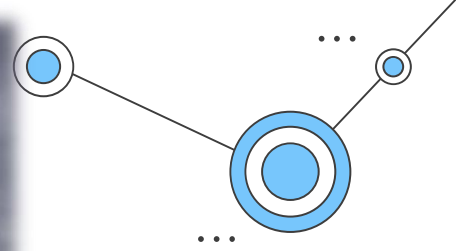


Decision making under uncertainty

Dr. Naghizadeh

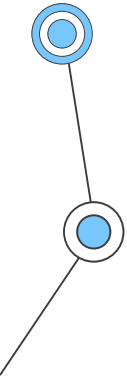
Presented by M. Heydar



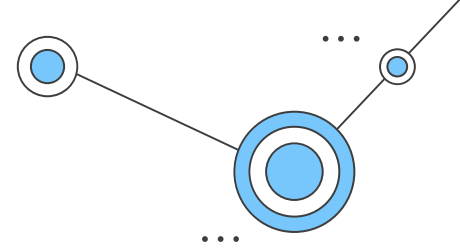
Uncertain variables which makes our act of decision making a little like driving in the fog

The problem is that we don't know in advance:

- 1) if an innovation will work – will the technology actually do what we hope?
- 2) will the market still be there and behave as we anticipated?
- 3) will competitors move in a different and more successful direction?
- 4) will the government change the rules of the game, and so on?



Meeting the challenge of uncertainty



What distinguishes innovation management from gambling?

- 1) Both involve committing resources to something which (unless the game is rigged) has an uncertain outcome.
- 2) But innovation management tries to convert that uncertainty at the outset to something closer to a calculated risk





Innovation management

01

Incremental innovation

Doing what we do but
better

We **have some prior knowledge** about markets, technologies, regulatory frameworks, etc. and so can make **reasonably accurate assessments of risks** using this information.

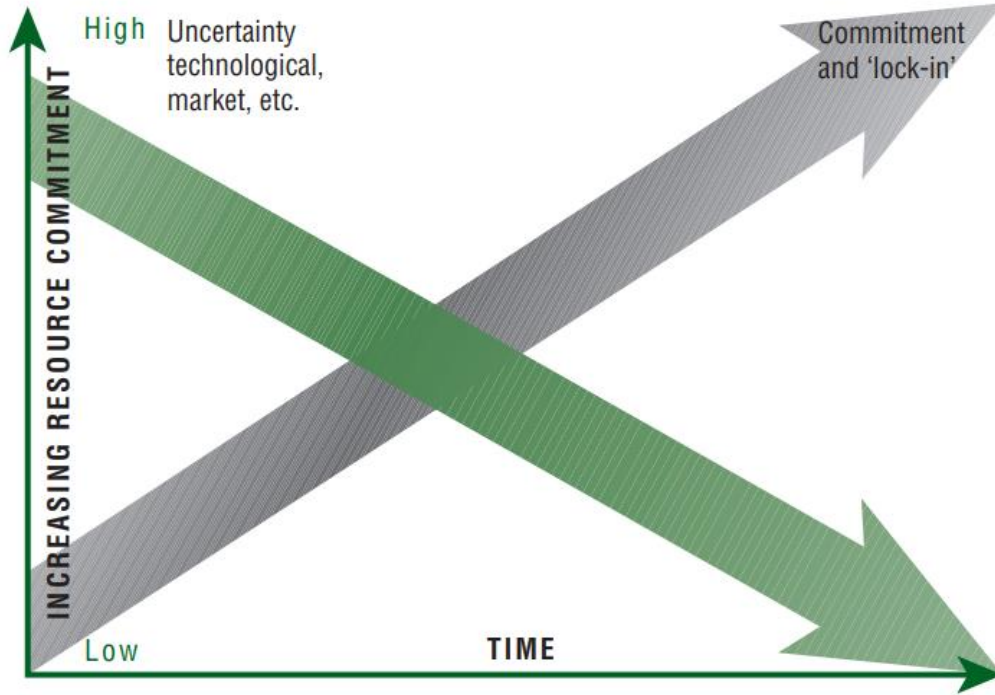
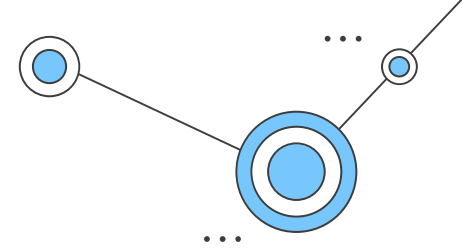
02

Radical innovation

Doing something
completely different

carrying **a much higher level of risk** because of the lack of information. **decision making** is often **shaped by emotional forces** as well as limited facts and figures.

THE FUNNEL OF UNCERTAINTY

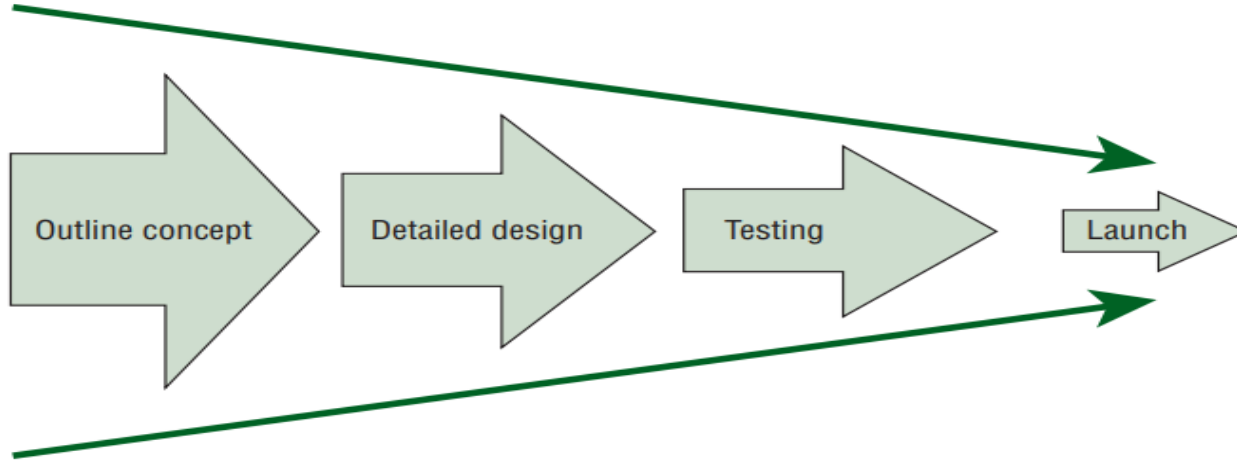
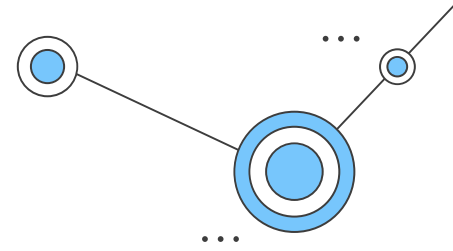


Managing innovation is a fine **balancing act**, between the **costs of continuing with projects** which may not eventually succeed (and which represent opportunity costs in terms of other possibilities) and **the danger of closing down too soon** and eliminating potentially fruitful options.

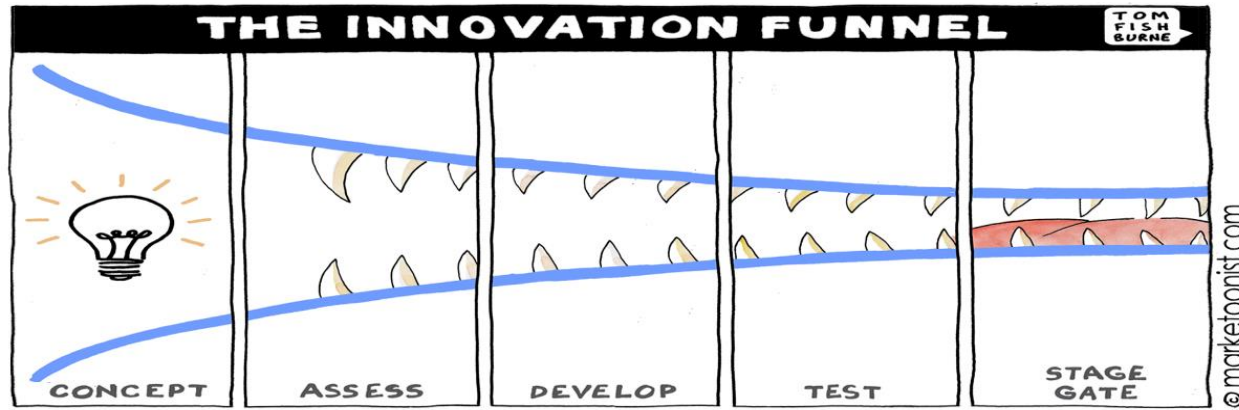
FIGURE 7.1: Increasing innovation commitment over time

The innovation funnel

a roadmap which helps us make (and review) decisions about resource commitment



Given this model it makes sense not just to make one big decision to commit everything at the outset **when uncertainty is very high** but instead to **make a series of stepwise decisions.** We move from uncertainty to increasingly **well-calculated risk management**



Decision making for incremental innovation

01
...

Doing what we already do but better
comparing something new with something that already exists

02
...

Risks are involved these can be calculated, using stage gate

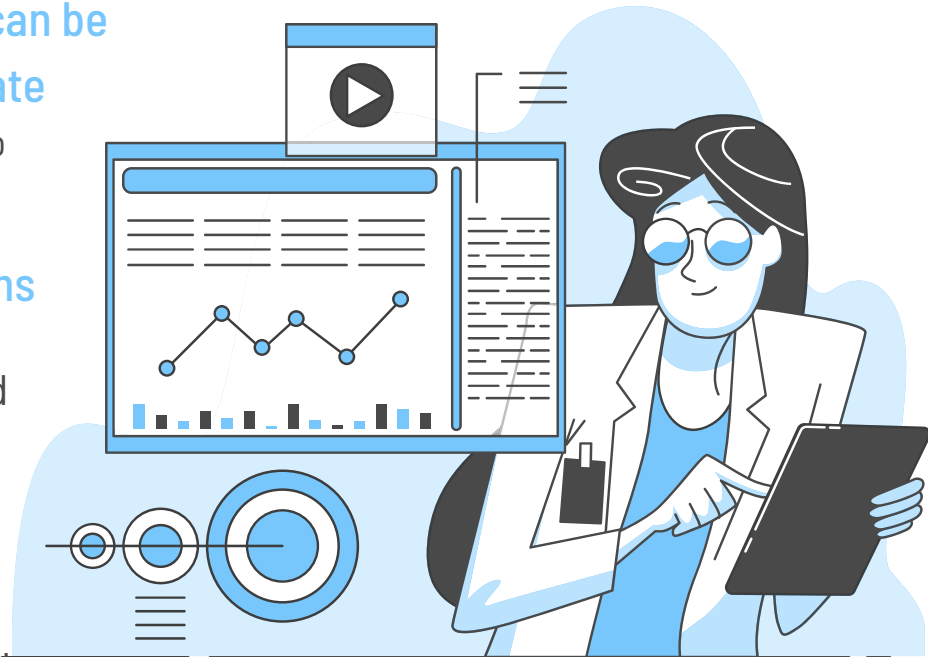
relevant information collected to help guide judgement in a (relatively) mechanistic fashion

03
...

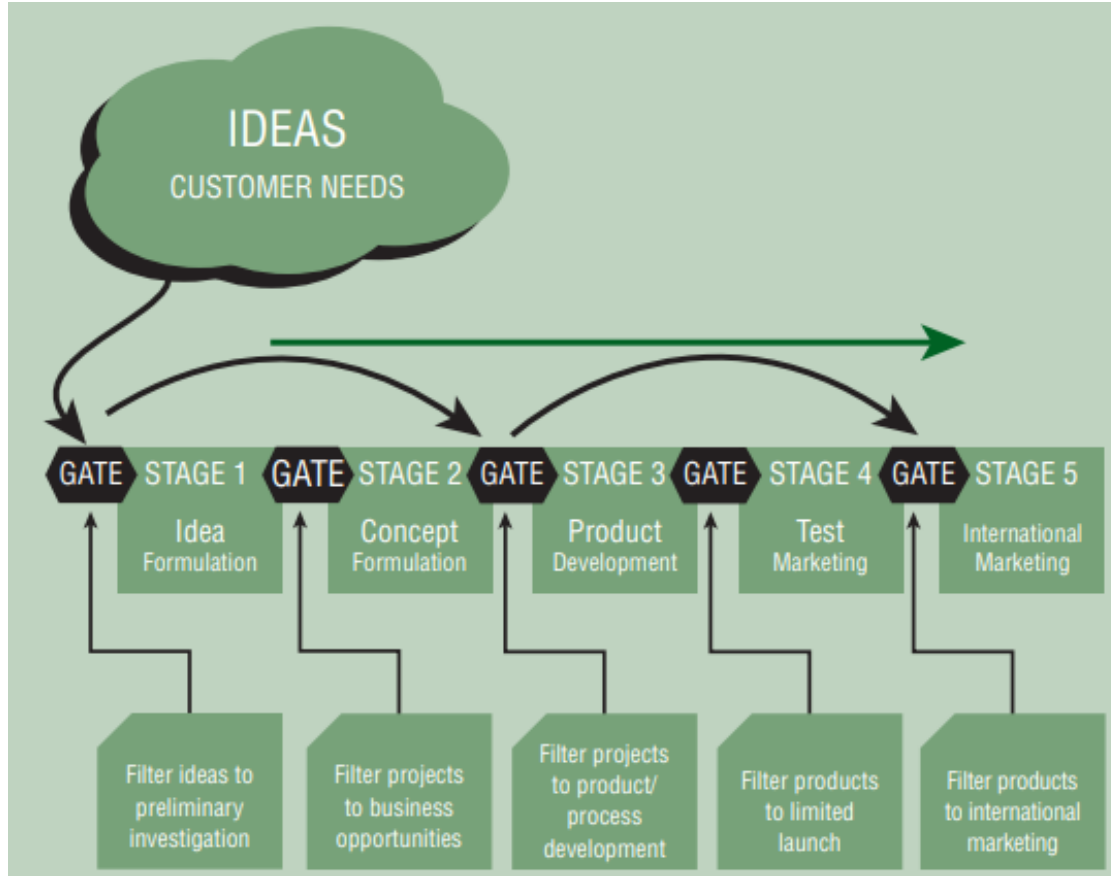
'high involvement' systems
a large proportion of the workforce becomes engaged in innovation

04
...

policy deployment
devolving the top-level innovation strategy to lower levels in the organization and allowing people to take decision



The stage-gate system



Each stage is followed by a 'gate', a decision point at which the project is reviewed by the **'gatekeepers'**. The gates serve as the critical quality control checkpoints between the stages. The development of new products into five manageable 'stages'. Each stage contains a number of parallel and coordinated activities designed for efficient manufacturing.

Spreading the risk – building a portfolio

TABLE 7.1

Problems arising from poor portfolio management

Without portfolio management there may be	Impacts
No limit to projects taken on	Resources spread too thinly
Reluctance to kill-off or 'de-select' projects	Resource starvation and impacts on time and cost – overruns
Lack of strategic focus in project mix	High failure rates, or success of unimportant projects and opportunity cost against more important projects
Weak or ambiguous selection criteria	Projects find their way into the mix because of politics or emotion or other factors – downstream failure rates high and resource diversion from other projects
Weak decision criteria	Too many 'average' projects selected, little impact downstream in market

Source: Based on Cooper, R. (1988) The new product process: a decision guide for management. *Journal of Marketing Management*, 3 (3), 238–55.

Portfolio methods try to deal with the issue of reviewing across a set of projects and look for a balance of economic and non-financial risk/reward factors.

Decision making at the edge

01

...

By the emergence of a radical new technology established incumbents often face a major challenge

because they are far outside the firm's 'normal' framework.

02

...

the incumbent decision-makers strongly favour the status quo

creates an opportunity for new entrants to colonize new market space - and then migrate towards incumbents' territory.

03

...

cognitive inertia/ dissonance of its corporate executives

when two cognitions are incompatible with each other. A cognition is a piece of knowledge, such as a: thought. attitude.

04

...

bounded rationality

Nobel Prize-winning economist Herbert Simon rationality is limited by our thinking capacity,

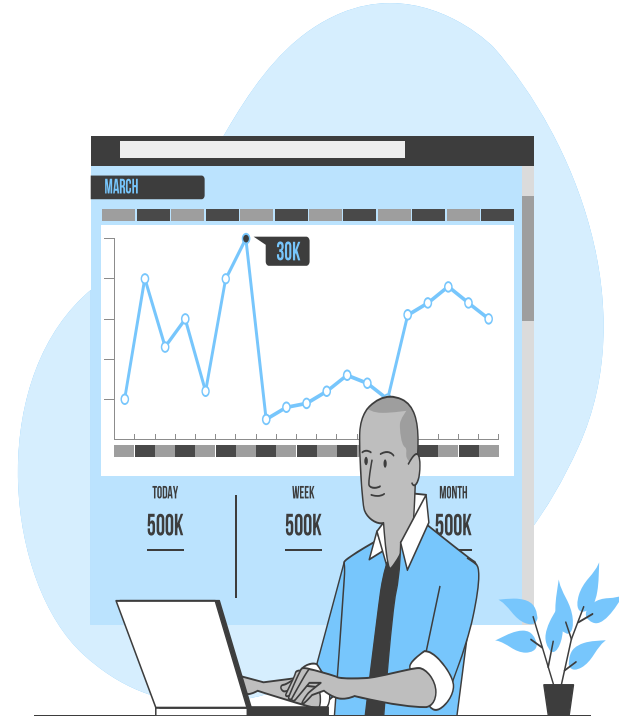


TABLE 7.2

Examples of justifications for non-adoption of radical ideas

Argument	Underlying perceptions from within the established mental model
'It's not our business'	Recognition of an interesting new business idea but rejection because it lies far from the core competence of the firm
'It's not a business'	Evaluation suggests the business plan is flawed along some key dimension – often underestimating potential for market development and growth
'It's not big enough for us'	Emergent market size is too small to meet growth targets of large established firm
'Not invented here'	Recognition of interesting idea with potential but reject it – often by finding flaws or mismatch to current internal trajectories
'Invented here'	Recognition of interesting idea but rejection because internally generated version is perceived to be superior
'We're not cannibals'	Recognition of potential for impact on current markets and reluctance to adopt potential competing idea

'Nice idea but doesn't fit'

Recognition of interesting idea generated from within but whose application **lies outside current business areas** – often leads to **inventions being shelved or put in a cupboard**

It ain't broke so why fix it'

No perceived relative advantage in adopting new idea

'Great minds think alike'

'Groupthink' at strategic decision-making level – **new idea lies outside the collective frame of reference**

'(Existing) customers won't/don't want it'

New idea **offers little to interest or attract current customers** – essentially **a different value proposition**

'We've never done it before'

Perception that **risks involved are too high** along market and technical dimensions

'We're doing OK as we are'

The success trap – lack of motivation or **organizational slack to allow exploration outside of current lines**

'Let's set up a pilot'

Recognition of potential in new idea but limited and insufficient commitment to exploring and developing it – **lukewarm support**

Mapping the selection space

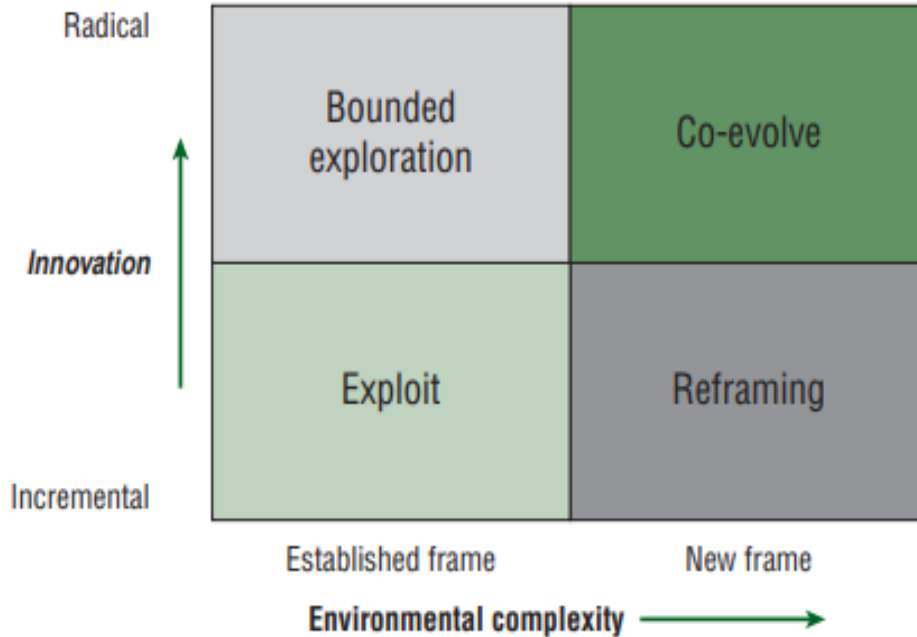
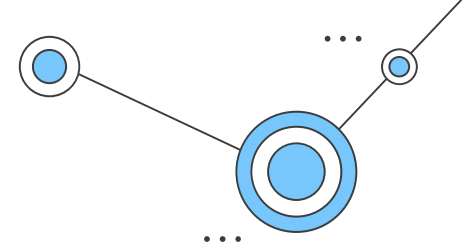


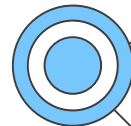
FIGURE 7.3: Outline map of innovation selection space



The vertical axis refers to the familiar **'incremental/radical' dimension** in innovation whilst the second relates to **environmental complexity**. Rising complexity means that it becomes increasingly **difficult to predict**.

...

Outline map of innovation selection space



...

01

Zone 1 Exploit

a stable and shared frame -
'business model'/architecture
adaptive and incremental
development takes place

02

Zone 2 Exploration

pushing the frontiers of what is known and
deploying different search techniques for doing
so. But this is still taking place within the same
basic cognitive frame - 'business model as
usual. Often there is a sector-level trajectory.
proceed becomes more of an 'act of faith'

03

Zone 3 Reframing

It involves searching and selecting from a
space where alternative architectures are
generated. permutations and combinations
of elements in the environment. risky and
often results in failure.

The example is, low-cost airlines

04

Zone 4 Co-evolve

represents the 'edge of chaos'
paradigm shift'
zone 4 is essentially
'unknown unknowns'

Tools to help with high uncertainty decision making

Building alternative futures

futures studies', using tools such as forecasting, trend extrapolation and scenario building to create and explore alternative models of the future and the potential threats and opportunities which they contain

Prototyping

The process involves building bridges in the minds of potential supporters. There are many different ways of prototyping including physical models, simulation, etc.

Probe and learn

making small steps into the fog. mapping 'unsafe' territory and reducing the emotional anxiety by a series of planned experiments. In this sense they are investments in what Robert Cooper calls 'buying a look'



Tools to help with high uncertainty decision making

Using alternative measurement and evaluation criteria

'**hurdle rate**' for return on investment – in order to mitigate the risk associated with uncertainty or applying broad boundaries (**maximum permissible losses**) in which radical innovation can be nurtured.

Mobilizing networks of support

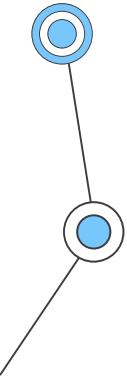
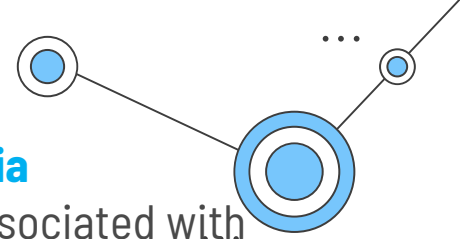
Identify several types of **champion**: technical champions, project champions . .

Deploying alternative funding structures

'**Venture capital**' finance available for higher risk and potentially higher reward projects. These can take many forms, including special project teams, incubators, new venture divisions, corporate venture units and 'skunk works

Mobilizing entrepreneurship

use of internal entrepreneurship – '**intrapreneurship**' – to help with radical innovation



1) we have looked at some of the challenges in making the selection decision

2) This quickly raises the issue of uncertainty and how we convert it to some kind of manageable risk

3) build a portfolio of projects spreading this risk

4) for incremental innovation are relatively straightforward (though there is never a guarantee of success)

5) For radical innovation, there is a need for making decisions 'outside the box' of its normal frame of reference.

Summary

