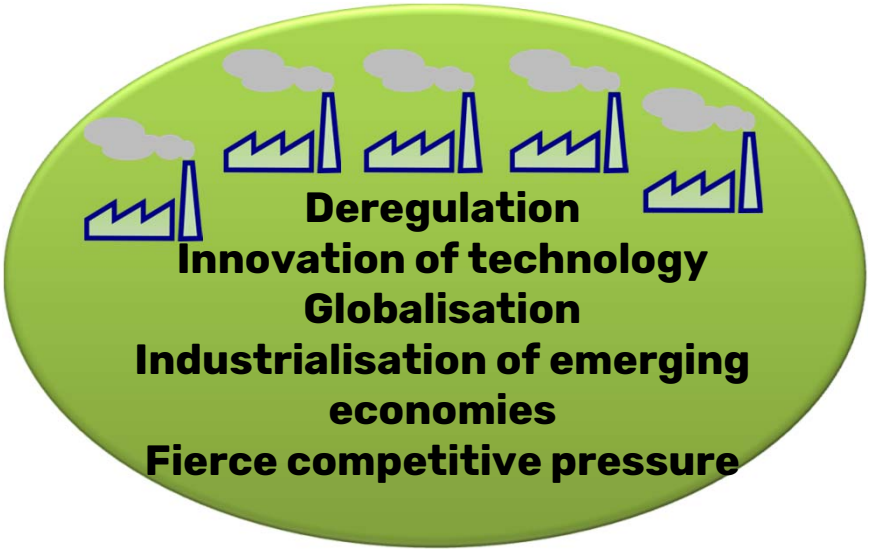
University of Bergamo

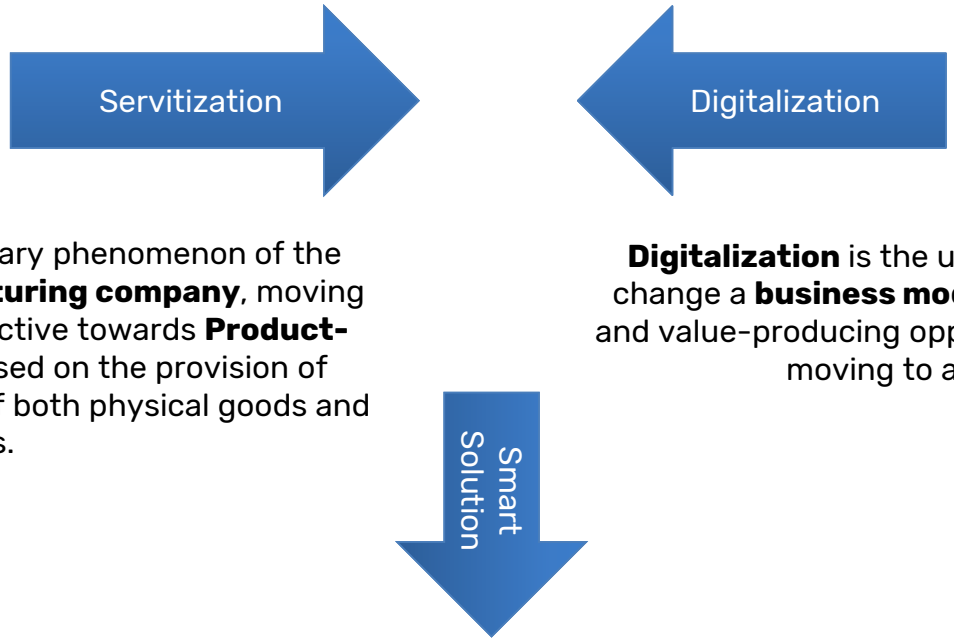
The new manufacturing context



…they have to move beyond manufacturing and offer services and solutions, delivered through their products.

To survive manufacturing firms can rarely remain as pure manufacturing firms …

Trends



Servitization is the evolutionary phenomenon of the **business model** of a **manufacturing company**, moving from a product-centric perspective towards **Product-Service Systems** (PSSs), based on the provision of integrated bundles consisting of both physical goods and services.

Digitalization is the use of digital technologies to change a **business model** and provide new revenue and value-producing opportunities; it is the process of moving to a digital business.

Smart products extend cyber-physical systems (CPS) with internet-based services, which use product-related data that are collected during the use of the product. Through these smart services, they enable customer-specific adaptations and updates of products in the field [Abramovici. 2014].

The servitization phenomenon

Video

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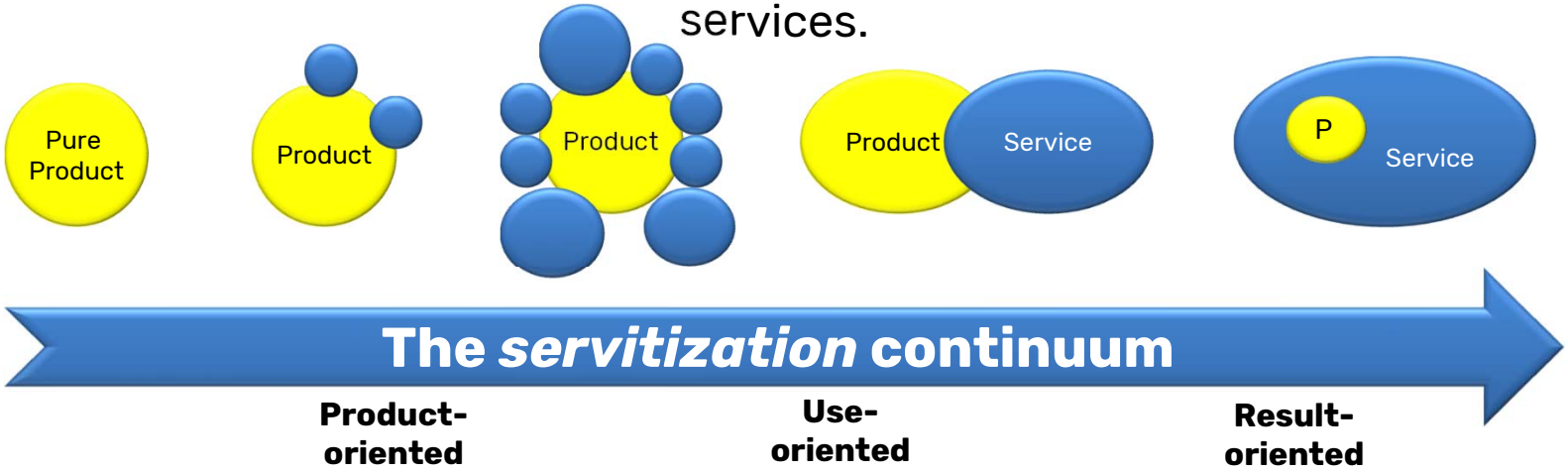


Vandermerwe, S. and Rada, J. (1988). Servitization of business: Adding value by adding services. *European Management Journal*, 6 (4), 314-324.

PRODUCT SERVICE SYSTEM (PSS)

Value based on combination of product and service

Product-based value

Pure Product

Product sale

The ownership of the product changes

Product Oriented

Product related service

Selling a product combined with a product related service (example: maintenance contract).

Product related advice.

Selling a product with a use related service (example: eco-driving course).

Use Oriented

Product lease

Exclusive use of a product without being the owner.

Product sharing/renting

Non exclusive use of a product. Consumer is owner (sharing) or provider is owner (renting).

Product Pooling

The product is simutaneously used.

Pay-per-service unit

The user pays for the output of the product according to the use level.

Result Oriented

Outsourcing

A third party owns the product and provides a product related service.

Functional result

A service provider delivers a specific result. The type of product is secondary.

Service based value

Pure Service

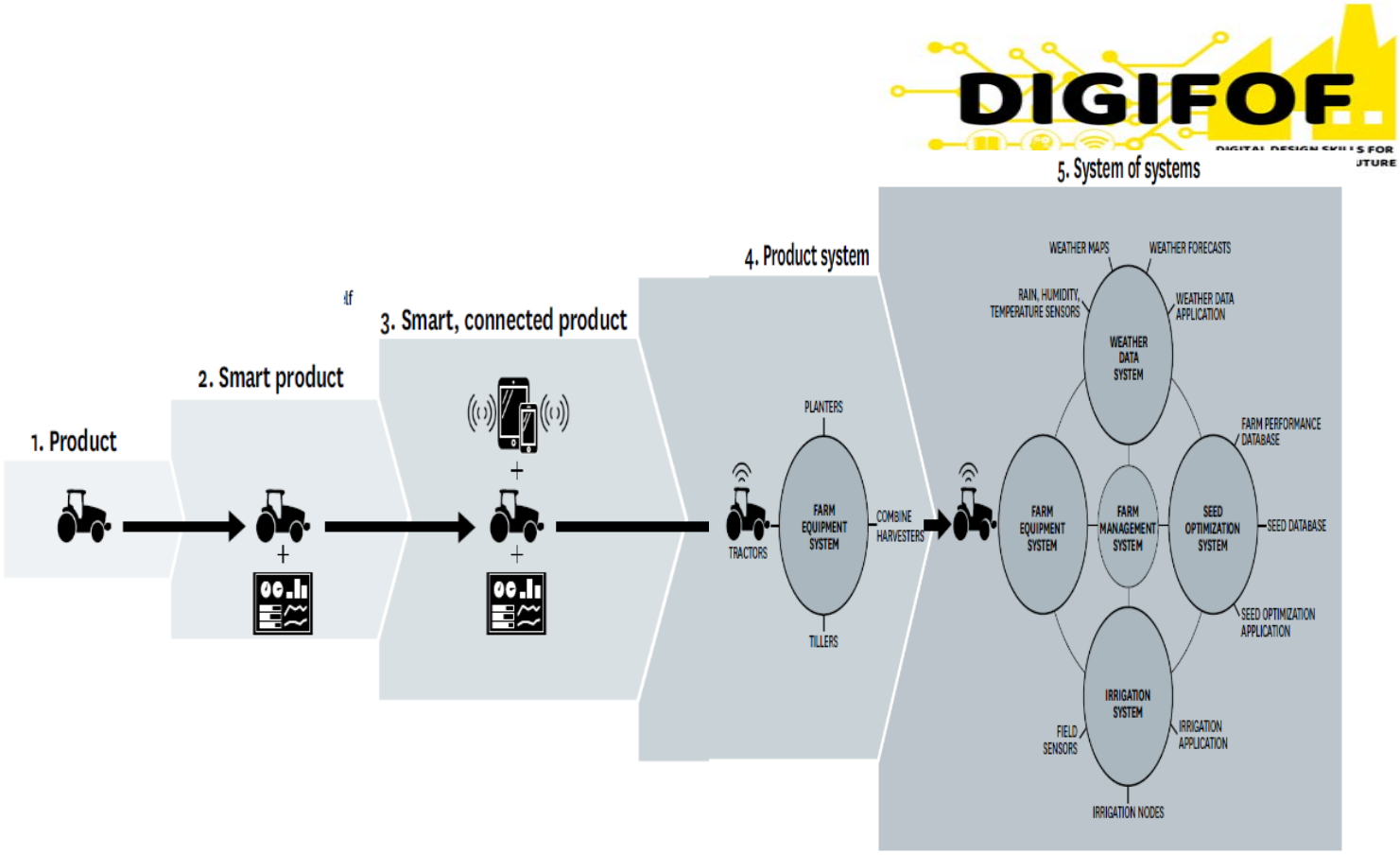
Service providing

An activity is provided without the use of any product. For example: teleportation.

Product Performance — employ distinguishing features and functionality

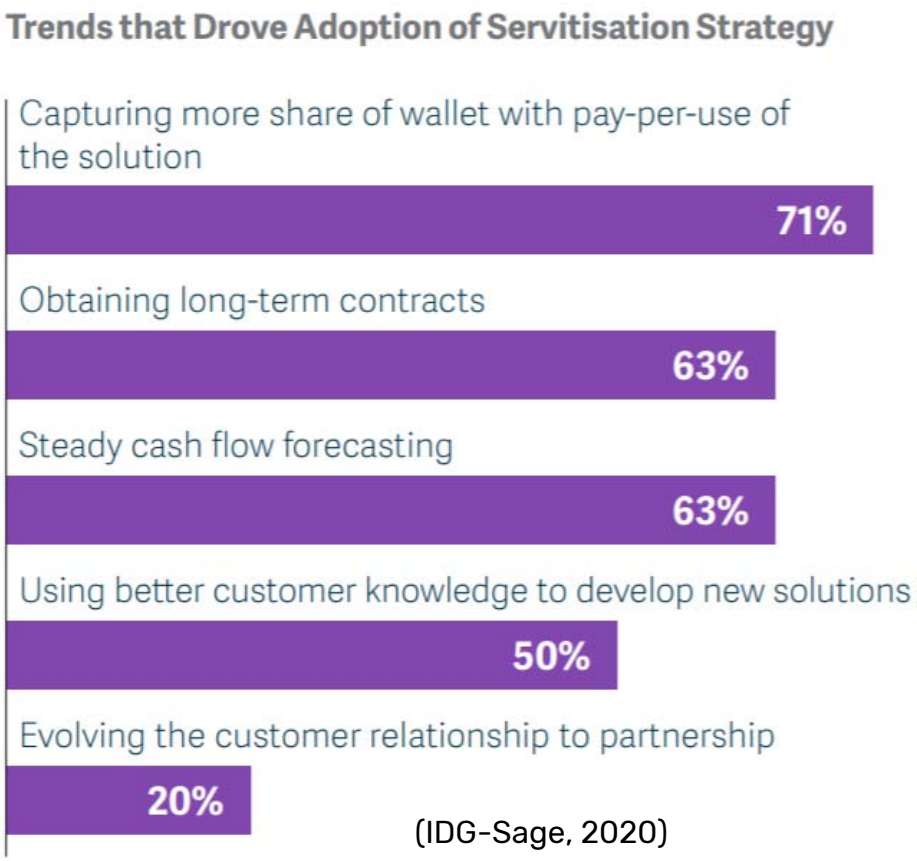
Service — support and enhance the value of your offerings

Trends



Source: Porter & Happelman (HBR – 2014)

Stervitization Strategy



(IDG-Sage, 2020)

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Think about possibile PSS

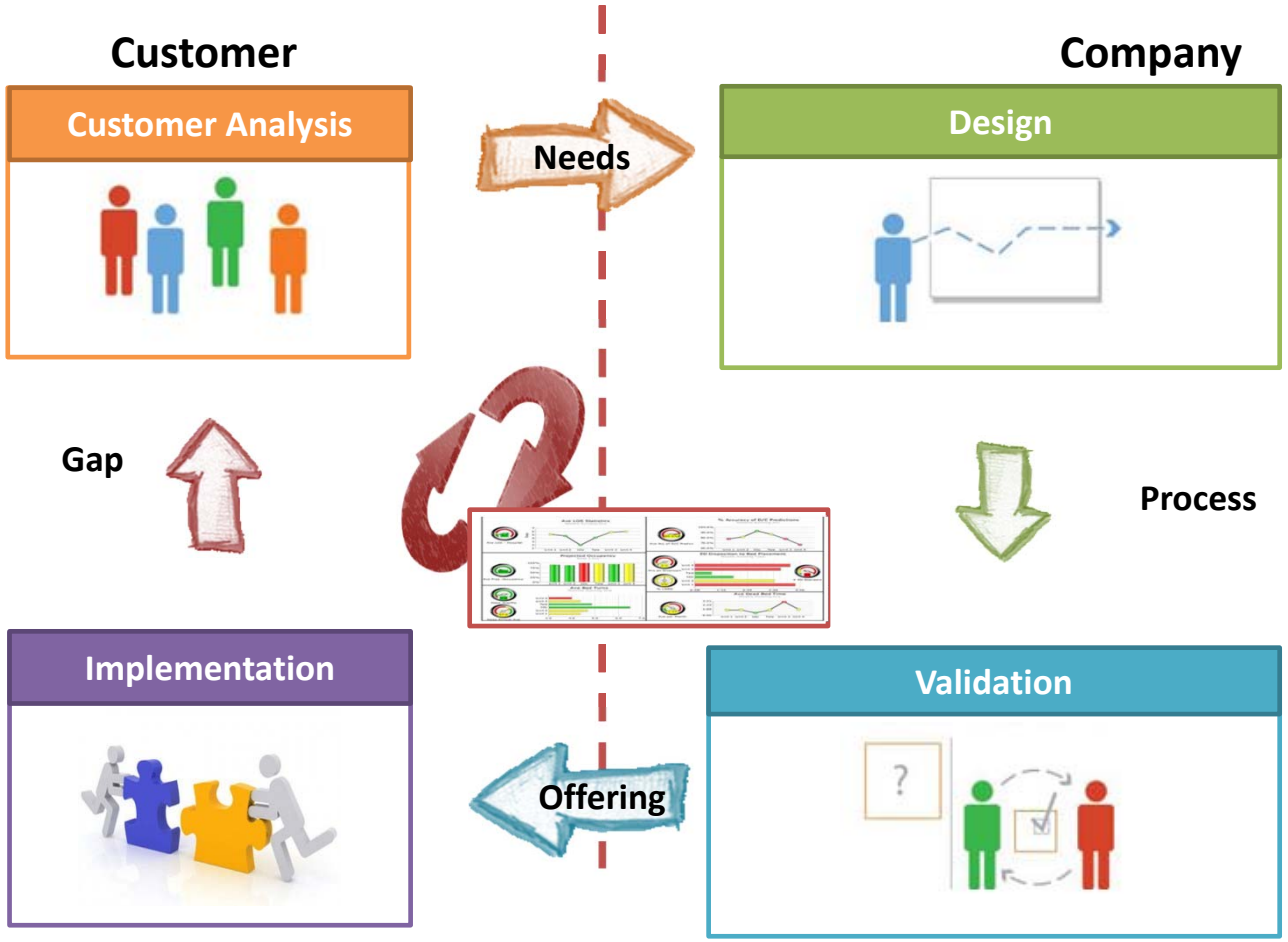
Industrial Automation

Medical Equipment

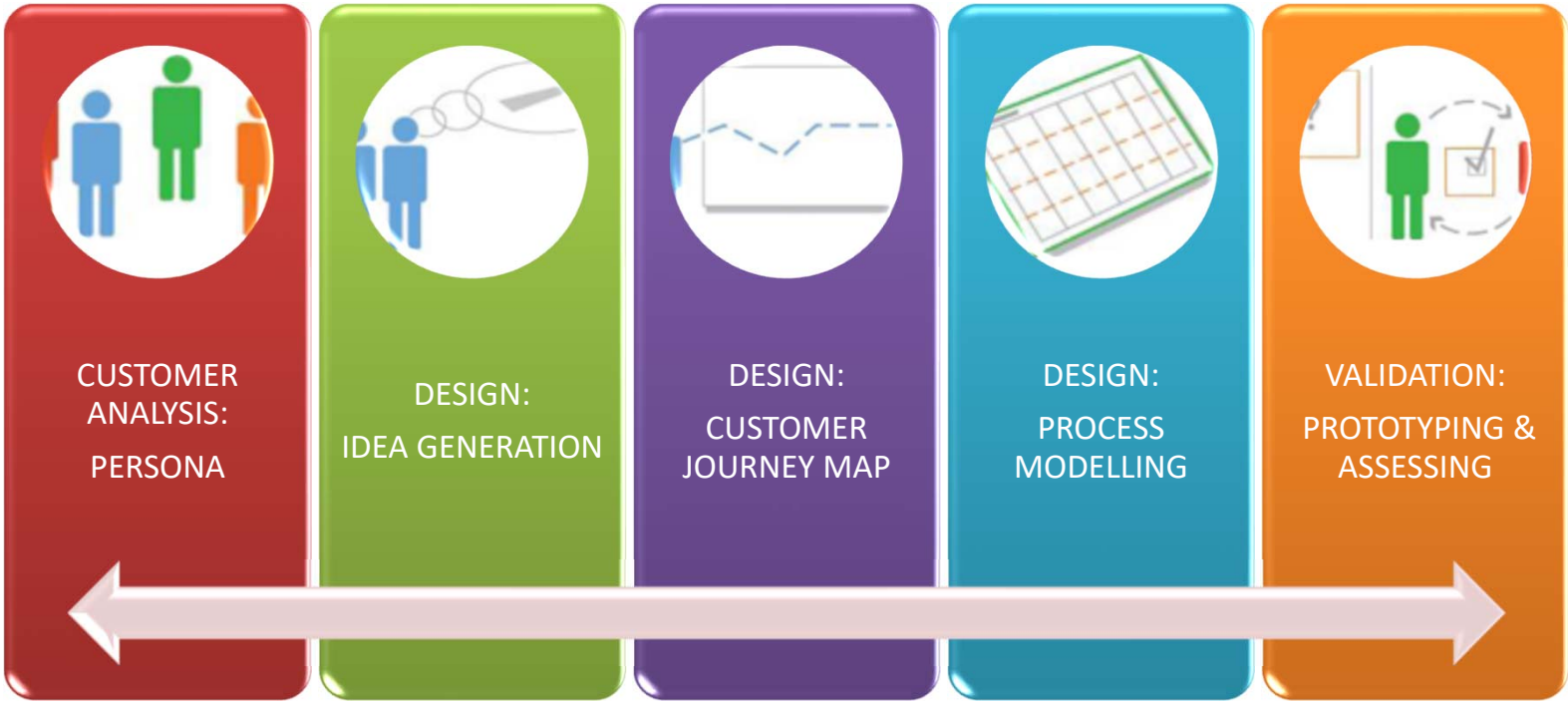
Elevetor

Service Engineering

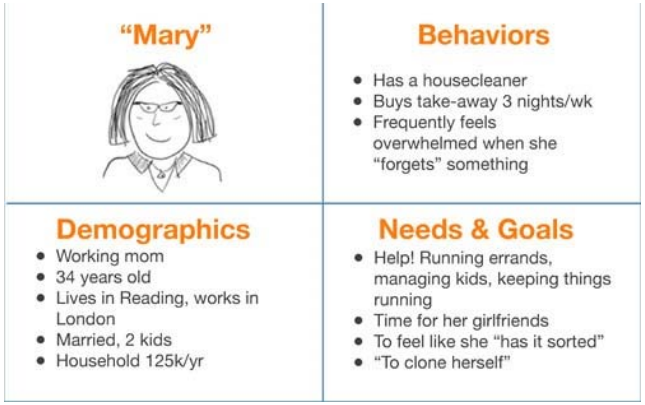
Engineering and Re-engineering a Service



Engineering and Re-engineering a Service

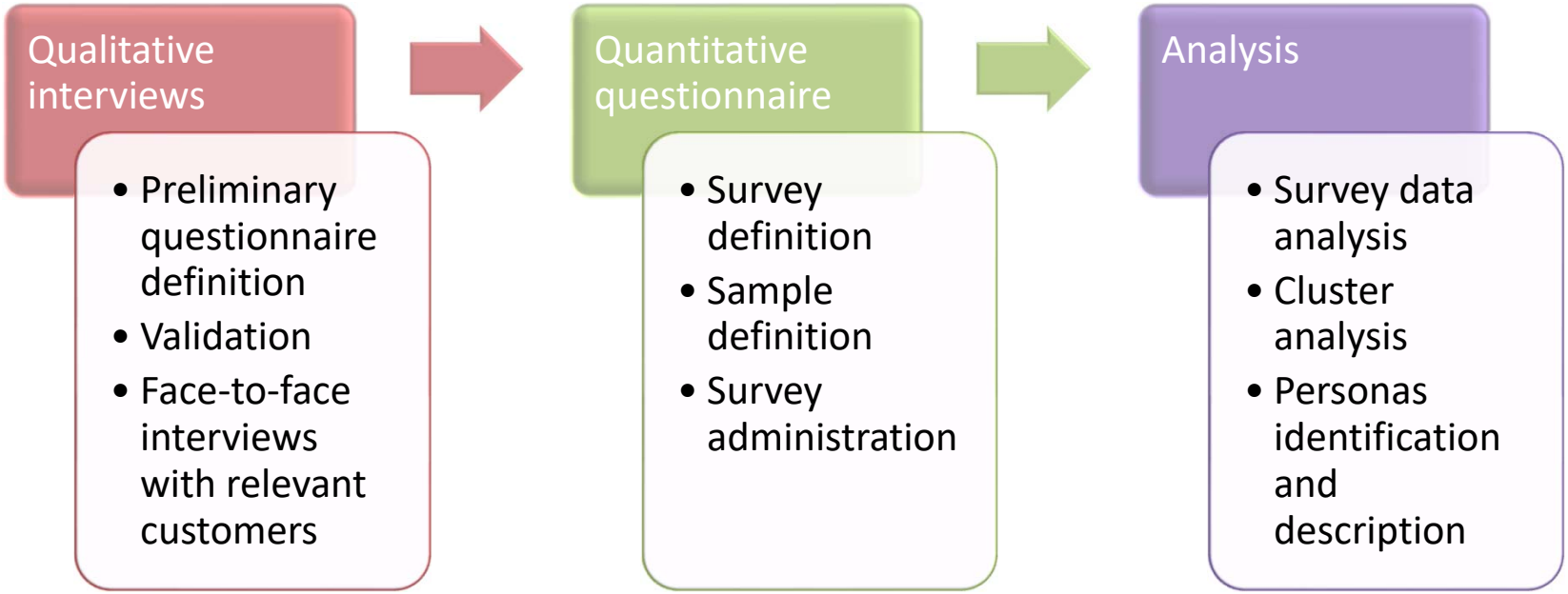


Persona Model

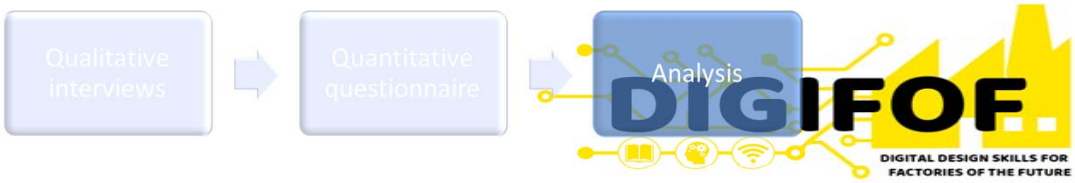


- Based on the general philosophy toward design that bring the users into the design process
- Powerful design tool for representing and communicating customer needs and values, introduced by Alan Cooper (1999)
- Central to Persona Model are Personas:
  - Fictitious, specific and concrete representations of target users based on real inputs and formally structured

Methodology



Analysis



NEEDS	SCORE
The supplier is fast in issue resolution	16,95
The supplier has people with the right competences	13,25
The supplier is able to answer customer request at any time and all over the world	11,99
The supplier supports in reducing breakdown risks (or their impact) during warranty period	11,25
The supplier is abl to deliver spare parts in 24h all over the world	9,33
The supplier is fair a co sparent commercial terms	7,05
The supplier is transparen nterventions and reporting activities	6,08
The supplier supports du g period	5,79
The supplier supports in c	
The supplier has a low price	
The supplier trains my people for service purposes	
The supplier cooperates with us in service marketing a	
Maintenance of products is done by the manufacturer	2,31
The supplier has a recognized reputation and strong brand	1,14

Responsiveness, efficacy, customer assistance and availability of high-skilled personnel able to solve problems

Brand is relevant when choosing the product and not the service provider

Example of Personas

Persona 1

Name:
David Smith

Age:
36

Role:
Technician

Company:
System integrator

"I focus on responsiveness and effectiveness in resolution"

Needs:

- Fast spare parts delivery
- Fast issue resolution
- Right competences
- Support during warranty period

Persona 2

Name:
John Lawson

Age:
57

Role:
Owner

Company:
System Integrator

"I'm looking for a partnership with the supplier"

Needs:

- Fast issue resolution
- Answer at any time all over the world
- Fairness and cooperation
- Transparency and visibility

Persona 3

Name:
Brian Jones

Age:
35

Role:
Mechanical Engineer

Company:
OEM

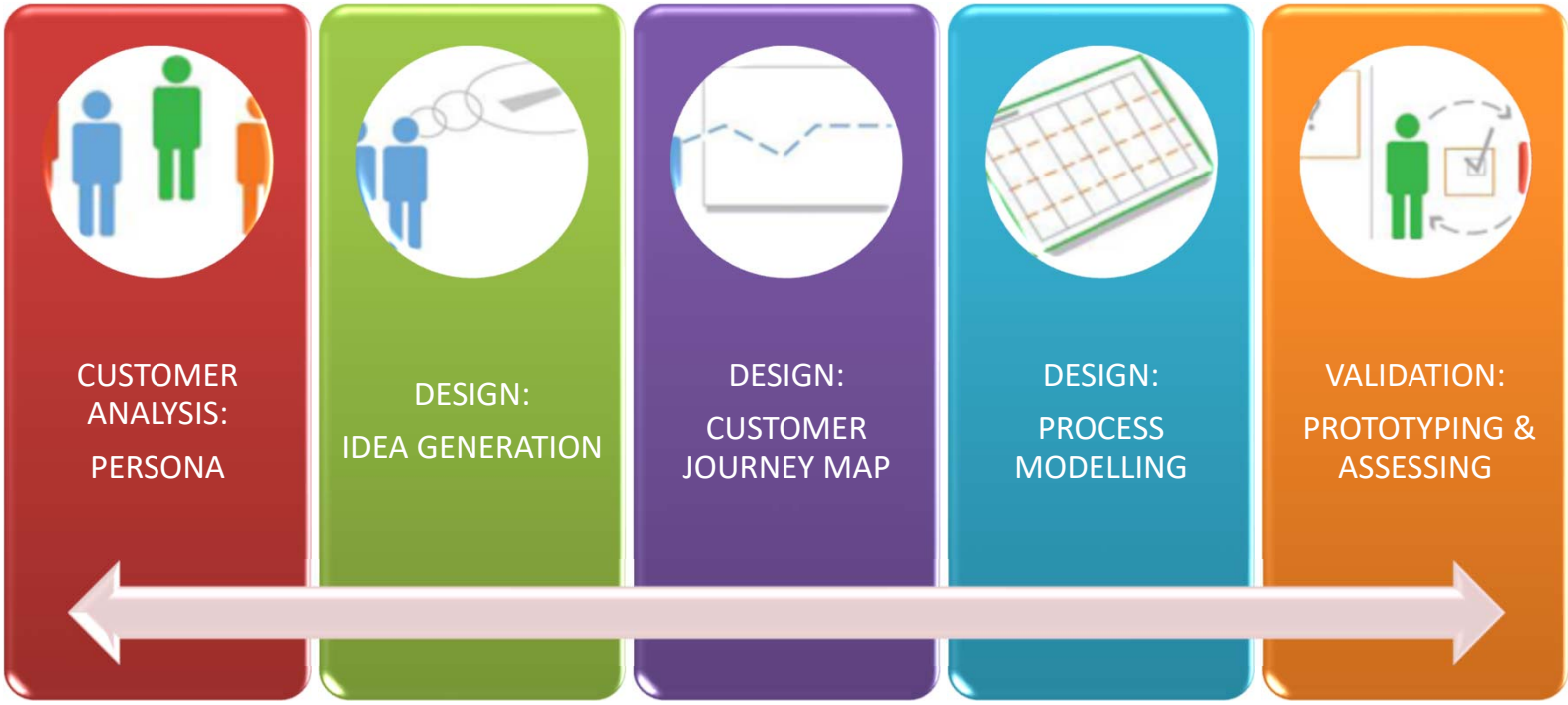
"I need strong support from the supplier"

Needs:

- Fast issue resolution
- Right competences
- Engineering/Commissioning support
- Support during warranty period

Sentiment Analysis

Engineering and Re-engineering a Service



Value

Value is the relation between the satisfaction of needs and the resources which are used to achieve a desired satisfaction

Balance between benefits and expenditure

Balance between stakeholders

$$\text{Value} \quad \alpha^{1} \frac{\text{Satisfaction of needs } \textit{(monetary and non-monetary)}}{\text{Use of resources } \textit{(money, people, time, energy and materials)}} = \frac{\text{Benefits}}{\text{Expenditure}} = \frac{\text{Functions}}{\text{Costs}}$$

Balance between use of resources

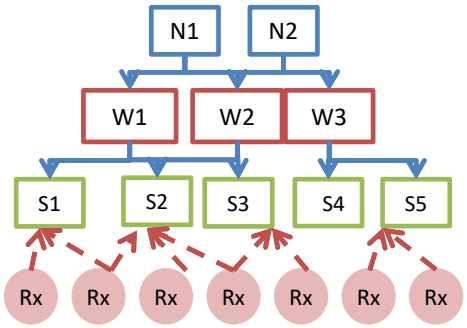
Service requirements tree

Needs

Wishes

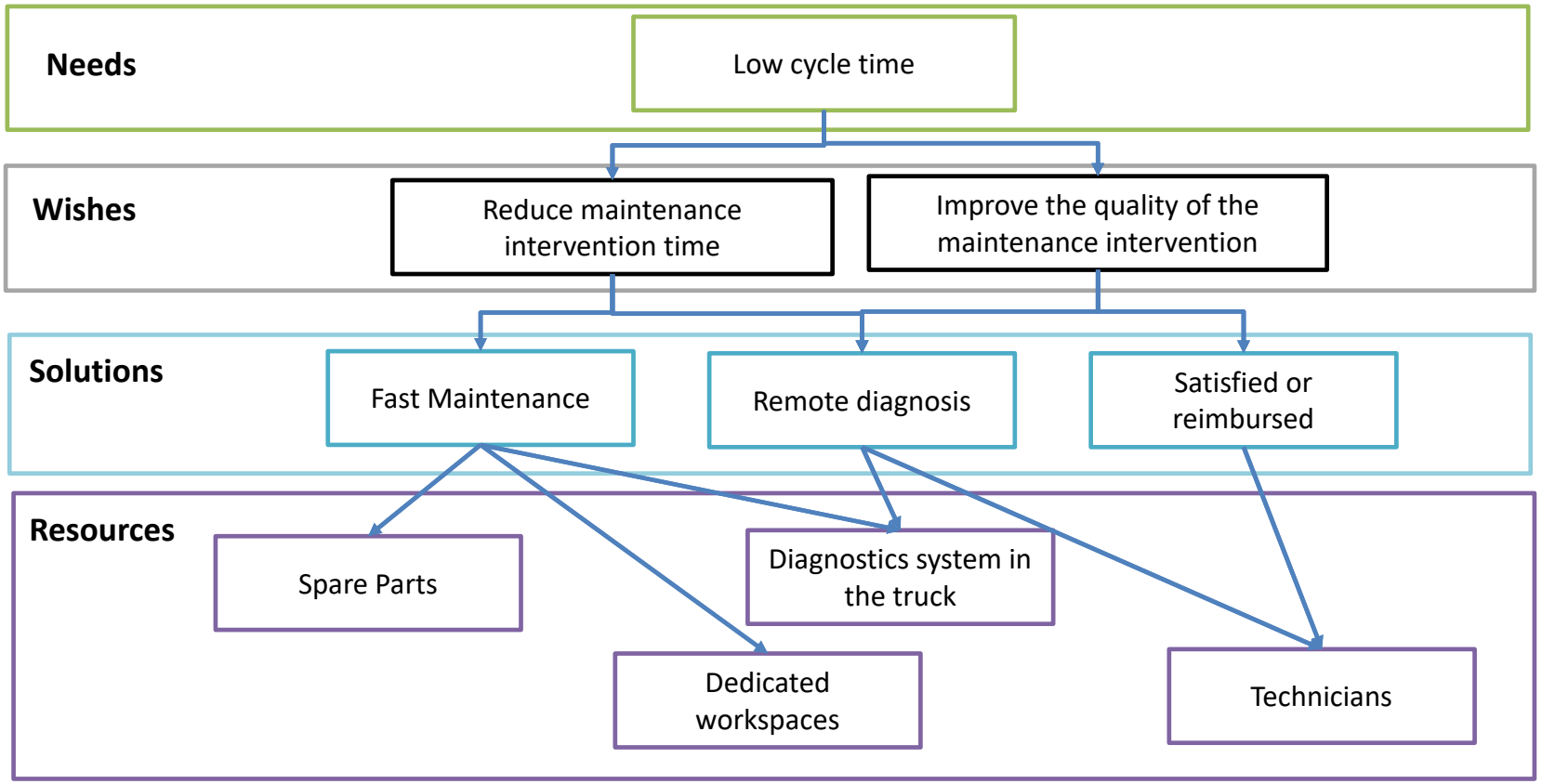
Solutions

Resourses



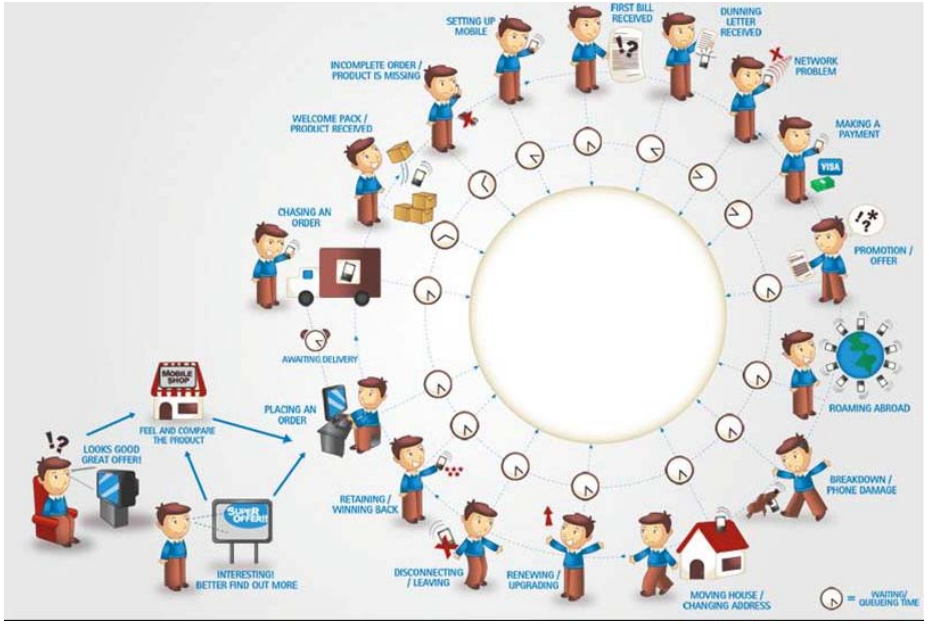
- **Needs (Nx)=** customer's **main needs** identified through the customer segments analysis
- **Wish (Wx)**= **how** the **customer** wishes to satisfy his needs
- **Solutions (Sx)** = **how** the **company** can satisfy the customers' wishes
- **Resource (Rx)**= **who/what (and how)** supports the delivering of a design requirements

Service requirements tree (Example)



Customer journey maps

Customer journey mapping is the process describing all the experiences and activities that customers have as they come across a service or set of services.



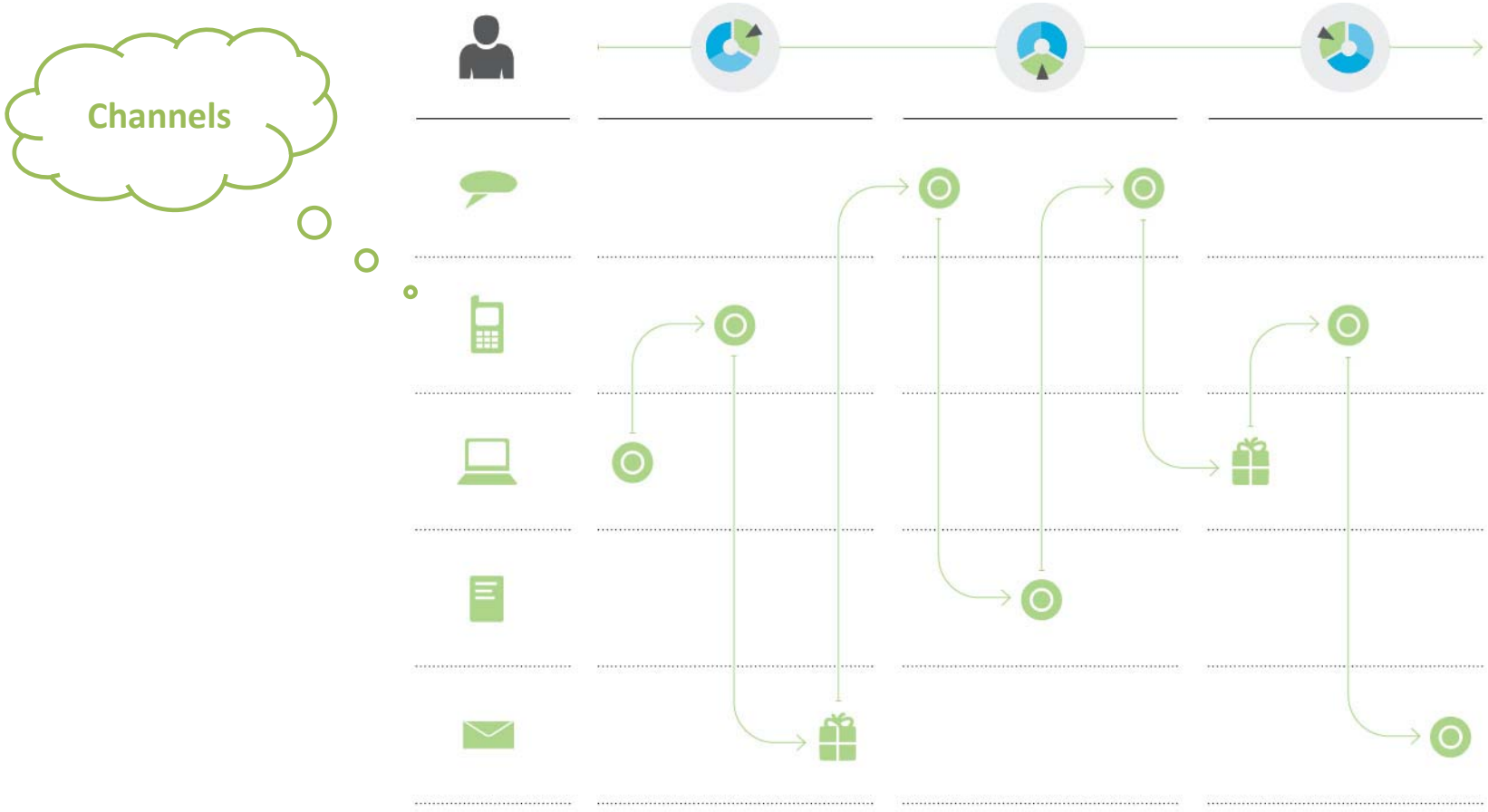
Customer journey maps

A customer journey map provides a vivid but structured visualisation of a service user's experience. The touchpoints where users interact with the service are often used in order to construct a "journey" – an engaging story based upon their experience.

This story details their service interactions and accompanying emotions in a highly accessible manner.

A customer journey map provides a high-level overview of the factors influencing user experience, constructed from the user's perspective.

Customer journey maps



Example: Holiday

Customer Journey map

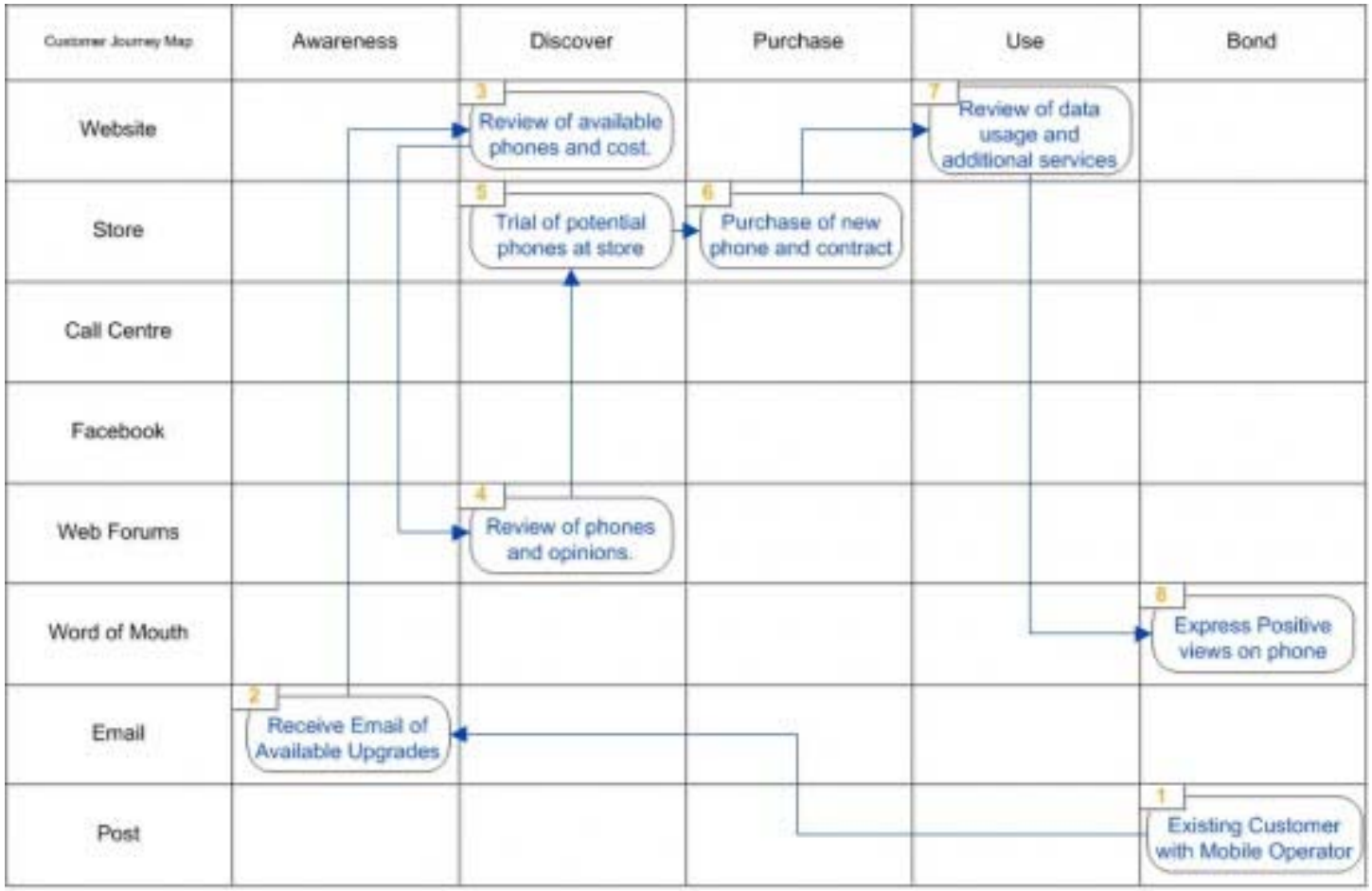
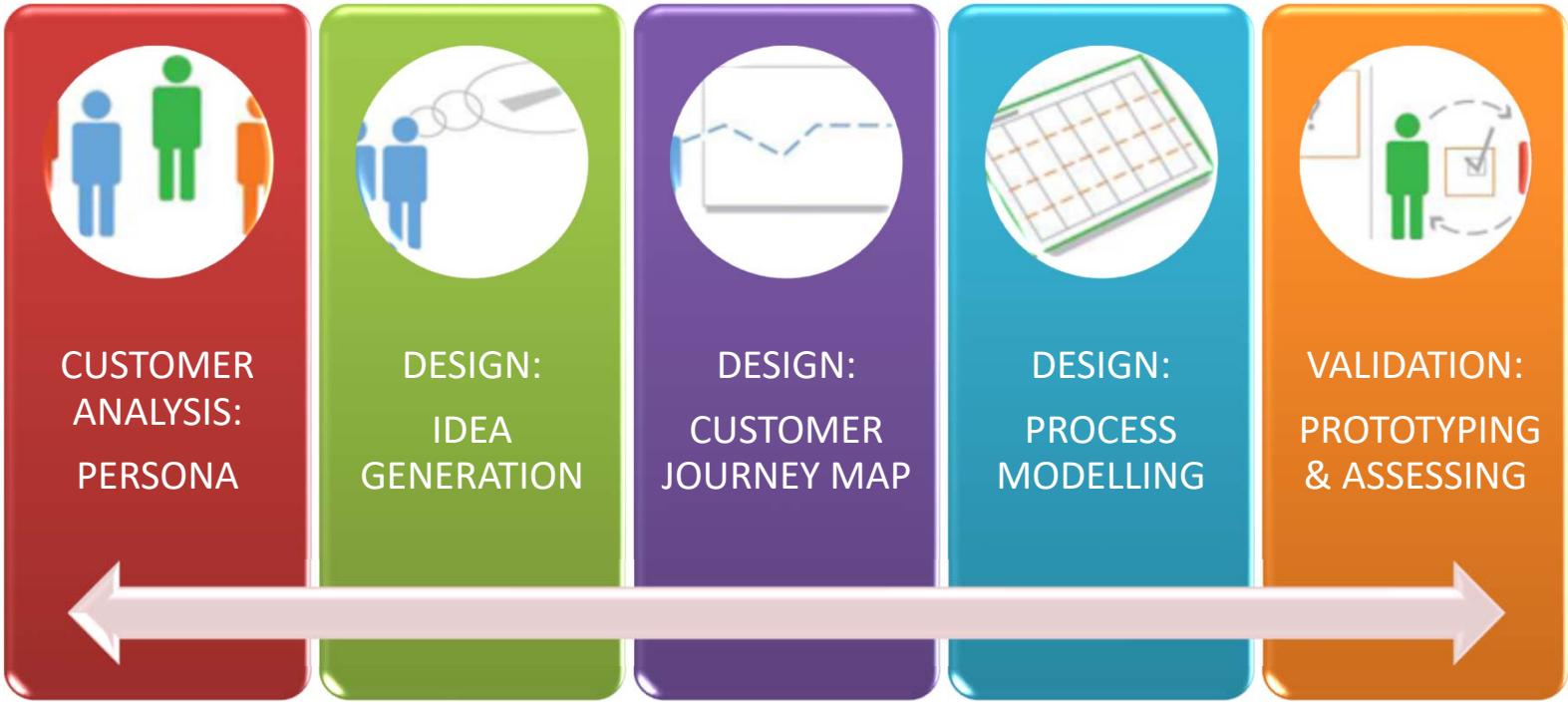


Fig 4

Engineering and Re-engineering a Service



Process Modeling

A model is a simplified and reduced representation of reality. Simplified because reality is too complex to copy exactly and much of the processes complexity is irrelevant to a specific problem.

Process model helps to clarify the steps involved in a particular process.

It is used to:

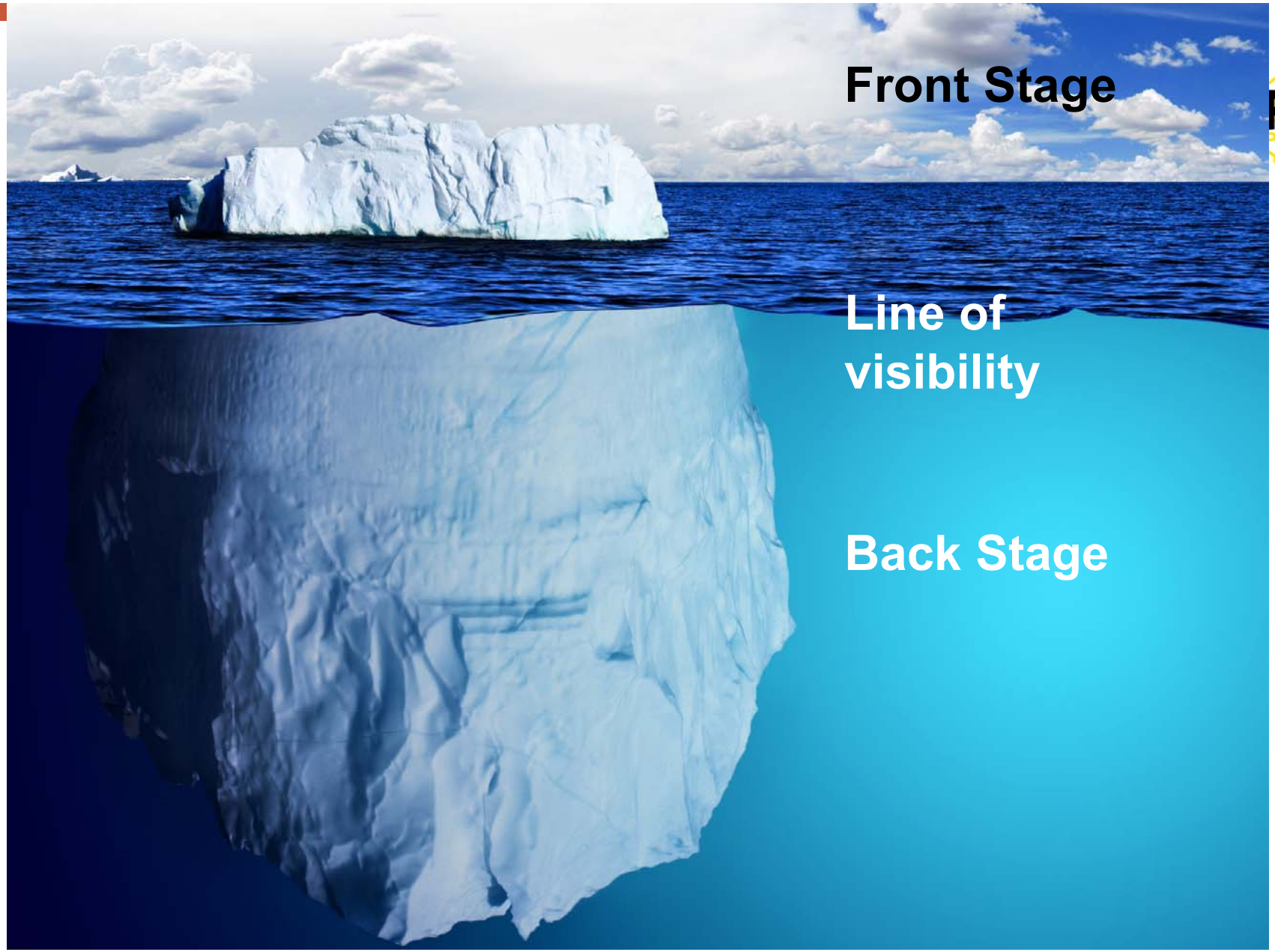
- understand the current processes
- design new processes
- clarify responsibilities
- identify process inefficiencies
- design new procedures considering the identified improvement (BPR)
- manage the company knowledge and training

How to produce a process map

- Consult with the experts: the people managing and working with the process
- Identify the main objectives
- Identify the boundaries considering the objectives
- Identify the elements considering the objectives : the participants, the phases and the decision points
- Collect the related information
- Identify the correct methods and tools to reach the objectives, and draw an initial process flow using selected standard symbols
- Check for completeness and validate the model
- Use the final model

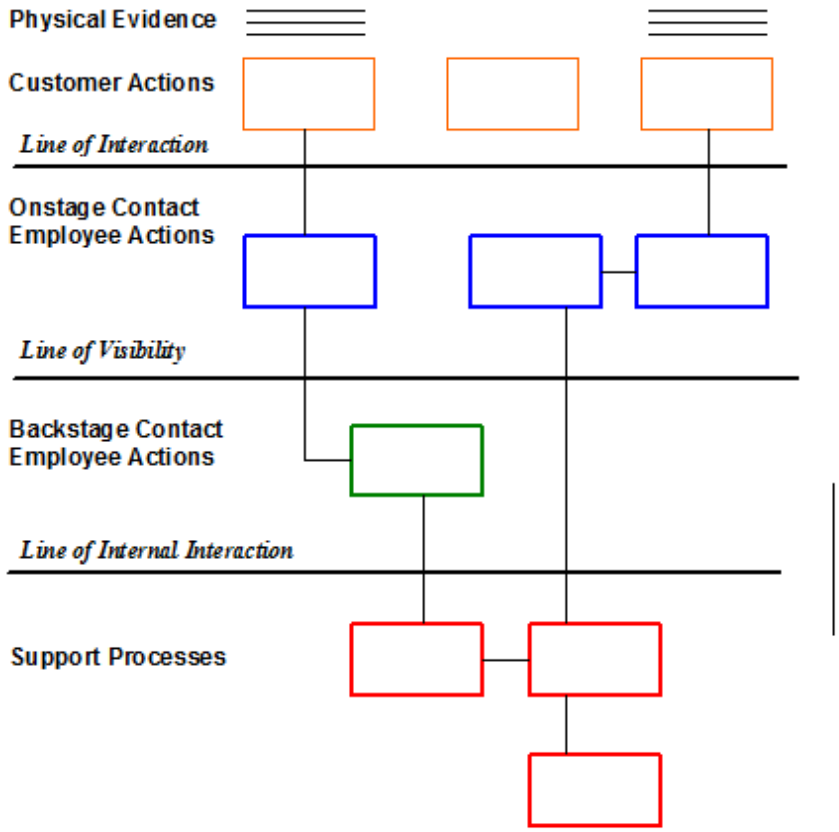
Service Mapping/Blueprinting

A tool for simultaneously depicting the service process, the points of customer contact, and the evidence of service from the customer's point of view

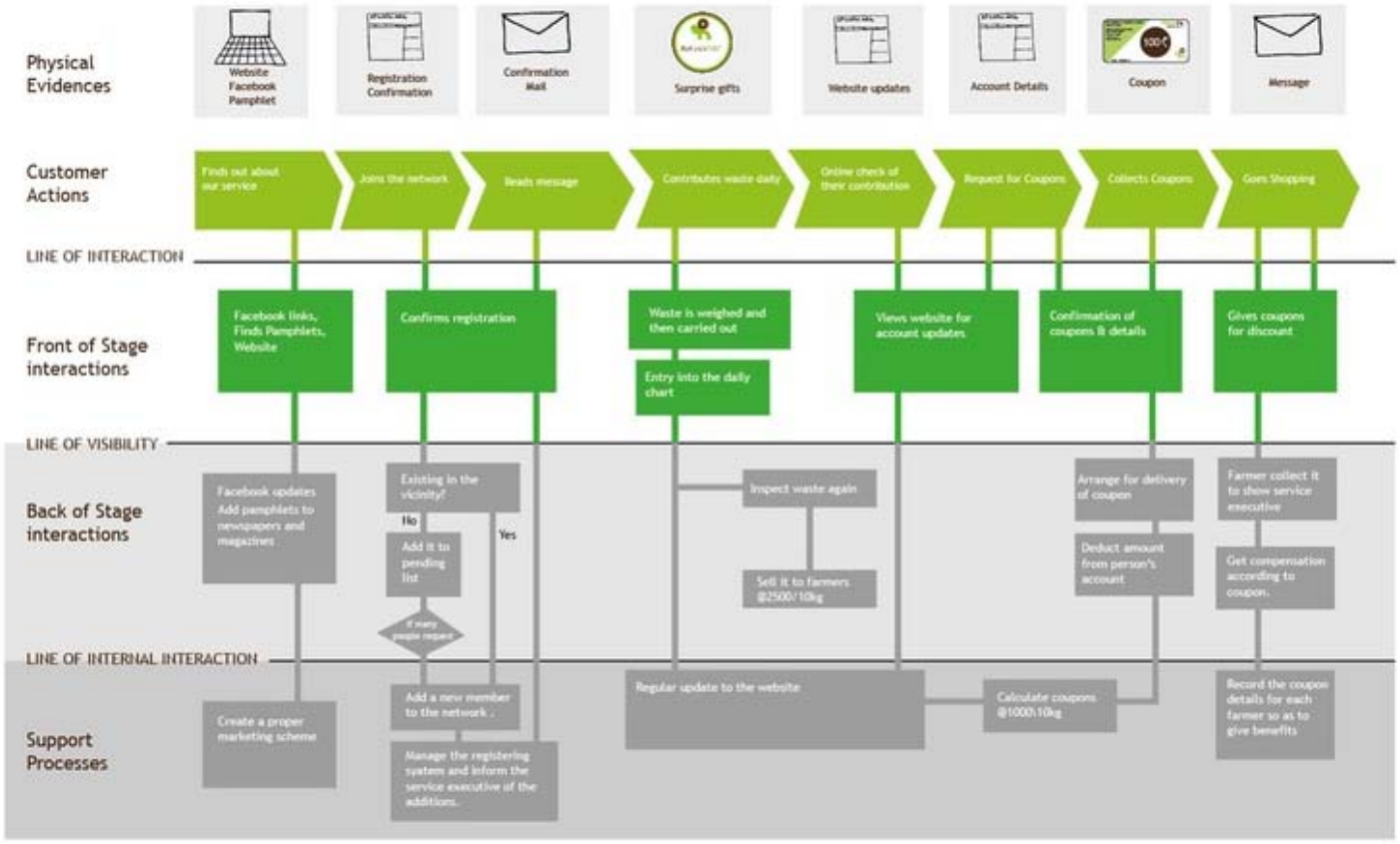


DIGITAL DESIGN SKILLS FOR FACTORIES OF THE FUTURE

Service Mapping/Blueprinting



Service Blueprinting



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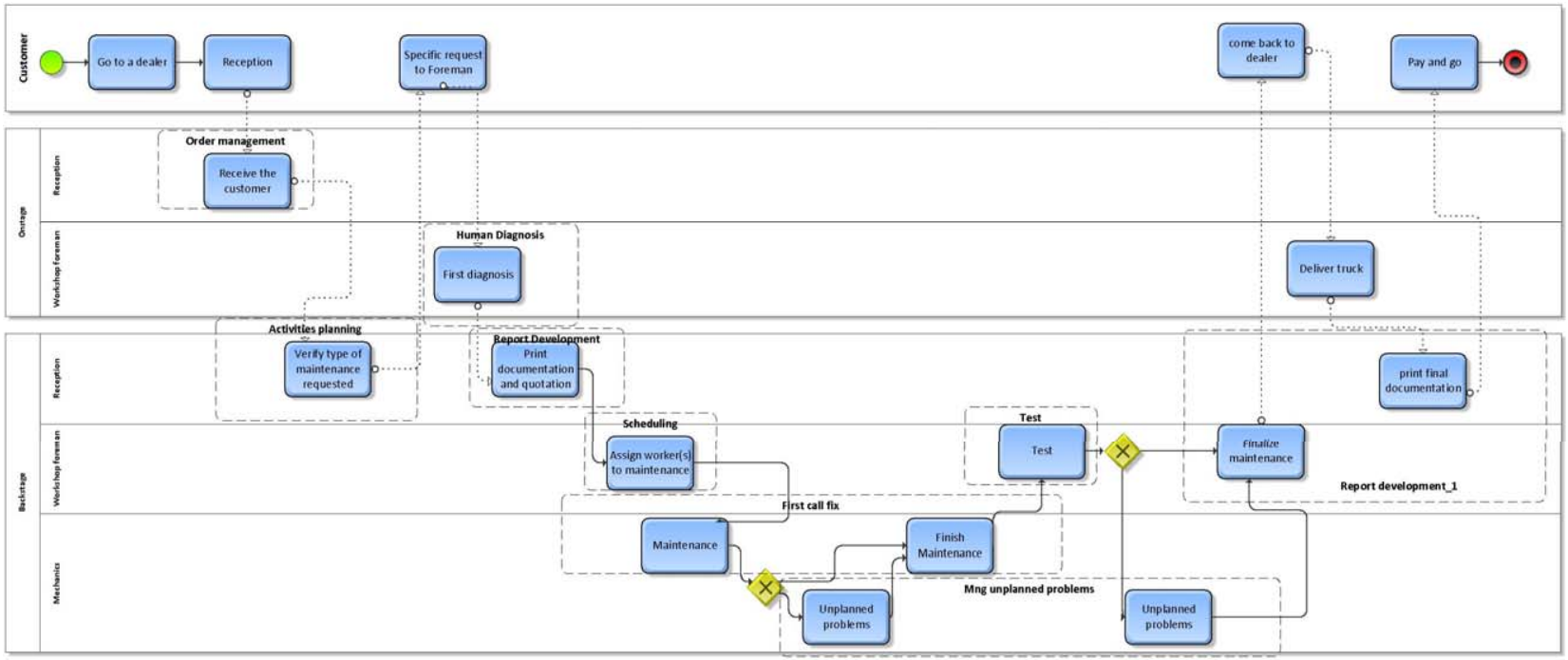
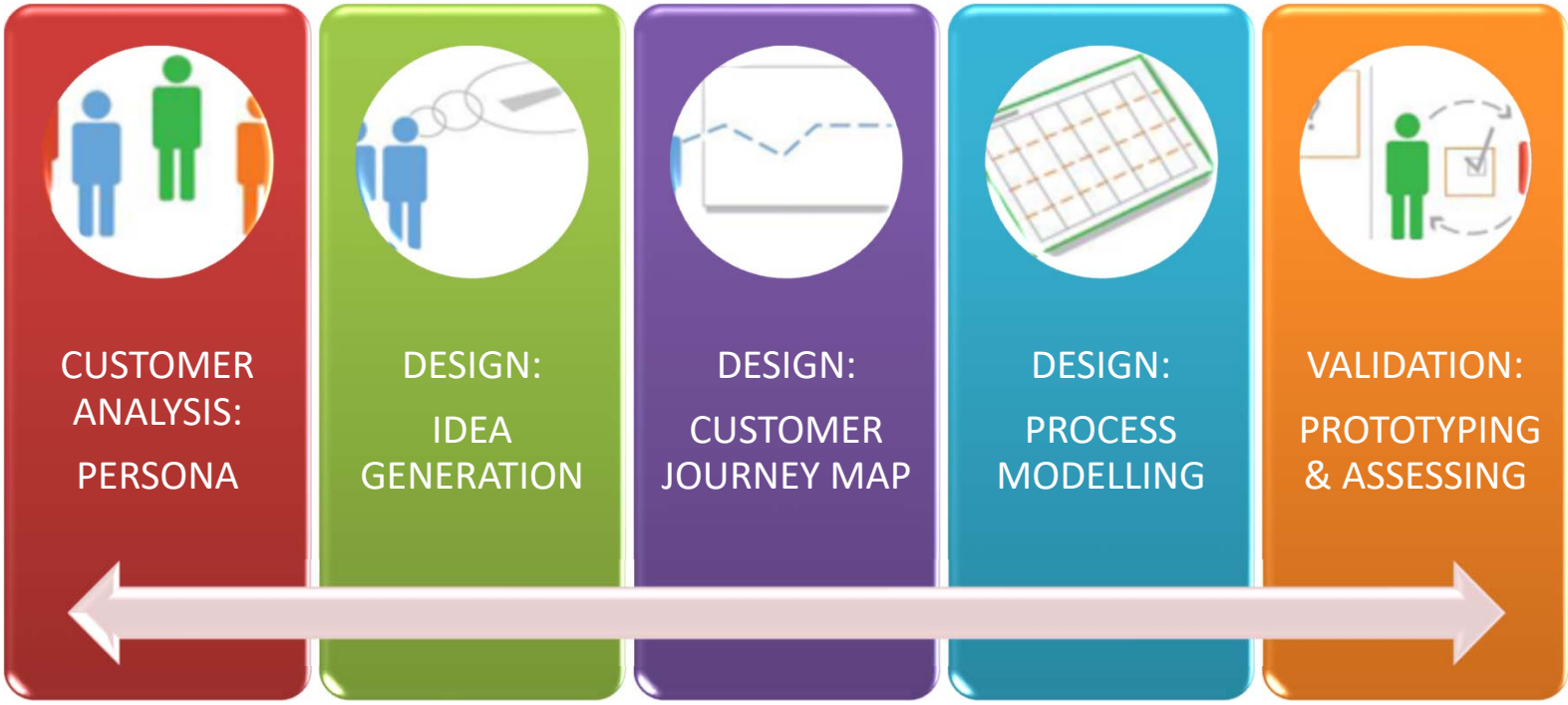


Engineering and Re-engineering a Service



Prototyping and assessing: Simulation

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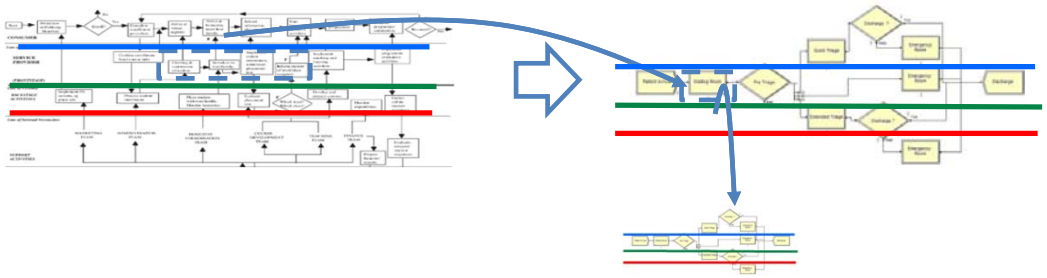
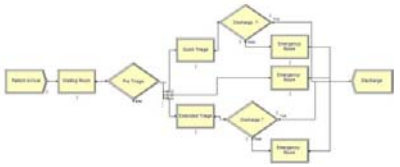
DIGITAL DESIGN SKILLS FOR FACTORIES OF THE FUTURE

DEVELOPMENT OF THE SIMULATION MODEL



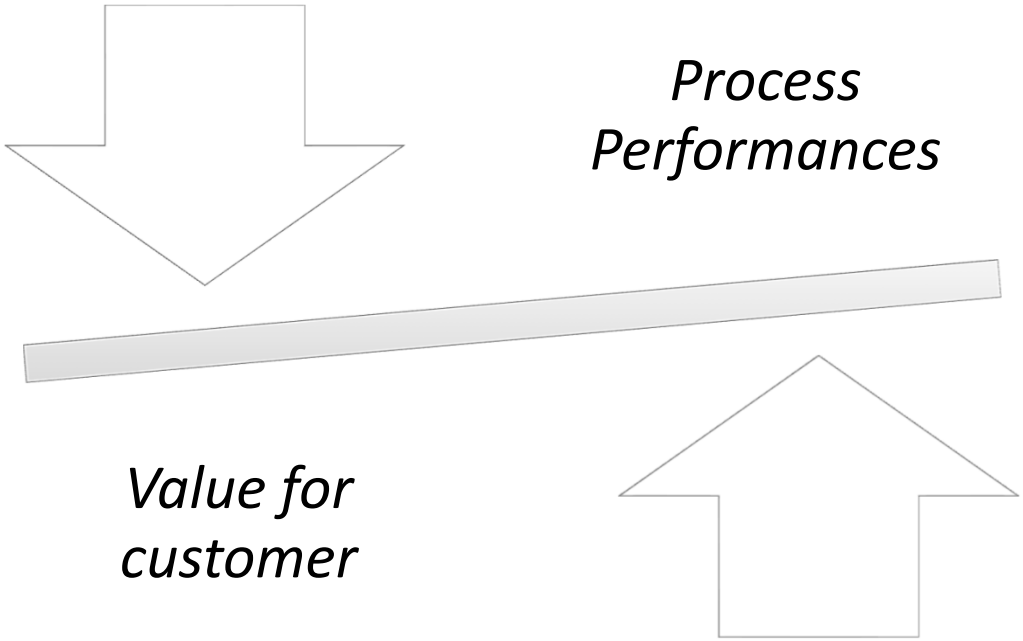
SIMULATION MODEL



The purpose of simulation

- The purpose of simulation is to:
  - **Assess** the performance of a service system under different conditions (*what-if analysis*)
  - **Evaluate** the effectiveness of possible changes in the service system organization
  - **Support** the selection of the process configuration with the best trade-off between internal performance and value for customer
  - **Provide** insights into the service system's dynamics and bottlenecks

Scenario Evaluation



⇨ Selection of the process configuration with the best trade-off between internal performance and value for customer

WORKSHOP

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DIGITAL DESIGN SKILLS FOR FACTORIES OF THE FUTURE

WORKSHOP

- Engineer a new service using the provided tools and methods starting from the following persona.

Tough Customers	Quality Seekers	Value Hunters	Social Butterflies	Restaurant Junkies
Not willing to wait to be seated Don't like noisy restaurants Middle income / $200K income 45+ years of age	Select Restaurants based on quality Eat out frequently $100K+ income group 65+ years of age	Go to a restaurant for a good deal Select affordable restaurants $60-99K income 18-34 years of age	Don't like to eat alone Like to eat out for special occasions Middle income group 35-44 and 65+ years of age	Love to eat out Like to eat out frequently Like restaurants with a lot going on 18-34 years of age Middle income