

# Managing product and service innovation

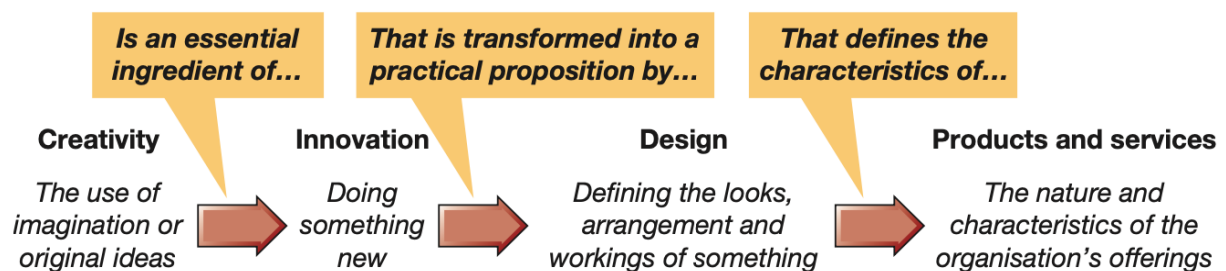
## 4.1 What is product and service innovation?

### Creativity, innovation and design

**Creativity** = ability to move beyond conventional ideas, rules or assumptions in order to generate significant new ideas (lack of creativity is a huge risk)

**Innovation** = something that is new, a change that creates a new type of performance, the process of introducing something novel. Transforming ideas into something that has the potential to be practical and provide a commercial return

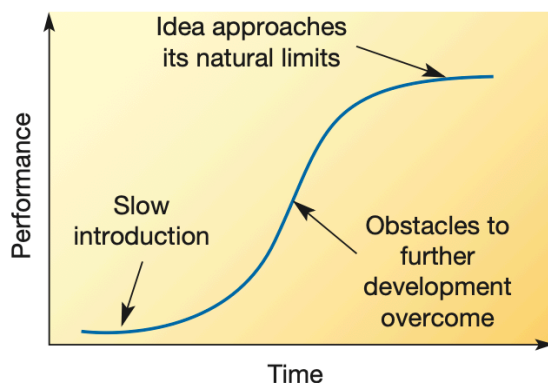
**Design** = the process that transforms innovative ideas into something more concrete



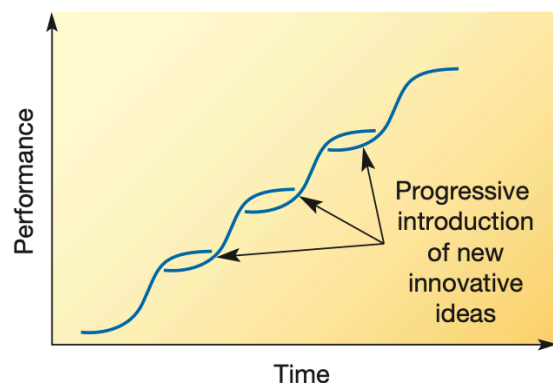
### The innovation S-curve

Performance follows an S-shaped process:

1. **Early stage** of the introduction of new ideas needs large amounts of resources, time and effort to introduce them – but small performance improvements are experienced
2. **Experience and knowledge** about the new idea grows over time and performance increases
3. **Established** idea extends its performance to a degree where further performance becomes difficult
4. **Maturity** – when the idea reaches its mature period it is vulnerable to new ideas being introduced which move in their own S-shaped progression



(a) The basic S-shaped improvement in performance



(b) Innovation following multiple S-shaped curves

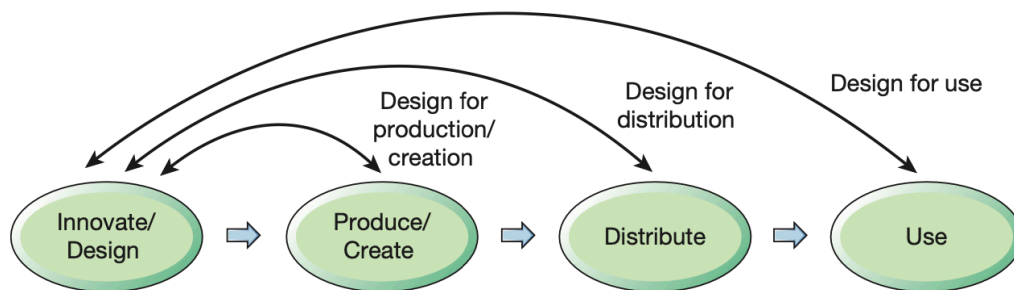
## Incremental or radical innovation

**Radical innovation** = often includes large technological advancements that may require completely new knowledge and/or resources. Radical innovation is rare but creates major challenges for existing players within a market since organizations often are unwilling to disrupt current modes of working in the face of a barely emerging market. By the time the threat has emerged it may be too late to respond

**Innovator's Dilemma** = innovation should be a process of creative destruction

**Incremental innovation** = involves relatively modest technological changes and builds upon existing knowledge and/or resources – existing services and products are not fundamentally changed

### Innovation is influenced by later stages in the value chain



**Figure 4.4** The influences on the design of a product or service are not limited to how it will be used, but include how it will be created and distributed

### Design for production/creation

Decisions taken during the design of a product/service effects how they can be created

### Design for distribution

Some products are designed so that when packaged they fit onto transportation pallets or containers

## 4.2 What is the strategic role of product and service innovation?

Effective product and service innovation processes add value to any organization by:

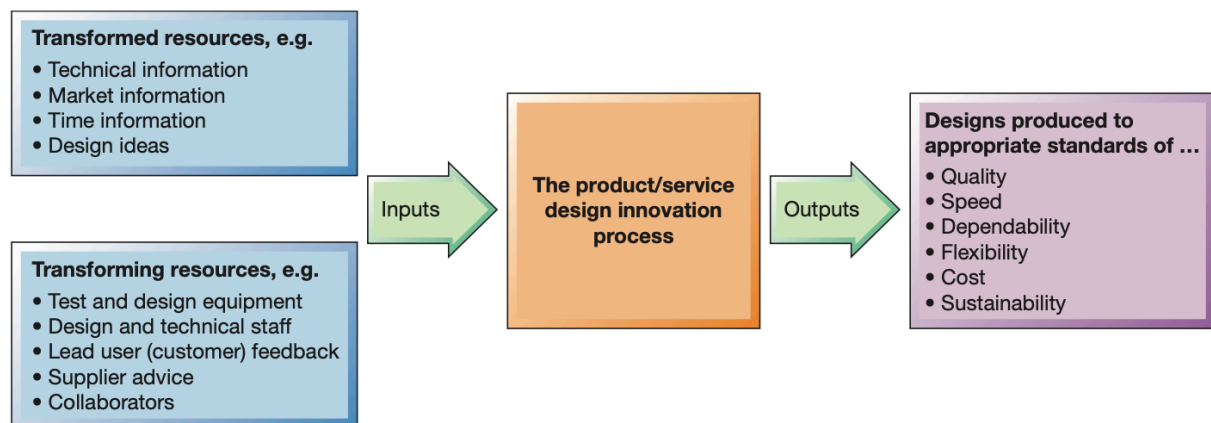
- Driving and operationalizing innovation, increasing market share and opening new markets
  - Differentiating products and services making them more attractive to customers while increasing consistency in the company's range and helping to ensure successful product launches
- Strengthening branding, so products and services embody a company's values
- Reducing the overall costs associated with innovation through more efficient use of resources, reduced project failure rate and faster time to market

## The process of design

The better the design process is managed, the better the service or product that is designed.

In the design activity as input-transformation-output, the transformed resource inputs will mostly consist of information in the form of market forecasts, market preferences, technical data and potential design ideas. These ideas and information transforms into the final design

Transforming resources includes designs and those who manage them



## Performance objectives for the product and service innovation process

Performance of design process is assessed in terms of quality, speed, dependability, flexibility and cost

### What does quality mean for the innovation process?

High- and low-quality designs are distinguished by judging them in terms of their ability to meet market requirements

**Product recalls** = many are design related and the result of **conformance failures** in the design process

**Specification quality of design** = the degree of functionality, experience or aesthetics that the product/service is competing on

### What does speed mean for the innovation process?

Rapid product/service innovation or time-based competition has become the norm for industries and is sometimes the result of fast-changing consumer fashion, whilst sometimes a rapidly changing technology forces it

Advantages of fast design are:

- **Early market launch** = can earn revenue for longer and command price premiums

- **Starting design late** = design decisions can be made closer to the time when offerings are introduced to the market which is important in fast-changing markets
- **Frequent market stimulation** = rapid innovations allow frequent new or updated offerings to be introduced into the market

### **What does dependability mean for the innovation process?**

Lack of dependability adds to the uncertainty surrounding the innovation process

**Professional project management** = helps reducing uncertainty and prevent missed deadlines, process bottlenecks and resource shortages

### **What does flexibility mean for the innovation process?**

**Flexibility in innovation process** = ability to cope with external or internal change

**External change** = mostly due to that markets, or specific customers, change requirements

**Internal change** = emergence of superior technical solutions. The increasing complexity and interconnectedness of service and product components in an offering may require flexibility

### **What does cost mean for the innovation process?**

Cost factors are split up into 3 categories:

1. **Cost of buying the inputs to the process**
2. **Cost of providing the labour in the process**
3. **Other general overhead costs of running the process**

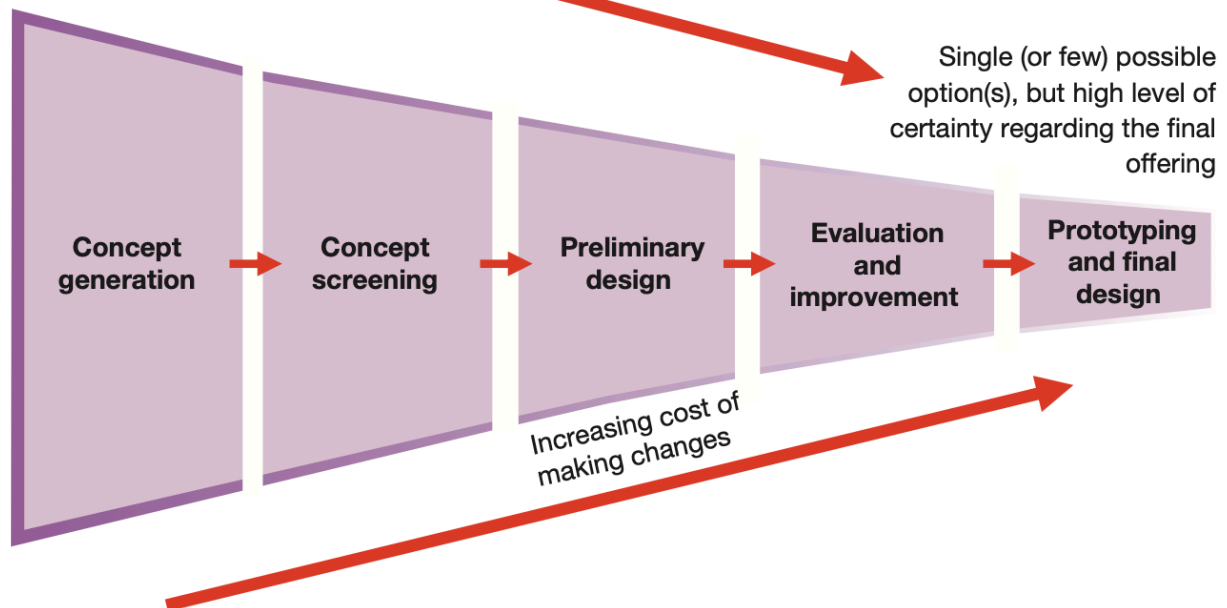
### **Sustainability and the innovation process**

**Sustainability of a product/service** = extent to which it benefits the triple bottom line – people, planet, profit

## **4.3 What are the stages of product and service innovation?**

All processes tend to move from a vaguely defined idea that is refined and made progressively more detailed until it contains sufficient information for turning into an actual service, product or process

Large number of possible options  
with low level of certainty  
regarding the final offering



### The design funnel

Decisions taken during the innovation process progressively reduce the number of options that will be considered. At each stage in the process the level of certainty regarding the final design increases as design options are discarded and the number of options decreases

Reducing design uncertainty impacts the cost of changing one's mind on some detail of the design

Changing a decision in a design stage is bound to incur rethinking and recalculation of costs

### Concept generation

**Concept generation** = where innovative ideas become the inspiration for new service or product concepts

Innovation comes from many sources:

- **Ideas from R&D** = research develops new knowledge and ideas to solve a problem or grasp an opportunity, development utilizes and operationalizes the ideas that come from research
- **Ideas from staff** = contact staff or sales can meet customers every day and get good ideas about customers preferences
- **Ideas from suppliers** = experts in their field compared to their customers and closer to technological advances in their component and they may supply similar customers

- **Ideas from competitor activity** = new idea from competitor may be worth imitating or improving upon. **Reverse engineering** is when you take apart a competitor's service/product to explore potential new ideas
- **Ideas from customers** = market research, complaints, transactions

**Open-source software** = communities around the world that can write software code come together and produce a software product. Result can be used for free and updates regularly

**Crowdsourcing** = process of getting work or funding from a crowd of people

**Lead users** = users who are ahead of the majority of the market on a major market trend and who also have a high incentive to innovate

**Harbingers of failure** = has ability to consistently make bad purchase decisions. Buys only the products that fail

## Concept screening

**Concept screening** = stage where potential innovations are considered for further development against key criteria. Purpose is to evaluate initial concepts for their **feasibility, acceptability and vulnerability**

| Evaluation criteria  | Marketing  | Operations  | Finance  |
|----------------------|--|---|--|
| <b>Feasibility</b>   | Is the market likely to be big enough?             | Do we have the capabilities to deliver it?                        | Do we have access to finance to develop and launch it?     |
| <b>Acceptability</b> | How much market share could it gain?               | How much will we have to reorganise our activities to deliver it? | How much financial return will there be on our investment? |
| <b>Vulnerability</b> | What is the risk of it failing in the marketplace? | What is the risk of us being unable to deliver it acceptably?     | How much money could we lose if things do not go to plan?  |

## Preliminary design

First task in preliminary design is to define exactly what will go into the service or product. **Service-dominant offerings** involves documentation in form of job instructions or service blueprints. **Product-dominant offerings** involves defining product specifications and the component structure of the offering.

May be opportunities to reduce cost through design simplification at this stage.

When an operation delivers a variety of services or products, the range can become complex which increases costs.

## Standardisation

**Standardisation** = application of commonality by using an agreed set of standards. Process of making components, methods or processes uniform throughout an operation and between operations.

Benefits are **predictability** on the design process, **clear communication** within and between enterprises, effect on **costs**.

### **Commonality**

**Commonality** = using common elements within a service/product simplifies design complexity

### **Modularisation**

**Modular design** = designing standardized sub-components of a service/product which can be put together in different ways. The standardized modules can be produced in higher volume and reduces their cost

### **Design evaluation and improvement**

This stage takes the preliminary design and evaluates it to see if it can be improved

### **Quality function deployment**

Purpose of QFD is to try to ensure that the eventual innovation actually meets the needs of its customers. Tries to capture what the customer needs and how it might be achieved

**Quality function deployment matrix** = formal articulation of how the company sees the relationship between the requirements of the customer and the design characteristics

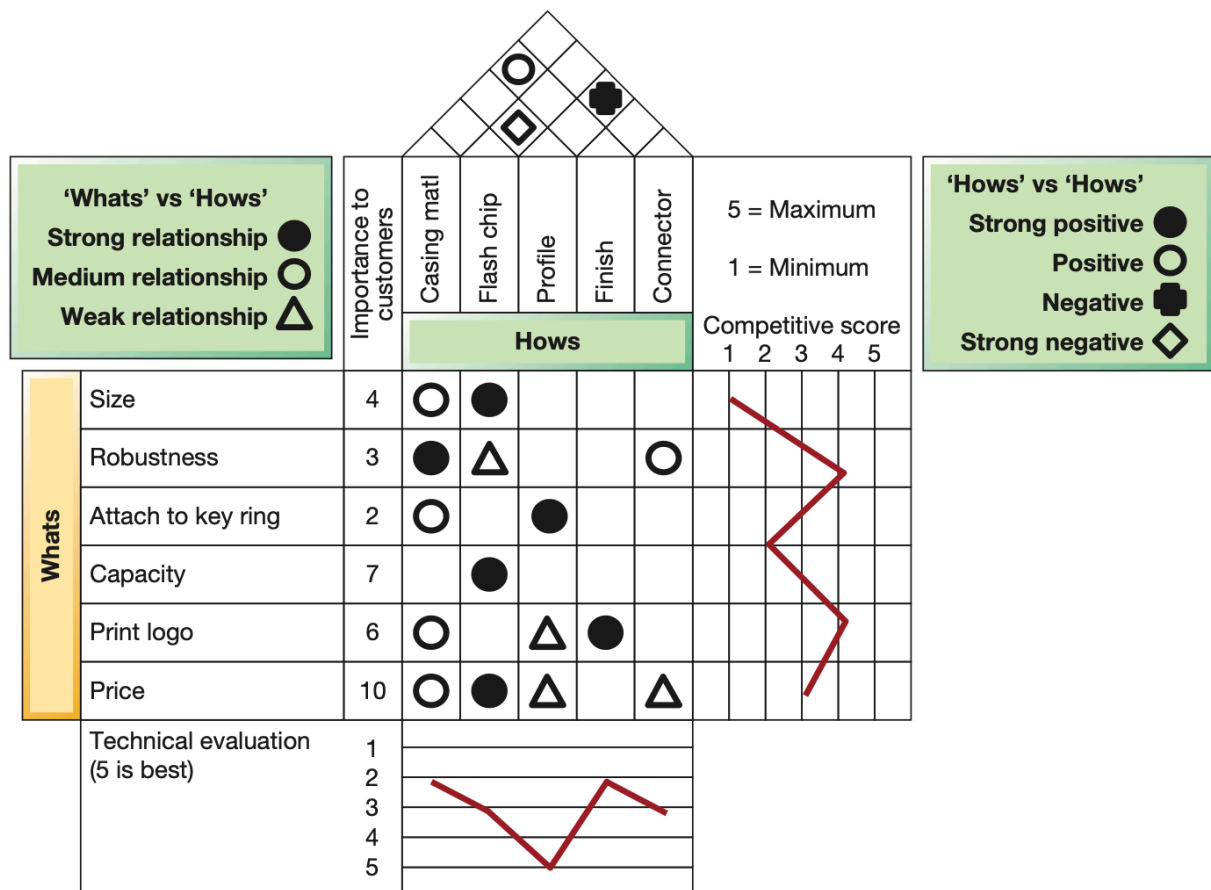
**Customer requirements** = list of competitive factors that customers find significant, their relative importance is scored with price scoring highest

**Competitive scores** = indicate relative performance of the product

**Design characteristics** = dimensions of the design which will operationalize customer requirements within the service/product

**Central (relationship) matrix** = view of the interrelationship between the customer requirements and the design characteristics

**Bottom box of matrix** = technical assessment of the product



**Figure 4.9** A QFD matrix for a promotional USB data storage stick

## Prototyping and final design

This stage turns the improved design into a prototype that can be tested.

**Alpha testing** = internal process where developers or manufacturers examine the product for errors, usually a private process. Performed in a virtual/simulated environment

**Beta testing** = product is released for testing by selected customers as an external pilot test that takes place in the real world before commercial production

### 4.4 How should product and service innovation be resourced?

There are 5 key questions to be considered in resourcing the innovation process:

1. What are the capacity for innovation?
2. Should innovation be carried out in-house or outsourced?
3. What technology can be used to support the innovation process?
4. What organizational structure is most suitable for the innovation process?
5. How can the innovation process be compressed?



## Understanding capacity requirements for innovation activities

**Capacity management** = involves deciding on the appropriate level of capacity and how it can be adjusted as demand changes

**Demand in innovation processes** = number of new designs needed

Innovation processes are subjected to uneven demand for designs → several new offerings may be introduced close together and sometimes little innovation is needed → resourcing problem since the capacity of an innovation activity is difficult to flex

Companies can get into cycles where they fail to invest in innovation resources because many design staff cannot be hired in the short term → innovation projects overrun or fail to deliver appropriate solutions → company loses business or suffers in the marketplace → less willing to invest in innovation resources

## Understanding whether innovation activities should be outsourced

**Design networks** = networks that connect suppliers and customers in the innovation process

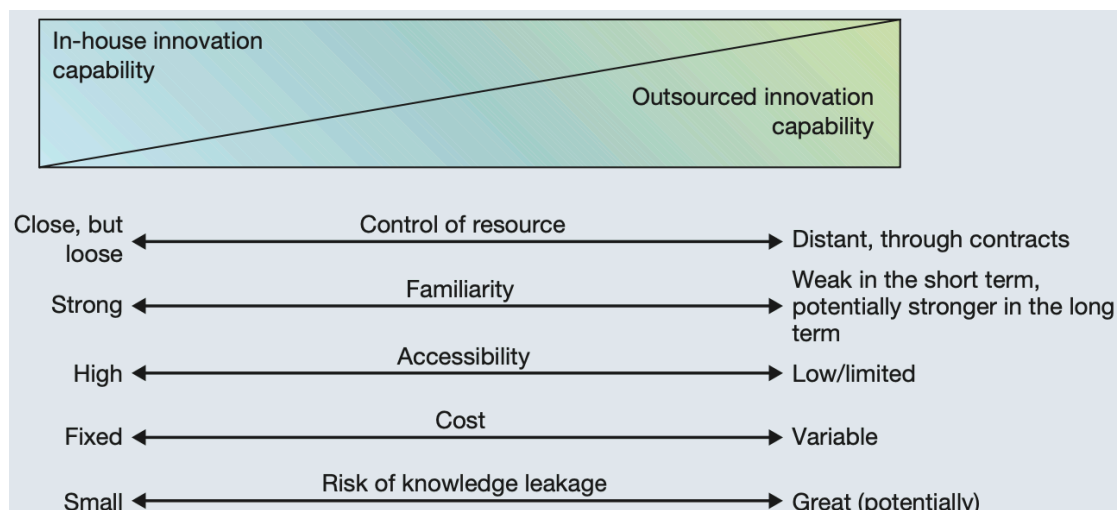
Innovation processes can adopt any position on a continuum of varying degrees of design engagement with a varying degree of internal and external capability

Resources are easily controlled if kept in-house since they are closely aligned with the company's normal organizational structures, but control should be relatively loose because of extra trust present in working with familiar colleagues.

Outsourced innovation involves greater control with penalty clauses for delays often used in contracts.

**Open innovation perspective** = firms should be willing to buy in innovations rather than relying on those generated internally. May be beneficial to give access to underused proprietary innovations through joint ventures, licensing or spin-offs.

Major inhibitor to open innovation is the fear of knowledge leakage



## Understanding what technologies to use in the innovation process

**Generative design** = involves designers specifying important design goals, parameters and performance requirements after which generative design software explores all possible permutations of a solutions – and generates design alternatives

**Computer-aided design (CAD)** = stores and categorizes component information and allows designs to be built up on screen. Performs basic engineering calculations to test the appropriateness of proposed design solutions. Designs from CAD can be converted to physical models with 3D-printing.

**Digital twin** = combination of data and intelligence that represents the structure, context and behaviour of a physical system of any type. Offers an interface that allows one to understand past and present operations and make predictions about the future.

**Knowledge management technologies** = expertise is put into a common pool so they can contact other staff in the company with certain skills relevant to a current assignment and identify previous similar assignments.

## Understanding what organizational structure to use in the innovation process

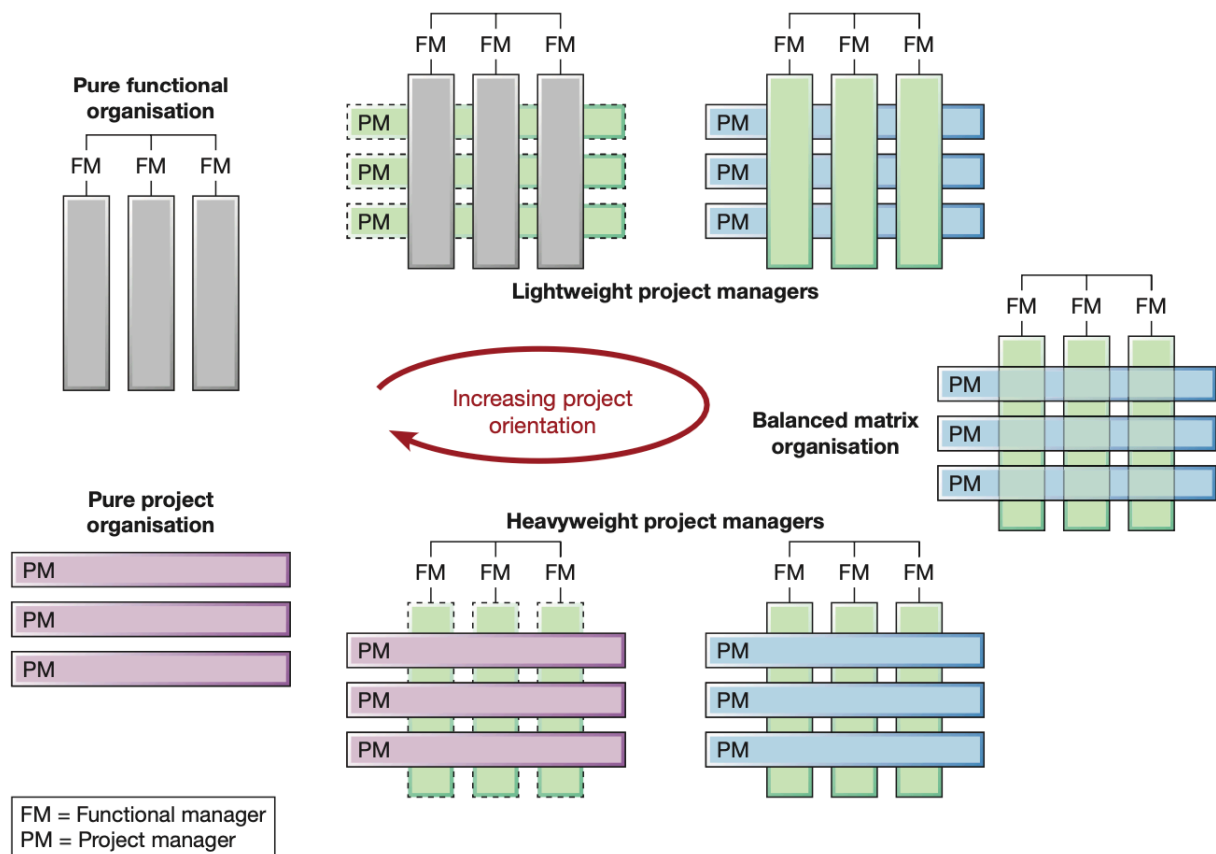
**Functional organization** = innovation project is divided into segments and assigned to relevant functional areas and/or groups within functional areas. Project is coordinated by functional and senior management

**Functional matrix** = a person is formally designated to oversee the project across different functional areas and may have limited authority over the functional staff involved and serves primarily to plan and coordinate the project. Functional managers retain primary responsibility for their specific segments of the project.

**Balanced matrix** = a person is assigned to oversee the project and interacts on an equal basis with functional managers which work together to direct innovation activities and approve technical and operational decisions

**Project matrix** = a manager is assigned to oversee the project and is responsible for its completion. Functional managers' involvement is limited to assigning personnel as needed and providing advisory expertise

**Project team** = a manager is given responsibility for a project team composed of a core group of personnel from several functional areas assigned on a full-time basis. Functional managers have no formal involvement



**Matrix structures** = appropriate for both simple and highly complex projects

**Project teams** = appropriate for projects with a high degree of uncertainty where their flexibility becomes valuable

**Functionally based structures** = resources clustered around a functional specialism help the development of technical knowledge

### Understanding how to compress the innovation process

**Simultaneous design** = merging the design processes of services and products.  
 Benefit as it reduces the time taken for the whole innovation activity

Reducing time to market TTM can give an important competitive advantage

### Integrating the design of the offering and the design of the process

Barriers to integrating the design of the offering and the process are:

1. **Timescales involved can be different** = offerings may be modified frequently and the processes that will be used to create and deliver an offering may be too expensive to modify every time the offering changes
2. **People involved in innovation and ongoing design are organizationally separate**
3. **Sometimes not possible to design an ongoing process for the creation and delivery of services and products until they are fully defined**

Processes can be designed to cope with a range of potential services and products

The design staff and operations staff can be encouraged to work together through communication and organizational mechanisms.

### Simultaneous development

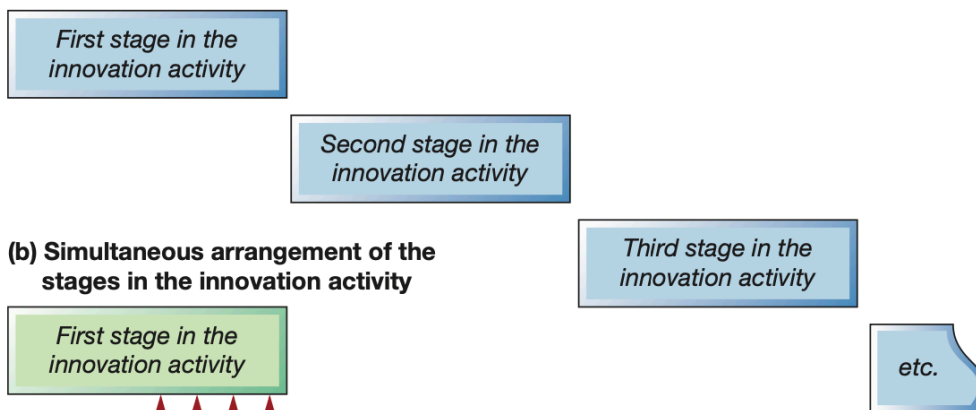
Advantages of sequential design innovation process is that it is easy to manage and control since each stage is clearly defined and completed before next stage starts.

Each stage can focus its skills and expertise on a limited set of tasks.

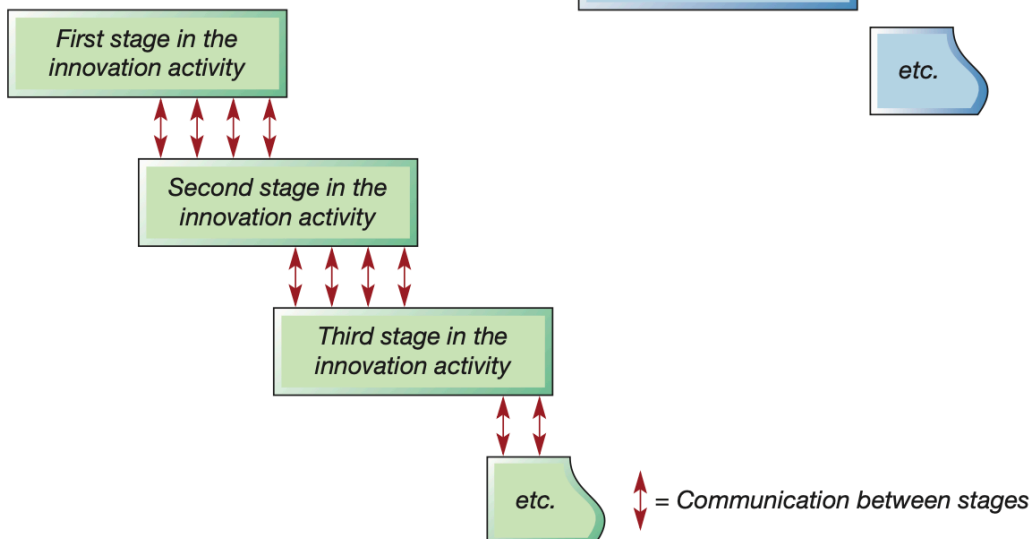
Disadvantages of sequential design innovation process is that it is time-consuming and costly. Difficulties found in one stage may halt another stage and move back to the previous stage.

In simultaneous development, one stage can commence before the previous has finished so there is simultaneous or concurrent work on the stages

**(a) Sequential arrangement of the stages in the innovation activity**



**(b) Simultaneous arrangement of the stages in the innovation activity**



**Figure 4.12** (a) Sequential arrangement of the stages in the design activity (b) Simultaneous arrangement of the stages in the design activity

### Early resolution of design conflict and uncertainty

Early decisions are difficult to make because of the high level of uncertainty surrounding what may or may not work as a final design.

One approach is to delay decision making in the hope that an obvious answer will emerge. Problem is though that if decisions to change are made later in the process, these changes will be more disruptive than if made earlier.

If the design team manages to resolve conflict early in the design activity, it will reduce the degree of uncertainty within the project and reduce the extra cost and time associated with either managing the uncertainty or changing decisions already made

It is worth trying to reach consensus in the early stages even if it delays the total process in the short term. Strategic intervention by senior management is also needed.

