

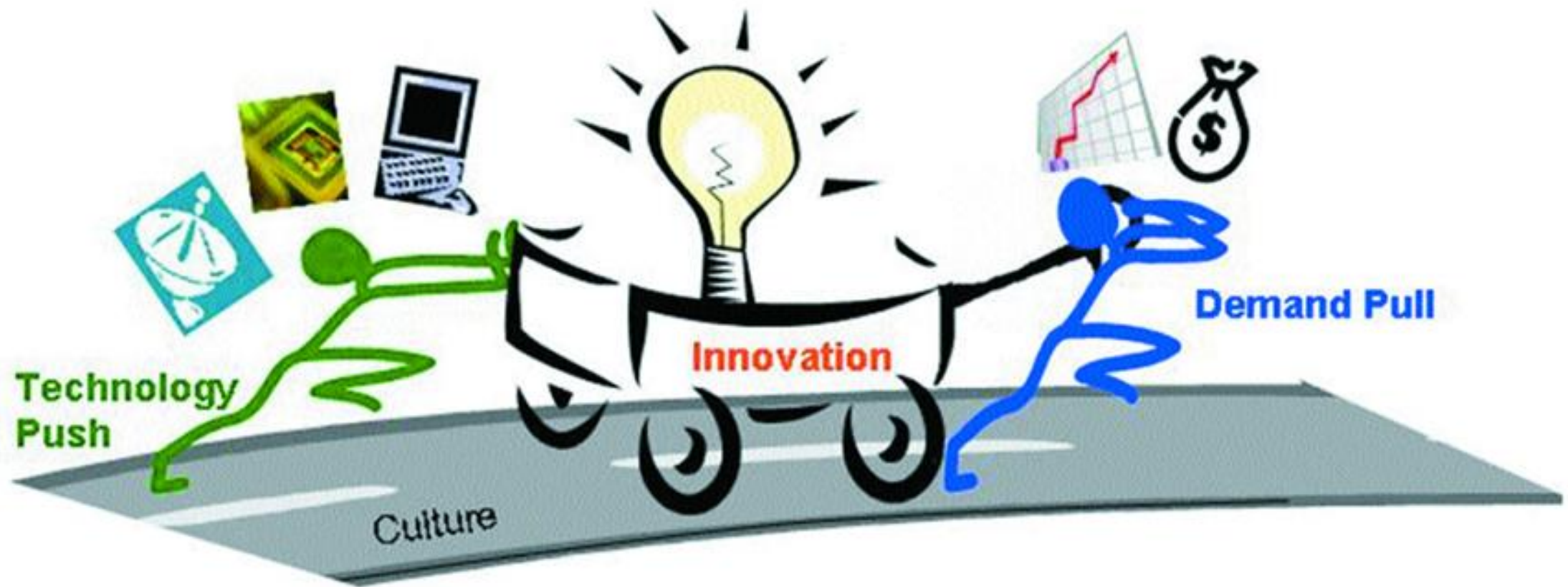


Sources of Innovation

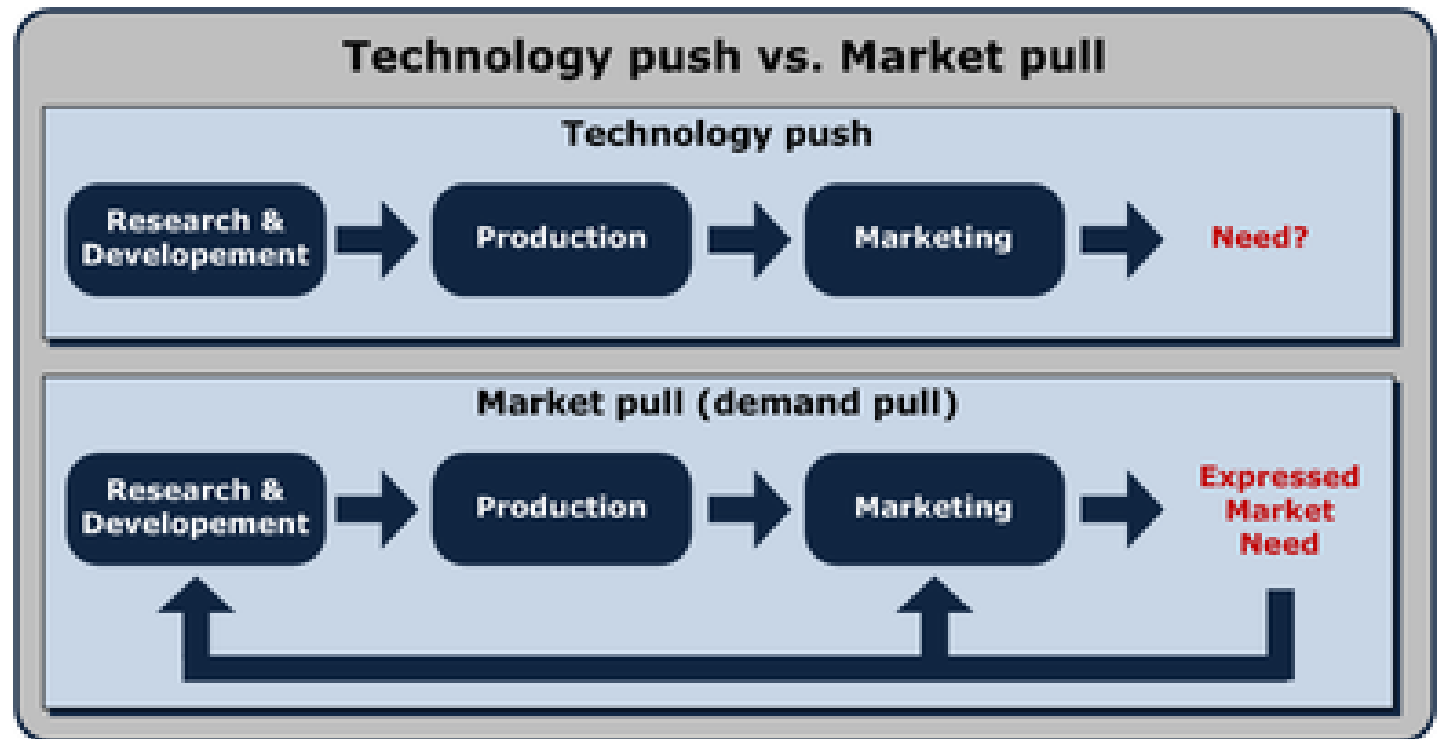
Where Do Innovations Come From: Sources of Innovation

1. Knowledge-push
2. Need-pull
3. Mass Customization
4. Users as Innovators
5. Extreme Users
6. Watching Others
7. Recombinant Innovation
8. Regulation
9. Future and Forecasting
10. Accidents

Push vs. Pull



Push vs. Pull



Knowledge-Push Innovation



One obvious source of innovation is the possibilities which emerge as a result of scientific research.



Knowledge creation provides a push, creates an 'opportunity field' which sets up possibilities for innovation.

Push vs. Pull



A technology push implies that a new invention is pushed through R&D, production and sales functions onto the market without proper consideration of whether or not it satisfies a user need.

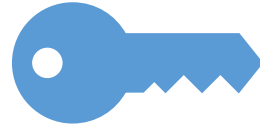


In contrast, an innovation based upon market pull has been developed by the R&D function in response to an identified market need.

Knowledge-Push Innovation



Knowledge push creates a field of possibilities – but **not every idea finds successful application**



One of the key lessons is that innovation requires **some form of demand** if it is to take root.



Bright ideas are not, in themselves, enough – they may not meet a real or perceived need and people may not feel motivated to change.

Innovation as a Result of Organized R&D Effort

TABLE 5.1

Some examples of knowledge-push innovations

Nylon	Radar	Antibiotics
Microwave	Synthetic rubber	Cellular telephony
Medical scanners	Photocopiers	Hovercraft
Fibre optic cable	Digital imaging	Transistor/integrated circuits

Need-Pull Innovation

- Another key driver of innovation is **need**
- ***'Necessity is the Mother of invention'*** – innovation is often the response to a real or perceived need for change.
- **Basic needs** – for shelter, food, clothing, security – **led early innovation as societies evolved.**



Need-Pull Innovation

- We are now at a stage where the need pull operates on more **sophisticated higher-level needs.**
- In innovation management the emphasis moves to ensuring we **develop a clear understanding of needs and finding ways to meet those needs.**

Whose Needs?



- When considering need-pull as a source of innovation we should remember that **one size doesn't fit all.**
- **Differences amongst potential users** can also provide rich triggers for **innovation in new directions.**

Towards Mass Customization

Before :
[mass production]



→
one way



After :
[mass customization]



↕
interactive
dialogue



Mass Customization



Mass customization is a marketing and manufacturing technique that combines the flexibility and personalization of custom-made products with the low unit costs associated with mass production.



The trouble is that markets are not made up of people wanting the same thing – and there is an underlying challenge to meet their demands for variety and increasing customization.



This represents a powerful driver for innovation

Different Levels of Customizing

Type of customization	Characteristics	Examples
Distribution customization	Customers may customize product/service packaging, delivery schedule and delivery location but the actual product/service is standardized	Sending a book to a friend from Amazon.com. They will receive an individually wrapped gift with a personalized message from you – but it's actually all been done online and in their distribution warehouses. iTunes appears to offer personalization of a music experience but in fact it does so right at the end of the production and distribution chain

Different Levels of Customizing

Type of customization	Characteristics	Examples
Assembly customization	Customers are offered a number of predefined options. Products/services are made to order using standardized components	Buying a computer from Dell or another online retailer. Customers choose and configure to suit their exact requirements from a rich menu of options – but Dell only start to assemble this (from standard modules and components) when their order is finalized. Banks offering tailor-made insurance and financial products are actually configuring these from a relatively standard set of options

Different Levels of Customizing

Type of customization	Characteristics	Examples
Fabrication customization	Customers are offered a number of predefined designs. Products/services are manufactured to order	Buying a luxury car like a BMW, where the customers are involved in choosing ('designing') the configuration which best meets their needs and wishes, e.g. engine size, trim levels, colour, fixtures and extras. Only when they are satisfied with their virtual model does the manufacturing process begin – and customers can even visit the factory to watch their car being built



Users as Innovators

- Successful innovation requires to **get close to the customer.**
- **The user can become a key part of the innovation process**, feeding in ideas and improvements to help define and shape the innovation.
- **Crowdsourcing** is the practice of engaging a 'crowd' or group for a common goal—often for innovation, problem solving, or efficiency.

Crowdsourcing



WIKIPEDIA
The Free Encyclopedia



NETFLIX

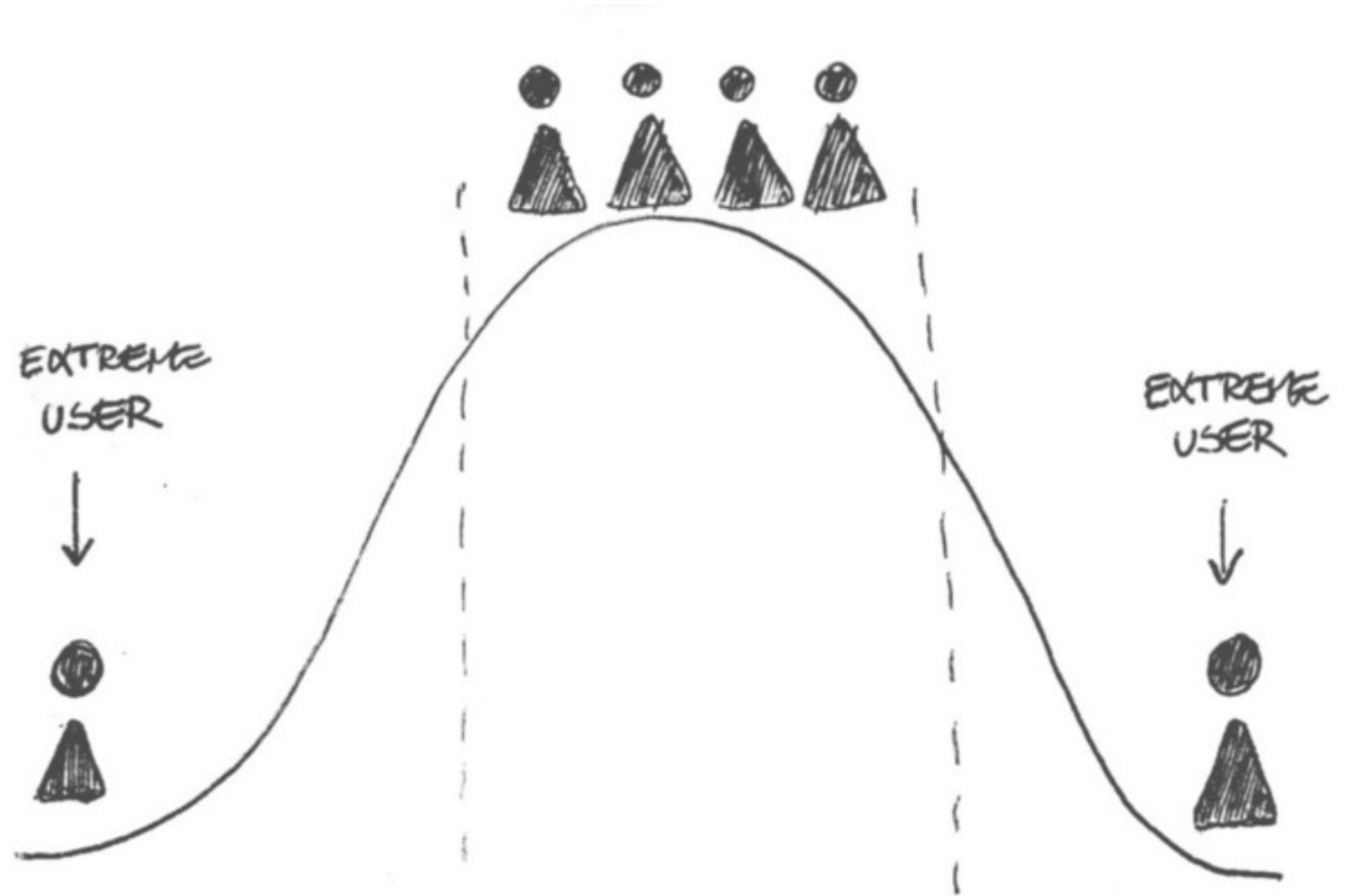


Crowdsourcing

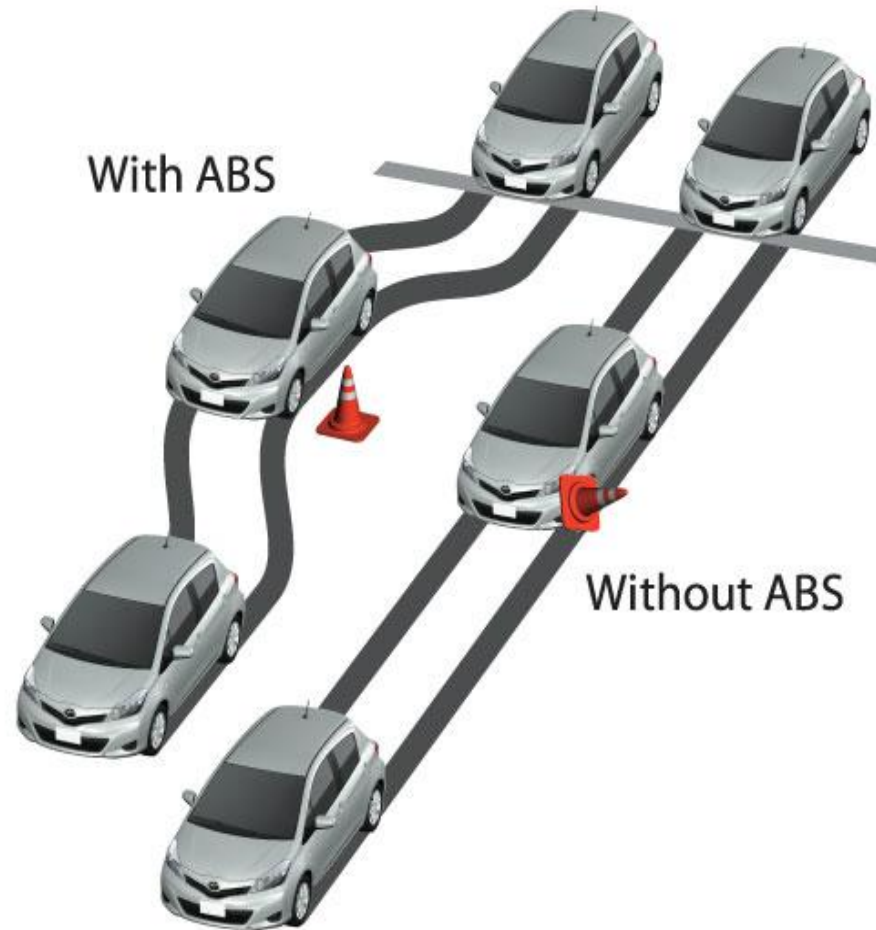
- Through the LEGO Ideas platform, users are able to submit ideas for new LEGO sets and vote and provide feedback on those submitted by others.
- Ideas with over 10,000 votes are reviewed by LEGO and if selected, the submitter works with LEGO team to make it a reality and receives royalties on sales.
- Not only does the platform support idea generation at LEGO but allows them to validate the demand for those ideas.

Extreme Users

- Looking for extreme environments or users can be a powerful source of innovation.
- Users in the toughest environments may have needs which by definition are at the edge – so any innovative solution which meets those needs has possible applications back into the mainstream.



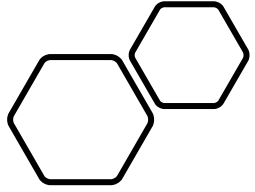
Extreme Users Antilock Braking System (ABS)



Extreme Users

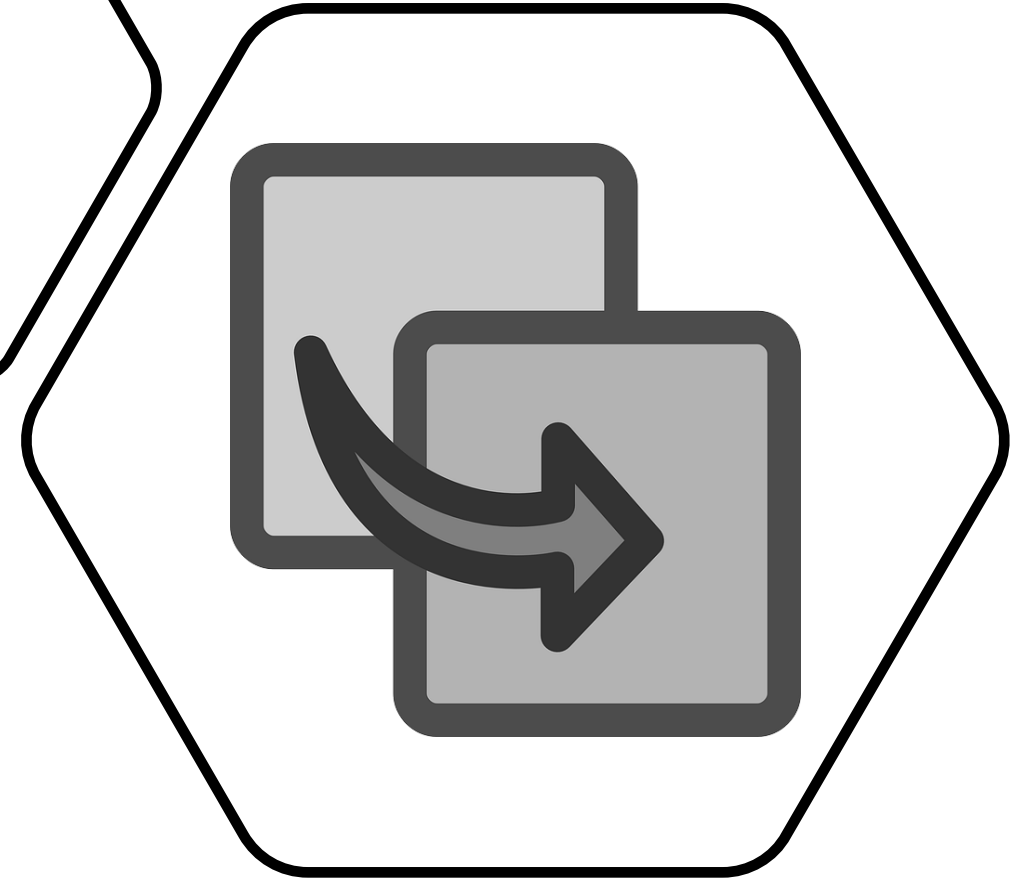
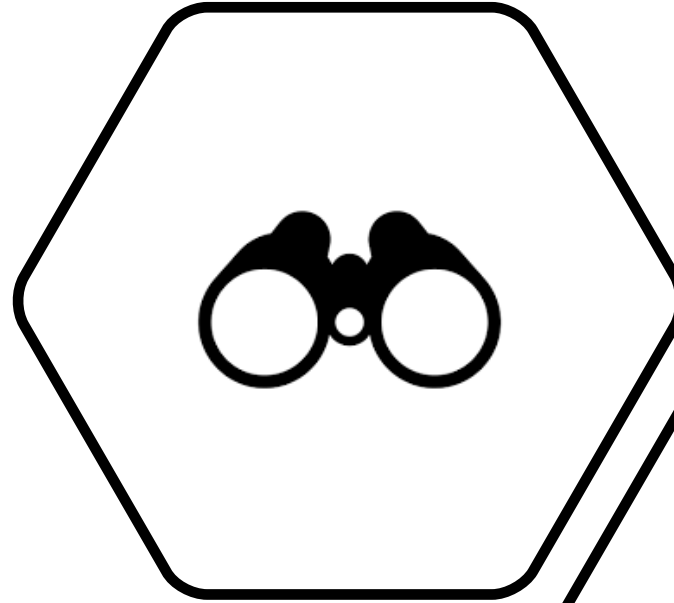


- ✓ Antilock braking systems (ABS) which are now a commonplace feature of cars began life as a special add-on for premium high-performance cars.
- ✓ The origins of this innovation came from a more extreme case:
 - The need to stop aircraft safely under difficult conditions where traditional braking might lead to skidding or other loss of control.
 - ABS was developed for this extreme environment and then migrated across to the easier world of automobiles.



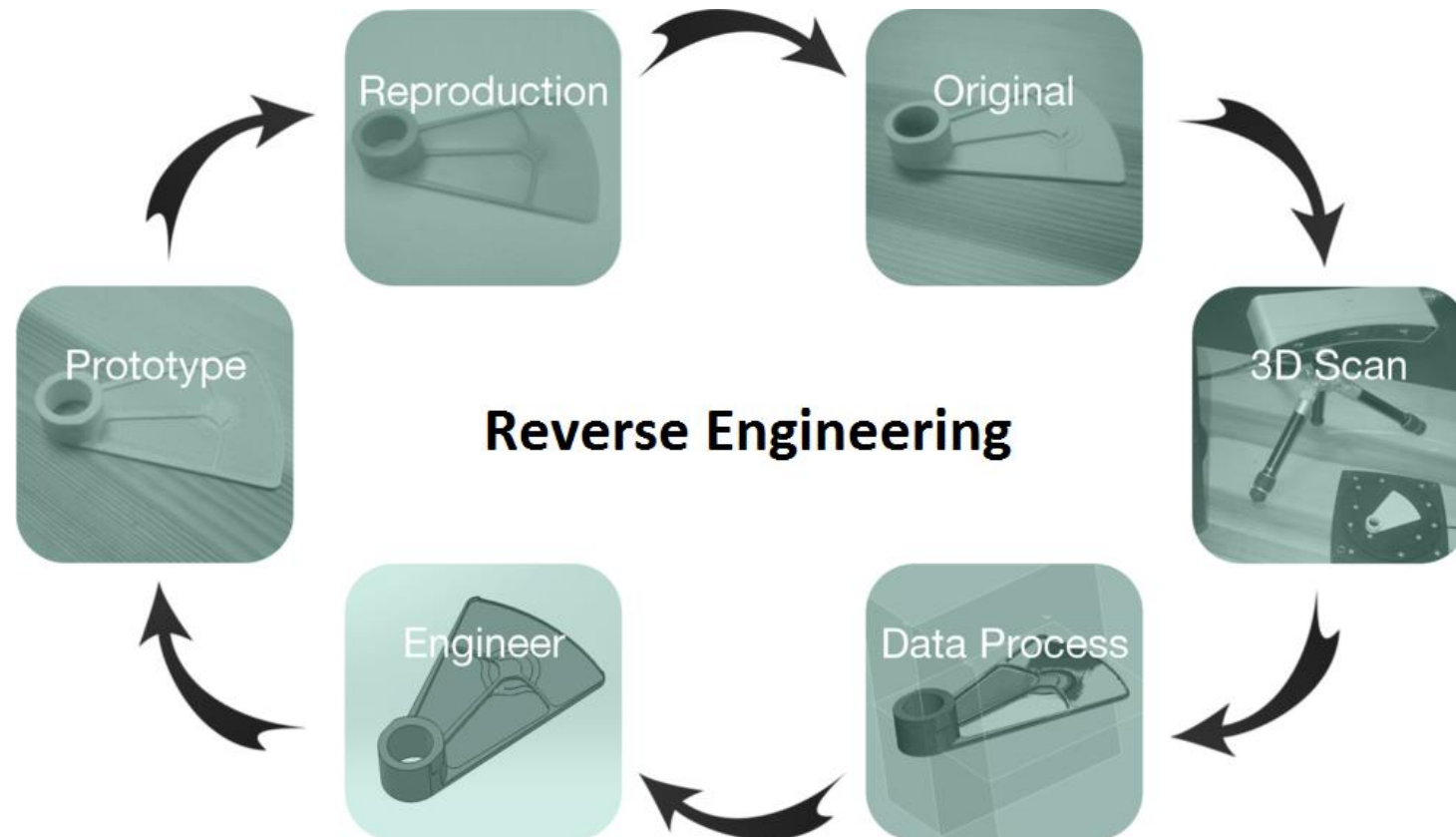
Watching Others

- This strategy involves learning from others
- For example, well-known route to find ideas:
 - reverse engineering of products and processes
 - development of imitations



Reverse Engineering

- The reproduction of another manufacturer's product following detailed examination of its construction or composition.



Watching Others

- Learning by working with established products and understanding how they might be adapted or developed for the local market.
- Subsequently this learning could be used to develop new generations of products or services.
- Much of the rapid progress of Asian economies in the post-war years was based on a strategy of 'copy and develop': taking Western ideas and improving on them.

Recombinant Innovation



Recombinant innovation: Ideas and applications in one world transferred to a new context



Innovators rarely come up with new ideas; instead, they adapt them from one context to another.



Bringing together apparently unrelated things which can somehow be connected and yield an interesting insight



Transferring or combining old ideas in new contexts can be a powerful source of innovation.

Recombinant Innovation

- Henry Ford adapted his automobile assembly-line technologies from meatpacking plant assembly lines.





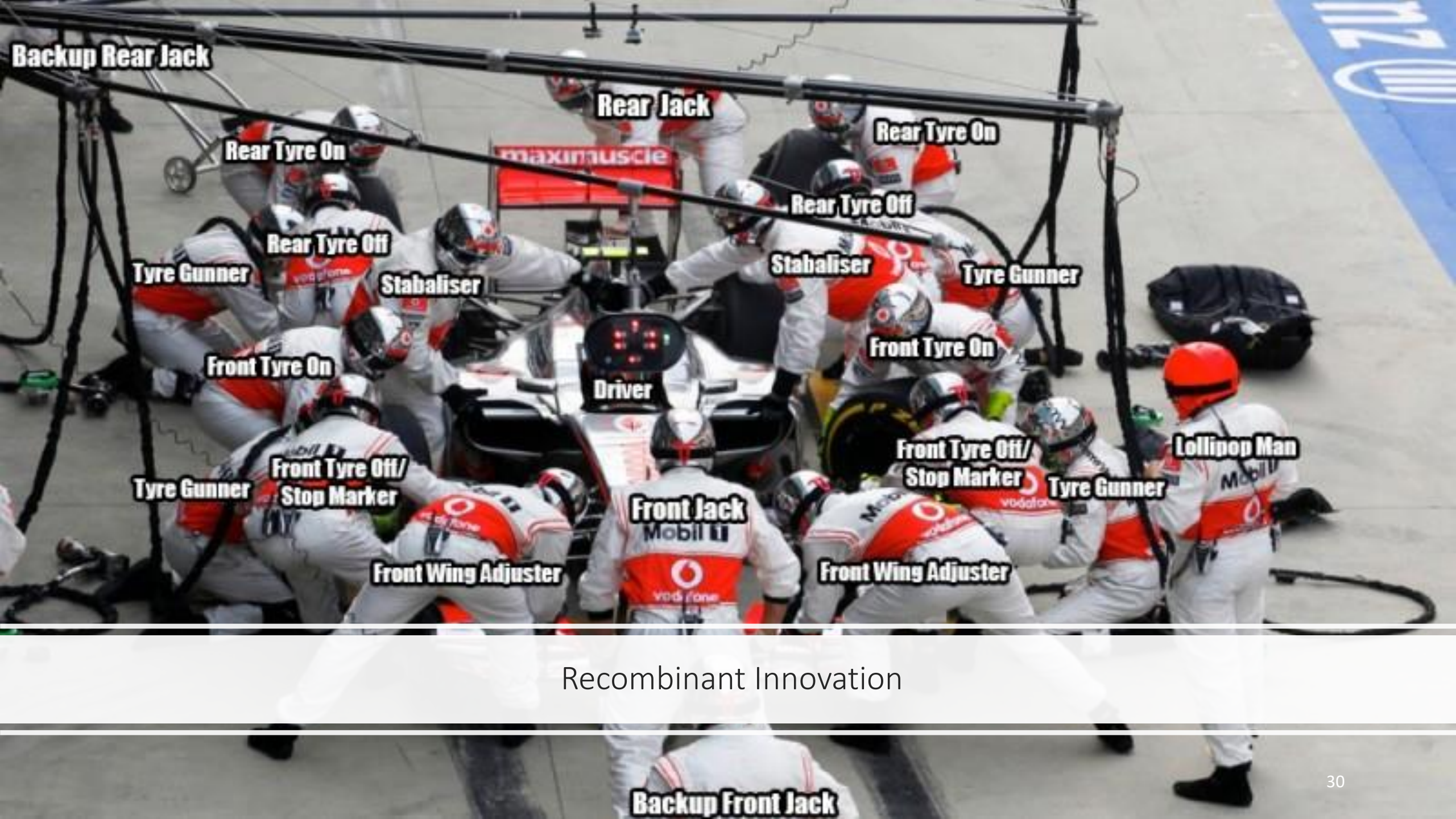
Recombinant Innovation

- In the low-cost airline world much depends on being able to land a plane, disembark the passengers, clean and refuel it, load new passengers and take off again in as short a time as possible.
- Southwest Airlines holds the record for this, regularly managing turnarounds in less than **20 minutes**.

Recombinant Innovation (Example)

- **Southwest Airlines** became the most successful carrier in the USA by dramatically **reducing the turnaround times at airports**
- Thanks to the innovation which it learned from studying pit-stop techniques in the **Formula 1 Grand Prix** events.





Recombinant Innovation

Recombinant Innovation

- The Reebok “pump” was an athletic-shoe air bladder borrowed from intravenous bag technology.



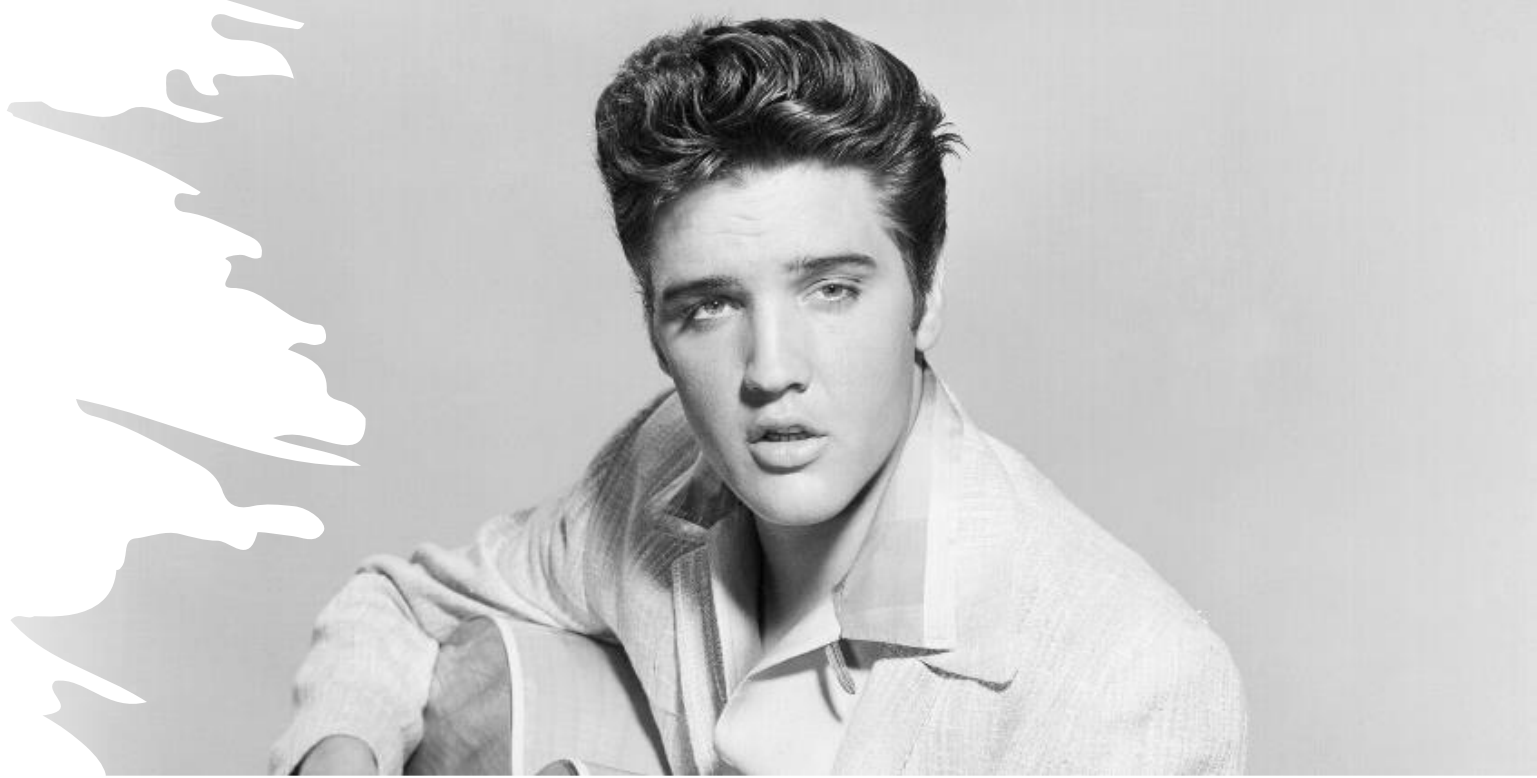


Recombinant Innovation

- Marco Polo brought pasta to Italy from China.

Recombinant Innovation

- Pop musicians from Elvis Presley to the Diddy have “sampled” tunes and themes across genres.



Advantages of Recombinant Innovation



Instead of wasting time developing solutions from scratch adapt and modify a proven model from elsewhere



Reduces learning costs since much of the original development of an innovation has been undertaken in a different context.



It opens up new and different innovation space; you can establish a new trajectory for further innovation.

Incongruities

- When the need is **incongruent** with the supply, innovation might be born.
- In an attempt to resolve the existing incongruities people might innovate.
- It is basically in the human nature to **try to fill the incongruities** he sees around him.



Incongruities

- For example as the population of cars grew there was a shortage of parking area.
- In an attempt to solve the incongruity between parking area and parking shortage, the smart car was born.
- Smart car is a small car that can fit in small spaces.



Regulation

- **Regulations** restricts certain things and opens up new ones along which change is mandated to happen.
- And it works the other way – **deregulation** – the slackening off of controls – may open up new innovation space.



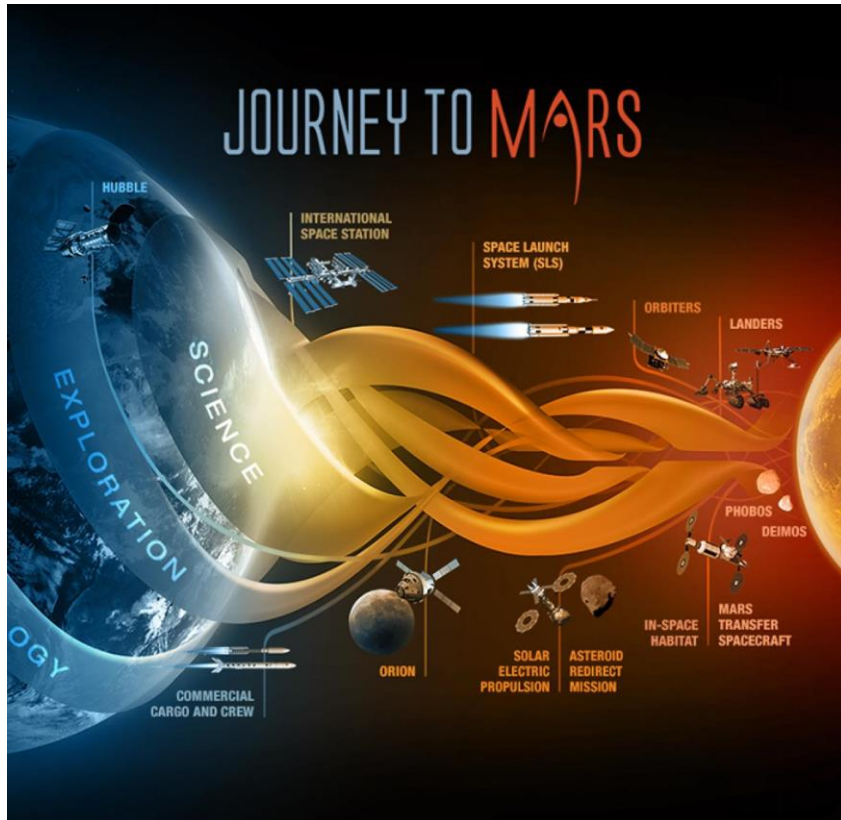
Regulation

- Regulation can also trigger counter innovation – solutions designed to get round existing rules or at least bend them to advantage.





Futures and Forecasting



- Another source of stimuli for innovation comes through imagining and exploring alternatives to the dominant version in everyday use.
- Shell has a long history of exploring future options and driving innovations, most recently through its GameChanger programme. Shell's GameChanger programme works with start-ups and businesses on unproven **early-stage ideas with the potential to impact the future of energy.**
- SpaceX: Mars Mission

Accidents


- Accidents can also trigger innovation, opening up surprisingly new lines of attack.
- For example:
 - ✓ The famous story of 3M's 'Post-it' notes began when a polymer chemist mixed an experimental batch of what should have been a good adhesive, but which turned out to have rather weak properties – sticky but not very sticky.



Accidental Innovations

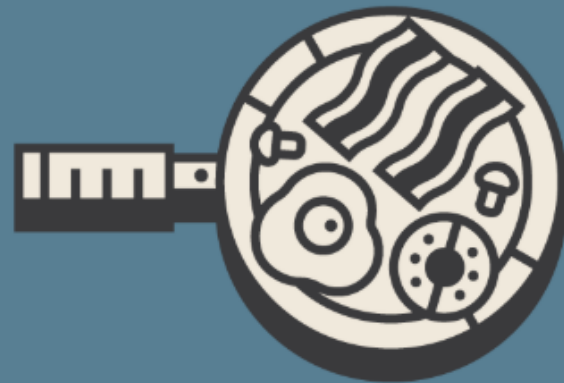
Teflon

Intention



Create new **Chlorofluorocarbons** (CFCs).

Creator: *Roy Plunkett*




Plunkett was trying to **create a new CFC** with a refrigerated experiment but instead of a gas he found **white flakes** which turned out to be the **chemical parts of teflon**.

Accidental Innovations


Safety Glass

Intention



Conduct a routine experiment.

Creator: *Edouard Benedictus*




Benedictus accidentally **knocked a flask off his desk**, it **cracked instead of shattering**. He discovered plastic cellulose nitrate coated the inside and prevented shattering.

Accidental Innovations


Microwave

Intention



Repair a radar array.

Creator: *Percy L. Spencer*



Spencer was working on a **microwave-emitting magnetron** when he realized it **melted the chocolate bar in his pocket**, discovering the effects of microwaves on food.