CHALMERS

SERVITIZATION THEORY AND SERVICE DESIGN

PPU231 22 JANUARY 2021

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Introduction

- According to Vandermerwe, S., & Rada, J. (1988):

- **servitization refers to industries using their products to sell "outcome as a service" rather than a one-off sale.**

- In this lecture, we look at the "extreme" case of **developing services**, in order to learn the implications that the service element brings for **PSS development**

Vandermerwe, S., & Rada, J. (1988). Servitization of business: adding value by adding services. European management journal, 6(4), 314-324.

Learning objectives

- From Ola's lecture yesterday

- Differences between product and service development

- Methods for **service design throughout the development process**

- Decision about how to find the best mix between products and services left for Ola's next lecture

2021-01-24
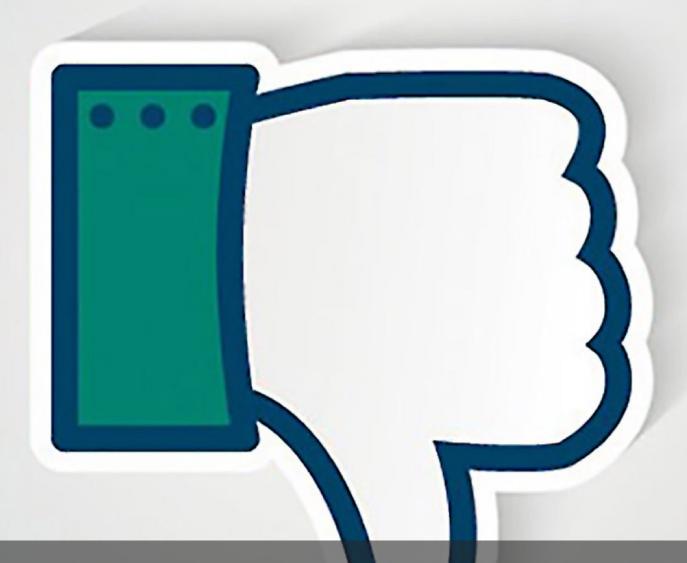
Is this a product or a service?

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Is this a product or a service?
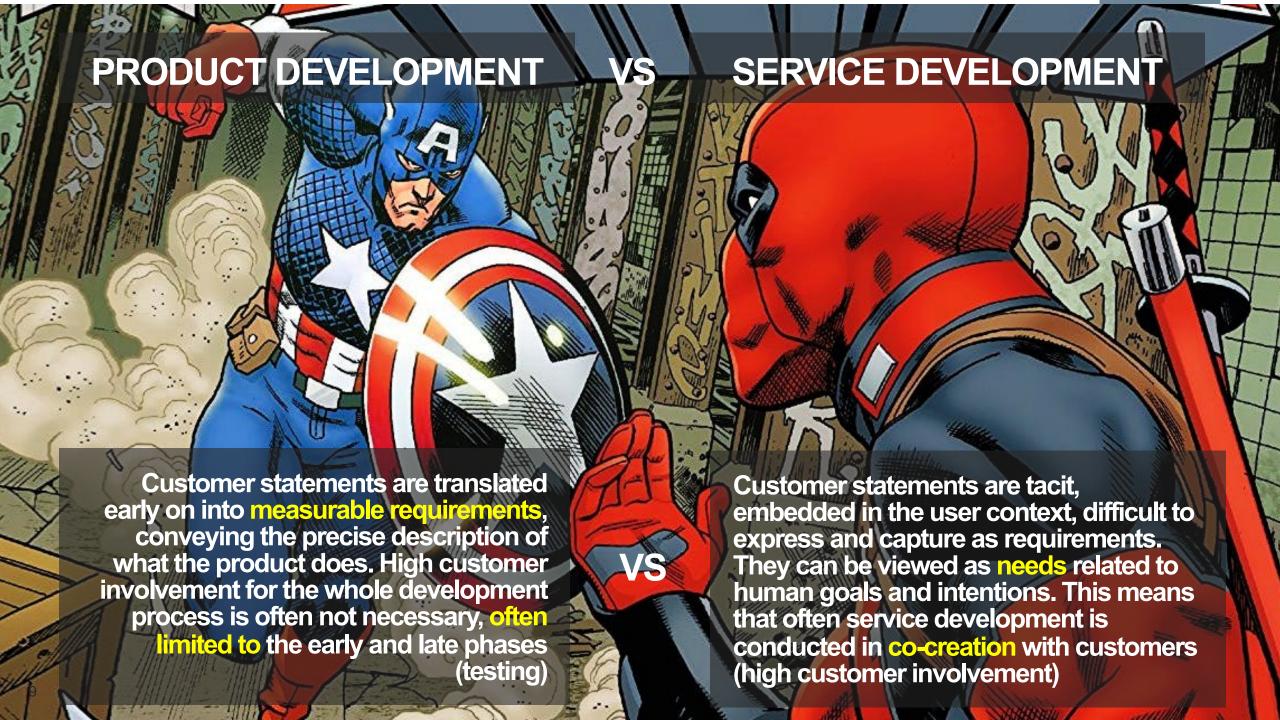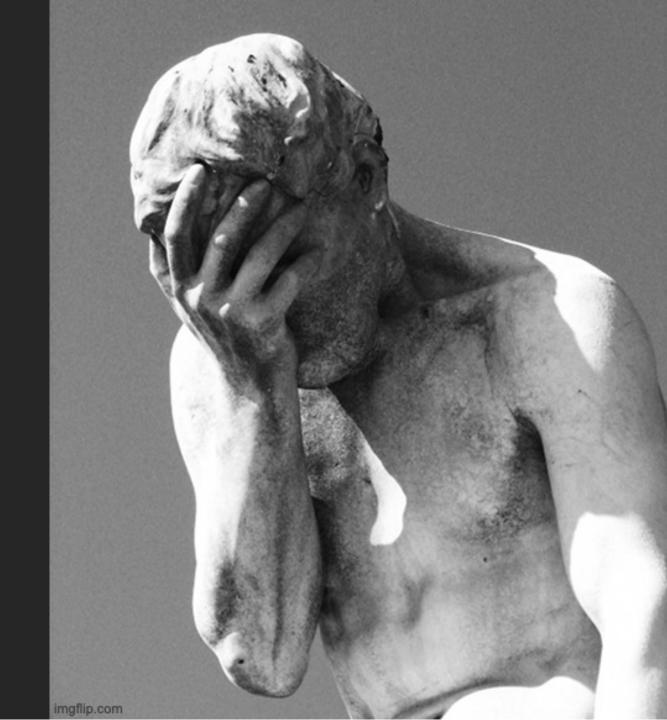
Exercise: think about a negative experience you had with a service, and tell what happened

Product and service development: same thing?

PRODUCT DEVELOPMENT VS SERVICE DEVELOPMENT

VS

Customer statements are translated early on into **measurable requirements**, conveying the precise description of what the product does. High customer involvement for the whole development process is often not necessary, **often limited to** the early and late phases (testing)

Customer statements are tacit, embedded in the user context, difficult to express and capture as requirements. They can be viewed as **needs** related to human goals and intentions. This means that often service development is conducted in **co-creation** with customers (high customer involvement)

Why may a service fail?

REASON 1: overlooking parts of the service that the customer does not see (back office)

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REASON 2: overlooking the role of people in service delivery

REASON 3: fail on analysing time, cost and profitability of the solution developed

REASON 4: fail to understand and communicate the connection between service and product elements

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SERVICE DESIGN

MMF176 28 SEPTEMBER

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Origins of service design

- According to G. Lynn Shostack (1982), a service exists in two states
    - **Potential state:** a service may be "stored". For example, the potential service of haircutting is stored in the form of a trained barber.
    - In its potential state, a service can only be described in hypothetical terms (or a "blueprint").
    - For example, the potential service of haircutting consists of a series of steps which a barber should perform in a particular order and manner to yield a particular type of haircut.
    - Whatever the blueprint for the potential service, the **actual state** of the service will almost always deviate in some way.
    - Unless the deviations exceed **some level of tolerance**, they will be accepted as part of the satisfactory execution of the service.
    - The more complex the service, the more likely the possibility of significant deviation.
    - Also, the less specific the blueprint, the more room there is for deviation.

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How to Design a Service

by G. Lynn Shostack

The difference between products and services is more than semantic. Products are tangible objects that exist in both time and space; services consist solely of acts or process(es), and exist in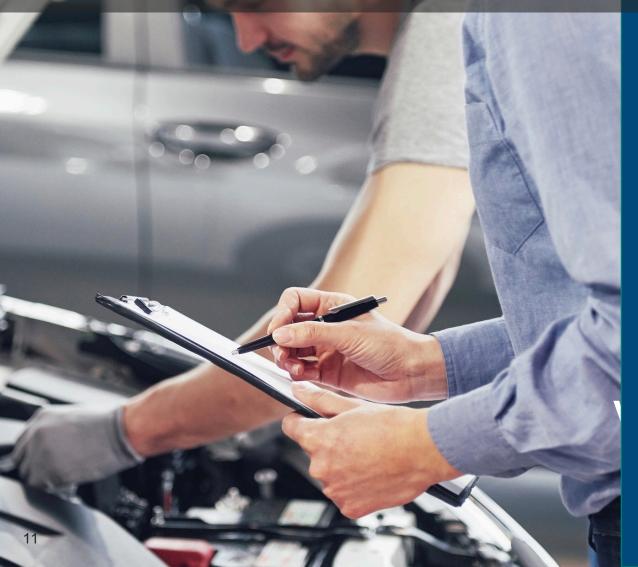 time only. The basic distinction between "things" and "processes" is the starting point for a focused investigation of services. Services are rendered; products are possessed. Services cannot be possessed; they can only be experienced, created or participated in.

Though they are different, services and products are intimately and symbiotically linked. A box of cereal, for example, may appear to be a simple product. But it is the culmination of a very long series of marketed services and products, beginning with the service of farming. Or, services and products can act simultaneously to form a larger entity. A department store is a place in which the service of retailing is rendered. Yet retailing is not a complete entity without inclusion of products. A department store's image and clientele are a function of both retailing and merchandise, and these cannot be separated without sacrificing the unique definition of a department store.

Today, while "that which is marketed" may still be a simple product or an unadorned service, it is often a more complex combination of products and services. And the first step towards rational service design is a system for visualising this phenomenon, so that services can be given proper position and weight in the context of any market entity.
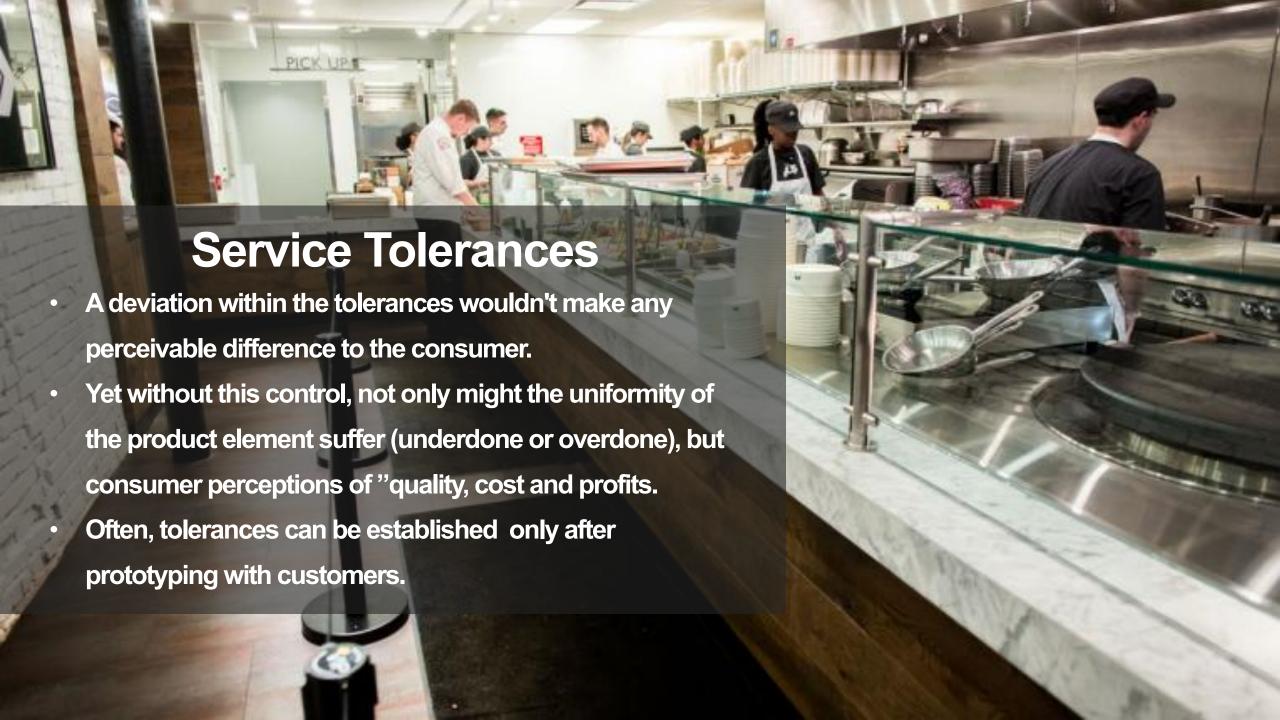
The Molecular Modelling Approach

Product/service combinations that form larger market entities can be quite complex. Since they are dynamic and have highly interrelated elements, it is useful to view them in an organic way, rather than as static bits and pieces. In fact, product/service combinations can be viewed very much like "atoms" connected in unique "molecular" configurations.

The molecular analogy has considerable merit. First, it allows full consideration of service elements as well as product elements. Second, it offers a framework for identifying and visualising all the parts of any complex market entity. Finally, it suggests the behavioural hypothesis that rearrangement or alteration of any element, whether by design or accident, will change the overall entity, just as changing the

Service Tolerances

- A deviation within the tolerances wouldn't make any perceivable difference to the consumer.

- Yet without this control, not only might the uniformity of the product element suffer (underdone or overdone), but consumer perceptions of "quality, cost and profits.

- Often, tolerances can be established only after prototyping with customers.

Service Blueprint
And the "corner shoeshine" example
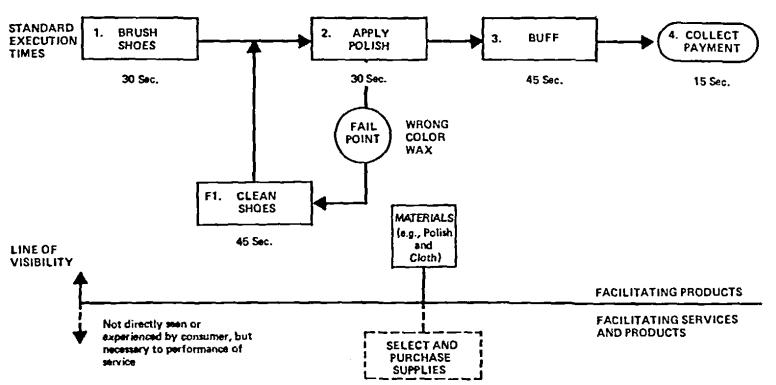
Service Blueprint
And the "corner shoeshine" example

STANDARD EXECUTION TIME: 2 Minutes
DEVIATION TOLERANCE: 3 Minutes — Intercycle Tolerance = 1 Minute / Extracycle Tolerance = 2 Minutes
TOTAL ACCEPTABLE EXECUTION: 5 Minutes
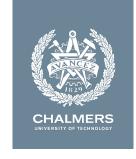
- **STEP 1: draw "line of visibility" (front office and back office)**
  - For some services these backoffice processes are important, since a change in them may change the service or entity.

- **STEP 2: identifying functions**

- **STEP 3: identify main error possibilities**
  - application of the wrong colour of wax
  - An auxiliary, or recycling, process (i.e., clean shoes) is shown as being necessary in order to complete the service.

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	Total Inter-Cycle Execution		
	2 Minutes	3 Minutes	4 Minutes
Price	50c	50c	50c
Costs			
1) Time @ 9 cents per minute	18c	27c	36c
2) Wax	5c	5-7c	5-7c
3) Other (brush, cloth, etc.— amortised	7c	7-8c	7-8c
Total Costs	30c	39-42c	48-51c
Pre-tax Profit	20c	8-11c	2-(1)c
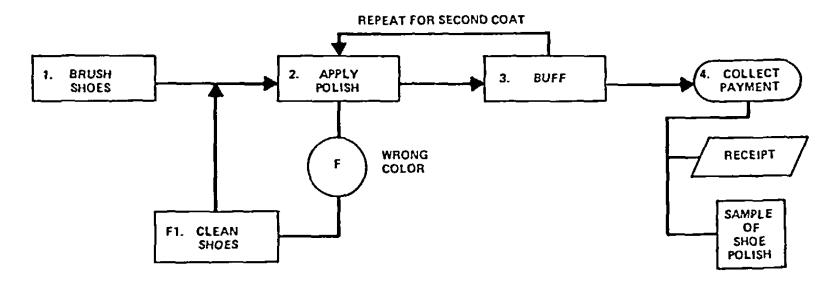
- **STEP 4: IDENTIFY STANDARDS AND TOLERANCES**

- Beyond five minutes, the consumer will show signs of dissatisfaction and begin to lower materially his judgement of quality.

- the total tolerance is divided into two categories.

- **Inter-cycle deviation:** occurs within the service process itself. For example, if buffing extends to 60 seconds, 15 seconds of inter-cycle deviation will have taken place.

- **Extra-cycle tolerance** occurs outside the service process. Waiting two minutes in line for the service would be an example of extra-cycle deviation.

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Service Blueprint
And the "corner shoeshine" example

REPEAT FOR SECOND COAT

1. BRUSH SHOES → 2. APPLY POLISH → 3. BUFF → 4. COLLECT PAYMENT

F — WRONG COLOR

F1. CLEAN SHOES

RECEIPT

SAMPLE OF SHOE POLISH

STANDARD EXECUTION TIME: 3 Min. 15 Sec.
DEVIATION TOLERANCE: 3 Min. < Intercycle Tolerance = 1 minute / Extracycle Tolerance = 2 minutes
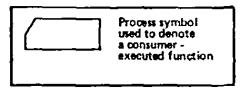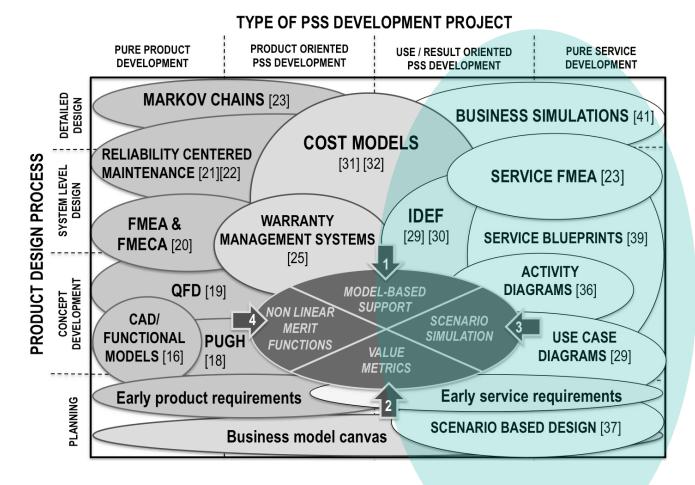TOTAL ACCEPTABLE EXECUTION: 6 Min. 15 Sec.

Process symbol used to denote a consumer-executed function

- **STEP 5: modify the service**

- add a repeat cycle of steps 2 and 3, thus creating a two-coat shine.

- This may be sufficient differentiation to allow a 20 cent price increase,

- Or add a service evidence in the form of a receipt,

- or add product in the form of a sample of wax.

- create a "reminder" of the service (by perhaps printing his name and address on the sample),

- maintain the price, yet increase his margin, by buying a machine that lets the customer buff his own shoes. (time saved).
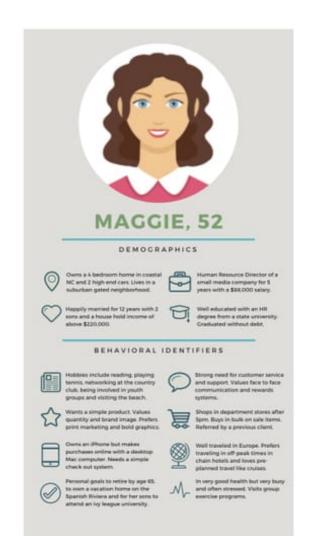
Bertoni, M., Panarotto, M., & Larsson, T. (2016). Boundary objects for PSS design. In *Conference on Product-Service Systems across Life Cycle, Bergamo, Italy* (Vol. 47, pp. 329-334). Elsevier.

- Methods such as service blueprint are too detailed to be used in the early design phases, where the knowledge about the service to developed is limited.

- **Service designers recognized the need for other methods and tools for the early design phases, in order to retrieve service requirements**

- Hereafter, it will ne introduced
  1. Scenario Based Design (Personas and Customer Journey Map)
  2. UML Diagrams (Use Case Diagrams, Activity Diagrams, Business Process Modeling, Business Simulations)
  3. Service Prototyping

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Service Design in the early phases - personas

JUSTIN, 31
DEMOGRAPHICS
BEHAVIORAL IDENTIFIERS

MAGGIE, 52
DEMOGRAPHICS
BEHAVIORAL IDENTIFIERS

- A persona is essentially a fictional representation of users, typically developed based on interviews, surveys and other insights.

- Personas commonly have names, images and narratives that make them more real and easy to recall.

- Focus not only on features, but also on customer' emotions as part of an experience.

- Personas can be a powerful tool to create empathy with the service users, as well as to ensure there is an understanding of nuances, behaviours and preferences of the people.

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CUSTOMER JOURNEY MAP Shopping for a New Car
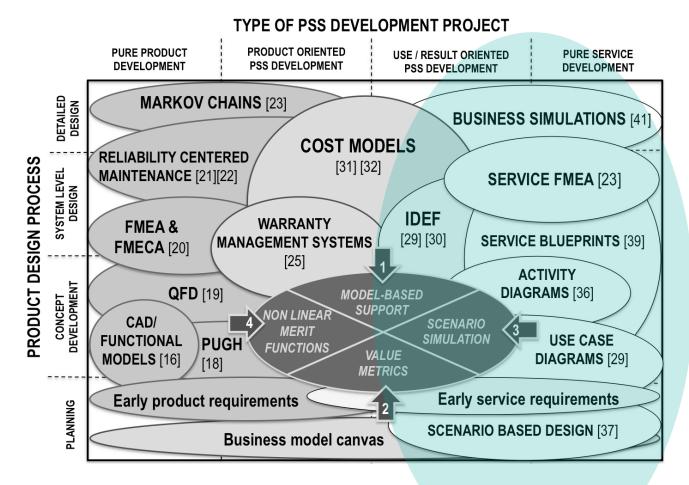
Service Design in the early phases – customer journey maps

- A customer journey map is a visual representation of the customer journey.

- It helps you tell the story of the intended customers' experiences with the service across all touchpoints.

- One of the most important aspects of the customer experience is personalisation.

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Service Design - UML diagrams

TYPE OF PSS DEVELOPMENT PROJECT

PURE PRODUCT DEVELOPMENT | PRODUCT ORIENTED PSS DEVELOPMENT | USE / RESULT ORIENTED PSS DEVELOPMENT | PURE SERVICE DEVELOPMENT

MARKOV CHAINS [23]
BUSINESS SIMULATIONS [41]
RELIABILITY CENTERED MAINTENANCE [21][22]
COST MODELS [31] [32]
SERVICE FMEA [23]
FMEA & FMECA [20]
WARRANTY MANAGEMENT SYSTEMS [25]
IDEF [29] [30]
SERVICE BLUEPRINTS [39]
QFD [19]
ACTIVITY DIAGRAMS [36]
CAD/ FUNCTIONAL MODELS [16]
PUGH [18]
NON LINEAR MERIT FUNCTIONS
MODEL-BASED SUPPORT
SCENARIO SIMULATION
USE CASE DIAGRAMS [29]
VALUE METRICS
Early product requirements
Early service requirements
Business model canvas
SCENARIO BASED DESIGN [37]

PRODUCT DESIGN PROCESS: DETAILED DESIGN / SYSTEM LEVEL DESIGN / CONCEPT DEVELOPMENT / PLANNING

Bertoni, M., Panarotto, M., & Larsson, T. (2016). Boundary objects for PSS design. In *Conference on Product-Service Systems across Life Cycle, Bergamo, Italy* (Vol. 47, pp. 329-334). Elsevier.

- Also, service designers recognized the need for a standardized way of modelling services.
- ISO/IEC 19505-2:2012 defines the **Unified Modeling Language (UML),** for modeling business and similar processes.
- https://www.iso.org/standard/52854.html
- Possible tool for UML diagramming: https://www.lucidchart.com/pages/

uc Use Cases

System Boundary
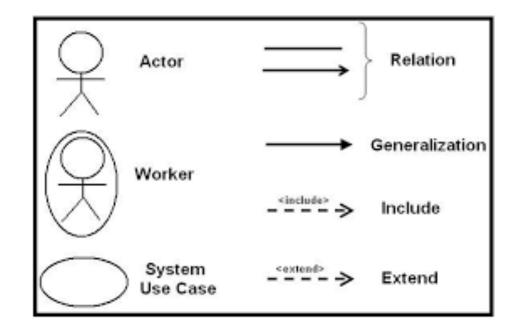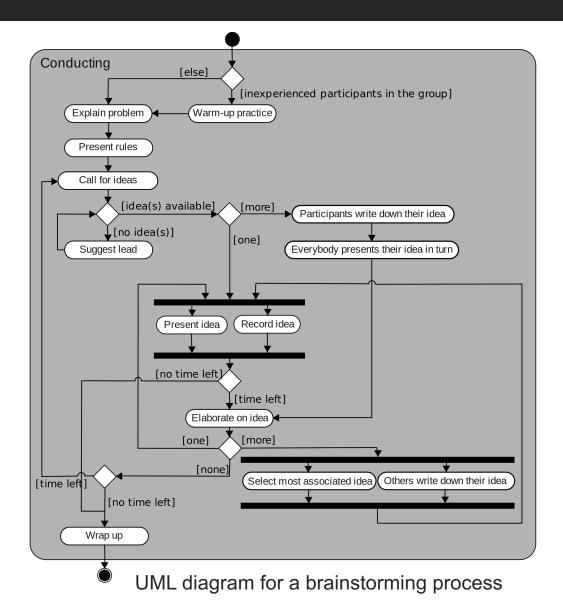
- A use case diagram is a representation of a user's interaction with the system.
- The purpose of use case diagram is to capture the dynamic aspect of a system.
- Tutorial:	https://www.youtube.com/watch?v=zid-MVo7M-E
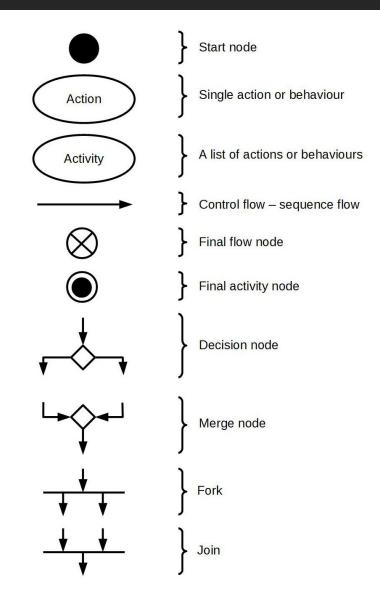
UML Activity diagrams

UML diagram for a brainstorming process

- Activity diagrams are graphical representations of workflows of stepwise activities.

- Compared to use case diagrams, It emphasized more **choices, iterations and concurrency.**

- Tutorial: https://www.youtube.com/watch?v=Wf_xlagfHmg

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UML Activity diagrams - symbols
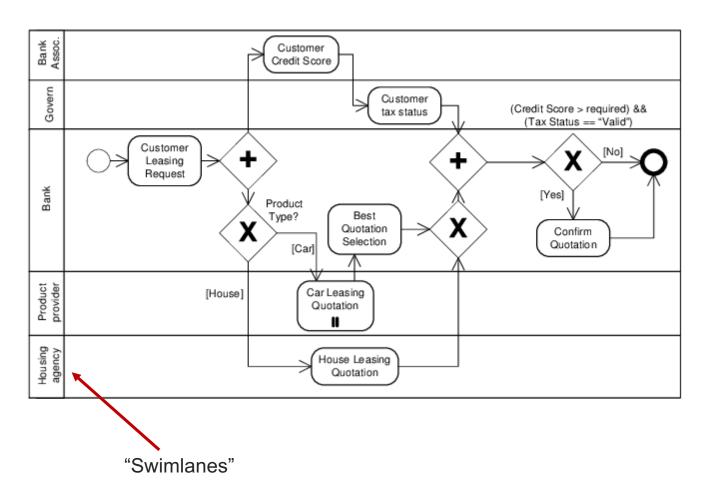
Symbol	Description
●	Start node
Action	Single action or behaviour
Activity	A list of actions or behaviours
→	Control flow – sequence flow
⊗	Final flow node
◉	Final activity node
◇	Decision node
◇	Merge node
▬	Fork
▬	Join

- Activity diagrams are graphical representations of workflows of stepwise activities.

- Compared to use case diagrams, It emphasized more **choices, iterations and concurrency.**

- Tutorial: https://www.youtube.com/watch?v=Wf_xlagfHmg

Business Process Modelling (BPMN)

"Swimlanes"
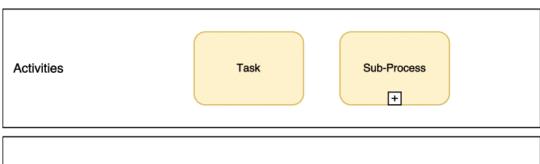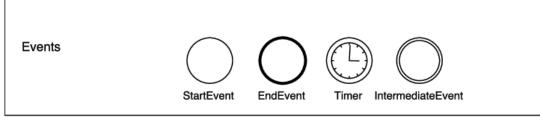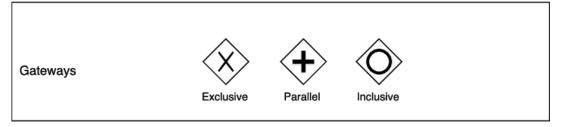
- Similar to service blueprint, the idea of **swimlanes** is similar

- yet there are some parts improved:

- Service Blueprint does not make a clear distinction where actions move across organizational boundaries to avoid damaging service support,

- It also fails to explain to back-office staff their role in supporting on-stage customer interactions.

- Business process modelling attempts to solve these issues

- It also provides a more granular distinction between activities and decision points

Business Process Modelling (BPMN)
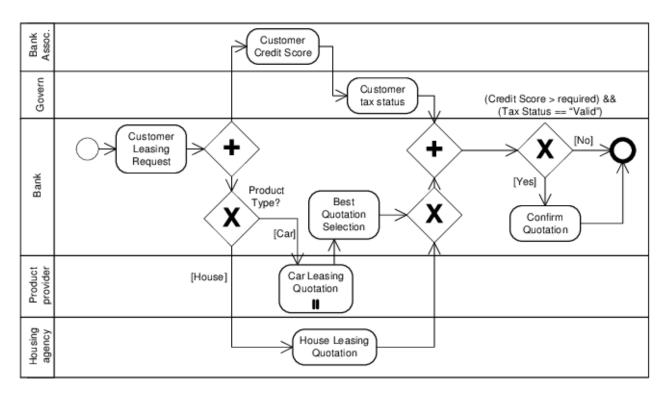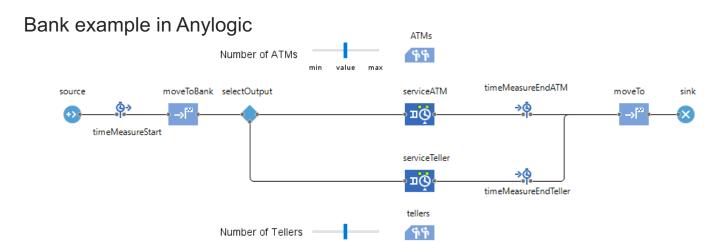
- Symbols
- Tutorial: https://www.youtube.com/watch?v=VVkd-jqGuq4
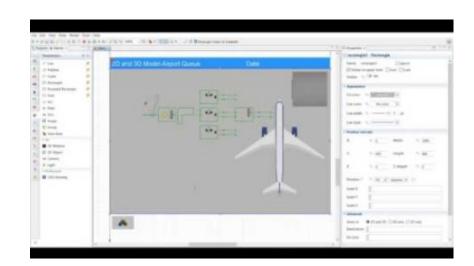
Business Process Simulations

Bank example in Anylogic
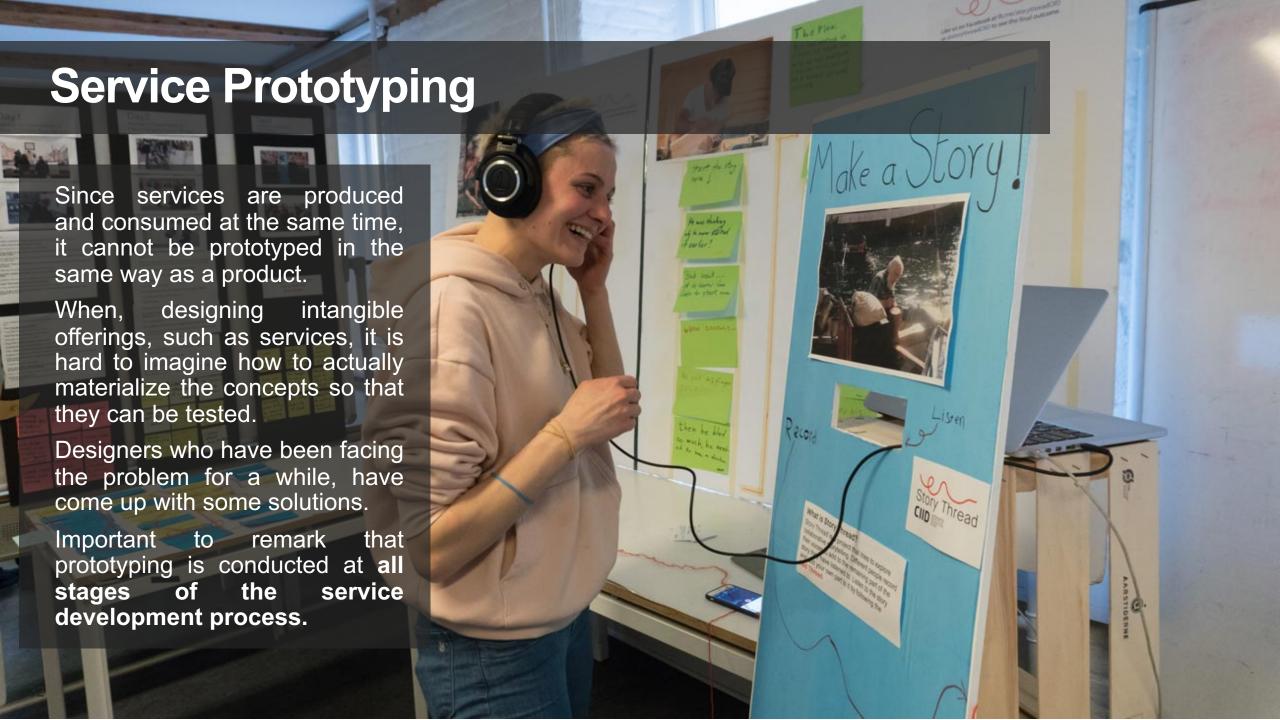
Aircaft queue example in Anylogic

- The benefit of mapping a service as a BPMN is that it becomes easier to run a **computer simulation** out of the model

- A popular technique is Discrete Event Simulation (DES)

- A discrete-event simulation (DES) models the operation of a system as a (discrete) sequence of events in time. Each event occurs at a particular instant in time and marks a change of state in the system.

- Possible tools:
  - http://automod.se/ (Production)
  - https://www.anylogic.com/ (Product)
  - https://simpy.readthedocs.io/en/latest/ (for Python geeks ☺)

Service Prototyping

Since services are produced and consumed at the same time, it cannot be prototyped in the same way as a product.

When, designing intangible offerings, such as services, it is hard to imagine how to actually materialize the concepts so that they can be tested.

Designers who have been facing the problem for a while, have come up with some solutions.

Important to remark that prototyping is conducted at **all stages of the service development process.**

1. Storyboarding

Service storyboards are sketches/visualizations of a future usage scenarios depicted with illustrations and small texts.

- When using storyboarding, the data for testing is usually collected directly and analyzed qualitatively. The participant involvement is either **attitudinal** — they share their perceptions of the service, or **generative** — they co-create scenarios.

- Possible tool: https://www.storyboardthat.com/

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2. Desktop Walkthroughs (Paper prototyping)

https://youtu.be/x702HnQjZP8

- Desktop walkthroughs are small-scale representations of service concepts and part of the service systems and processing by using handcraft materials and toys.

- The data for testing is collected directly and analyzed qualitatively. The participant involvement is either **behavioral** — they interact with the prototype, or **generative** — they co-create the scenarios. The participant interaction is typically scripted — they try to accomplish certain tasks

2021-01-24

3. Role playing (Body storm)

https://youtu.be/hkAFdIrTR00

- Role-play (a.k.a bodystorm) prototypes are enactments of services. Their purpose is to help designers understand the nuances of the design challenge and explore new solutions through experiencing the service situation physically.

- The data for testing is collected directly and analyzed qualitatively. The participant involvement is either **behavioral** — they interact with the prototype, or **generative** — they co-create the scenarios.
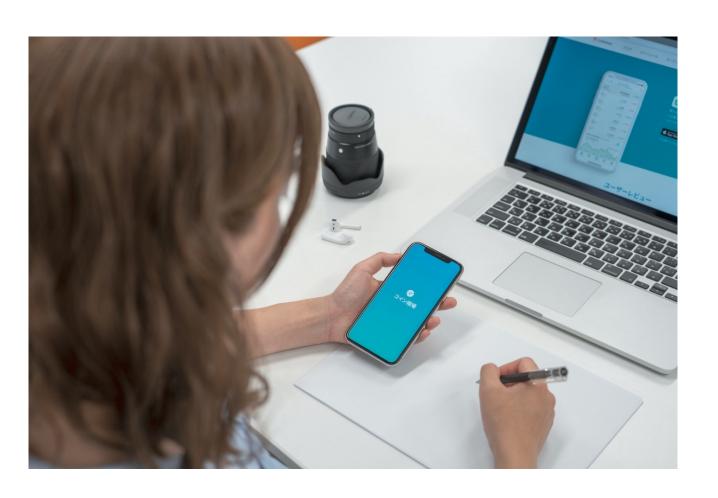
4. Service Walkthroughs (experience prototyping)

- Service walkthroughs or service simulations are full-scale representations of service concepts and parts of the service processes and systems. They tend to mimic the environments of the intended service contexts and can include some props and mock-ups.

- The participant involvement is either **behavioral** — they interact with the prototype, or **attitudinal** — they express their perceptions.

- The downside is that the **co-creation** process becomes more difficult at this stage

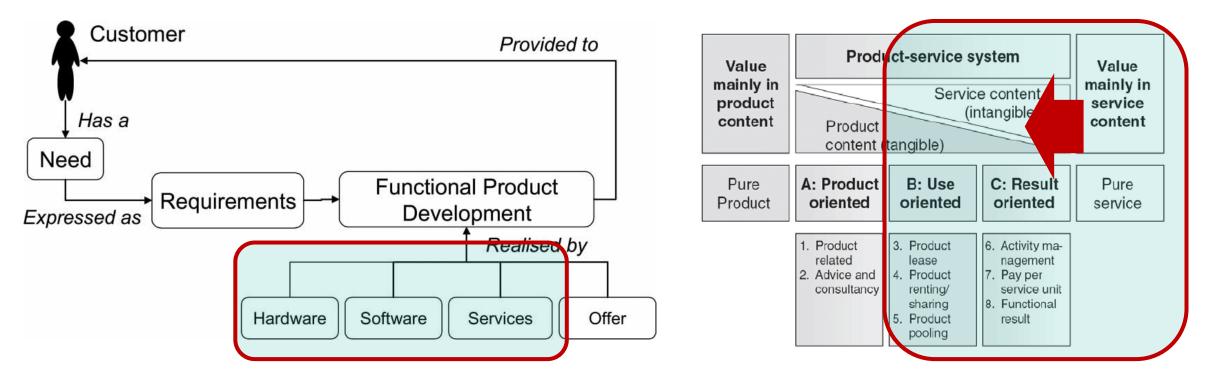2021-01-24

5. Digital mockups

- Digital mock-ups are representations of digital interfaces with their look, feel and properties but without the programming.

- Possible tools: https://www.uxpin.com/

- https://www.figma.com/

- The participant involvement is **behavioral** — they interact with the prototype. The participant interaction is typically **scripted** — they try to accomplish certain tasks.
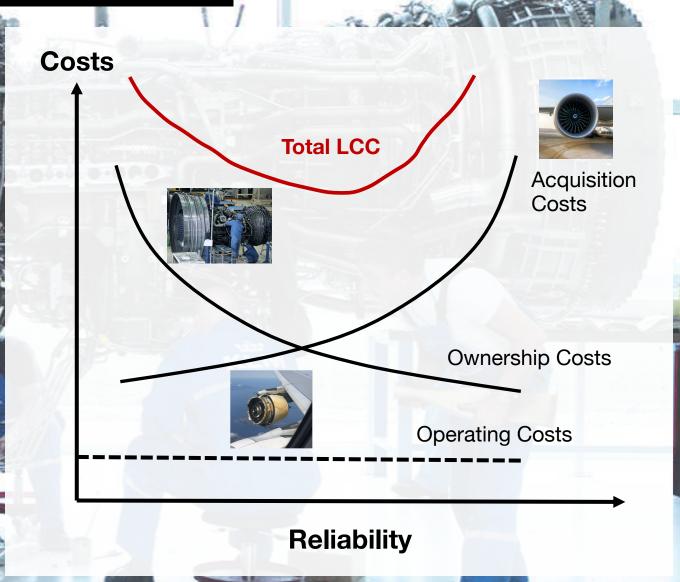
From service… to PSS

- When the solution presents a high mix and interaction between hardware and service, the hardware choices have an impact of the **maintenance and availability** of the product and hence on the success of the offerings

- Overlooking at these dependencies can be a cause for major risks and costs
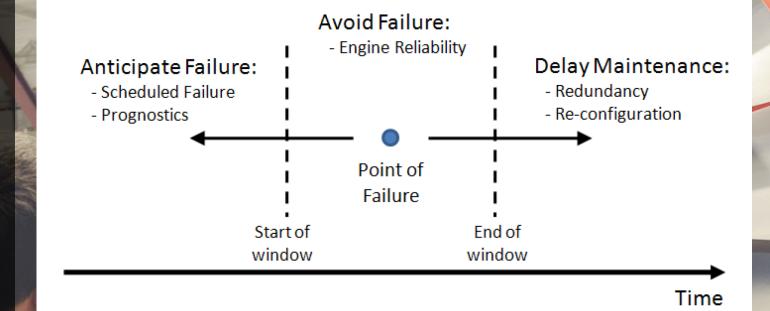
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Impact of Maintenance on PSS

- Offering a PSS implies selling **availability of the product over time**

- Hardware choices has an impact on **availability influencing factors**, such as reliability, maintainability and maintenance support

Costs

Total LCC

Acquisition Costs

Ownership Costs

Operating Costs

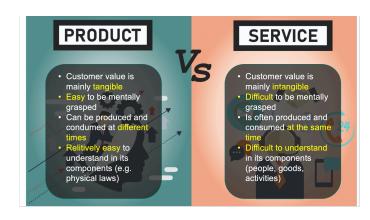Reliability

Impact of Maintenance on PSS

- Also, service choices has an impact on **availability influencing factors**
- **anticipation of failure and taking appropriate actions during the maintenance period,**
- **The delaying of maintenance, following failure, to a subsequent maintenance period.**
- **These topics will be introduced by Torbjörn next week**

Anticipate Failure:
- Scheduled Failure
- Prognostics

Avoid Failure:
- Engine Reliability

Delay Maintenance:
- Redundancy
- Re-configuration

Point of Failure

Start of window

End of window

Time

Key takeaways

- Product and services present different characteristics

- Therefore, product and service development need to deploy different methods

- Methods for service design can be distinguished into
  - methods for **representing** (customer journey map, use case diagram, activity diagram, business process modelling)
  - and methods for **prototyping** (Storyboarding, Desktop Walkthroughs, Role-playing, Experience Prototyping, Service Walkthroughs, Paper Prototyping, Digital Mockups)

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