CONSULTANCY
TRAINING
SUPPORT

Innovation Management

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Innovation is ...

…the successful exploitation of **new** ideas.

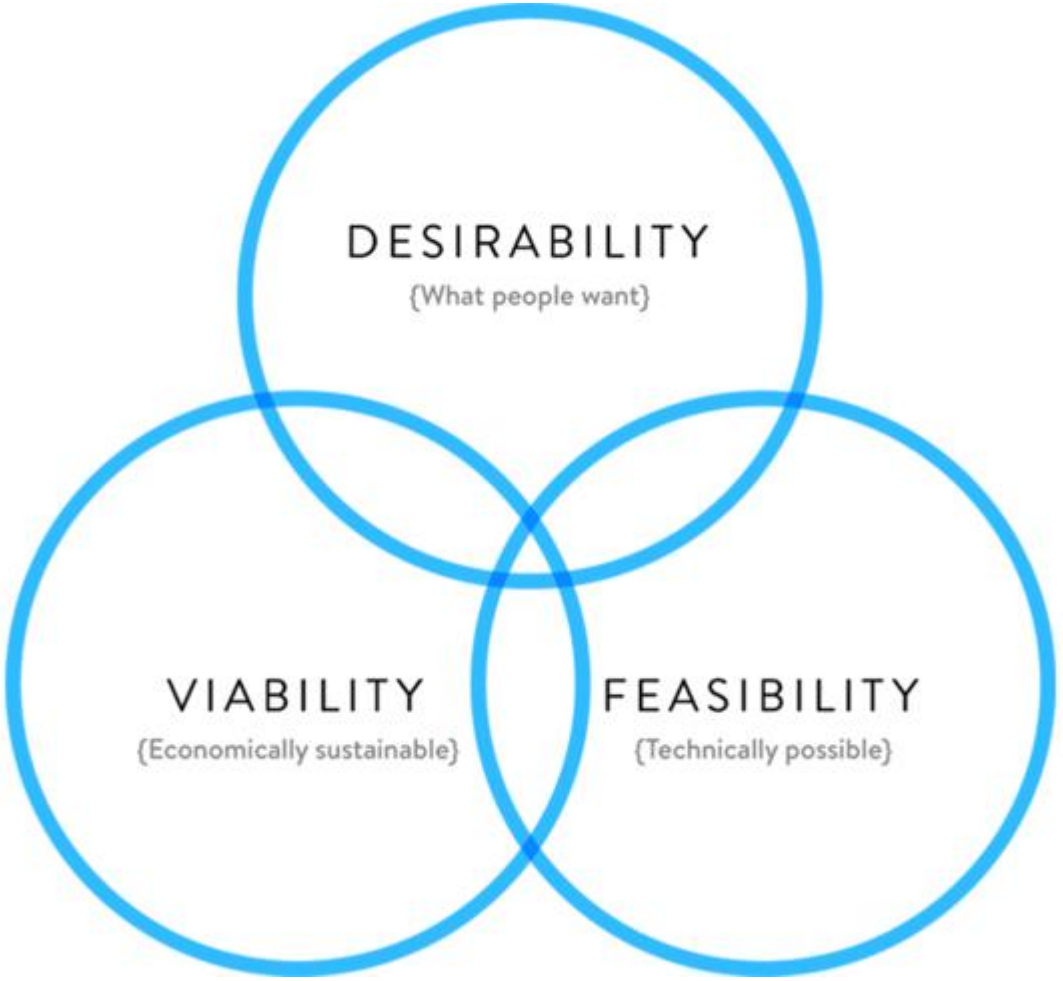
Innovation Management

What have we got to get right in product and process development?

Essentially there are 3 key requirements:

1. Developing a product or service that a client wants.
2. Providing it at a sustainable economic level.
3. Ensuring we can actually provide it!

A Venn diagram of product development: Desirability, feasibility and viability.



Product and Process Design : Differing Priorities

Producer's perspective:

- Product design must support product *manufacturability* (the ease with which a product can be made)
- Product has to be manufactured using materials, equipment and labour skills that are **efficient and affordable**; otherwise its cost will be too high for the market.

Customer's perspective:

- If a product is to achieve customer satisfaction, it must have the combined characteristics of **good design**, **competitive pricing** and the **ability to fill a market need**.

Let us summarise the
Innovation Process
into 4 stages..

New-Product Development Process

Step 1 : Idea Generation

Idea generation is the systematic search for new-product ideas

Sources of new-product ideas can be:

- Internal
- External

New-Product Development Process

Idea Generation

Internal sources refer to the company's own formal research and development, management and staff

External sources refer to sources outside the company such as customers, competitors, distributors, suppliers, and strategic partners,

External Idea Sources

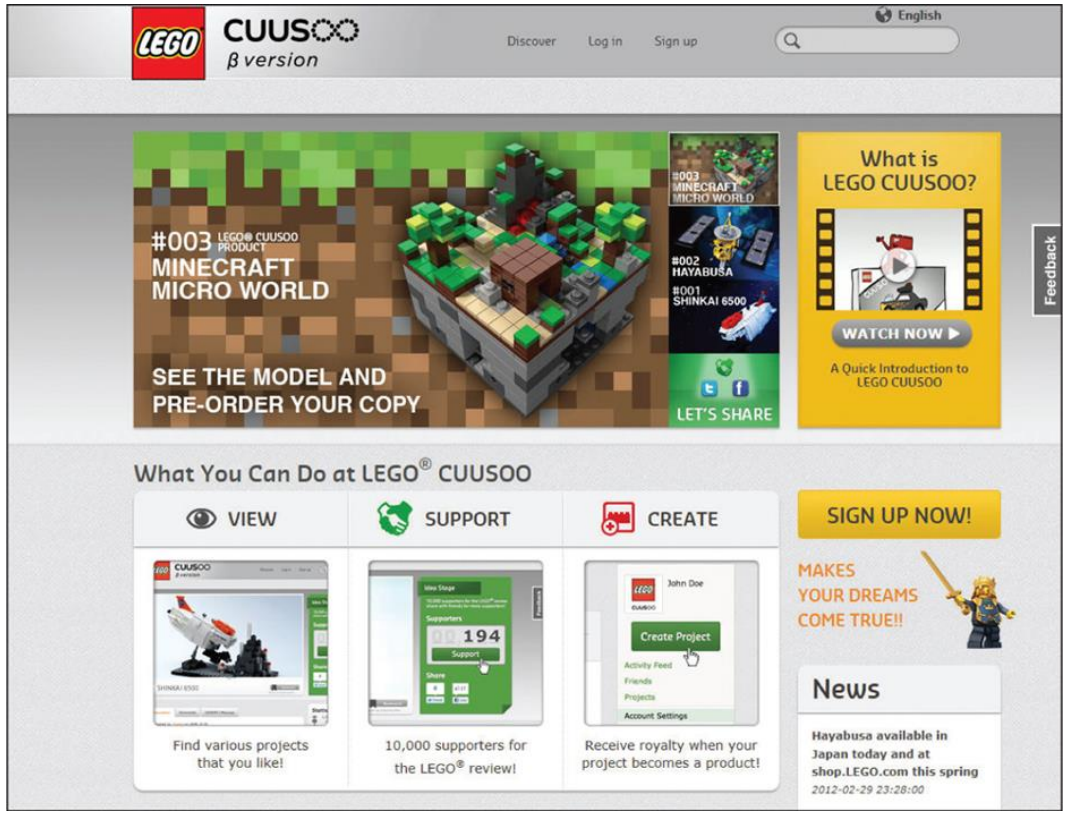
- Companies can also obtain good new-product ideas from any of a number of external sources.
- **Distributors** are close to the market and can pass along information about consumer problems and new-product possibilities.

- **Suppliers** can tell the company about new concepts, techniques, and materials that can be used to develop new products.
- **Competitors** are another important source.

- Perhaps the most important sources of new-product ideas are **customers** themselves.
- The company can analyse customer questions and complaints to find new products that better solve consumer problems.
- Or it can invite customers to share suggestions and ideas.

Lego has established its own platform where customers can submit their product designs. Then, other Lego customers can vote for their favourite product ideas, explain why they like them, and say how much they'd be willing to pay for them.

Designs with the most likes get reviewed by Lego's official committee.



Crowdsourcing

- **Crowdsourcing** throws the innovation doors wide open, inviting broad communities of people – customers, employees, independent scientists and researchers, and even the public at large – into the new-product innovation process.

- Truly innovative companies don’t rely only on one source or another for new-product ideas.
- Instead, they develop extensive innovation networks that capture ideas and inspiration from every possible source, from employees and customers to outside innovators and trusted strategic partners.

Open innovation

“No matter who you are, most of the smartest people work for someone else.”

This famous statement made by Bill Joy of Sun Microsystems, known as Joy’s Law, highlights the importance of accessing external knowledge for innovation success. Open innovation embraces this concept.

Open innovation is broadly defined as a way of doing innovation, whether that be by the generation (**ideation**), **development**, or **commercialisation** of new ideas. This is done by actively seeking and leveraging external sources of knowledge.

The knowledge base can be broad, and can encompass things such as resources, capabilities, technologies, expertise and channels to market.

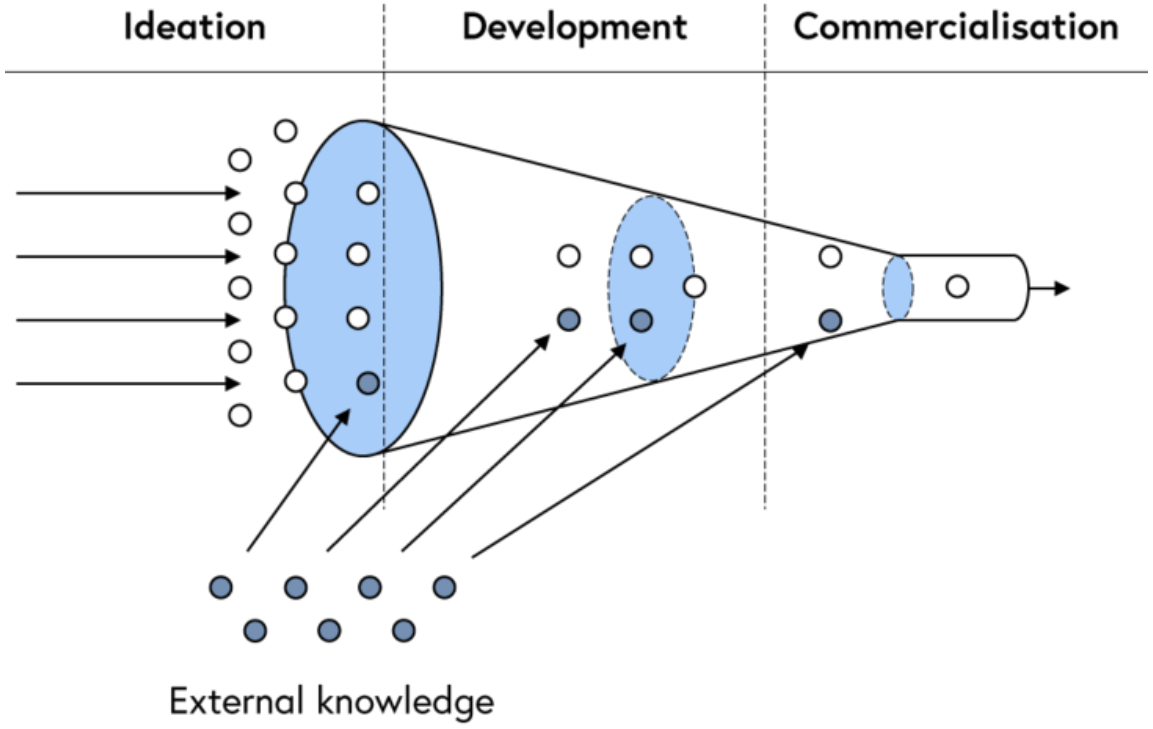
Organisations can engage with open innovation by applying three core processes:

1. Outside-in process
2. Inside-out process
3. Coupled process

Outside-in process:

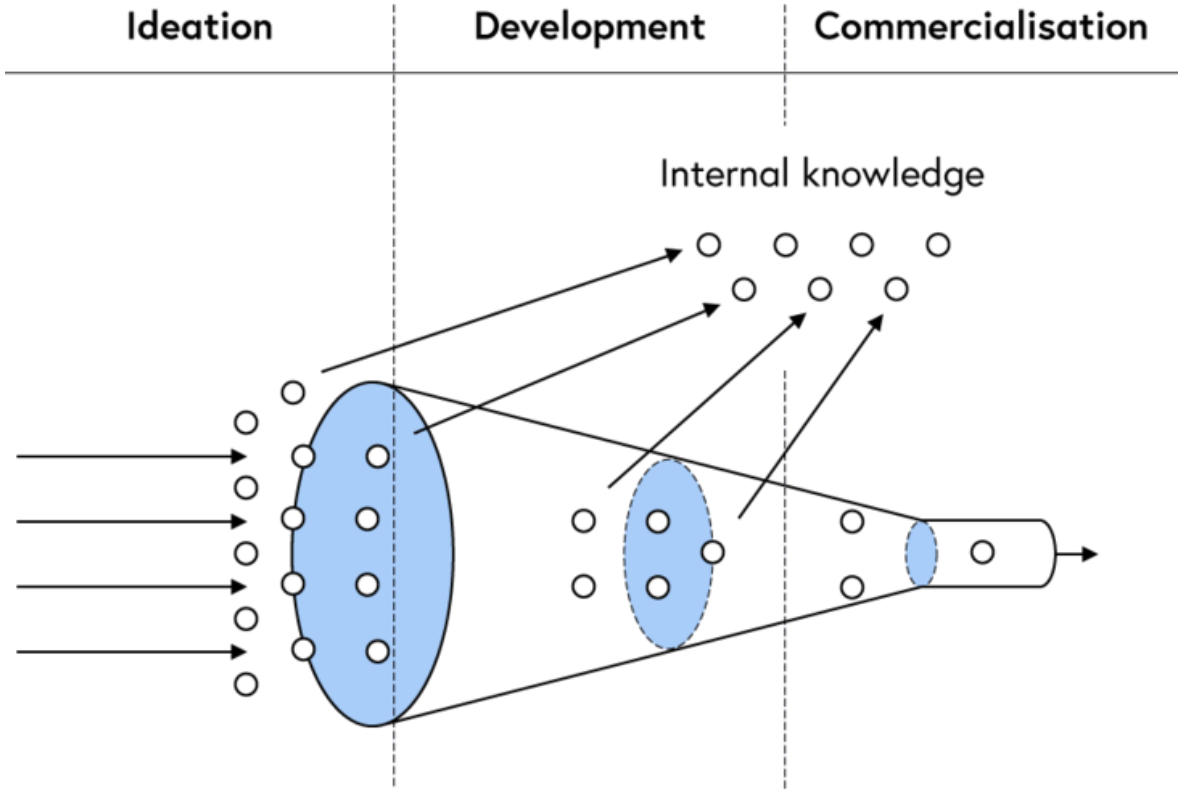
In this process, the organisation brings in external knowledge to innovate internally.

This involves an inbound flow of knowledge from external partners such as suppliers, customers, competitors, universities and consultants.



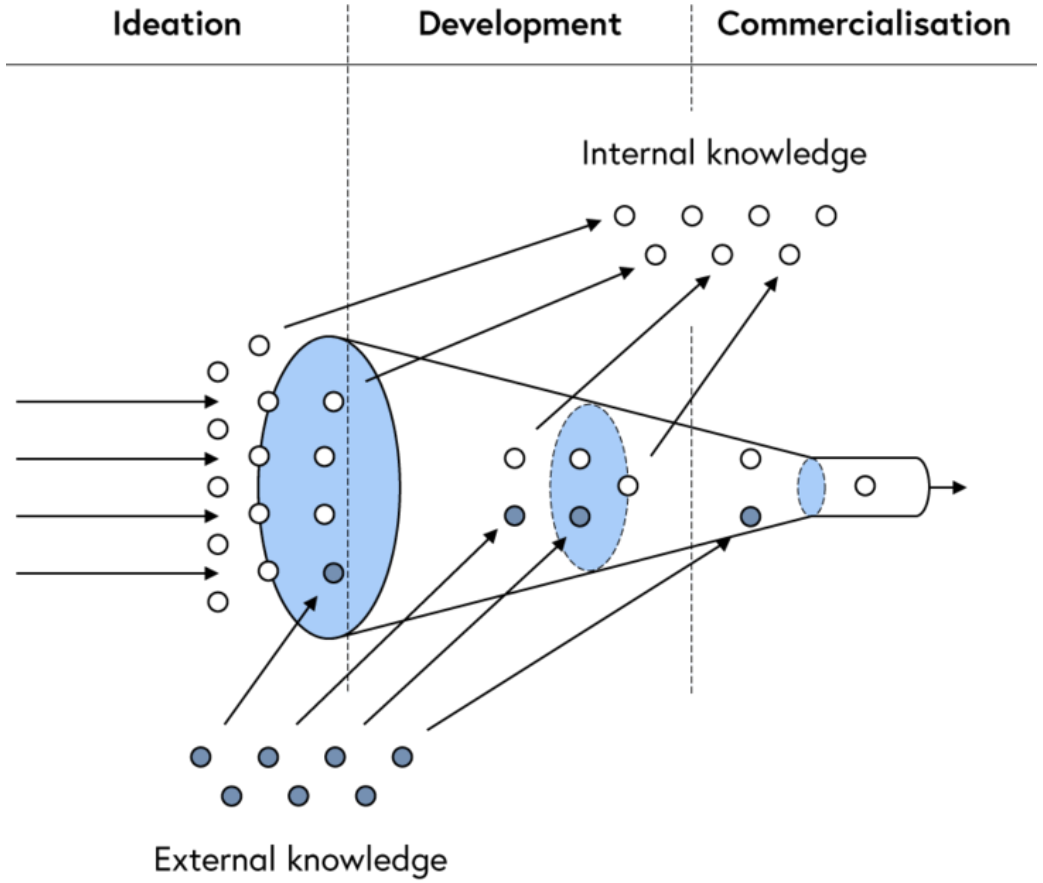
Inside-out process:

Here, the outbound flow of knowledge from inside the organisation improves the innovation capability of external partners that are transferring or licensing the intellectual property (IP) to take to market.



Coupled process:

In the coupled process, a combination of inbound and outbound knowledge flows facilitate co-creative efforts among partners. These are usually a formalised relationship, such as a joint venture or strategic alliance.



By engaging in open processes of innovation, organisations are able to access and use a wider domain of knowledge than is possible by simply ‘going it alone’.

This means that organisations generally engage with or partner those that possess knowledge they need but do not have themselves.

Idea Development : A summary

- All product design begins with an idea.
- The ideas may come from the customers, marketing, engineering, suppliers or increasingly, strategic partners.
- Some ideas may come from the competitors:

Benchmarking: The process of studying the practices of companies (including looking at the product design, pricing strategy and other aspects of the operation) and comparing your company's performance against theirs.

Reverse Engineering: The process of disassembling a product in order to analyse its design features.

The Product Design Process

Step 2 - Product Screening

- Every business needs a formal/structured evaluation process to determine the likelihood of success of a new innovation idea.
- Some of the issues that can be explored include, fit with facility and labour skills, size of market, contribution margin, **break-even analysis (**return on sales).

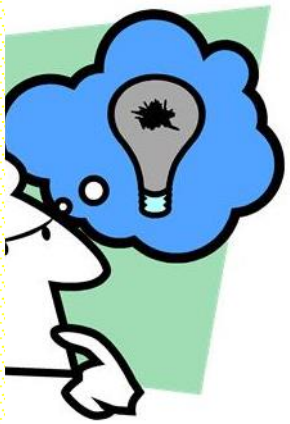
Idea Screening

- The first idea-reducing stage is **idea screening,** which helps spot good ideas and drop poor ones as soon as possible.
- Product development costs rise greatly in later stages, so the company wants to go ahead only with those product ideas that will turn into profitable products.

New-product Screening framework

Asks Three Questions

1. Is it a realistic product?
2. Can we make money on it?
3. Does it fit with what this company is about?



The organisation needs to implement a structured but dynamic innovation management process.

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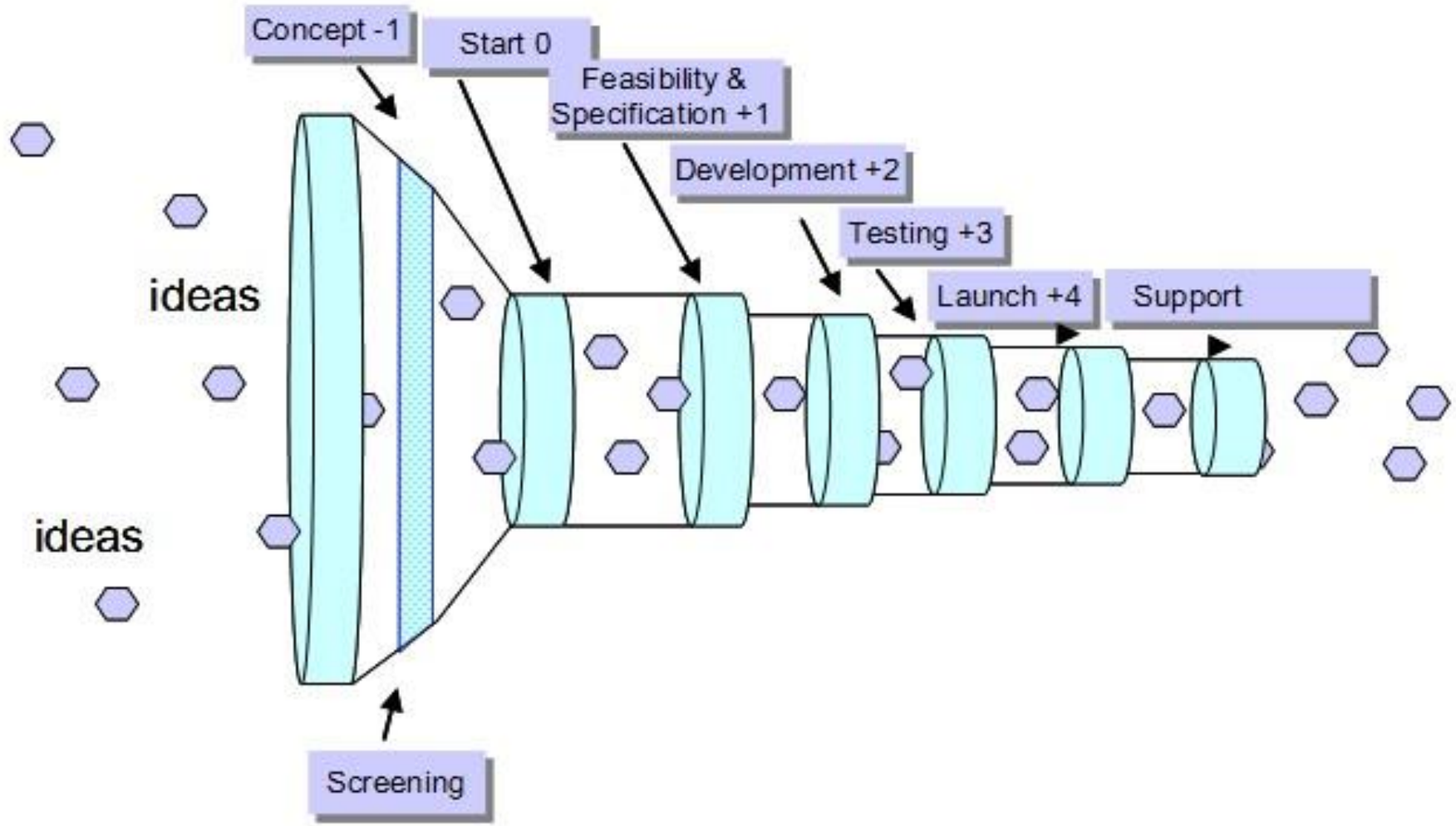
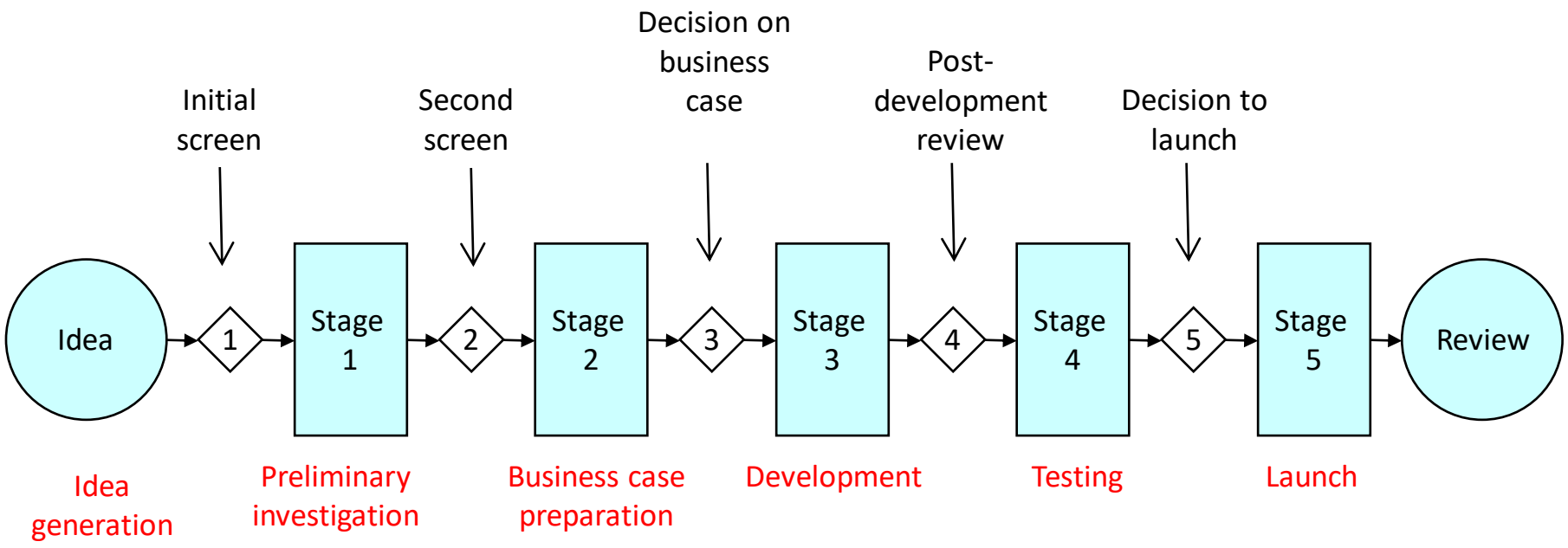


Stage-Gate Processes



Source: Robert G. Cooper

Development Project Process – example for a small company

Developing a new product or service type proposal

Gate 1 :Business case for this product/service type

Gate 2: Capability phase

Gate 3 = Specification requirements

Gate 4– Operations requirements

What is the business case for this product/service?

1. Is it the type of business we want?
2. Does it enhance the company profile?
3. Can we make money on it?
4. What are the regulatory requirements?

Can we provide this product/service?

1. Have we got the equipment Capacity and lead time?
2. Do we have the skills profile?
3. Can cost targets be met?
4. Have we got the equipment capability?
5. How much investment is required? What is the payback?

What are the critic design factors ?

1.
2.
3
4.

Key Design Activities

What supply chain/internal modifications need to be done at this stage ?

1.
2.
3.
4

Key Scale-up Activities

M0 – Approvals required

Person 1 approval

Person/Dept. 2 approval

M1 - Project approval

Person 1 approval

Person 2 approval

M2 - Design approval

Person 1 approval

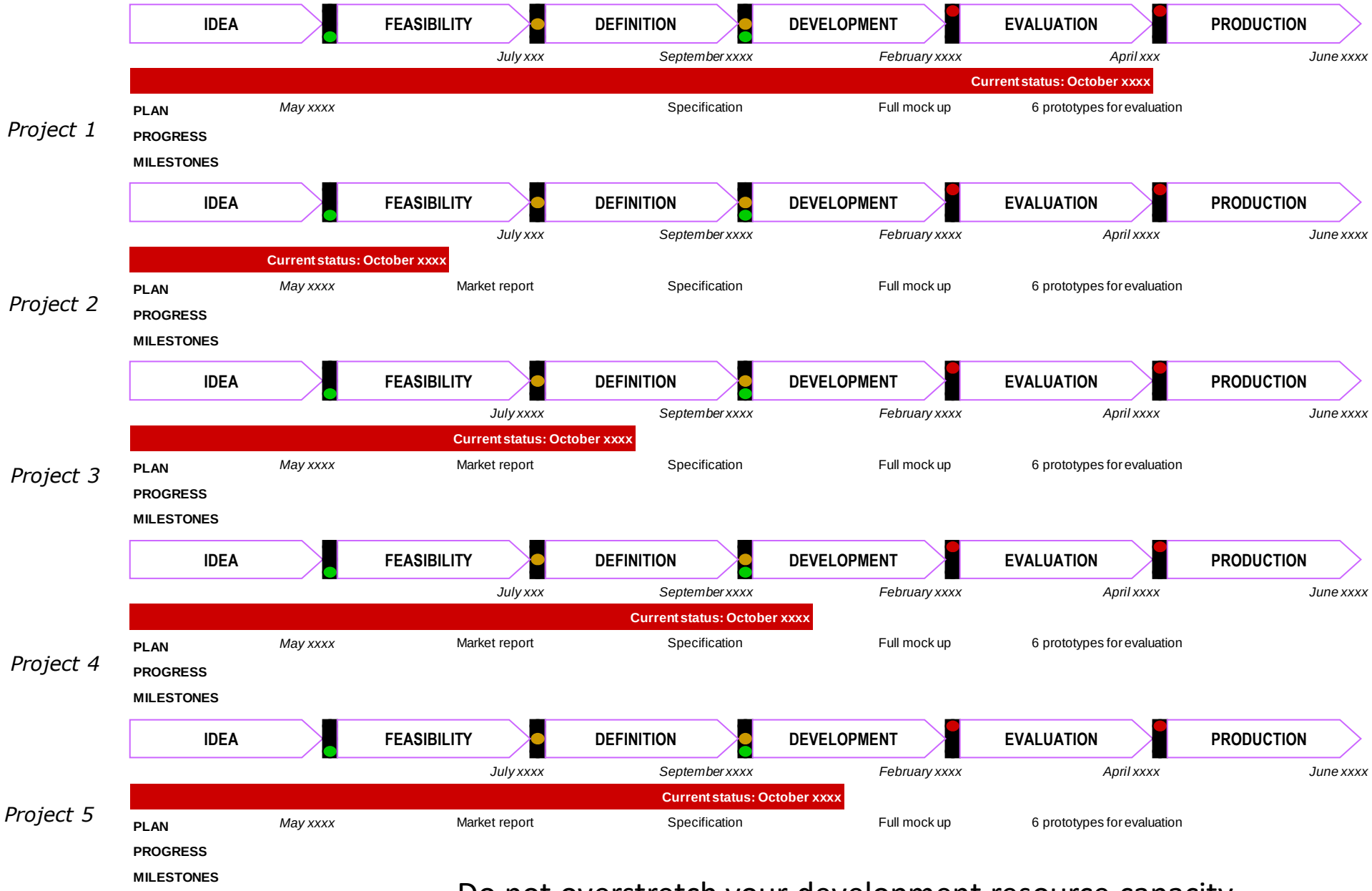
Person 2 approval

M3 – Supply verification

Person 1 approval

Person 2 approval

Managing a Portfolio of Projects



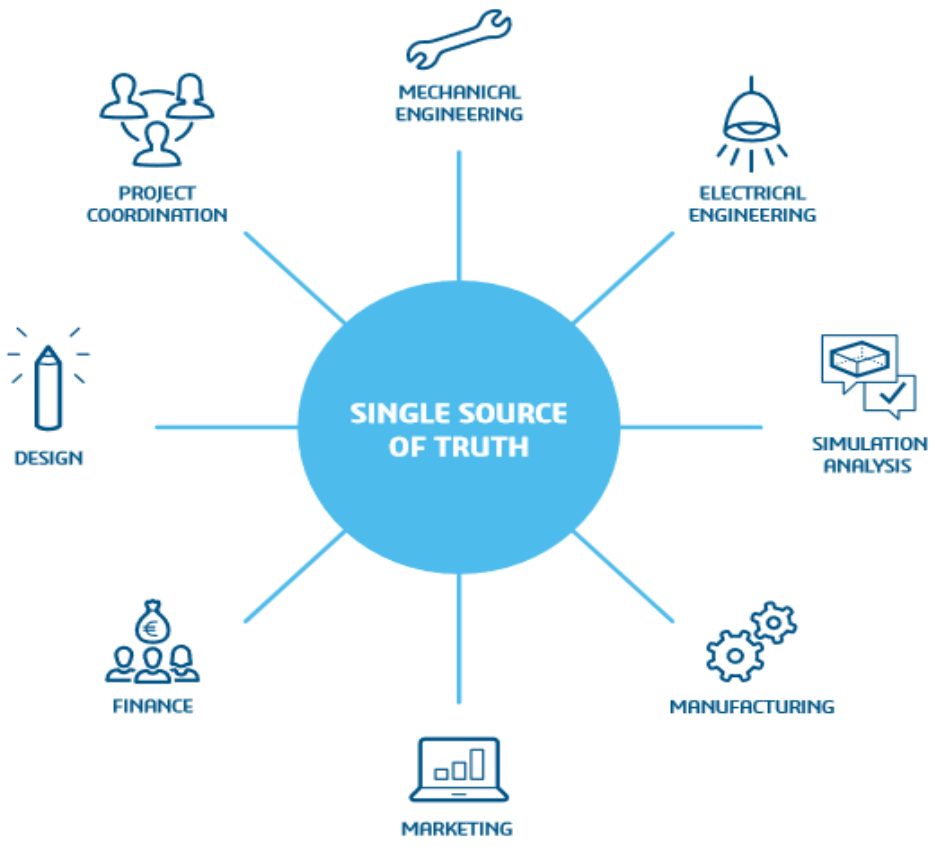
Do not overstretch your development resource capacity.

The Product Design Process

Step 3 – Preliminary Design and Testing

- Technical specifications are developed, prototypes built, testing starts.
- Changes are made based on test results, and the process of revising, rebuilding a prototype and testing continues.

It takes a team to bring an idea to life. Solicit early validation from specialists across multiple disciplines to make a design model stronger. Working with a range of collaborators also establishes a familiar foundation for the rest of the product development lifecycle.



Why is innovation management difficult?

- Failure to fully understand the market /customer needs
- Lack of a structured product development processes
- Too many projects on the go at once
- Cross functional conflict between different departments

Let us examine this last point…

Cross Functional Product Design

- Traditionally, individual functional areas (engineering, operations, marketing) operate without consulting each other. This is the **Sequential or 'over the wall'** approach.

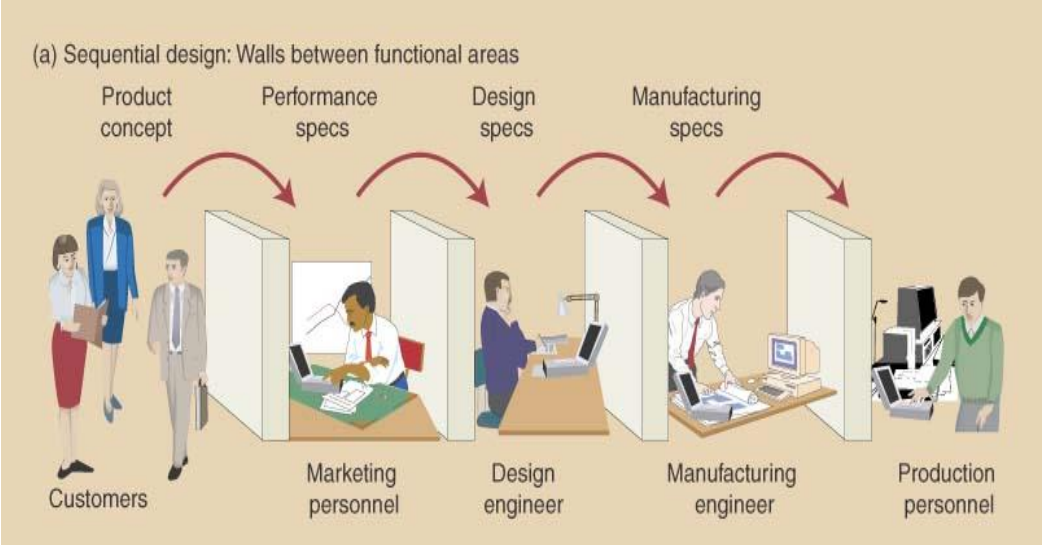
- This often resulted in misalignment of objectives.

- The more effective **Concurrent approach** requires the various functional areas to cooperate and work together in the same time frame.

Concurrent Innovation

Old "over-the-wall" sequential product design process

Each function did its work and passed it to the next function.



Improved Concurrent Engineering process

All functions form a design team that develops specifications, involves customers early, solves potential problems, reduces costs, & shortens time to market.

Prototyping

Prototypes can start as very low fidelity versions of your solution, using paper or cardboard, stickers on the wall, handwritten posters instead of digital displays etc.

Test kit cardboard prototype

Prototype portable insulin solution

Stages in the Prototype development process?

3D printing is transforming the prototyping process

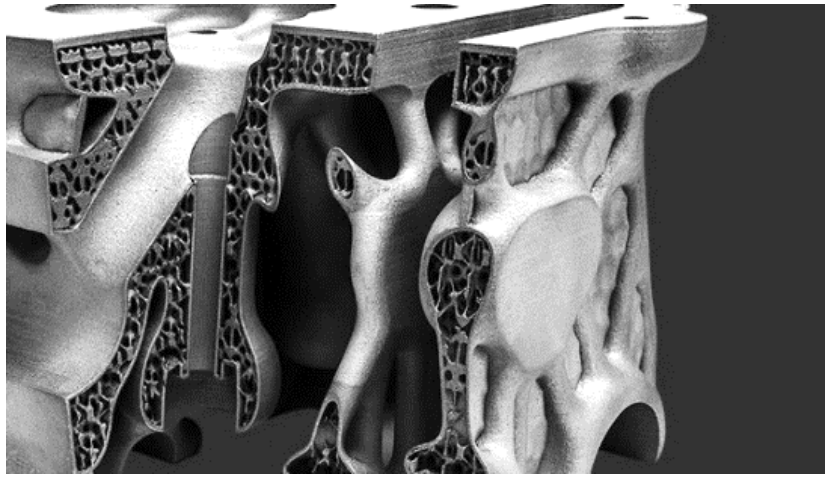
Known as additive manufacturing, 3D-printed objects are created from a digital file and a printer that lays down successive layers of material until the object is complete.

Additive manufacturing breakthroughs.

Previously unimaginable structures can now be created, sometimes from completely new materials.

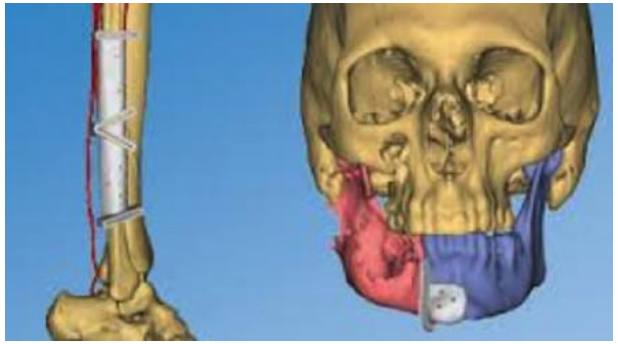
Design-engineered items produced by AM allow product with greater internal complexity.

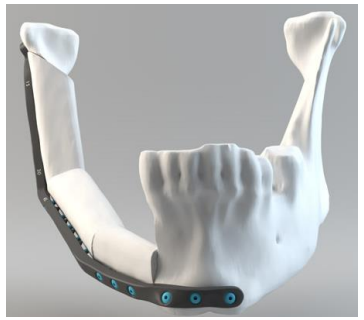
The ability to include internal lattices in AM structures is of particular benefit to aerospace and automotive light-weighting initiatives.



Medical and Dental

Patient-specific implants that fit a patient perfectly. When an implant, such as a cranial plate or hip bone, is printed with a porous structure, only possible with 3D printing, it encourages bone growth and makes it more quickly accepted by the patient's body.





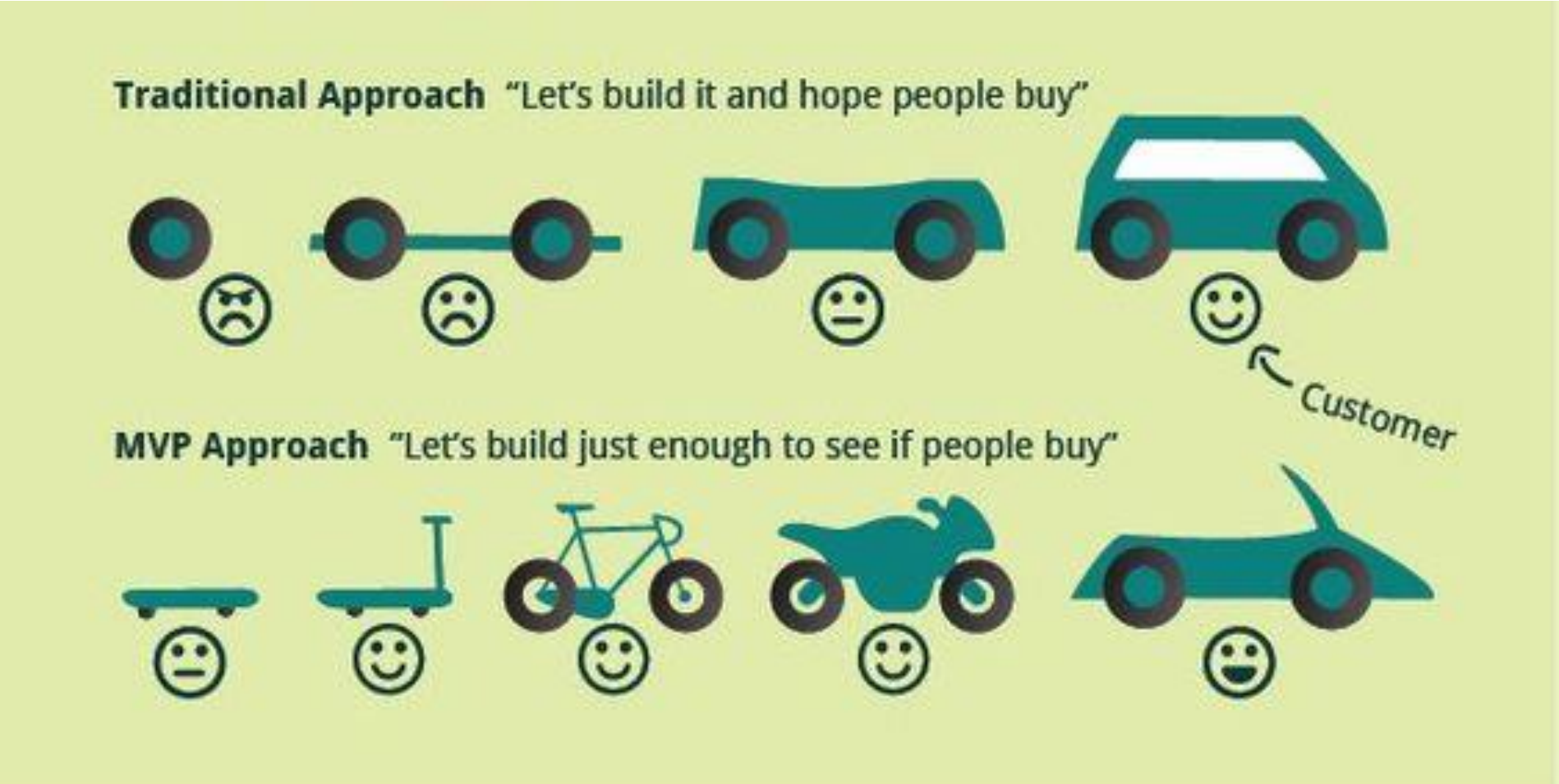
3D printing is transforming the innovation process

This company were able to print this part, more than 55 inches in diameter, in just a few days. According to the part's customer, obtaining the component as a forging from an overseas supplier would have involved a lead time of up to 2 years even before the pandemic.

Minimum viable product (MVP).

A minimum viable product or MVP is the most basic version of the new innovation that the company can make ‘live’ i.e. can be put out to market or put into practice for real users to interact with it.

It allows you to test your solution on a small scale, or with limited investment, for example with a small group of users, or with limited functionality.


Traditional Approach "Let's build it and hope people buy"
Customer
MVP Approach "Let's build just enough to see if people buy"

The Product Design Process

Step 4 – Final Design

- Following extensive design testing the product moves to the final design stage. Final specifications are drawn up at this stage.

- The final specifications are translated into specific processing instructions to manufacture the product.

- This may include :

  - identification of facilities and equipment required
  - defining skills required and the type of jobs that are needed
  - identifying specific materials needed and their suppliers.

Intellectual Property

Organisations gain corporate competitive advantage from the creation of new innovations and the ownership of intellectual assets. When these assets are protectable in law, we refer to them as intellectual property rights (IPRs).

Protecting IPRs is essential for any organisation to ensure that it can appropriate value from them and gain advantage over rivals.

Innovation is ...

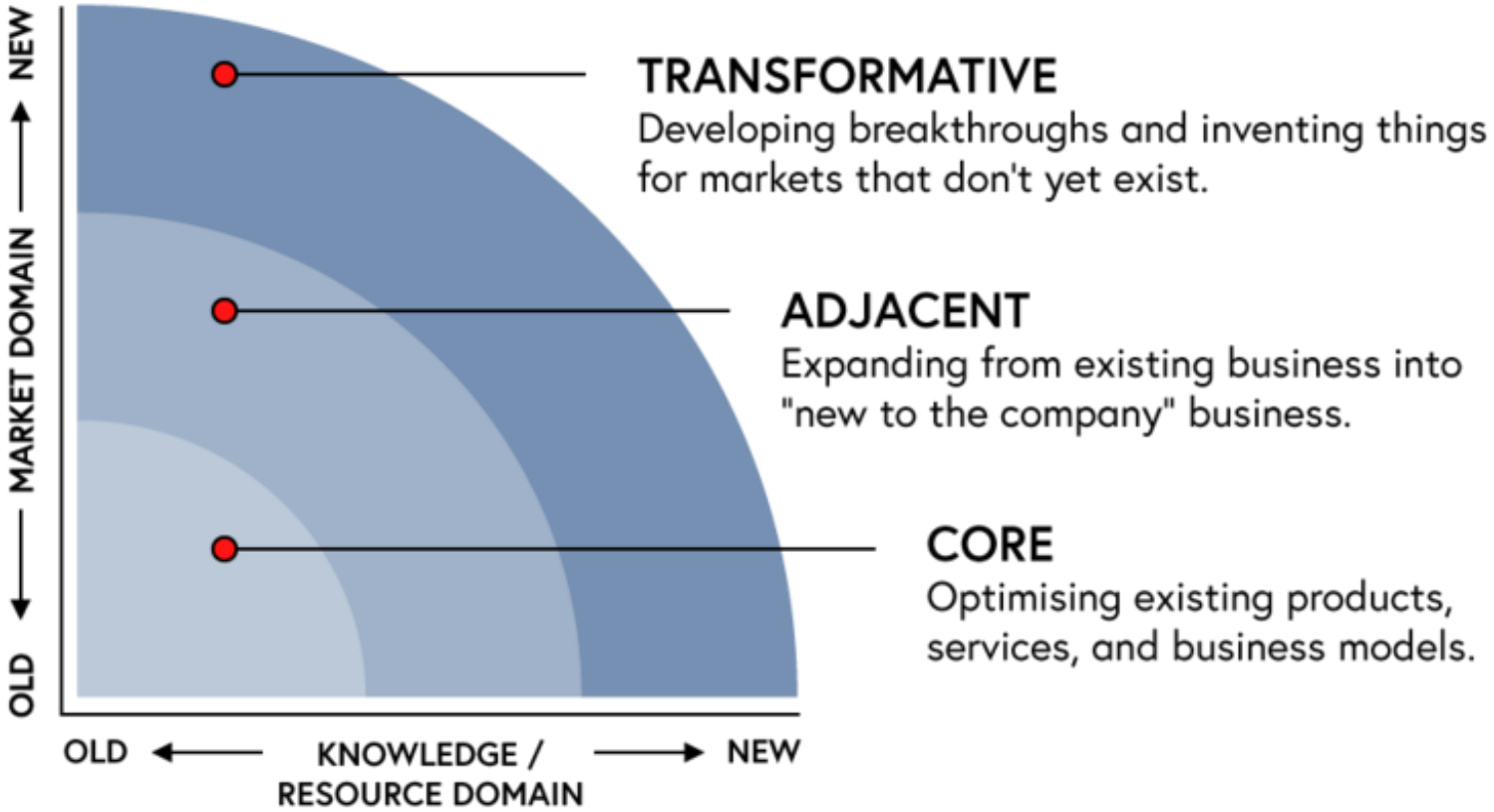
the successful exploitation of **new** ideas ...

... but how radical should you be?

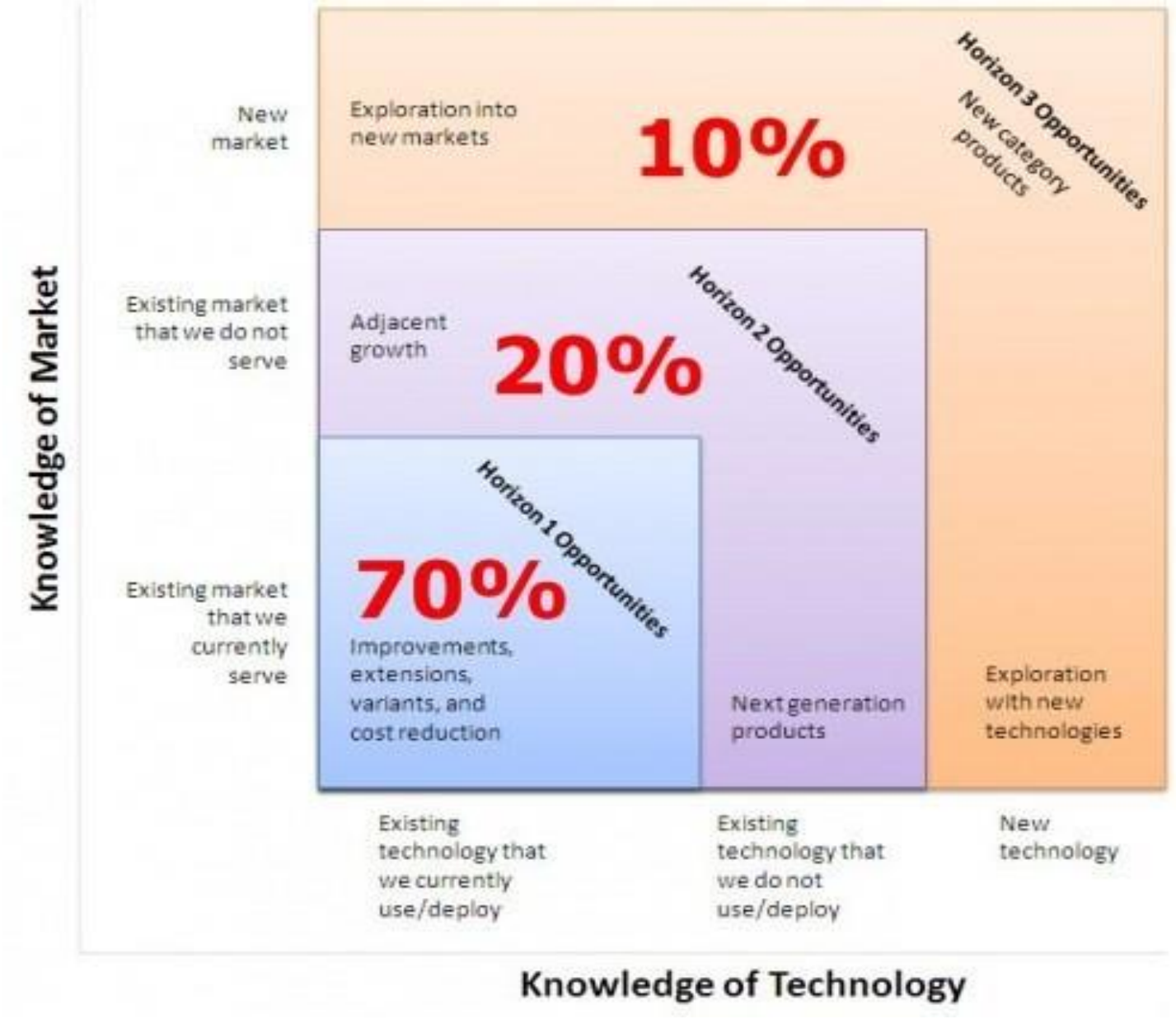
Successful organisations use innovation as a mechanism for driving sustained improvement in their business.

This can be incremental or more transformative change:

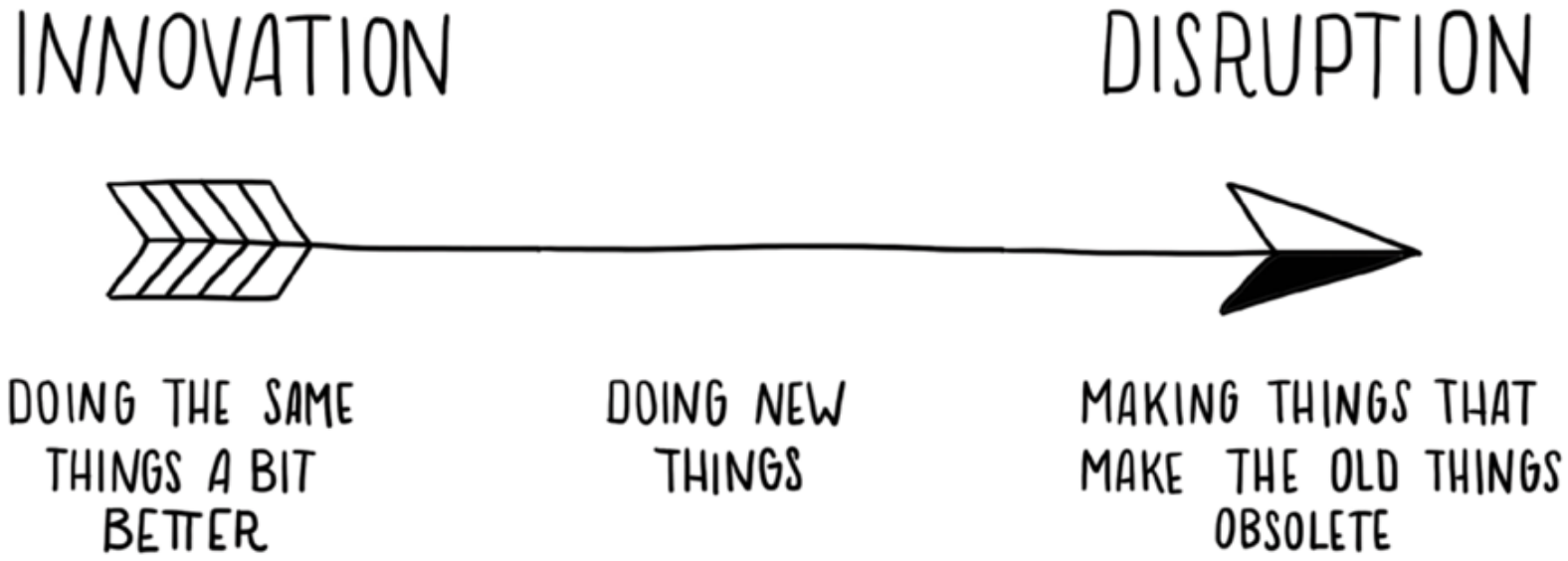
- **Improving current products and services**
- **‘New to the company innovation’.**
- **‘New to the world innovation’.**



Nagji and Tuff recommend that organisations aim for the following distribution:



Disruptive Innovation


INNOVATION
DISRUPTION
DOING THE SAME THINGS A BIT BETTER
DOING NEW THINGS
MAKING THINGS THAT MAKE THE OLD THINGS OBSOLETE

NEW KODAK MOTORMATIC 35 CAMERA

Winds the film for you! Sets the exposure, too!

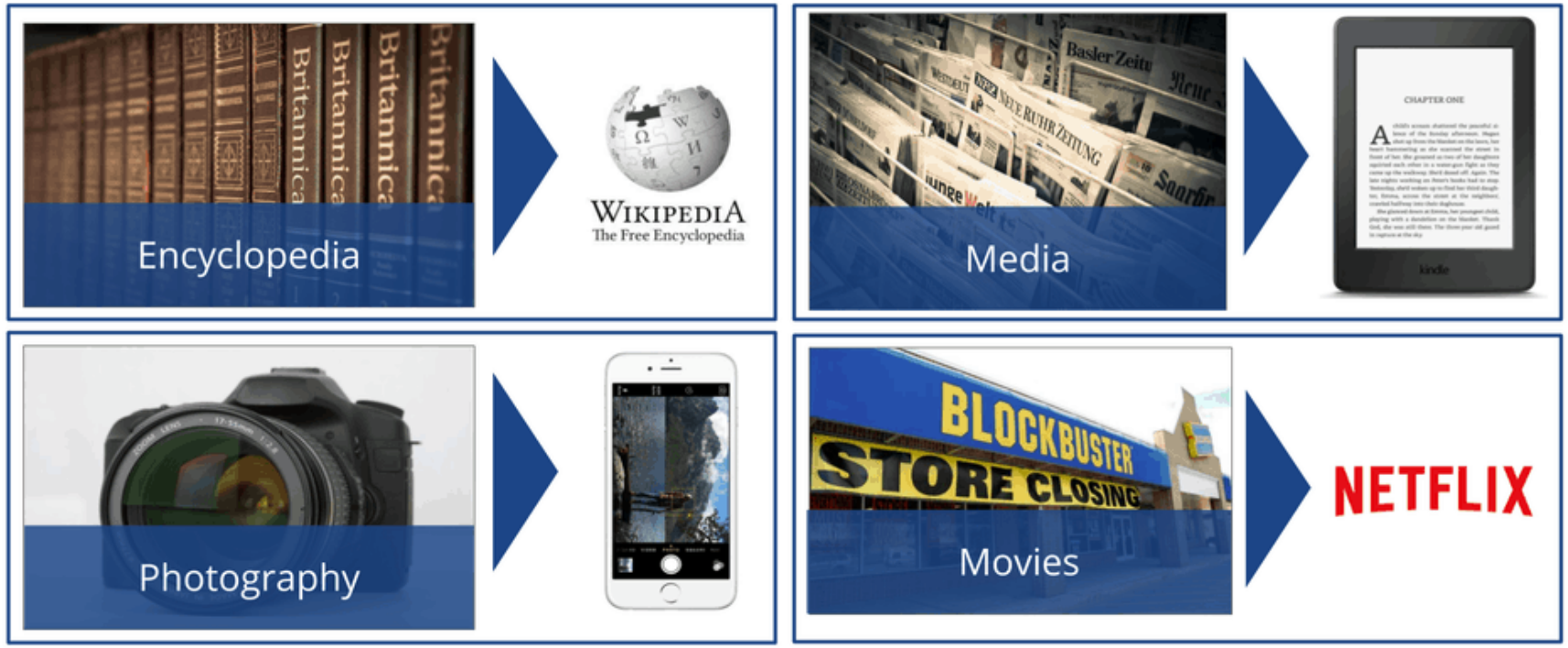
- Eventually digital cameras became “good enough” and disrupted the market

- The same is now happening to digital cameras


55"

In business, disruption is defined as a fundamental change that alters how organisations and their business environments create and appropriate value. This form of change goes well beyond the simple distinction between radical and incremental change.

Examples of Disruptive Innovation :



Opportunities and threats by PMG

Product Market Group	Opportunity or Threat	Impact	Urgency	Draft Objectives
PRODUCT/ MARKET GROUP A	1. Larger scale operation set up by RM suppliers (T) 2. Need to be faster in developing to new products (O)	5 3	3 4	1. Cost reduction plan. 2. Develop new product development system.
PRODUCT/ MARKET GROUP B	1. European and Chinese substitutes (T)	4	4	1. Benchmark competition.
PRODUCT/ MARKET GROUP C	1. Significant increase in raw material prices (T)	3	5	1.. Identify alternative source/material.
PRODUCT/ MARKET GROUP D	1. Possible closure of key supplier(T)	5	5	1.Source alternative supplier.

1 : Little importance/urgency 3 : Medium importance /urgency 5 : Very important /urgency

The following are all examples of disruption caused by innovation:

Disruption causing obsolete business assets:

Disruption involving major changes can make key existing business assets obsolete, including expertise, organisational capabilities and business models.

Disruption by ‘inferior’ products and services:

Christensen argues that disruptive innovation is particularly peculiar because the new technology, product or service is often initially seen as inferior by the core customers.

Asset-light business model disruption:

The digital platforms such as Facebook, Airbnb and Amazon, characterised by asset-light business models, disrupted conventional media, hotels and retail companies.

In order to manage potential disruptions, innovation needs to be recognised as a core organisational capability. This capability should be developed to simultaneously:

- **exploit core business**
- **explore emerging opportunities in new fields.**

These emerging disruptive opportunities may replace current core businesses in the future.

Organisations that protect and advance a core business whilst exploring new and potentially disruptive business are described as ambidextrous organisations.

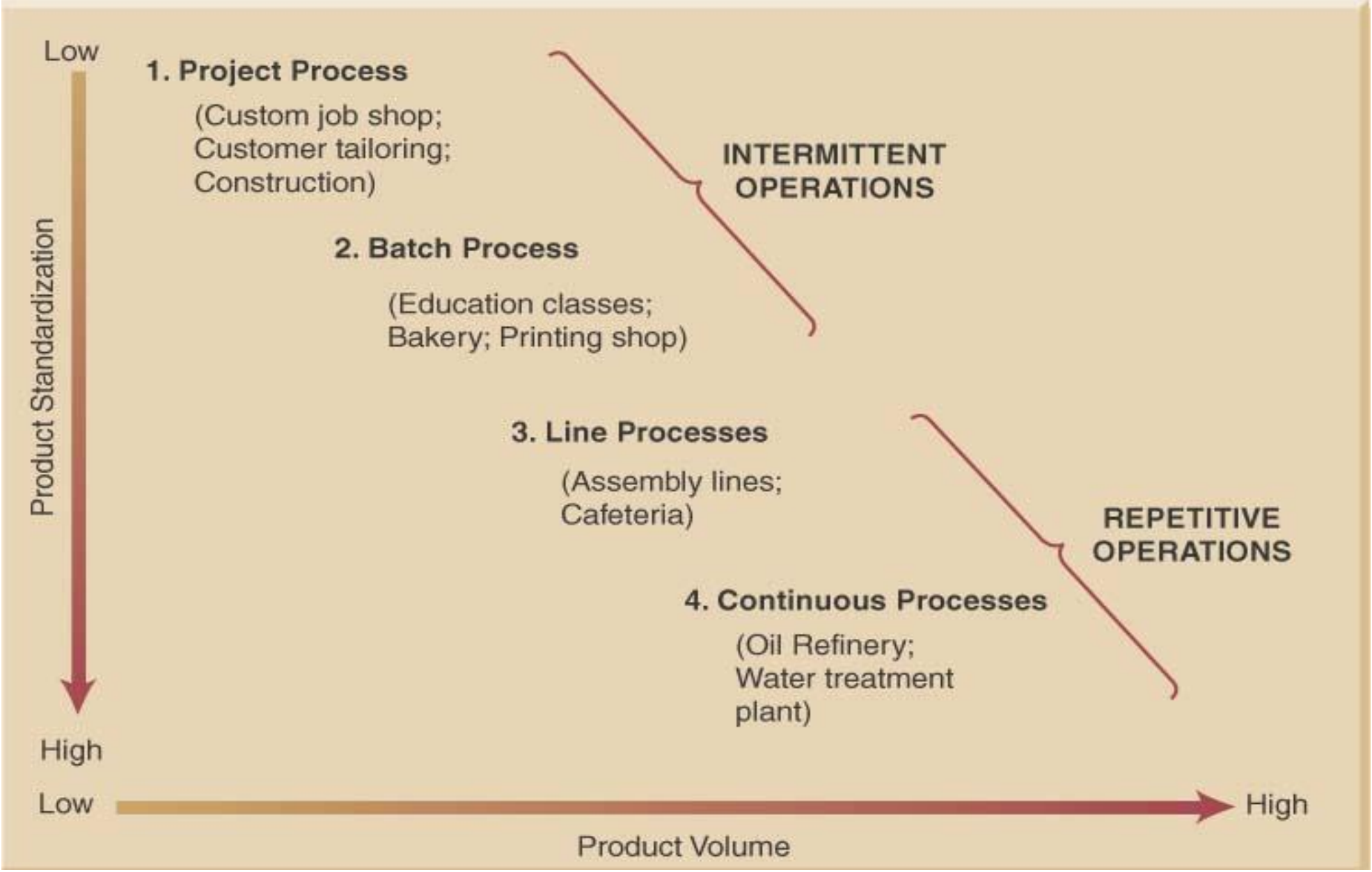
We now need to develop a process!

Types of Processes

The category of process we choose will be dictated by **product volume** and the **degree of standardisation.**

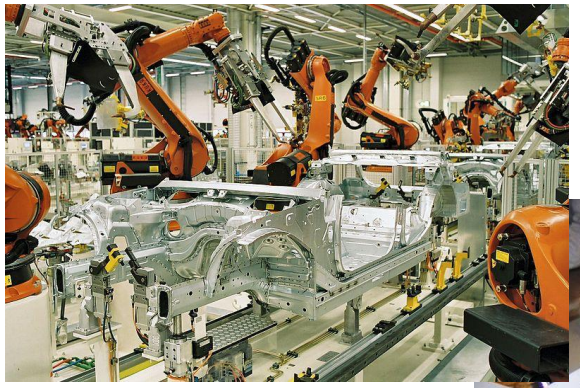
- **Project process** – make a one-at-a-time product exactly to customer specifications
- **Batch process** – small quantities of product in groups or batches based on customer orders or specifications
- **Line process** – large quantities of a standard product
- **Continuous process** – very high volumes of a fully standard product. Products produced by these processes are usually in continual rather than discrete units.

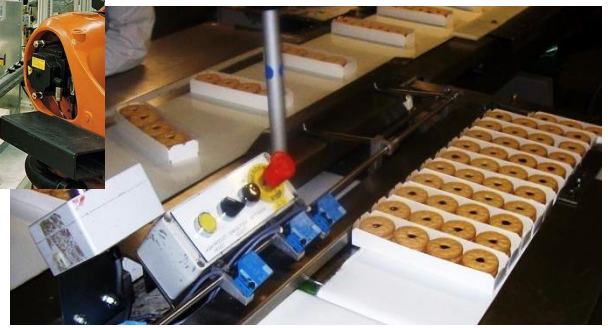
Process types exist on a ***continuum…***


Low
1. Project Process
(Custom job shop;
Customer tailoring;
Construction)
INTERMITTENT
OPERATIONS
2. Batch Process
(Education classes;
Bakery; Printing shop)
Product Standardization
3. Line Processes
(Assembly lines;
Cafeteria)
REPETITIVE
OPERATIONS
4. Continuous Processes
(Oil Refinery;
Water treatment
plant)
High
Low
High
Product Volume

Project process

Line process

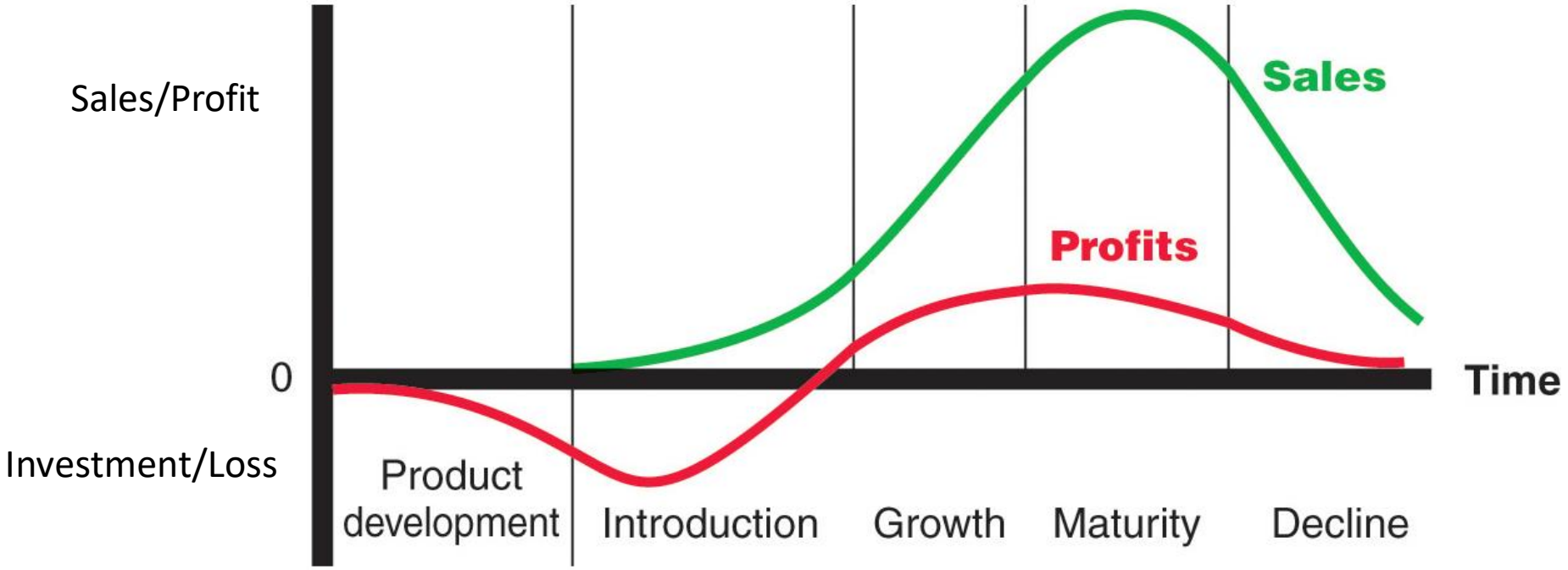




Batch process

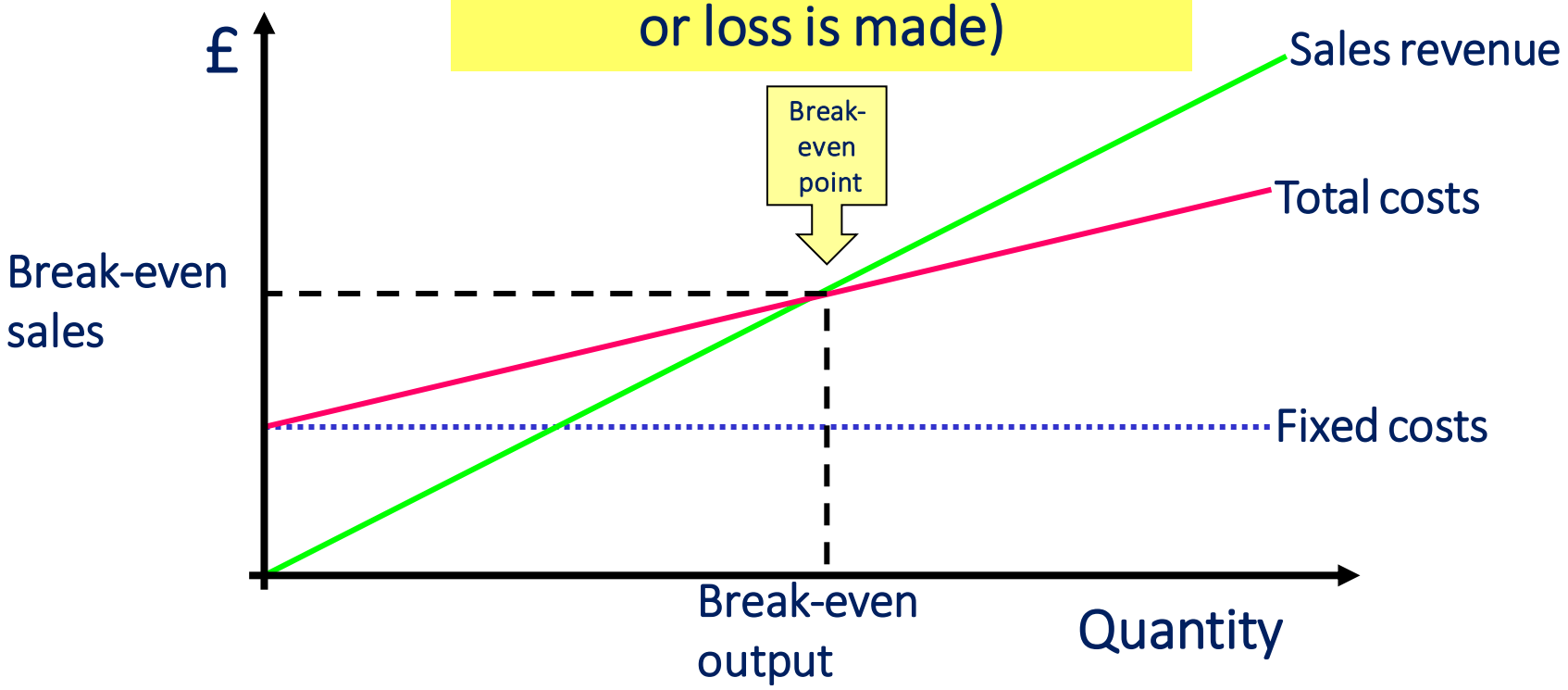
Continuous process

Process selection is also linked to the stage in the Product Life Cycle



Drawing a Break-even chart

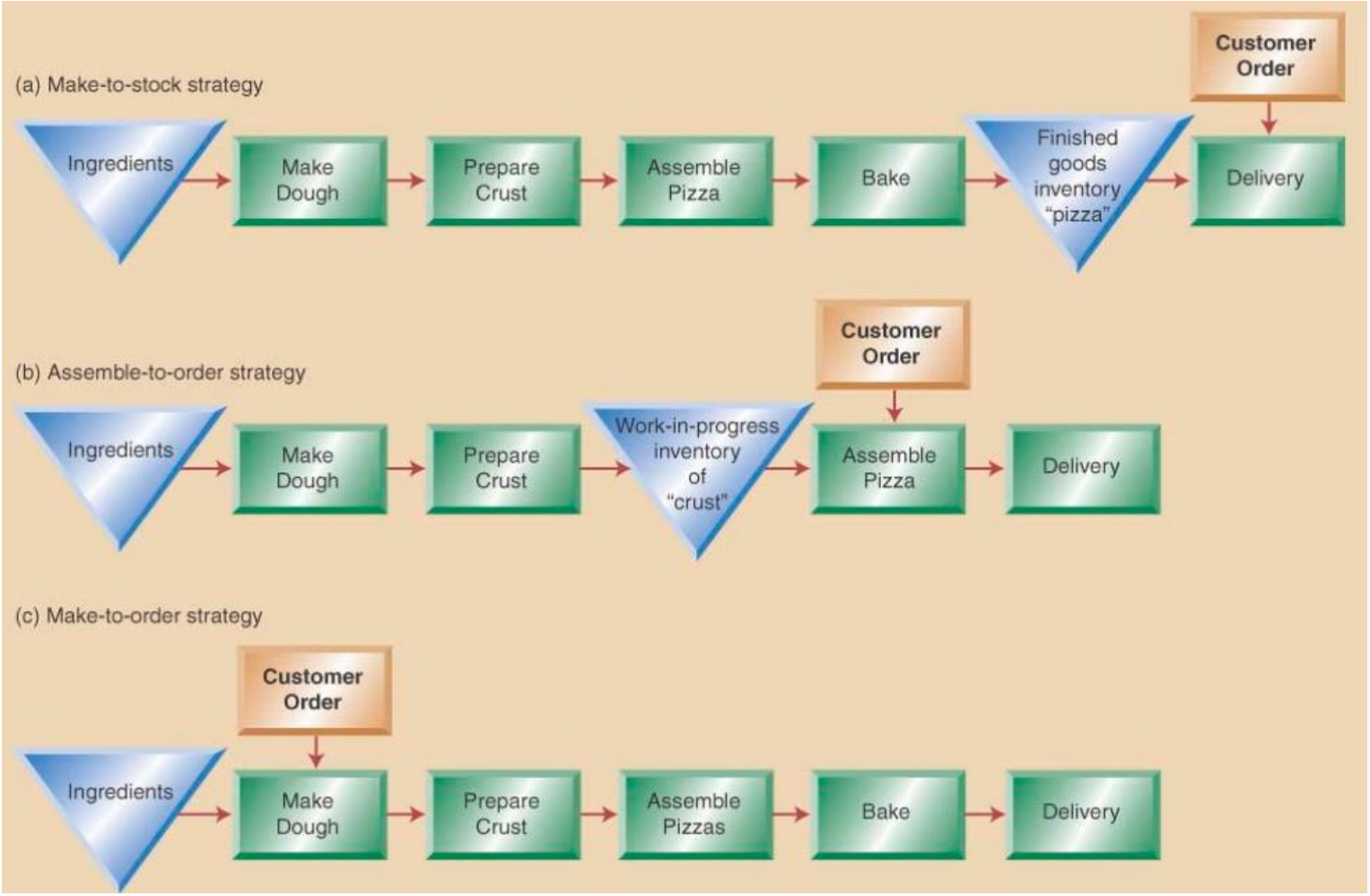
At the break-even point, total sales = total cost (i.e. no profit or loss is made)



Designing Processes to match Customer demand.

- **Make-to-stock strategy**: Produce standard products and services for immediate sale and delivery.
- **Assemble-to-order strategy**: Produces standard components that can be configured to customer specifications.
- **Make-to-order strategy**: Produces products to customer specifications after an order has been received.

Different product strategies for Pizza supply



Factors Impacting Product Design - **DFM**

- Need to **Design for Manufacturing** – DFM
- DFM is a series of guidelines to follow in order to produce a product easily and profitably. They focus on the following two issues:

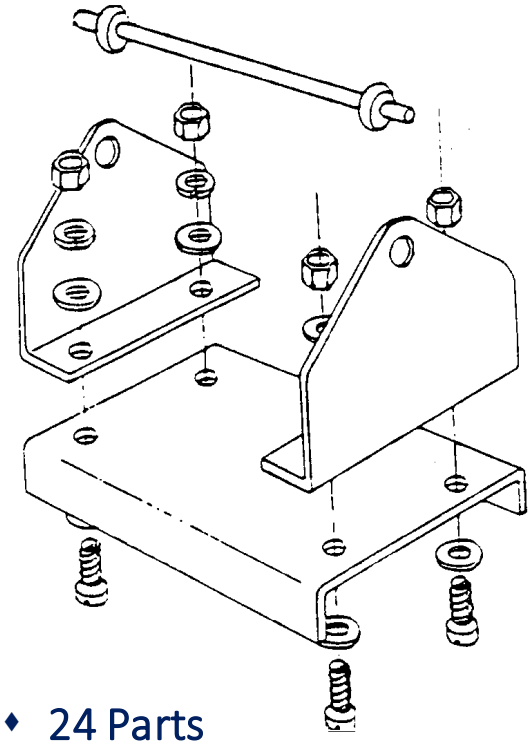
  - **Simplification** - Minimise parts
    - A simpler product is easier to make, costs less and gives higher quality

  - **Standardisation** – Use of common and interchangeable parts
    - Design parts for multiple applications
    - Enables us to offer greater variety of products with less inventory.
    - Results in lower cost and provider greater flexibility

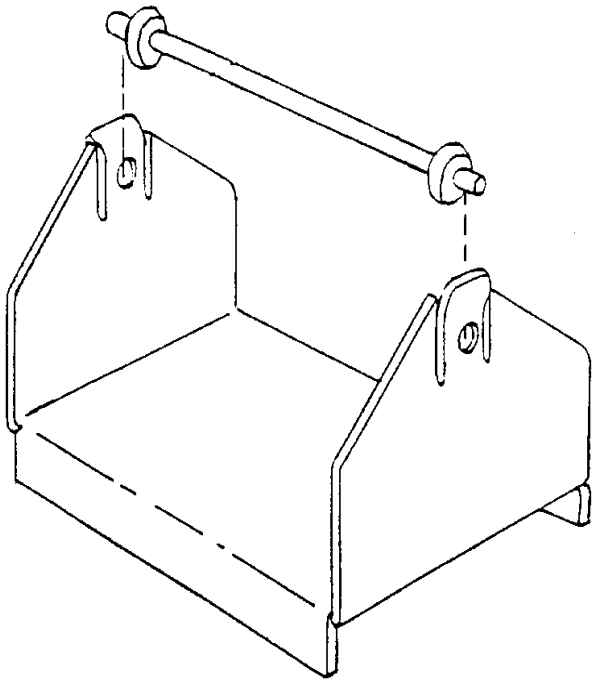
Designing out complexity

Definition: DFM is the method of design for ease of manufacturing of the collection of parts that reduces the chances of error.

Component Elimination Example



- 24 Parts
- 8 different parts
- multiple mfg. & assembly processes necessary



- 2 Parts
- 2 Manufacturing processes
- one assembly step

Innovation Management

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