Transforming Future Defence Capabilities through Anticipatory Innovation

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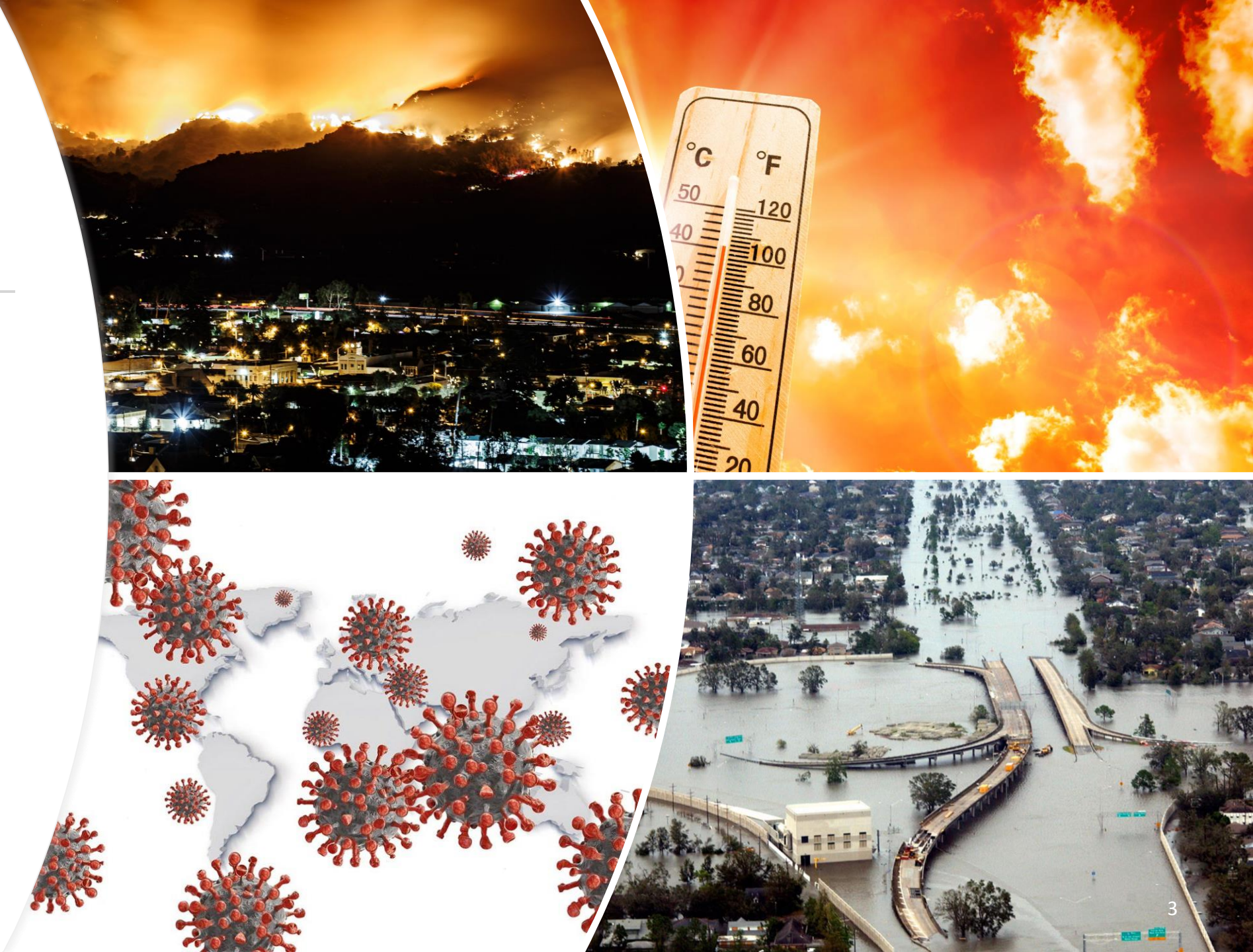
Defence R&D Canada

Anticipation is Power

Shocks

- **There are many events (both natural and man-made) that have stressed tested the resilience of our societal systems.**

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Exposure to failure

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Not seeing a tsunami or an economic event coming is excusable; building something fragile to them is not.

Taleb, 2014

COVID-19

- 'COVID-19 has firmly established itself as the single largest security disrupter of this century in the non-traditional sense. It has necessitated a recalibration of securitisation framework...'.

Security landscape

- Security matters such as climate change are of great concern to NATO given that such issues can lead to humanitarian crisis, regional tensions and violence affecting and creating fragile regions and states and vulnerable populations.

Anticipation

- As described by Reez (2021), traditional mindsets and practices are inadequate to deal with disruptions characterized by VUCA (volatility, uncertainty, complexity, ambiguity) conditions.

- **Anticipatory innovation** is introduced as a gamechanger in addressing such disruptive effects as climate change on security.

- Even though foresight tools are increasingly integrated into policymaking, governments often lack a practical understanding of how to anticipate uncertain futures but also **how to act on them today to achieve desired outcomes** (Tõnurist and Hanson, 2020).

Complex Risk Landscape

- The world is insufficiently prepared for an increasingly complex risk environment.

Figure 13: Risks Interconnection Map (RIM) 2010. Source: World Economic Forum 2010

WEF (2015) Global Risks 2015 10th Edition: Insight Report.
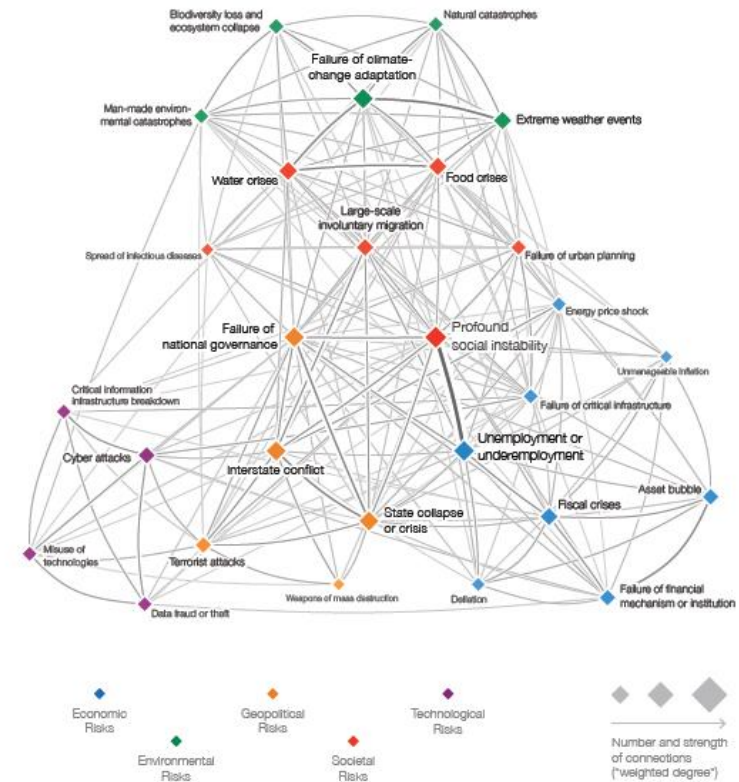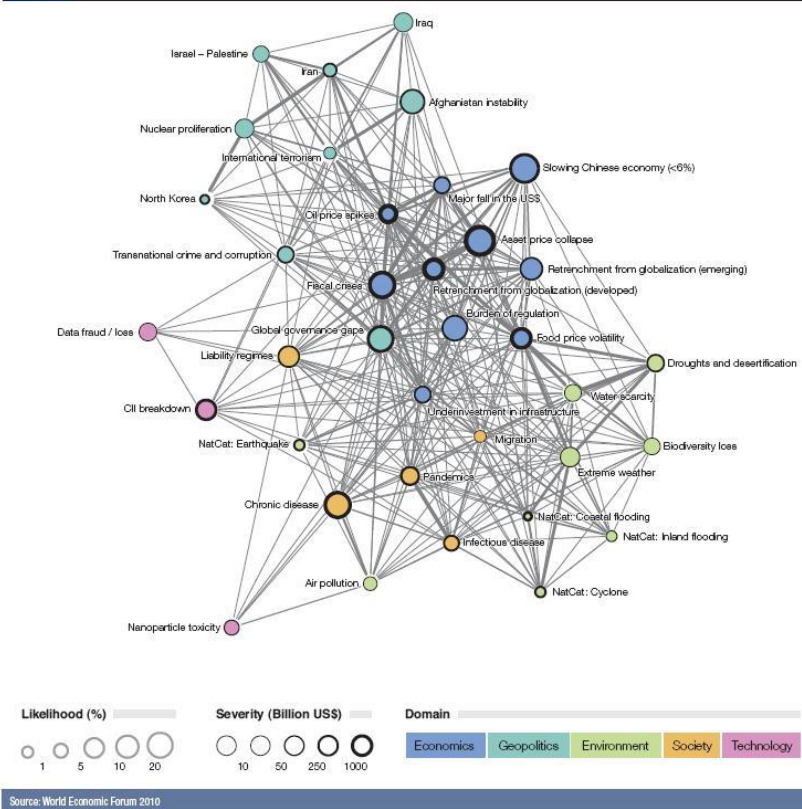
Wicked Problems

- Humanity faces a number of wicked problems, from global climate change and the coronavirus pandemic to systemic racism and widening economic inequality.

- Such societal wicked problems create and perpetuate security vulnerabilities and conditions that can challenge NATO's operational capability.

Security ecosystem: Recognizing vulnerable populations

- Natural hazards, including those influenced by climate change, expose existing inequalities.

- Those who face the greatest levels of risk – and therefore require the highest levels of resilience – are often those who face the highest inequality and barriers to accessing their rights in everyday life.
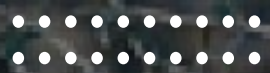
Inherent fragility and the security ecosystem

- Relatively localized damage in one system may lead to failure in another, triggering a disruptive avalanche of cascading and escalating failures.

- Understanding the fragility induced by multiple interdependencies is one of the major challenges in the design of resilient communities.

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Fragility, conflict, and violence (FCV)

- Fragility, conflict, and violence (FCV) present **a critical development challenge that threatens efforts to end extreme poverty in both low- and middle-income countries**.

- By 2030, up to two-thirds of the world's extreme poor could live in FCV settings.

- Conflicts also drive 80% of all humanitarian needs.

Fragile States

- Violent conflict has spiked dramatically in the last decade, and the fragility landscape is becoming more complex.

- Since the start of the COVID-19 pandemic, the world has seen a series of massive setbacks to stability in regions across the world: from Asia and Africa to Latin America and the Caribbean and more recently in Eastern Europe.

Poverty and food insecurity

- Risks affecting FCV settings, including food insecurity, climate change, rising inequality, demographic change, and the socio-economic impacts of the pandemic.

- World Bank estimates show that an additional **20 million people are living in extreme poverty** in countries affected by FCV since the onset of the COVID-19 pandemic.

- Around 81 percent of the nearly 193 million people estimated to be experiencing acute food insecurity in 2021 were in countries affected by FCV.

The global fragility landscape

- Violent conflicts have increased to the highest levels observed over the past three decades.

- The world is also facing the largest forced displacement crisis ever recorded.

- Rising inequality, lack of opportunity, discrimination, and exclusion are fueling grievances and perceptions of injustice.

- Climate change, demographic change, migration, technological transformations, illicit financial flows, and violent extremism are often interconnected, posing risks that transcend borders.

- Many countries also suffer from chronically poor governance. These factors can increase vulnerability to shocks and crises and can create regional and global spillovers.

FY23 List of Fragile and Conflict-affected Situations

CONFLICT	INSTITUTIONAL AND SOCIAL FRAGILITY
Afghanistan	Burundi
Burkina Faso	Chad
Cameroon	Comoros
Central African Republic	Congo, Republic of
Congo, Democratic Republic of	Eritrea
Ethiopia	Guinea-Bissau
Iraq	Haiti
Mali	Kosovo
Mozambique	Lebanon
Myanmar	Libya
Niger	Marshall Islands
Nigeria	Micronesia, Federated States of
Somalia	Papua New Guinea
South Sudan	Solomon Islands
Syrian Arab Republic	Sudan
Ukraine	Timor-Leste
Yemen, Republic of	Tuvalu
	Venezuela, RB
	West Bank and Gaza (territory)
	Zimbabwe

Humanitarian Emergency

- "We live, it seems, in a permanent state of humanitarian emergency," warned Kőrösi, pointing out that over 300 million people are now in urgent need of aid and protection – a 10 percent increase since January – and that climate change, COVID-19, and conflict have pushed global hunger to "alarming levels."

UN General Assembly President Csaba Korosi, Sept 2022

A 'perfect storm'

- In 2017 80 million people were headed toward starvation
- Climate related issues raised number to 135 million
- COVID-19 raised it to 276 million
- Ukraine crisis raised it to 345 million
- Creating a perfect storm leading to famine, starvation, destabilization of nations

Lederer, EM (2022) UN food chief warns of 'perfect storm' of crises. Globe and Mail, 24 Sept 2022

Surprises?

- "Surprising events" reflect an organizations inability to recognize evidence of new vulnerabilities or the existence of ineffective countermeasures (Woods, 2006, p. 24).

- This necessitates the requirement to readjust to their existence and thereby the need to consider the extremes (Taleb, 2007, p. xx).

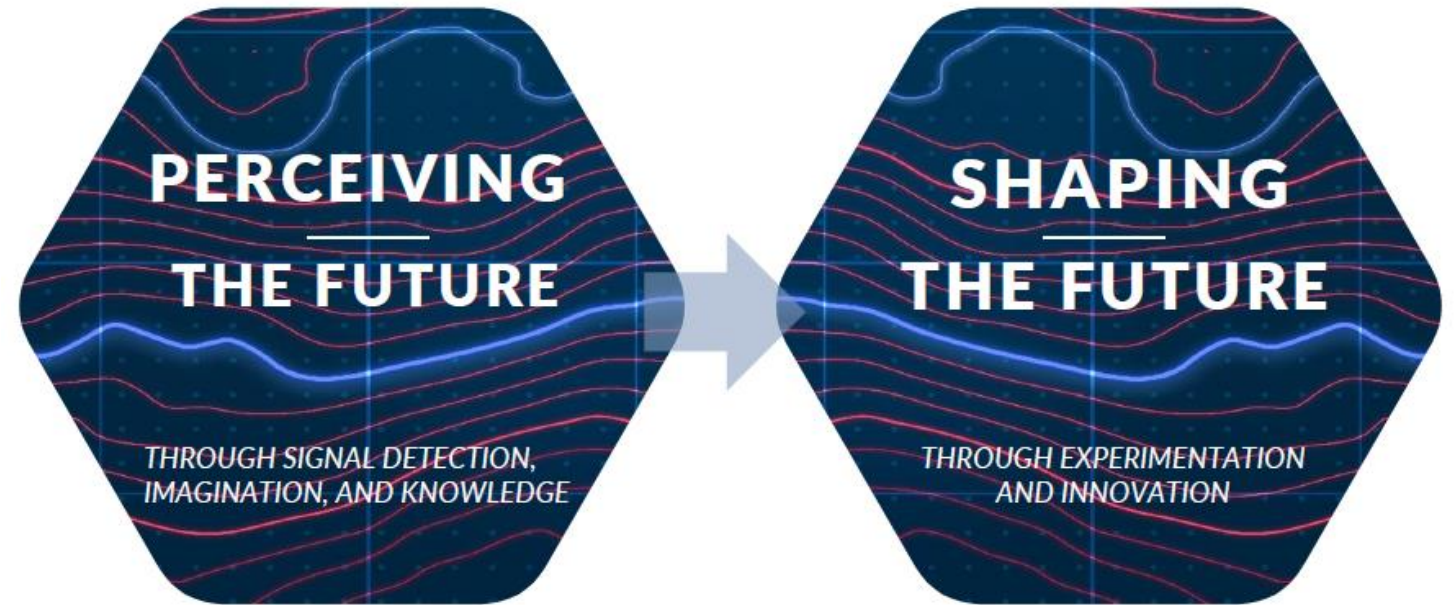To do differently, we must think differently

Problem Framing

- 'One of my rules in consulting is simple: never solve the problem I am asked to solve. […] Because, invariably, the problem I am asked to solve is not the real, fundamental, root problem.'
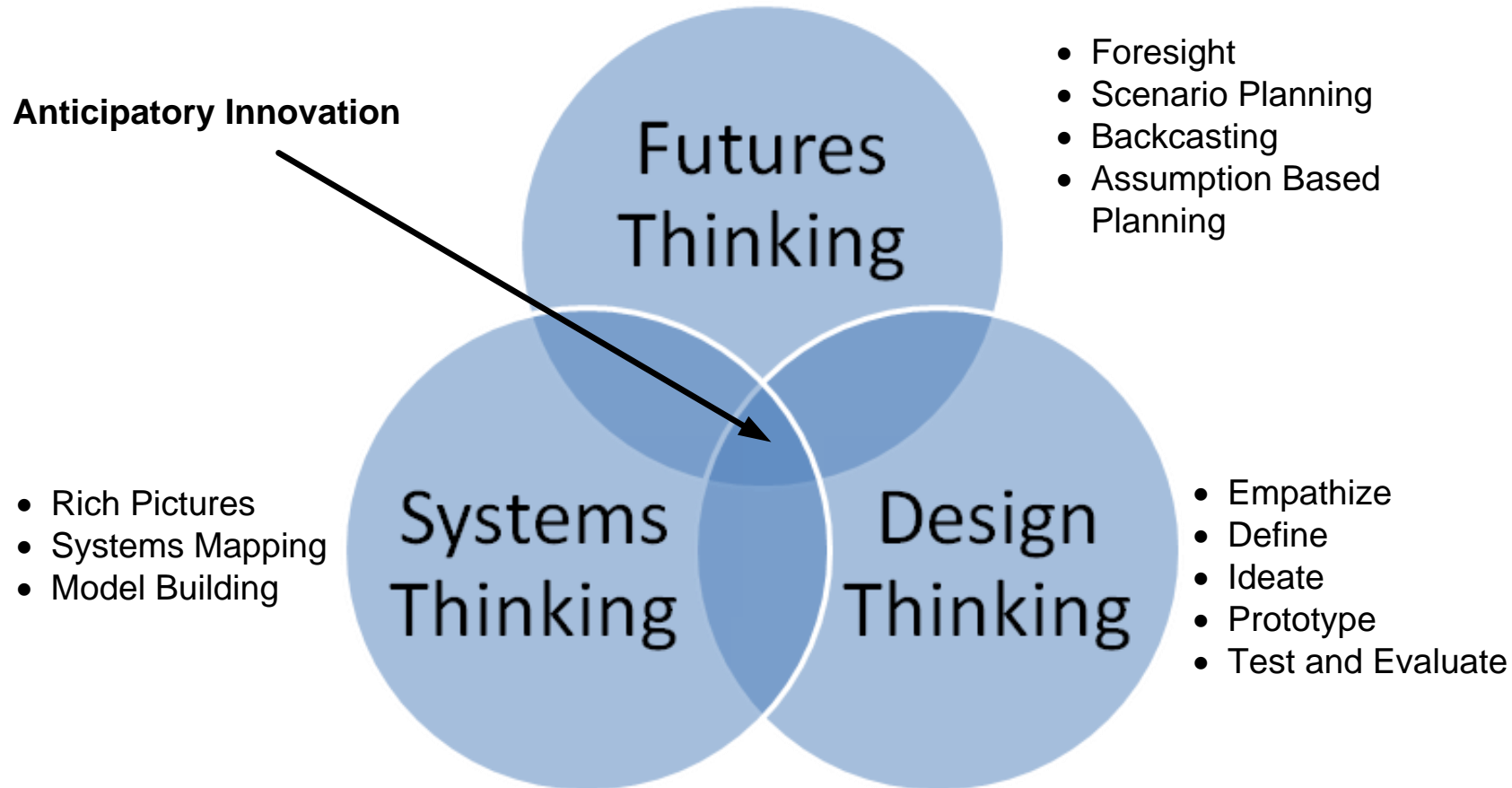
— Don Norman, author of *The Design of Everyday Things*

Anticipatory Innovation

Anticipatory innovation is the act of creating and implementing new, potentially value-shifting innovations in environments of deep uncertainty, particularly for the purpose of exploration and with emergent issues that might shape future priorities and future commitments (OPSI, 2021).

Anticipatory innovation is about helping to shape how the future might play out, rather than being forced to respond to it when it arrives.

PERCEIVING
—
THE FUTURE

THROUGH SIGNAL DETECTION,
IMAGINATION, AND KNOWLEDGE

SHAPING
—
THE FUTURE

THROUGH EXPERIMENTATION
AND INNOVATION

Anticipatory Innovation

Anticipatory Innovation

- Foresight
- Scenario Planning
- Backcasting
- Assumption Based Planning

Futures Thinking

Systems Thinking

Design Thinking

- Rich Pictures
- Systems Mapping
- Model Building

- Empathize
- Define
- Ideate
- Prototype
- Test and Evaluate

Angel Gurria: OECD Secretary General (2018)

Angel GURRÍA
OECD

- 'Unless we adopt a systems approach, unless we employ systems thinking, we will fail to understand the world we are living in'

Systems Thinking

If you want to solve a complex problem, first work to understand the system that gave rise to the problem...

...and that starts with being a systems thinker

Systems Thinking

- Systems thinking is about making sense of the world rather than merely describing it
  - Interrelationships
  - Perspectives
  - Boundaries
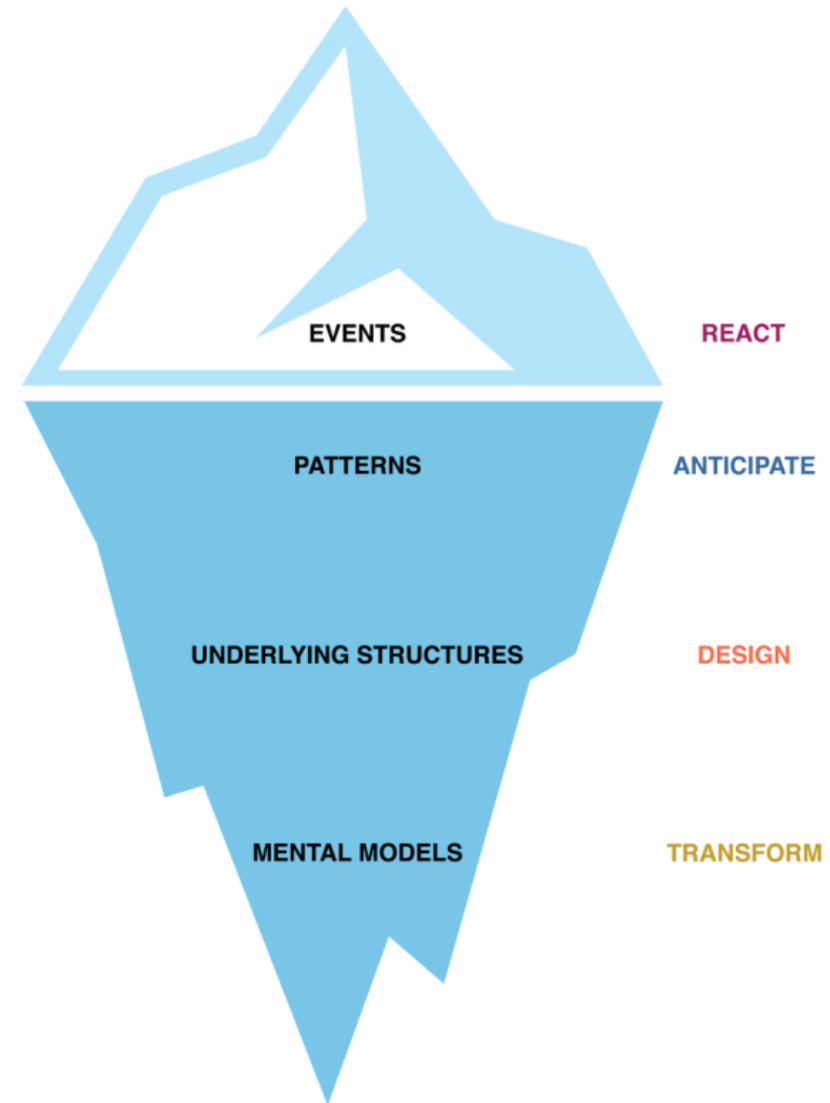
Systems Thinking

- In brief, 'systems thinking' refers to ways of thinking about the world in terms of systems that influence one another within a whole, and it describes networks, webs, and cycles of relationships rather than linear cause-effect relationships (Anderson & Johnson, 1997; Checkland, 1981; Forrester, 1994; Senge, 1990).
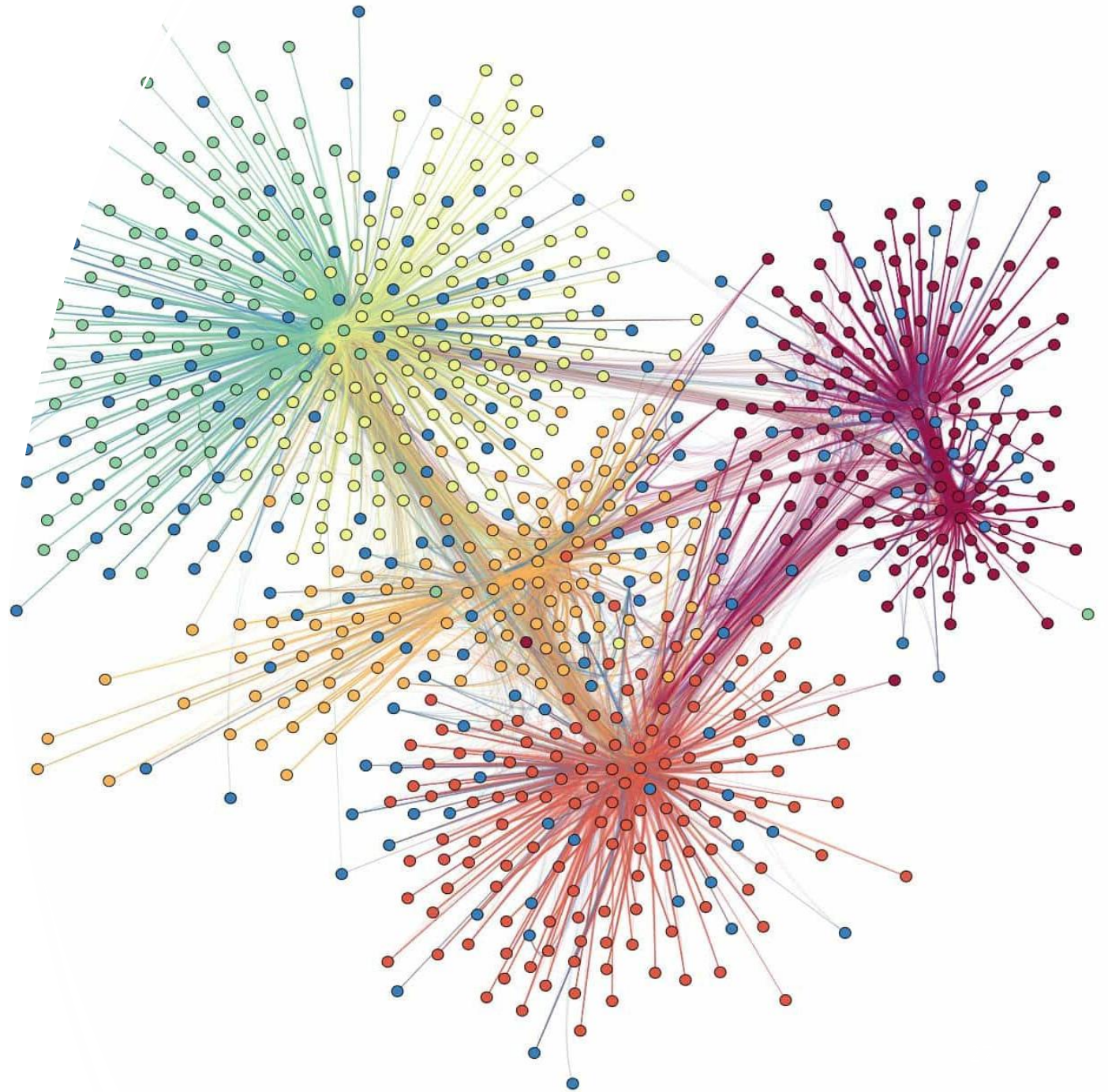
Interrelationships

- Dynamic aspects, the way the interrelationships affect behaviour of a situation over a period of time

- Nonlinear aspects, where the scale of 'effect' is apparently unrelated to the scale of the 'cause'; often but not always caused by feedback

- Sensitivity of interrelationships to context, where the same intervention in different areas has varying results, making it unreliable to translate a 'best' practice from one area to another

- Massively entangled interrelationships, distinguishing the behaviour of 'simple', 'complicated' and 'complex' interrelationships.

Perspective

- Forces us to comprehend not only that a situation can be 'seen' in different ways, but that this will affect how you understand the system or situation.
  - Think stakeholders

- Perspectives draw the focus away from the system or situation as it supposedly exists in 'real life' and allow us to consider alternatives: what it might be like, could be like, or even should be like.
  - Leads to deeper learning

- Perspectives help us deal with interrelationships that are massively entangled.
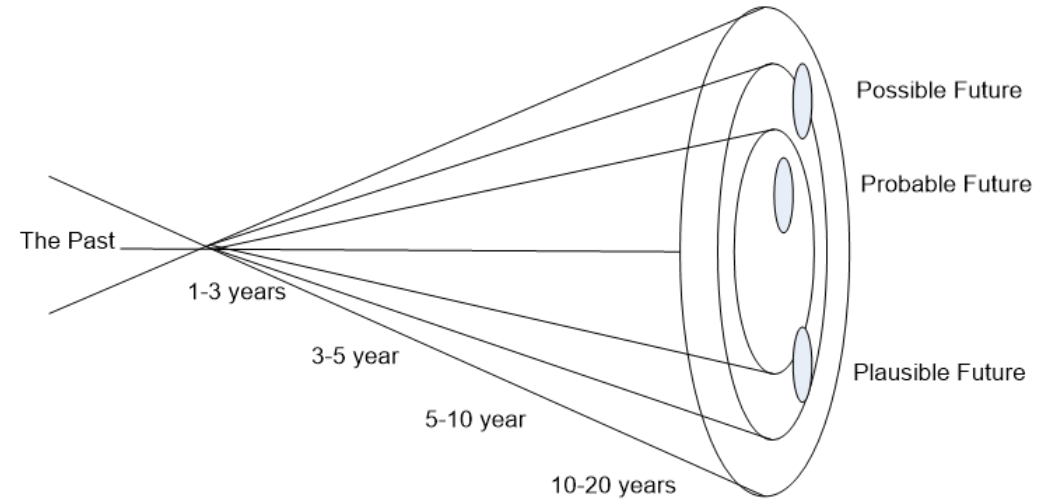 - Unearth assumptions

Boundaries

- A boundary differentiates between what is 'in' and what is 'out'.

- Boundaries are the sites where values get played out and disagreements are highlighted.

- Boundaries also determine how we approach a situation, what we expect from it, and what methods we might use to manage it.
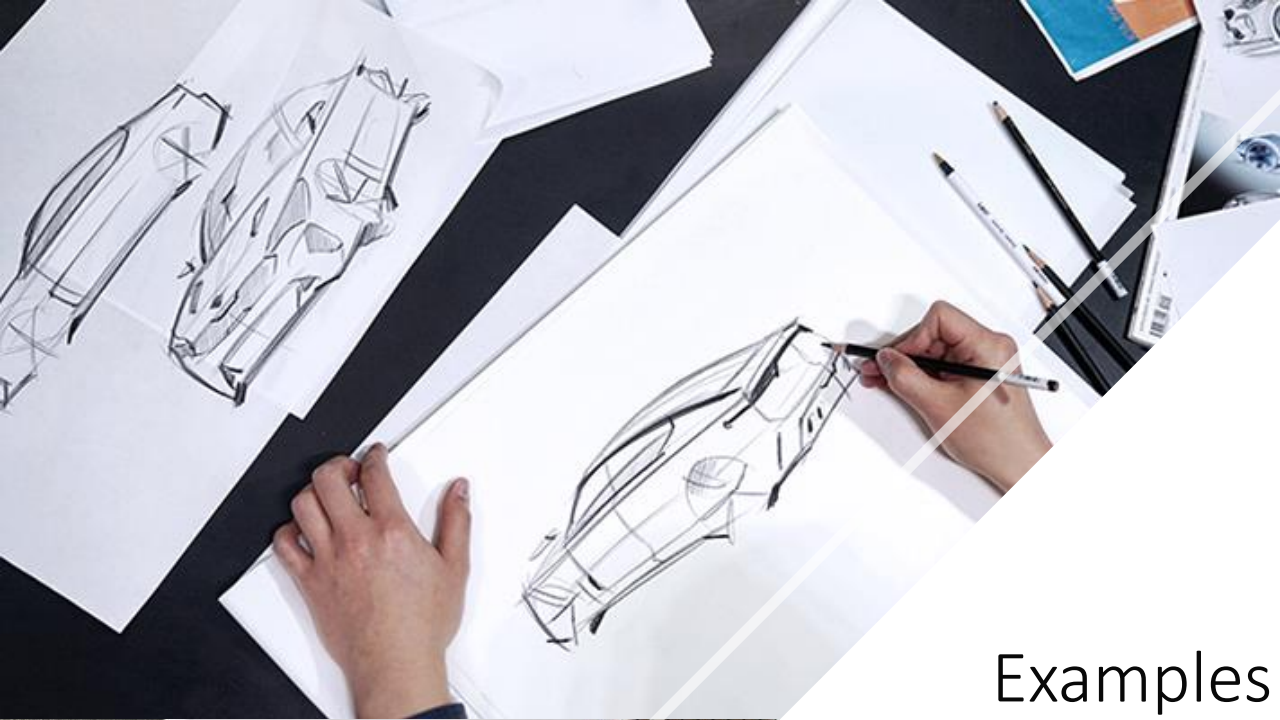
Futures Thinking

- Foresight
- Scenario Planning
- Assumption Based Planning
- Backcasting

Possible Future
Probable Future
Plausible Future
The Past
1-3 years
3-5 year
5-10 year
10-20 years

Examples of Design Thinking

Design Thinking

- Design Thinking is a solution-oriented methodology used by designers to solve complex problems. It draws upon logic, imagination, intuition, and systemic reasoning, to explore possibilities of what could be, and to create desired outcomes.

Design Thinking

- Razzouk and Schute define design thinking as "an analytic and creative process that engages a person in opportunities to experiment, create and prototype models, gather feedback, and redesign."

EMPATHIZE DEFINE IDEATE PROTOTYPE TEST

DESIGN THINKING

Security by Design

- A design mindset is not problem-focused, its solution focused, and action oriented. It involves both analysis and imagination.

- Design represents a process that embraces innovation, creativity, opportunity analysis and problem framing and solving.

- Through the phases of Inspiration, Ideation and Implementation, Design Thinking is operationalized through an iterative (not linear) 5 step process.

Designers

- '…designers have specific abilities to produce novel unexpected solutions, tolerate uncertainty, work with incomplete information, apply imagination and forethought to practical problems and use drawings and other modeling media as means to problem solving.

Anticipatory Innovation

- Foster a mindset that the future may be radically different from the present

- Look for signs of impending change (social, economic, environmental, political, technological)

- Look for potentially critical tipping points at both the macro- and micro-level

- Intervention strategies must consider the systemic perspective

Anticipatory Innovation

- Is about:
  - Moving from reacting to anticipation
  - Exploring the future security landscape
  - Creative solution navigation
  - Integral to the M&S ecosystem for capability analysis

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