PA194 Introduction to Service Science

What is Service Science?

Service Science means curricula, training, and research programs that are designed to teach individuals to apply scientific, engineering, and management disciplines that integrate elements of computer science, operation research, industrial engineering, business strategy, management sciences, and social and legal sciences, in order to encourage innovation in how organizations create value for customers and shareholders that could not be achieved through such disciplines working in isolation. (U.S. National Innovation Investment Act, 2007)

Service Science is trying to interconnect IT an “the rest of the world”.

What is service?

- Services are processes, performances, or experiences that one person or organization does for the benefit of another
- In all cases, service involves deployment of knowledge, skills, and competences that one person or organization has for the benefit of another, often done as a single, customized job (Lusch & Vargo)

Characteristics of a service

- Services we speak about are information and knowledge intensive
- Output is intangible, hard to quantifiable and measurable
- Non-storable
- Lack of mobility
- Consumption runs simultaneously with the supply
- The customer is presented on the production
- Hardly specifiable

What is science?

- To help service managers to achieve standardization
- Assembly of standardized modular service elements in several "customizable" but highly predictable permutations
- Customers seeks for value standardization because it reduces variability and usually helps bring prices down
- Services in the digital economy employ standardization and mass customization
- A new service definition might focus on the technical nature of modern days service

Key trends

- Services have become a driving force in economics around the world
- Services represent more than 70% of global GDP.
- The services sector in EU accounts for almost 70% of EU GDP.
- Also manufacturing industries include more and more services. There are becoming part of tangible and intangible products
- Services are more and more knowledge and information intensive
- Service innovation is recognized as key for the economic growth and competitiveness
- Academic programs and research activities in engineering and business schools did not meet the needs of this sector.

- Universities, governments and industry start to work together to ensure that service become a distinct and legitimate area for research and teaching.
- ICT plays a major role in services innovation and realization

Industry request

- Industry signals that most of entry level engineers lack necessary skills especially in soft skills and in legal and economic framework.
- In detail:
    - Ability to communicate effectively to technical and non- technical audience
    - Ability to self-educate
    - Ability to work in heterogenous teams
    - Willing to take risks, experiments, and to be innovative
    - Global engagement
- Questions:
    - How would IT expert recognize the right identification of customers problem?
    - How does customer choose the right solution from the IT expert offers?

Solution

- To be able to answer both questions we need:
    - IT expert that has knowledge from both sides
        - Can analyze problem on customer side
        - He knows proper IT tools
        - Has multidisciplinary knowledge
    - IT expert can act on any side of the market (customer or supplier)
- This expert should be a Service Science educated

Product and Service Dominant Logic

Product dominant logic paradigms

- A manufacturer develops a product
- The manufacturer makes the product
- The product is given to the market
- A consumer buys the product
- The consumer uses the product
- The supplier eventually provides additional support of the product
- The consumer gets rid of the product

Product dominant logic

- The process is considered as an ownership transfer
- The producer and buyer are not closely connected
    - They are in touch only in the moment of ownership transfer
- The product is tangible, and it is easy to convert it to money
- The major task in production is an optimization of product quantity according to fixed and variable costs
- The main goal is to achieve maximum profit in short term
- Only difference for the services is immateriality

Service Economy

Service is:

- Associated with the work that servants did for their masters
- Set of the benefits delivered from accountable service provider, mostly in close co-action with his service suppliers, generated by the functions of technical systems and/or by distinct activities of individuals, commissioned according to the needs of his service customers
- Application of specialized competencies through deeds, processes and performances for benefit of another entity or entity itself (Vargo and Lush)
- Application of competencies for the benefit of another, meaning that service is kind of action, performance or promise that is exchanged for value between provider and client

Service dominant logic

- The emphasis is not on tangible product
    - Is on services the customer can get
- No matter if the service is realized using product or someone else to perform the service
- Ownership is not important
- The customer obtains benefits by renting to:
    - use a physical object
    - hire the labor and expertise
    - pay for access to facilities and networks
- Customers do not buy goods or services
    - They buy offerings which render services that create value
- Traditional division between goods and services is outdated
    - Activities render services
    - Things render services
- Shift of focus to services leads to shift from producer perspective to customer perspective
- Example:
    - You buy toothbrush to clean your teeth
    - The service (problem to solve) = to clean dirty teeth to impress a girl / boy
    - The service can be enlarged by communication with the customer
        - For mouth wash
        - Specialized toothpaste – white teeth, mint breath
        - Electric teeth brush

Basic Service Economy Paradigms

- Service is the fundamental basis of exchange
    - The application of operant resources
        - The seller uses his resources to provide the service
    - The basis for all exchange
        - There is not possible to simply exchange the product without using services or this possibility is only marginal
    - Service is exchanged for service
        - Services are used on both sides of the market to finish the transaction
    - Example: Buying a phone, you really buying the services related with the phone, not the phone itself.
- The customer is always a co-creator of the value
    - The role of the customer is interactional

    - The customer cannot be ignored
    - Without interaction with the customer the transaction cannot be finished
    - Value creation is interactional
    - Example:
        - You cannot provide the cloud service without communication with the customer and analyzing of his/her needs
- All social and economics actors are the resource integrators
    - Value creation is network of networks
    - The sellers need to buy other services
        - They are customers for other providers
        - They also participate on value creation
    - The integration of the resources is kind of the service
    - Also, final customers need to integrate resources
    - Example:
        - To provide Software as a service you need to integrate cloud services, project management services and the others
        - But to know how to use those services, you need to integrate the skills, knowledge and information – the real resources
- Value is always uniquely and phenomenologically determined by the beneficiary, so value is:
    - Idiosyncratic
        - Designed for specific for every customer
    - Experiential
        - The knowledge and information are not static
    - Contextual
        - The combination of knowledge and information is unique in every case
    - Meaning laden
        - Client and provider should understand the meaning of the value

Advanced SDL Paradigms

- Indirect exchange masks the fundamental basis of exchange
- Goods are distribution mechanism for service provision
- Operant resources are the fundamental source of competitive advantage
- All economies are service economies
- The enterprise cannot deliver value, but only value proposition
- A service-centered view is inherently customer oriented and relational

Indirect exchange masks the fundamental basis of exchange

- The application of specialized skills and knowledge is the fundamental basis of exchange
- Service is provided through complex combinations of goods, money and institutions
- But still, the fundamental basis is about knowledge, skills and information
- Example:
    - BMW or Volvo cars comparing to Dacia
    - The basic usage is the same, difference is in the skills and knowledge of such a company

Goods are distribution mechanism for service provision

- Goods deliver their value through use
- Using goods is the service

- We are not buying goods to own them but to use them
- Price difference is based on the difference of service the goods provide
- Example:
    - The goods the customers are buying on amazon.com
    - These goods can be bought anywhere else – the reason why the customers are buying it there are services
    - The goods are just „channel“ for the services

Operant resources are the fundamental source of competitive advantage

- We speak bout knowledge an information intensive service
- The services are provided by combination of specialized knowledge, ownership of information and combination of other resources (labor, capital)
- The comparative ability to cause desired change drives competition
- Example:
    - Success of innovative companies – like kiwi.com
    - Their only advantage was their knowledge, information and unusual way of their usage

All economies are service economies

- Present economics systems cannot exist without services
- Even developing countries are dependent on services
    - Example: Payments are done by mobile phones
- Services are now becoming more apparent with increased specialization and outsourcing
- Example:
    - The services innovation in Estonia took them to the position of innovation leader

The enterprise cannot deliver value, but only value proposition

- Not only enterprise, generally every entity providing a service (provider)
    - School, university, state
- Provider can offer their applied resources for the value creation
- Collaborate on value creation following acceptance of value propositions
- Cannot create and/or deliver value independently
- Example:
    - University and its study programs are just value proposition, the students will not be successful without their own activity

A service-centered view is inherently customer oriented and relational

- Service is defined in terms of customer-determined benefit
- Service is co-created with the customer
- Only customer decide the final version of the service
- Co-creation is inherently customer oriented and relational
- Example:
    - Development of the IT services
    - Always need to ask about the core of an issue they are solving and find a real source of problems

Comparison

Product Dominant Logic:

- Customer is value destroyer
- Customer has limited power to impact quality or features
- Customer is motivated to destroy goods to buy new one
- Seller is maximizing short time profit

Service Dominant Logic:

- Customer is value co-creator
- Customer communicates with seller about all features of the service
- Long time relationship is preferred
- Seller is maximizing the longtime profit

Service System

Service modelling

- Service is action bringing some usefulness to receiver of this action.
- Purpose and/or goal of this action must be the use (usage) of the action results or outcomes
- Provided actions are strongly connected (related) to knowledge and information.
- Knowledge - information and final usefulness are positively correlated

Service properties

- Provider – somebody / something that perform the action and by this provide the service
- Client – somebody / something that receives results of this action
- Where somebody / something could be
    - Individuals
    - Organized group of individuals
    - Technology assembled and organized into value adding application
    - Any combination of previous items
- Target is the part of the reality to be transformed or operated for the sake of client
- It could be practically anything
    - An individual
    - A group of individuals
    - An organization
    - Computer network
    - Technology
- It is “the source of the problem”

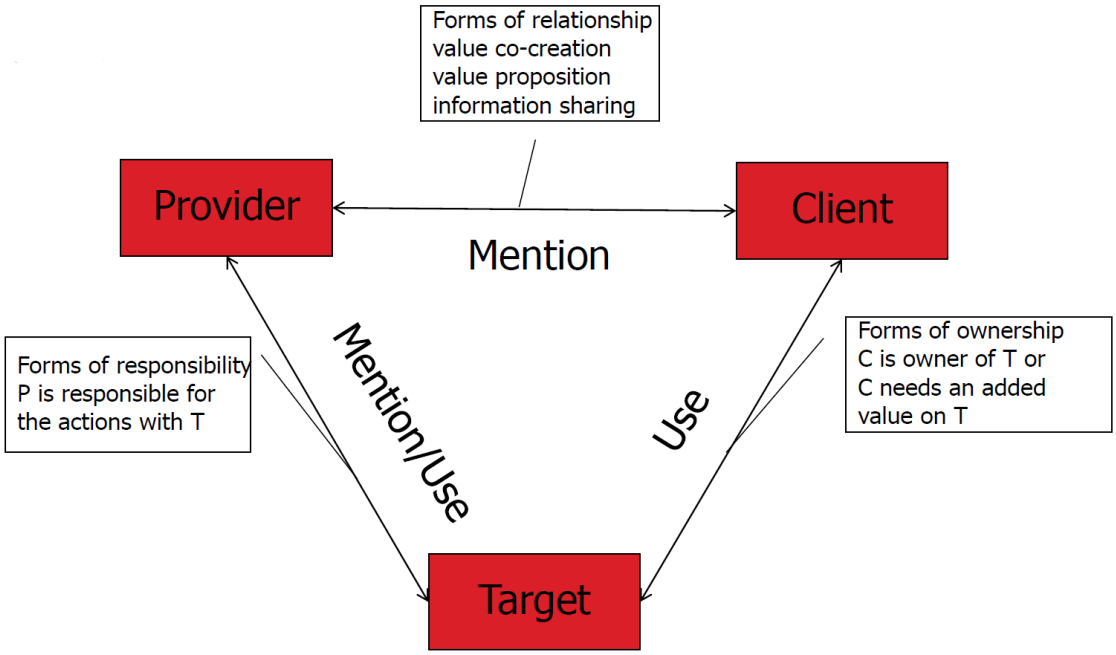
Service features

- A service can be one shot or repeatable
- Each service is connected with shared information
- Each service is connected with shared knowledge
- The key value is the performance (actions) of the services
    - Done now or promised in the future

Service system

- Provider
    - Individual
    - Organization
    - Any of previous combined with the technology and/or piece of environment
    - Technology that provider is responsible for

- Client
  - Individual
  - Organization
  - Any of previous combined with the technology and/or piece of environment
  - Portion of reality owned by Client
- Target
  - The reality to be transformed or operated on by Provider for sake of Client
  - People, dimensions of business
  - Dimensions of products, technology artefacts & environment
  - Information, codified knowledge



Client – Provider relationship

- Information Sharing
- Knowledge Sharing
- Negotiations
- Balancing and establishing Value Proposition
- Repetitive reviewing of previous items
- In Mention Mode

Client – Target connection

- Client owns the Target
- Client owns rights to use and/or manipulate the Target
- Client has (owns) problem
  - Client recognizes a problem on the Target
  - Client is willing to invest to the problem solution
- The solution involves an operating and/or transformation of the Target
- Relation is in Use mode

Provider – Target connection

- Kind of competence
- Provider knows and is able to operate on the Target
- Provider knows how and is able to transform the Target
- Provider understands the Target and is able to plan operation on transformation of it
- Provider improves Target for better utilization by the Client (benefit for the Client)

Value creation

- What is the value?
    - Sake of client?
    - The benefit of the client
- Value is strongly related with the target
- Value is created by both (client + provider)
    - Value is co-created
- Value can be created only if Client wants (or needs) an added value on Target
    - Identifying a gap

Value proposition

- The most important connection between C and P
- The offer done by provider to the client
- What he/she is able to do with the target to increase beneficiary of the client
- Based on
    - Knowledge about target
    - Information about client
    - Similarities on the market
- What we can do for what price

Mentioning and Using

- Mentioning
    - To think about future actions
    - What / how / who / where / when / why / for how much
    - Negotiation between client and provider
- Using
    - Use our capabilities to do some action to bring a value
- Duality between mentioning and using
    - Each entity can mention, use or make both
- Project management
    - Application of the principle of mention / use

System complexity

- Provider, Client or Target may contain one or more service systems
    - Those service systems need to cooperate in some way
    - The cooperation between those service systems is also service system
- If they are not a simple person or technology
- They can be organization, more complex entity etc.
    - Technology with the community of developers
- It must be organized in synergy
    - Some services must be finish first, some in the specific order etc.

The time dimension

- Selling a service means a lot of preliminary work
- Sold product means success
- Selling a service is the beginning
    - Start of the service execution
    - Preliminary work is about
        - Value proposition
        - Service modelling
- Providing services means continual development
- To stabilize the service system is necessary to continue with the cooperation

Role of time

- The roles of all elements are not changing during whole life cycle of the service system
- Time period of existence of a service system is not a trivial one compared to actions performed within a service provision systems
- The dividing of the time and planning of the life cycle are important for the relationship client – provider

Example

- Two companies
    - Software developer EasySoft
    - Telecommunication company Telecoco
- Problem
    - Telecoco want to have outsourced information system, developed by EasySoft
- The service system is easily created
- Is there any possibility (or need) to create other service system?
- And if yes, are they related?
- Service system:
    - Provider – EasySoft
    - Client – Telecoco
    - Target – Information system
    - Benefits are focused to the client
    - Easysoft uses its competencies to act for the sake of Telecoco
    - There is one more special relationship
        - The payment is also service system
- Payment service system:
    - Provider – Telecoco
    - Client – EasySoft
    - Target – the bank account of EasySoft
    - The provider (Telecoco) acts on Target (send the payment) for the sake of EasySoft
    - This service system cannot exists without the first service system

Prime service system

- Primary created service system
- The roles are distributed and do not change
- Creation of this service system causes the creation of next service systems
- We need to analyze
    - The relationships between them

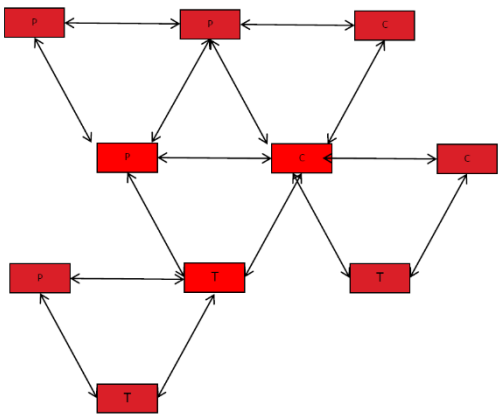
- The possibility of influence
- The causes of synergy

Cooperation of service systems example

- Study program SSME and cooperation with business partners on internships
  - Client – business partner
    - Wants to have properly educated students
  - Provider – Faculty of informatics
    - Has abilities to educate the students
  - Target – study program SSME
    - Provides the students
- Internships projects
  - For the successful study program faculty needs
    - Practice – an internships with quality emphasis
    - Mandatory for every student enrolled in the program
  - Client – faculty of informatics
    - Demand the internships positions for the students
  - Provider – The company
    - Offers the positions for the students
  - Target – The study program SSME
    - Students are „only“ the products of the study program
    - Faculty wants to improve the study program
      - Through the internships
      - Using the feedback from the partners
- In this case the target is the same in both cooperating service systems

Service system environment

- Are there any other possibilities of the cooperation?
- What to do if
  - Client or Provider in one service system plays the role of of the Client, Provider or Target in other service systems?
  - If the value proposition or the benefits depends on other related service system?
    - Company is able to pay only if its customers will pay
    - Value proposition can be set properly only if we know all related inputs
- During negotiations must be explored not only the target, but also all important relations
  - Cooperating service systems
    - Dual service systems
  - Related service systems
- After that the value proposition can be set



Role of information and IT

What is the information?

- In common language
  - Knowledge to be presented, content of the message, answer to a question
- In science
  - Data on the properties, setting and arrangement of the object
- In informatics
  - Coded data that can be sent, received, saved and processed by technical equipment

Economics view to information

- Till 60s of 20th century
  - Information are „perfect“
  - All parties have same access to the information
  - Information are public goods
  - Some authors mentioned marginal problem to access information (Smith, Marshall, Keynes)
- 1961 – George Stigler – Economics of information
  - Information is valuable source
  - First try to set the price mechanism

Economics of information

- Perfect information
  - All participants of the game can see the cards of others as well as the undistributed cards in the package
- Incomplete information
  - All participants have the same information, but no-one has information advantage
  - All participants can see cards of the others, but undistributed cards are hidden
- Asymmetric information
  - All participants can see only their cards
  - Some information is private
- The game theory – one of the sources of analysis
  - Imperfect information
    - One player does not know the behavior of the others
  - Incomplete information
    - One or more players do not know one or more aspects of the game rules, necessary for their decisions

Stigler's model

- Seniors game
  - Where to buy a particular good for the cheapest price
- Assumptions
  - The buyer knows all shops, where he can buy this product
  - The buyer does not know the prices in the shops
  - The buyer is prone to invest some costs to find the lowest price
  - The amounts of those costs are limited
- What do we do now to solve this problem?

The searching costs

- The valuation of the time, needed for the finding of the information
- The costs for the searching must be same or less than expected profit
- Conclusions
    - The costs for the searching are individual
    - The reduction of the problem to the price difference is wrong
        - The value is also important
    - The analysis of the problem is too simple
    - IT rapidly decline the searching costs

Quality of information

- If you are buying some product or services, how you can be sure about its quality?
- Guarantee
    - Insurance for the product failure
    - Impulse for the producer to improve the quality
    - Has information value – indicator of the product quality
    - Direct influence to the producer reputation
    - Selecting (extended) guarantee can be used for the customer discrimination

Moral hazard

- Is a tendency to take undue risks because the costs are not borne by the party taking the risk
- The customer is able to affect an event he is insured against, but the seller has no power to monitor or affect this event.
    - Insurance company do not know how you use your car
    - ERP supplier has limited information about customers IT security
- Double moral hazard
    - Supplier gives only limited or minimal guarantee
    - Customers information about product quality is limited

The market of Lemons

- Author: G. Akerlof
- Lemon = used car
- Main assumption
    - Every used car has hidden defect
    - If it would not have, the owner should use it instead of selling it
    - The owner of the good car is not motivated to sell the car
    - The quality of used cars on the market is very low
- Conclusion for Lemons market
    - The price for the comparable cars will be the same
    - The buyer has limited possibilities to recognize the real quality of the car
    - If the quality of offered cars would drop under level of the price, the market would be empty
- Solutions from Lemons market
    - The way how to deal is to create informed customer
    - If customer know how to distinguish the lemon, he will be able to make a business
    - There is still place for selling lemons to less informed customers

Auctions models

- Situations
  - A holder sells a special kind of product or good (art)
    - Not able to estimate the value for the buyer
    - To declare a price
      - Someone is willing to pay more
  - A customer buys a unique kind of the service
    - Not able to estimate the real costs
    - To declare a price
      - Someone is willing to deliver the service cheaper
- Solution
  - Move the asymmetry to the other part of market

Types of auctions

- With common value of the product
  - Each participant has his own value of the product
  - Participant do not know the valuation of each other
  - English auction
    - The price grows according to the orders
    - The highest price wins
  - Dutch auction
    - The price is set on the highest lever
    - The price is reduced
    - The first call wins
- With independent private value of the product
  - There is only one objective value of the product
  - Nobody knows it
  - Closed auctions
    - The offers are given before the first price auction
    - The highest or the lowest price wins
  - The second price auction
    - The highest and lowest offer are excluded
    - The second highest or lowest offer wins

Information gap

- Subjects on the opposite sides of the market have a different information about the subject of exchange
  - Seller has better information about the car
  - The insurance company must trust in its clients responsibility
- Information gap is the difference between two subjects on the market
  - Is positive – if the subject knows the information
  - Is negative – if the subject does not know the information
- Moral hazard – effect when the activity of one subject decreases the utility of the second subject concurrently with information gap on side of the second subject
- Information gap is not stable
- Examples
  - Try to find an example of the information gap you have met

Filling the information gap

- By distribution of the information?
- Removal of subject‘s disadvantage, based on nascence of particular information
- Subject must be willing to invest to filling of the gap

- The first condition is to identify the gap
- The filling is the function of time
- Questions
    - How will the subject fill the gap?
    - Can the gap be filled by itself?

Absolute

- The information are distributed from one side to the other
- Example
    - Register of insured persons
        - To know a history of new client
    - Register of debtors
        - To eliminate to risky clients
- Subjects facing negative gaps can join even if they are competitors

Relative

- If there is no way how to get the information
- Example
    - Bankrupt of travel agency
        - The client has no power nor possibility to find the information
    - Mandatory insurance of travel agency
        - The client does not need to take care about travel agency finance
    - Mandatory car insurance
- Relative filling is the eliminating of the gap's influence

More general attitude to information gaps

- Direct methods of filling
    - If the aim is particular information gap
- Indirect
    - The aim is more general
        - To prevent the creation of information gap
        - To solve whole problem
    - Indirect method to fill the gaps
        - Source of information
            - Subject that provide the knowledge or information
            - The way of transfer of the information
            - Primary source
                - Author of information
                - No changes on the character of information
            - Secondary source
                - Information is transformed
        - Information channel
            - If more sources of information join to use the same way of transfer

Role of IT

IT is a tool to:

- fill the gap – to distribute information
- To eliminate the gap – using IT services to interconnect subject with negative effects of a gap
- Manage the information
    - To prevent the influence of the gaps
    - To eliminate the gaps

The price of information

- Is almost individual
- It is equal to the searching (opportunity) costs
- It is important to divide the price of information and the price of access to information
    - To buy the possibility to search
    - To buy a possibility to share information
    - The question of technology
    - Higher speed means higher probability to find what I am looking for

Government and information

- It needs the information for making of the decisions
- It is important source of information
- It is supervisor on the market with information

Government as the information receiver

- The most of analysis is done by
    - State institutions
    - Ministry clerks
    - National bank
- The government is the source of information for itself
    - The analysis can be wrong
    - The decisions can be wrong – moral hazard
    - The question of time

The government and searching of information

- Where is the equilibrium of searching?
- Stigler model does not work
    - The process of searching is excluded from the process of evaluating and using of the information
    - The person who is searching does not know the effect
- We cannot be sure that the government has right information
- We cannot be sure the information is correct
    - Moral hazard
    - The Greece

The government as the source of information

- The government is not one source of information
- The motivation of the clerks
    - To publish only the information that are good for them
    - Moral hazard

- The subjects need the information from other source to prove it

The government regulates the market of information

- Direct approach
    - Problem of the identification of information gap
    - Absolute filling
        - How to do it
        - Law – market subject must give some information to the register
    - Relative filling
        - Not necessary to identify a specific problem, just a group of problems
        - Mandatory insurance
- Indirect approach
    - Development of information sources and channels
    - Support of using services
        - Data mail-boxes
        - Digital signature
        - E-government
    - Supporting the development of the information access

Service Science and Management

- Management is focused on
    - Negotiations
    - Finding source of the problem
    - Competencies of the people
    - Leadership
- The most important is synergy
- To create synergy in management means
    - Understand mission of the company
    - Share the vision of the company
    - Learn the strategy of the company
- Any organization is example of service environment

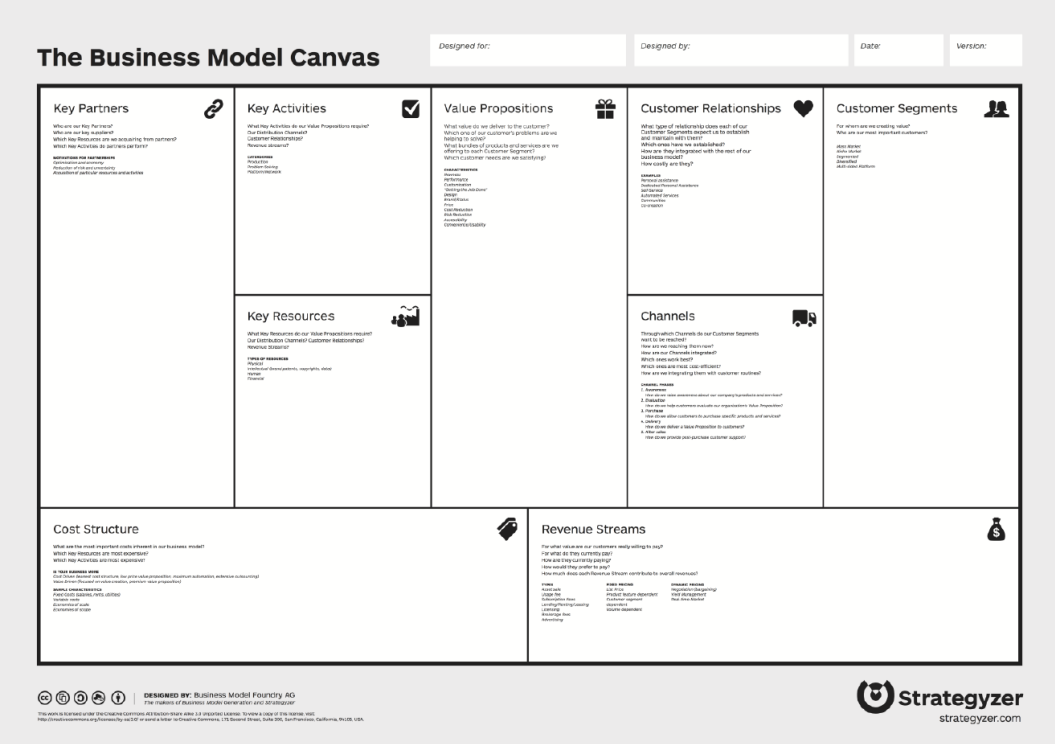
Organization as Service Environment

- Internal services
    - Supporting main business of the company
        - IT services, Cleaning services, Backup office, Accounting
    - Representing relations between people
        - Cooperation on the project
        - Communication in the company
- External services
    - Services company buys or sells

Management of Service Company

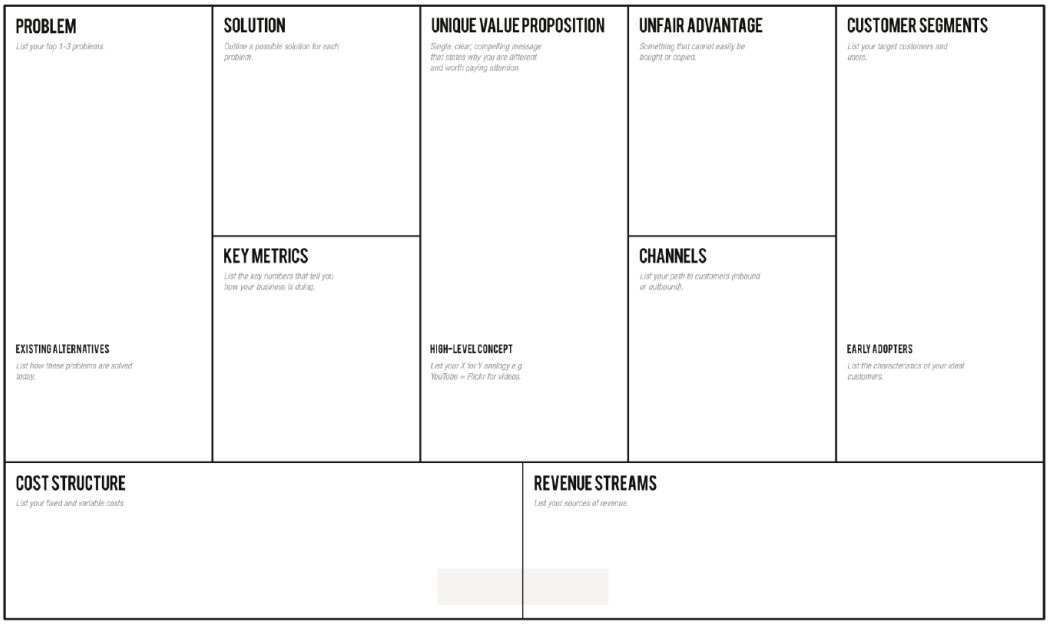
- A lot of new methodologies inspired by services
- New business models
- Switch from Business model Canvas to Lean Canvas

Business model Canvas



- Value of Business Model Canvas:
  - Think about new service/business
  - Think about your idea
  - Communicate and discuss your idea with others
  - Present your idea to investors
  - Count if it's profitable or not
  - Manage and improve your service/business

Lean Canvas



Service Science and Marketing

- Marketing is complex tool
    - how to promote your services
    - How to set up communication
- On some universities, service science is taken just like marketing tool
- Service Science is more complex
- It provokes the changes in understanding of marketing
- The main changes to marketing thinking
    - Always think about the customer
    - Build long time relationship
    - Involve the customer into value creation proces
- Switch from pushing relationship to synergy relationship
    - Relationship marketing
- It always helps in the building customer loyalty

Service Science and Economics

- Economics of information
- Service dominant logic is specific approach to economics reality
- It does not change the basic economics principles
- It looks to them from other point of view
- Moral Hazard as the motivation of creating service systems

Service Science and Soft Skills

- Key factor for multi-disciplinary approach
- To be able to set up a service system you need communication skills
    - To understand the position of customer
    - To find the problem
    - To present correct solution
- Service Science is affecting many other disciplines
- Complete switch of the world understanding
- Soft skills are mostly connected with
    - Communication
    - Behavior
    - Cognitive methods
    - Adaptation
- In Service Science people also tend to call „Soft Skills“ all knowledge that is not dominant

Service Science and IT

- Gives meaning to IT
- Analyzing environment
    - Gives examples of data usage
    - Is inseparable part of the environment development
- Helps to develop IT supported services
- Parent – child relation
- Cooperative relation
- Relation to information

Cooperative relation

- The purpose of IT is to provide service
    - Usage of IT is a service
    - It has power to support other services more than others
- SeS helps to adapt the service for particular user
- SeS says how to retain the user
- SeS defines how the product's value is developed
- The development of IT tools must not be purposeless (without specific aim)
- The concrete IT experts need to have multidisciplinary knowledge

Relation of Information

- Work of informatics specialists is about work with information
- Do they know all semantics and consequences?
- SeS is the reaction to moral hazard problem on IT market
    - a tendency to take undue risks because the costs are not born by the party taking the risk
- Double moral hazard
    - If both subjects are mutually in the relationship that causes moral hazard problem

IT Company

- Offers a big customised ERP system together with CMS system
    - CMS system has connection to Social Networks
- The problem to solve is the communication
- But it is not a part of the problem
- IT company needs to find its paths through particular targets – to analyse the situation if the client

Value

- Value proposition is hidden
    - is hidden by the hill
- Hierarchy of barriers hiding the target
    - have to be overcame step by step
    - leads to process of value estimation
- Value can not be proposed
- It can be only estimated
    - is used to find value proposition
    - there is not a target, only target area
        - target area is the space of all sub-targets, corresponding with particular value estimation

Value estimation

- modified by the value co-creation process
- motivated by the decreasing of the level of information asymmetry of both parties
- the process is about particularize of value estimations
- till the moment of founding the value Proposition

Value proposition

- can be found in the moment client and provider can see the target

    - share the same point of view
    - both can see the utility level
    - and share as well
- both partners agree with concrete mutual criteria of success
    - variables to test
        - no of customers
        - profitability
    - target values
        - number of customers rise of 30%
        - profitability rises more than 10%

Costs of Value Estimation

- must be shared and paid
    - problem is complex
    - must be understood and explored
- provider must be paid for using his sources to do it
- Client is paying for the analysis of the target area

World Understanding and Modeling

- We are using different tools and approaches to model reality
- Do we really understand the models?
- Are the models readable for others?
- What if we need to communicate with people from other domains?
- And what if we need to achieve understanding across domains?
- How we can model in multidisciplinary way?
- Problem:
    - What if we need to model Smart Street?
    - But from what perspective?
        - IT devices
            - networks
            - sensors
            - controllers
        - Infrastructure
            - water
            - electricity
            - facilities
        - Equipment
            - streetlight
            - benches
            - bus stops
- Solution is to go back to our roots and ask
    - What are we modeling?
    - The answer is – objects from the real world
    - Where are we modeling?
    - The answer is - in our mind!
    - How does any person build own mind model?

Why We Need Diamonds

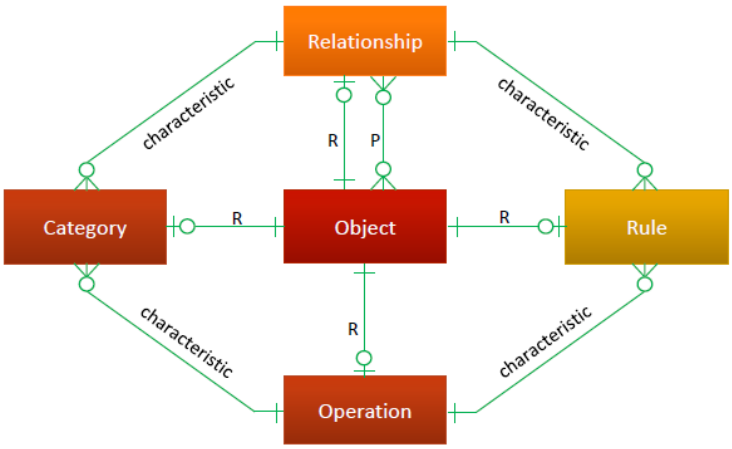
- We need to describe things
- And their relations
- In some given context
- Than we need to organize/plan operations
- And execute them in some time perspective
- Our natural language is
    - Redundant
    - Ambiguous

4 Diamonds

- **See:** Describing things (objects) and basic relations
- **Recognize:** Adding context to relations
- **Organize:** How agents behave to recognized objects, what kind of operations we can do
- **Do:** Executing planned operations and getting results

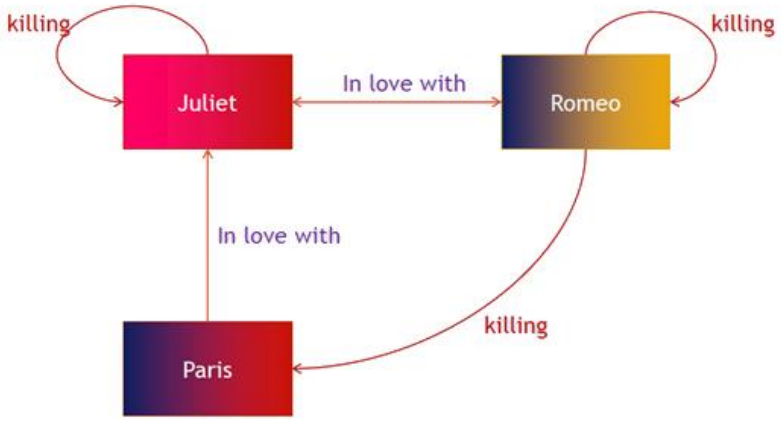
See

- We are describing the seen object
- It has
    - Particular shape or form
    - There can be some different variets of this object
    - It can be used for some purposes
    - Using this object is under some rules
- There can be connections to other objects



Objects and relationships

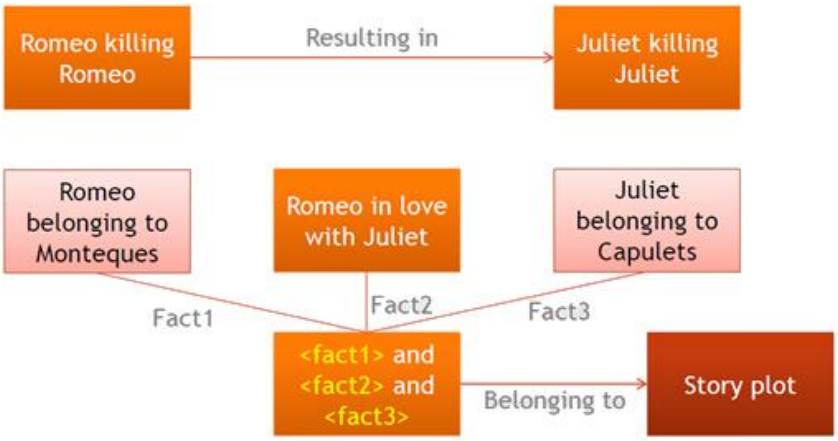
Name	Relationship	Name
Road	Is on	Street
Car	Is on	Road
Bus	Is on	Road
Bicycle	Is on	Road
Pedestrian way	Is on	Street
Driving	Are dividing	Road
Trees	Are plant on	Road



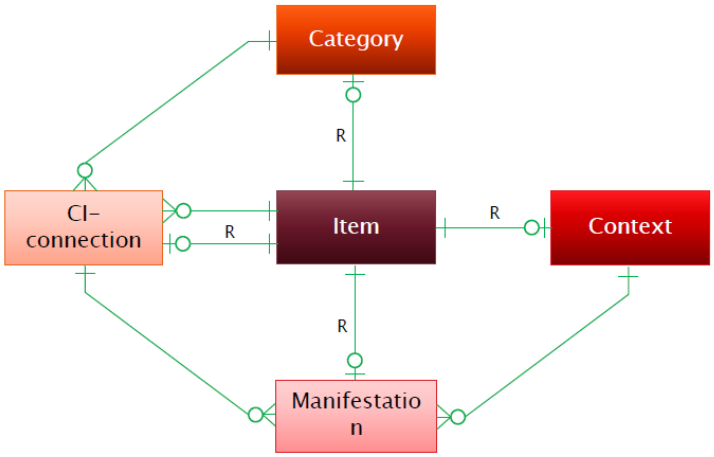
Recognize

R-edges

In some cases, it might be also useful to mention nontrivial concepts – contexts, categories, classifications or manifestations.



Context serves as a model. The base edge defines the set of categories to classify its items to.

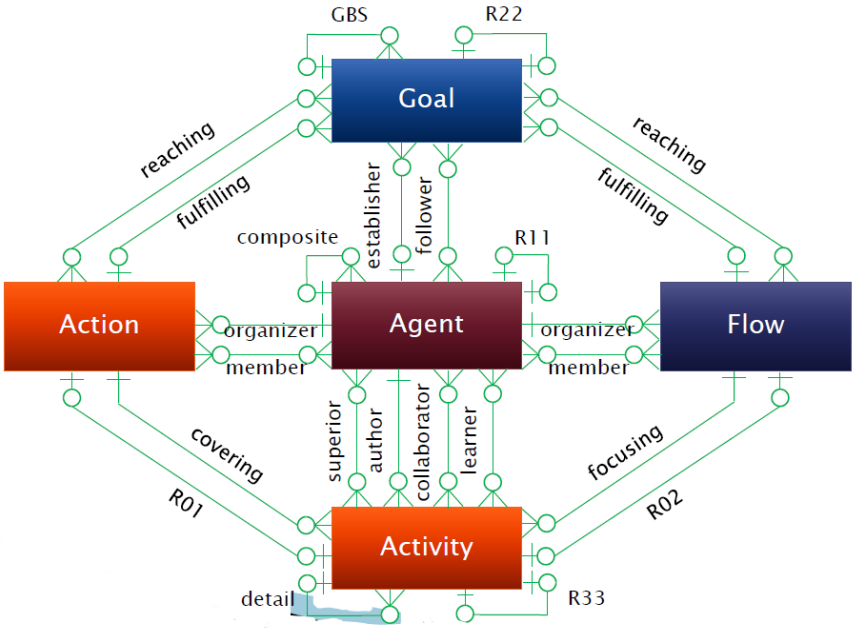


Why we need it?

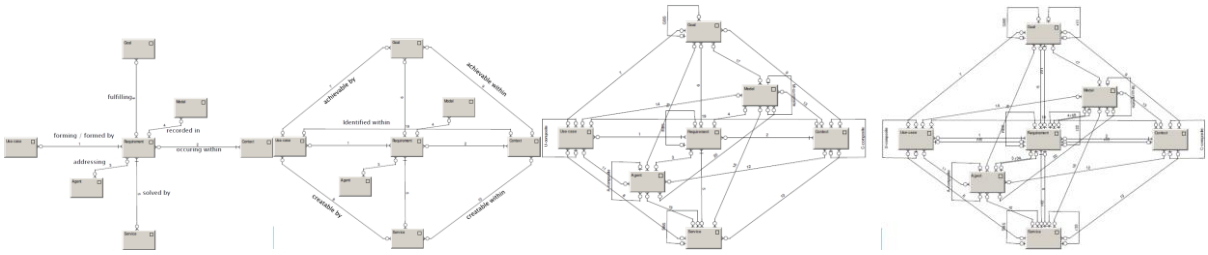
- In the complex service environment (like Smart City) only one perspective is not enough
- Already in a very simple applications we need to work with different manifestation of the same item
- If we add the relation to other Services, environments we get very complex model
- To understand we need to have the possibility to analyze the manifestation of each item in all contexts

Organize

- How is your life / position / work organized?
- How can be some agent
    - Member of some team
    - Work on projects
    - Be educated or teach
- Matrix-based organization: Action vs. Flow



Do



https://is.muni.cz/el/1433/jaro2013/PV202/um/SSMEstar_manuscript.pdf page 264

System Usability Scale (SUS)

- Measurements of Usability
    - Effectiveness (can users successfully achieve their objectives)
    - Efficiency (how much effort and resource is expended in achieving those objectives)
    - Satisfaction (was the experience satisfactory)
- Scoring SUS
- Users will have ranked each of the 10 template questions above from 1 to 5, based on their level of agreement.
    - For each of the odd numbered questions (1,3,5,7,and 9), subtract 1 from the score.
    - For each of the even numbered questions (2,4,6,8 & 10), subtract their value from 5.
    - Take these new values which you have found, and add up the total score. Then multiply this by 2.5.
- SUS scores have a range of 0 to 100
- The average System Usability Scale score is 68. If your score is under 68, then there are probably serious problems with your website usability which you should address. If your score is above 68, then you can relax a little bit.
- Here's an overview of how your scores should measure:
    - 80.3 or higher is an A. People love your site and will recommend it to their friends
    - 68 or thereabouts gets you a C. You are doing OK but could improve
    - 51 or under gets you a big fat F. Make usability your priority now and fix this fast.

SERVQUAL

When there is some service, how good this service is?

The Five Key Service Dimensions

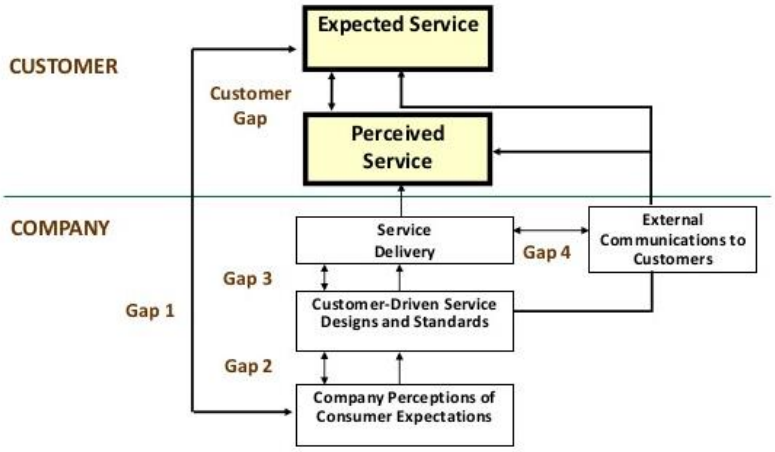
Dimension	No. of Items in Questionnaire	Definition
Reliability	5	The ability to perform the promised service dependably and accurately
Assurance	5	The knowledge and courtesy of employees and their ability to convey trust and confidence
Tangibles	4	The appearance of physical facilities, equipment, personnel and communication materials
Empathy	5	The provision of caring, individualized attention to customer
Responsiveness	4	The willingness to help customers and to provide prompt service

Dimensions of Service Quality

- Reliability:
    - Perform promised service dependably and accurately.
    - Example: receive mail at same time each day.
- Responsiveness:
    - Willingness to help customers promptly.
    - Example: avoid keeping customers waiting for no apparent reason.
    - Quick recovery, if service failure occurs
- Assurance:
    - Ability to convey trust and confidence.
    - Give a feeling that customer's best interest is in your heart

    - Example: being polite and showing respect for customer.
- Empathy:
    - Ability to be approachable, caring, understanding and relating with customer needs.
    - Example: being a good listener.
- Tangibles:
    - Physical facilities and facilitating goods.
    - Example: cleanliness.

Service Gap



- Gap 1: The difference between management perceptions of what customers expect and what customers really do expect
    - Management may not understand how customers formulate their expectations from past experience, advertising, communication with friends
        - Improve market research
        - Foster better communication between employees and its frontline employees
        - Reduce the number of levels of management that distance the customer
- Gap 2: The difference between management perceptions and service quality specifications - the standards gap
    - Management unable to formulate target level of service to meet customer expectations and translate them to specifications
        - Setting goals and standardizing service delivery tasks can close the gap
- Gap 3: The difference between service quality specifications and actual service delivery - are standards consistently met?
    - Actual delivery of service cannot meet the specifications set by management
        - Lack of teamwork
        - Poor employee selection
        - Inadequate training
        - Inappropriate job design
- Gap 4: The difference between service delivery and what is communicated externally - are promises made consistently fulfilled?
    - Discrepancy between service delivery and external communication
        - Exaggerated promises in advertising
        - Lack of information provided to contact personnel to give customers

- Gap 5 (Customer Gap): The difference between what customers expect of a service and what they actually receive
    - Customer satisfaction depends on minimizing the four gaps that are associated with service delivery
    - expectations are made up of past experience, word-of-mouth and needs/wants of customers
    - measurement is on the basis of two sets of statements in groups according to the five key service dimensions

User-based collaborative filtering

- Let's predict the rating of Item 5 for Alice
    - Step 1: measure similarity
    - Step 2: make prediction based on similarities

	Item1	Item2	Item3	Item4	Item5
Alice	5	3	4	4	?
User1	3	1	2	3	3
User2	4	3	4	3	5
User3	3	3	1	5	4
User4	1	5	5	2	1

Measuring user similarity

A popular similarity measure in user-based CF: **Pearson Correlation**

a, b : users

$r_{a,p}$: rating of user a for item p

P : set of items, rated both by a and b

- Possible similarity values between -1 and 1

$$sim(a,b) = \frac{\sum_{p \in P}(r_{a,p} - \overline{r_a})(r_{b,p} - \overline{r_b})}{\sqrt{\sum_{p \in P}(r_{a,p} - \overline{r_a})^2}\sqrt{\sum_{p \in P}(r_{b,p} - \overline{r_b})^2}}$$

The Pearson correlation coefficient takes values from

- +1 (strong positive correlation) to
- -1 (strong negative correlation)

	Item1	Item2	Item3	Item4	Item5	
Alice	5	3	4	4	?	
User1	3	1	2	3	3	sim = 0.85
User2	4	3	4	3	5	sim = 0.70
User3	3	3	1	5	4	sim = 0.00
User4	1	5	5	2	1	sim = -0.79

Making predictions

A common prediction function:

$$pred(a,p) = \overline{r_a} + \frac{\sum_{b \in N} sim(a,b) * (r_{b,p} - \overline{r_b})}{\sum_{b \in N} sim(a,b)}$$

Calculate, whether the neighbors' ratings for the unseen item are higher or lower than their average.

Add/subtract the neighbors' deviation from the active user's average and use this as a prediction.

Similarity is used as a weight factor.

Voting Strategy

A list TV programs

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6

Utilitarian Strategy

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6
Group	21	18	13	22	26	26	17	23	20	22

- Ratings are added, the larger the sum the earlier the alternative appears in the sequence
- Tie: weight of the person will be considered
- Individual viewer might always lose, because their opinion happens to be a minority view

Multiplicative Strategy

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6
Group	100	180	48	378	630	648	180	432	210	384

- Multiplied, the larger the product, the earlier the alternative appears in the sequence

Borda Count

	A	B	C	D	E	F	G	H	I	J
John	8	1	0	2 ½	8	6	2 ½	4 ½	8	4 ½
Adam	0	7 ½	4 ½	7 ½	3	7 ½	2	7 ½	1	4 ½
Mary	9	1½	0	5½	8	7	1½	3½	5½	3½
Group	17	10	4½	15½	19	20½	6	15½	14½	12½

- Points are awarded to each alternative according to its position in the individual's preference list
- John has the lowest rating for C, C is 0
- An individual has multiple alternatives with the same rating, averagely distribute the points
- Add up

Copeland Rule

	A	B	C	D	E	F	G	H	I	J
A	0	-	-	-	0	-	-	-	0	-
B	+	0	-	+	+	+	0	+	+	+
C	+	+	0	+	+	+	+	+	+	+
D	+	-	-	0	+	+	-	0	0	-
E	0	-	-	-	0	-	-	-	-	-
F	+	-	-	-	+	0	-	-	-	-
G	+	0	-	+	+	+	0	+	+	+
H	+	-	-	0	+	+	-	0	+	-
I	0	-	-	0	+	+	-	-	0	-
J	+	-	-	+	+	+	-	+	+	0
Index	+7	-6	-9	+1	+8	+5	-6	0	+3	-3

- Copeland index: pairwise comparison
- The number of times an alternative beats other alternatives minus the number of times it loses to other alternatives

Approval Voting

Threshold 5.

	A	B	C	D	E	F	G	H	I	J
John	1			1	1	1	1	1	1	1
Adam		1	1	1	1	1	1	1		1
Mary	1			1	1	1		1	1	1
Group	2	1	1	3	3	3	2	3	2	3

Threshold 6.

	A	B	C	D	E	F	G	H	I	J
John	1				1	1		1	1	1
Adam		1	1	1	1	1		1		1
Mary	1			1	1	1			1	
Group	2	1	1	2	3	3	0	2	2	2

Least Misery Strategy

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6
Group	1	4	2	6	7	8	5	6	3	6

- Make a new list of ratings with the minimum of the individual ratings the higher the sooner the items get selected.
- The group is as happy as its least happy member.

Most Pleasure Strategy

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6
Group	10	9	8	9	10	9	6	9	10	8

- Opposite of Least Misery Strategy
- Make a new list of ratings with the maximum of the individual ratings

Without Misery Strategy

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6
Group	-	18	-	22	26	26	17	23	-	22

- Do not count items whose score is below a certain threshold (say 4)
- A new list of ratings with the added individual ratings

Plurality Voting

	1	2	3	4	6	7	8	10
John	A,E,I	E,I	I	I	H,J	J	G	C
Adam	B,D,F,H	B,D,F,H	B,D,F,H	B,D,H	B,H	B	B	C
Mary	A	E	F	D,I	H,J	J	B,G	C
Group	A	E	F	D,I	H	J	B,G	C

- Each voter will vote for his/her most preferred alternative in each round

Most Respected Person Strategy

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6
Group	1	9	8	9	7	9	6	9	3	8

- Dictatorship
- The idea behind this strategy is that groups may be dominated by one person
- Social effects

Smart Service for groups

- Research has been conducted in the domain of
  - TV, Movie, Recipe/food and Holiday
- Size of the group: 3-8
- Different strategies are used
- Psychological issues in group:
  - Emotional Contagion
    - other users being satisfied may increase a user's satisfaction (e.g. if somebody smiles at you, you may automatically smile back and feel better as a result)
  - Conformity
    - the opinion of other users may influence your own expressed opinion, based on the so-called process of conformity.

GOOD LUCK
