Systems Curriculum virtual event series

Principles and practical applications of systems thinking in the investment industry

Session 1. Systemic Risk | 12 June 2024 | Pre-reading slides

Thinking Ahead Institute
An innovation network founded by WTW

1. Preface – Roger Urwin

Defining systemic risk

Overview of the concept of systemic risk

Systems curriculum: understanding the power and practice of systems thinking

1. Systemic risk – 12 June 2024

- *Systemic risk concepts*
- *Deepening understanding*
- *Adapting our practices*

- Pre-reading
- 90 minutes hybrid meeting (45-20-25)
- Includes expert inputs
- Includes Q&A

0. Systems primer – the key features of systems thinking and systems design and the different lenses to see systems through

1. Systemic risk

2. Systems leadership – *the use of systems leadership models* which recontextualise problems as shared problems and use systems thinking to explore and solve the problem

3. Beliefs – *the use of system patterns* to understand the present landscape and plan for the future

4. Sustainability – *the use of systems-level investing* in which the three dimensions of risk, return and impact are integrated

5. Measurement - *the use of balanced scorecards* in which measuring and incentivisation is addressed more holistically and systemically

Source: TAI Systems Curriculum: June – December 2024

Systemic risk

Define your terms

“Systemic risk is the possibility of a malfunctioning of the system, and is an inherent property of any system – particularly a complex adaptive system.”

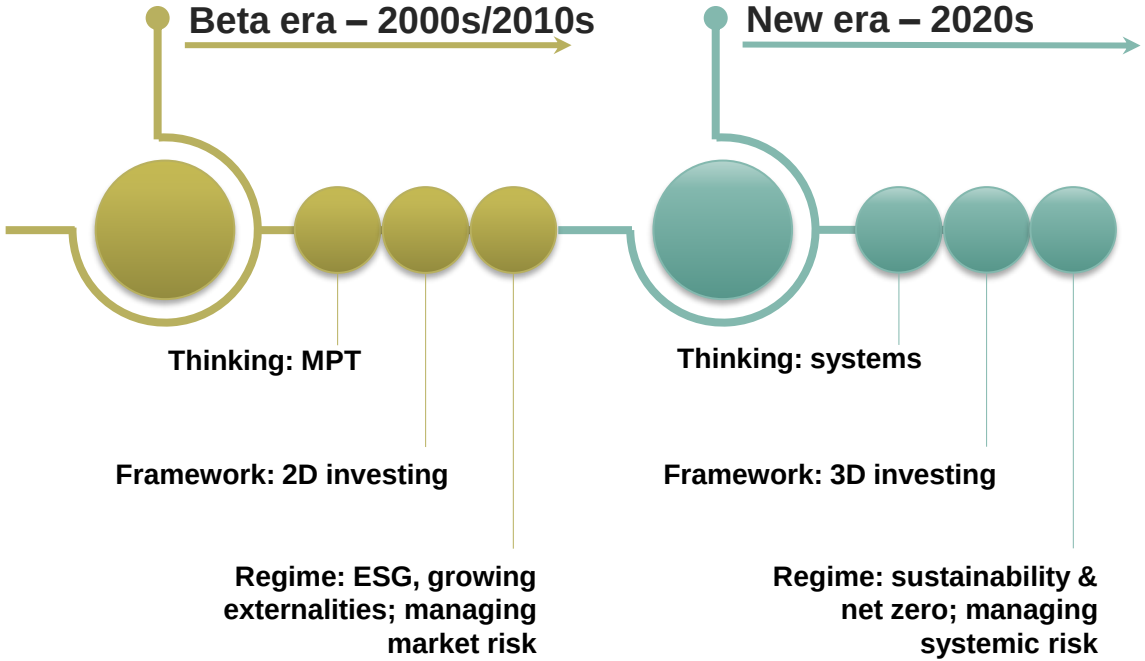
-Thinking Ahead Institute

“Systemic risk refers to the risk of a breakdown of an entire system rather than simply the failure of individual parts. In a financial context, it denotes the risk of a cascading failure in the financial sector, caused by linkages within the financial system, resulting in a severe economic downturn.”

-CFA Institute

Preface: Investment industry era change – thinking, framework and regime

Change on multiple fronts



The emergence of systemic risk

Big differences from core market risks

- A special part of market or systematic risk
- Arising from malfunctions in the system that cascade through the whole market
- Very different from core market risks* in term structure and path dependence
- Very different from classic market risk in being an addressable (endogenous) risk

**core market risk - the core components of market risk – which is the systematic risk of adverse outcomes from economic factors – rates, inflation, growth, liquidity etc.*

- uncertain (limited data and as a result contested)
- pervasive (undiversifiable and unhedgeable)
- inter-connected (complex reinforcing loops that can domino)
- non-linear (growing, potentially spiky, even runaway)
- endogenous (can be addressed and mitigated)

In history

- Systemic risk historically has been about financial interdependency risks (plumbing) and geo-political risks
- Systemic risk downside historically has been smallish but subject to bursts and spikes

In future

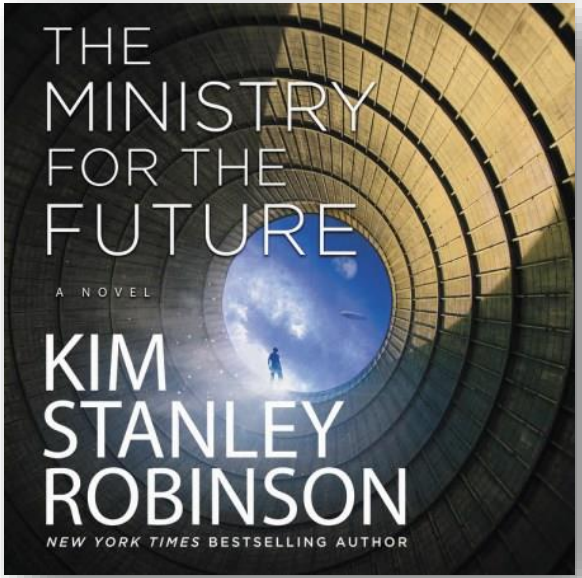
- Systemic risks in the future are increasingly from climate, environmental and social sources
- Future systemic risk is likely to be orders of magnitude bigger than prior versions

The Ministry for the Future

A compelling trio of engaging story – intriguing theory – significant figures

The story

- ***The Ministry for the Future*** is a climate fiction ("cli-fi") novel by Kim Stanley Robinson published in 2020. Set in the near future, the novel follows the UN sponsored Ministry for the Future established under the Paris Agreement whose mission is to act as an advocate for the world's future generations of citizens as if their rights were as valid as the present generation's
- The story starts in a sustained heat wave in Northern India which leads to the electric grid failure and an ensuing inferno causes more than 20 million deaths
- With the book's scientific accuracy, the novel is called 'hard science fiction'



The theory

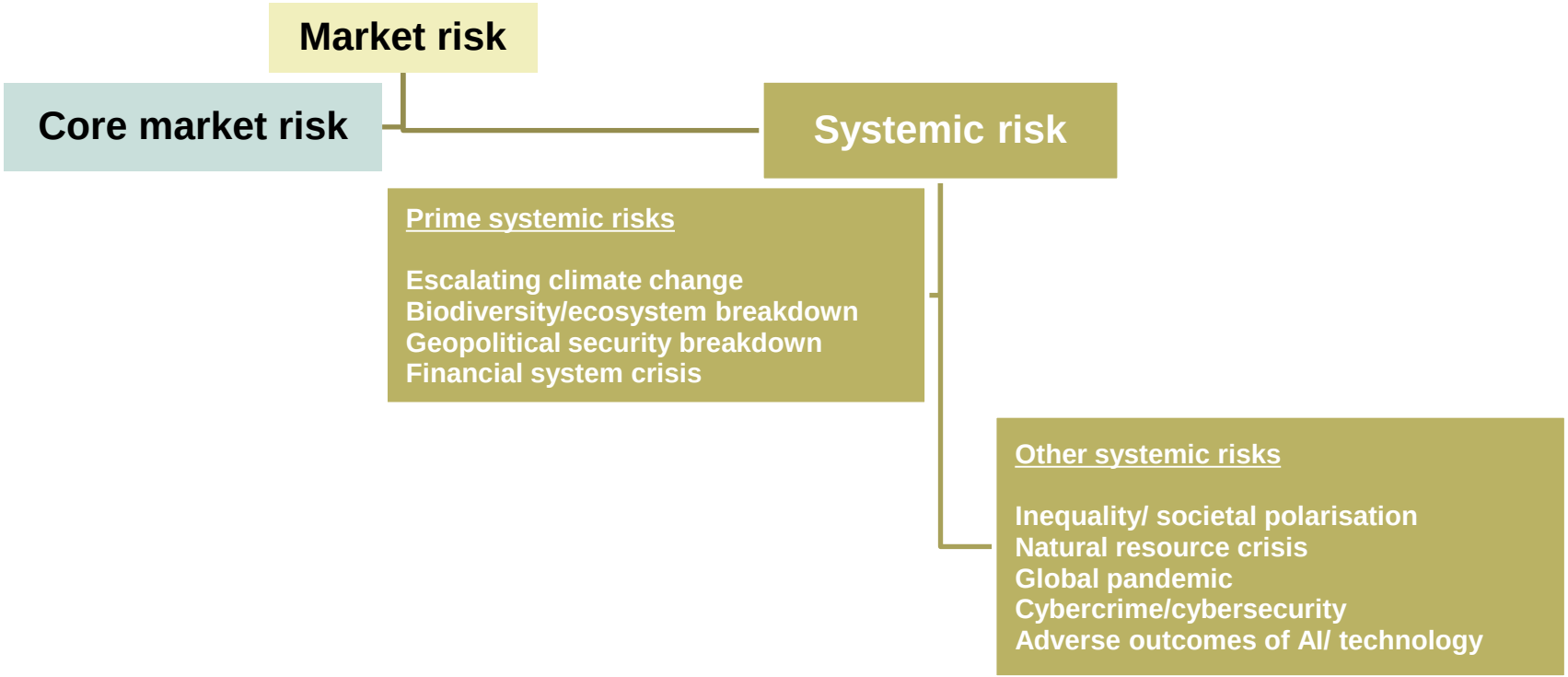
- The impact of climate risk needs more attention and respect. Fiction can help stimulate the imagination to gain this
- With tipping points being reached, the outlook for climate change systemic risk may be worse than most expect
- The place of geoengineering – glacier drilling and solar particle seeding - will likely need to be explored

Significant figures

- Desperate need for principled leadership – a vignette from Christina Figueres

The multiple forms of systemic risk

Systemic risk is the risk of malfunctions/breakdowns in an entire system, as opposed to breakdowns in individual parts or components of the system. The listing of systemic risks below is indicative



Conversation about systemic risk – Tim Hodgson with Sue Brake

How would you define systemic risk?

What, if anything, can a CIO do about systemic risk?

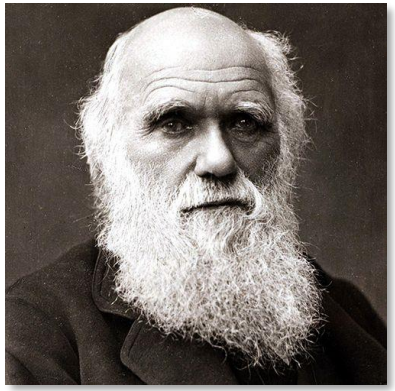
And what of the future? Is systemic risk just part of the background noise, or does it change in magnitude and significance?

2. Deepening our understanding – Tim Hodgson

2.1 Reality, systems and models

Systemic risk features in the first two, often not in the third

The power of models



Charles Darwin 1809-1882

Synonymous with evolution

Darwin’s model assumes scarcity, which leads to struggle, which justifies competitive behaviour

Lynn Margulis 1938-2011

Synonymous with symbiosis

Margulis’s model assumes co-existing for mutual benefit

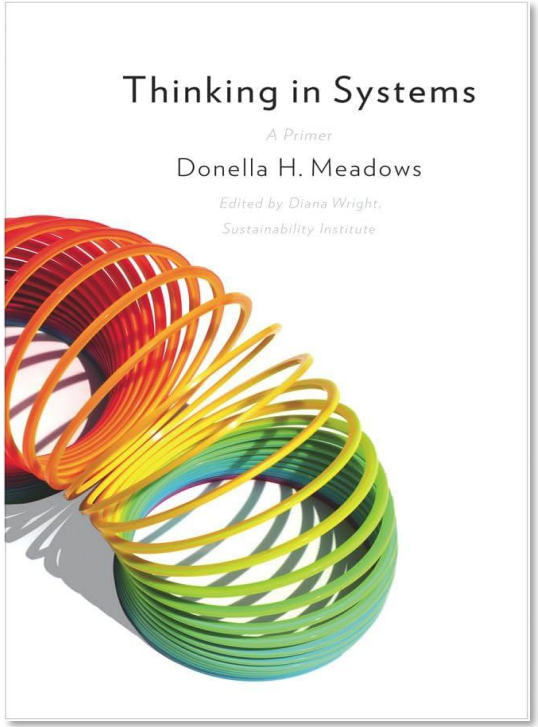
No symbiosis, no life, no evolution

2.2 Systems and boundaries

“There are no separate systems. The world is a continuum. Where to draw a boundary around a system depends on the purpose of the discussion.”

-Donella Meadows

As reality is simply too big to comprehend, we have to draw a boundary. We carve out a piece from reality. What is inside the boundary is our system.

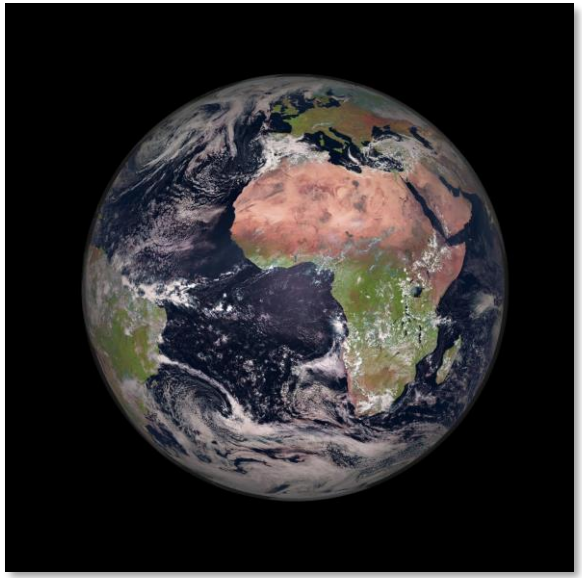


universe

galaxy

solar system

We choose to draw a boundary around the Earth's atmosphere to denote the largest system relevant to investment



The 'capital-S' System — *planet and atmosphere*

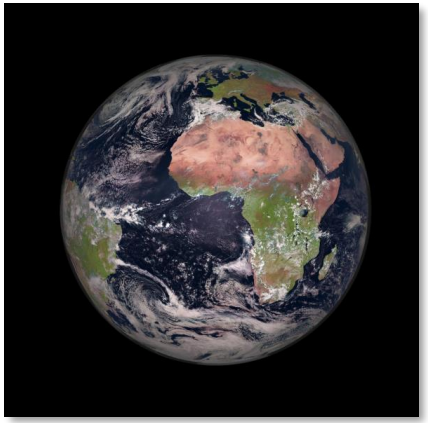
boundary

system of interest — *eg a single country*

boundary

sub-system — *eg a sector*

Alternatively, we can divide the capital-S System into three realms



The realm of…

E — Earth systems and nature

S — human relationships

G — commerce and economy

Systems grow…

…in size and/or complexity…

…unless actively constrained

That's what they do

This means systemic risk will tend to rise through time

It is mostly about energy

Systems require energy for…

…maintenance and repair…

…information processing…

…growth

We can therefore think of systems as energy budgeting exercises. How much energy is available? How much should we spend on maintenance? How much is required for information processing? Anything left over can be used for growth. This version of energy budgeting is likely to be compatible with sustainability.

An alternative version of energy budgeting would start with growth and end by seeing how much was left for maintenance. This is unlikely to be sustainable over the long term.

2.3 Systemic risk – deepening our understanding

“Systemic risk is the possibility of a malfunctioning of the system, and is an inherent property of any system – particularly a complex adaptive system”

-Thinking Ahead Institute, *Systemic risk | deepening our understanding*

Systemic risk is quite unlike other risks…

…it is not symmetrical...

- very limited upside
- very infrequent, but catastrophic downside

…it is endogenous – meaning it comes from inside the system

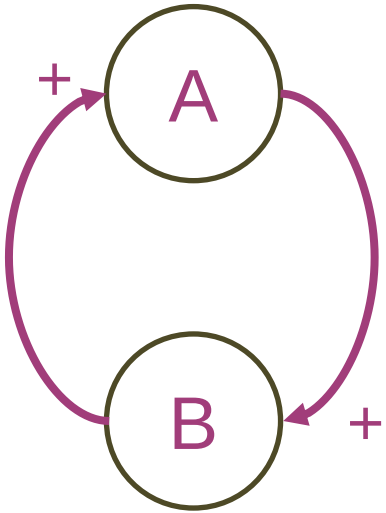
…it can cascade from one system to another

…it is a property of the whole system – either the system works the way we want it to, or it doesn't

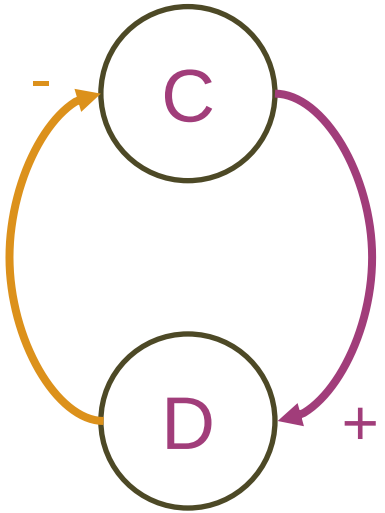
All systems contain feedback loops

Reinforcing loops, left unchecked, would generate exponential growth. Balancing loops are the system's stabilisers. A system can be described as safe, or stable, when the balancing feedback loops have the upper hand. Although, if they have too strong a hand, the system might not be responsive enough to the changing context around it. A low-systemic-risk (stable) system dampens and/or absorbs shocks; a high-systemic-risk (unstable) system amplifies shocks, which can trigger cascades across adjacent subsystems.

Reinforcing (positive) feedback loop



Balancing (negative) feedback loop



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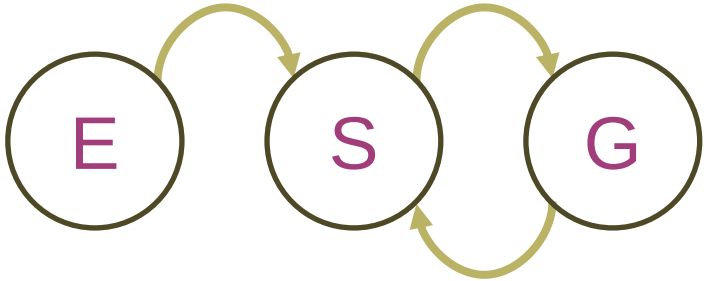
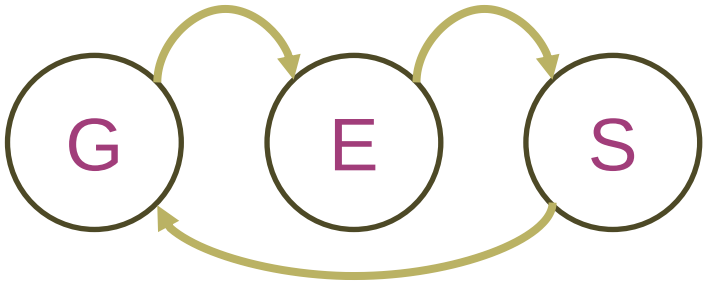
Stylised examples

Pandemic



A pathogen originates in nature (E – the realm of Earth systems and nature) and crosses to humans. It then propagates through society (S), with adverse impacts on the economy (G). Commercial organisations lay off workers, re-transmitting the adverse impacts to society (S)

Climate



Commerce (G) extracts and burns fossil fuels, increasing the concentration of greenhouse gases in the environment (E). The trapped heat impacts onto society (S) which, among other things, exacerbates inequality. Society calls for a just transition, and climate migration increases – with both having impact back on the commercial sphere (G)

3. Systemic risk - adapting our practices – Roger Urwin

3.1 Resetting the model

Conversation about systemic risk – Roger Urwin with Mirko Cardinale

Have asset owners got good processes for dealing with climate risk?

What is USS doing on this?

Some changes are needed

Changes to thinking	
Systems thinking	Recognise systemic risk as an under-estimated part of investment risk with VUCA characteristics Apply systems thinking in recognising wider factors, inter-connectedness and ripple effects
Extended risk framework	See risk through multiple lenses. Think of risk in wider, softer, longer ways including as impairment to mission Adopt total portfolio thinking
Narratives & numbers	Balance between data and narrative Respect the limits of data inference

Changes to investment practice	
Adapting to systemic risk	Adapt to a lack of meaningful data. Integrate forward thinking and scenarios. Understand links between systemic scenarios & financial outcomes Incorporate 3D investing – fiduciary duty, scorecards
Risk culture and governance	Develop organisational resilience through strengthening risk culture and effective governance Build resilience from greater awareness of current circumstances and future trends
Extending investment scope	Extend portfolio-level scope – work on increased resilience to reduce exposure to systemic risks Extend system-level scope – sustainability solutions and stewardship to mitigate systemic risks

‘Wrong type of snow’. Improving the state of the art in risk management

- **There are certain failures in the investment industry with managing risk due to gaps in understanding, methods and governance**
- **Existing practices are falling short of what is needed**
  - Focus tends to be on managing expectations rather than on value creation. There is more risk measurement than risk management
  - Focus is on short-term risk and single periods but to most AOs long-term risk and multiple periods are more critical
  - There is a lot of looking backwards to derive assumptions, less with looking forward
  - There is a preference to treat risk as a number when it’s really a multi-faceted concept
  - External factors are modelled (market risks, manager risks) when internal forces (decision-making given personal and organisational pressures) are often more important

- **Things would improve if the risk framework was to be extended**
- Wider – many sources of risk lie outside traditional models
- Softer – many risks cannot be measured, need assessment and commentary
- Longer - more can be done to integrate long-term risk alongside short-term risk

Source: **‘Wrong type of snow’: TAI 2012 and 2020**

Governance – principles for dealing with more complex forms of risk

- **Adopt appropriate Board structure**
  The Board as the owner of the risk budget (Reference Portfolio)
  The Board as the challenger/ sounding board/ motivator of the CIO/ Executive
- **Adopt appropriate CIO-ship/ Executive structure**
  The CIO's assessment of all risks and changing circumstances - assets/ liabilities/ adaptive capital
- **Risk budget focus**
  Dealing with risks and returns and non-linearity of outcomes; dealing with liquidity as needed, mixing in the governance budget
- **Risk culture**
  The whole organisation sharing certain beliefs and values in dealing with risk
  - Risk is everyone's responsibility
  - Risk and return are treated as an inter-connected duality: two sides of the same coin
  - Recognition of complexity and inter-connectedness
    The world is complex. Respect it. Adapt to it. Even exploit it. Get on top of the inter-connections
  - Hard-to-measure risks needs to be framed by *size/ likelihood/ impact/provenance/significance*

Source: Clark and Urwin 2007, Best-practice investment management

Risk scenarios and risk modelling to cover systemic risk

Adapting to the limited amount of useful past data

1	▪ Risk modelling of systemic risks has been based on projecting from past data, but this is an increasingly limited – even flawed – concept given that the systemic risks and macro risks of the future have limited presence in the past
2	▪ The modelling process should develop in a systems thinking framework – allowing for the broader system including ‘STEEPLE’ and governance factors that will affect the pathway over time that a fund or portfolio traces out ▪ This involves using horizon scanning and allows more exploration of mission impairment

3	▪ Modelling methods should be adapted to deal with systemic risks
	  ▪ adapting to a lack of meaningful data by integrating forward thinking
	  ▪ bringing in scenarios more significantly
	  ▪ understanding the interplay between systemic risk scenarios and financial outcomes

4	▪ Develop a list of systems risk scenarios with climate change at the top of the list ▪ Model the systemic risk exposures as far as you can and use measures in portfolio quality dashboard. Allow for inter-connectedness as far as is possible in estimates ▪ Develop extreme risk scenarios including consideration of collapse risks and polycrisis ▪ Develop scenario thinking to provide input to improve resilience and the adaptability to risk events and provide early warning to and planning for emerging risks.

Stress tests and theory of change – a stranded assets scenario

Likely state
Increasing limits to growth

- The pursuit of exponential growth of financial capital by drawing down natural capital is likely to become increasingly unsustainable given issues with planetary boundaries
- The aggregate stock of financial capital will reach an inflection point with declining rates of growth, producing more stranding
  - a declining aggregate rate of return on invested capital
  - a systematic financial asset devaluation
- Issues of intergenerational equity

Desired state
Evolving sustainable practice

- Large-scale technological replacement and innovation with significant opportunity but pricing challenges as well
- Voluntary or policy-induced reinvestment of profits by the corporate sector into natural and social capital
- Influences through the asset owners and asset managers to adopt strategies that manage natural and social capital outputs
- Increased private philanthropy to recycle financial capital back into social and natural capital

Theory of change
Adapting to future events via new thinking and interventions

- Climate outcomes may surprise with more downside than upside
- Climate outcomes link to policy actions and government responses
- Actions by corporations and asset managers and asset owners (universal owners) to address these risks and issues at the appropriate time
- Net zero has its own theory and practice issues
- Increasingly difficult to pursue appropriate management of inter-generational risks

Case study application (1): horizon scanning / theory of change workshop

This project provides leadership with a streamlined process to set a five-to-ten-year view of future landscape

1. **Convening a senior group** to consider a vision of industry trends, the macro* and key risks and opportunities
2. **Identifying the 5-10 year vision across** societal, technological, economic, environmental, political, legal, ethical factors
3. **Understanding and exploring the future vision** and its implication to mission and strategy
4. **Stress testing** various scenarios for the future vision and possibilities for mission and strategy
5. **Write up** of key results and conclusions with actionable takeaways in the form of beliefs, principles and strategies

Discovery

Workshop

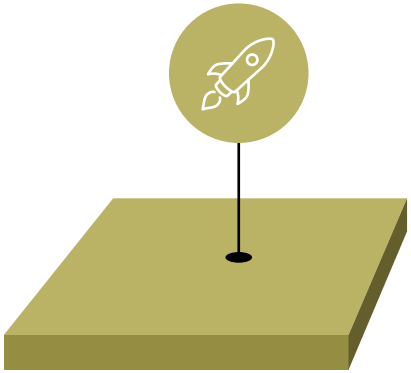
Delivery

- *Horizon scanning is the systematic analysis of potential threats and opportunities and likely future developments*
- *This method sits alongside and complements scenarios, stress testing and theory of change processes*

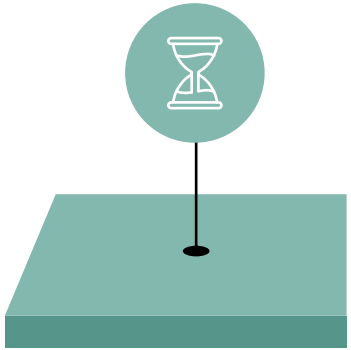
(*) The long-term outlook for different asset classes and investment strategies given anticipated future conditions

Case Study (2): integrated risk models with systemic overlays

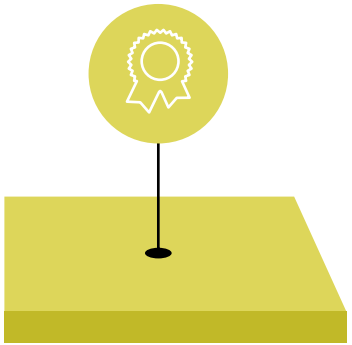
Framing through three steps of integration



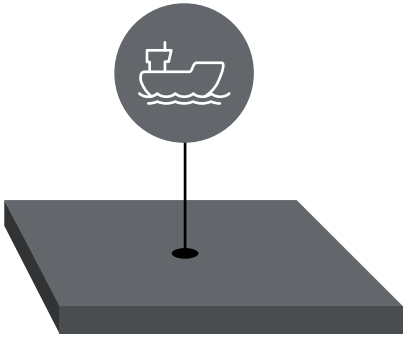
1. Market risk model
Historic or blended



2. Climate risk model
Qualitative or low-provenance quant



3. Integrated risk model
Overlays with left-skewed or symmetrical properties



4. Integrated systemic risk management
Applying systems leadership to difficult challenges

3.2 Adapting our practices – Marisa Hall

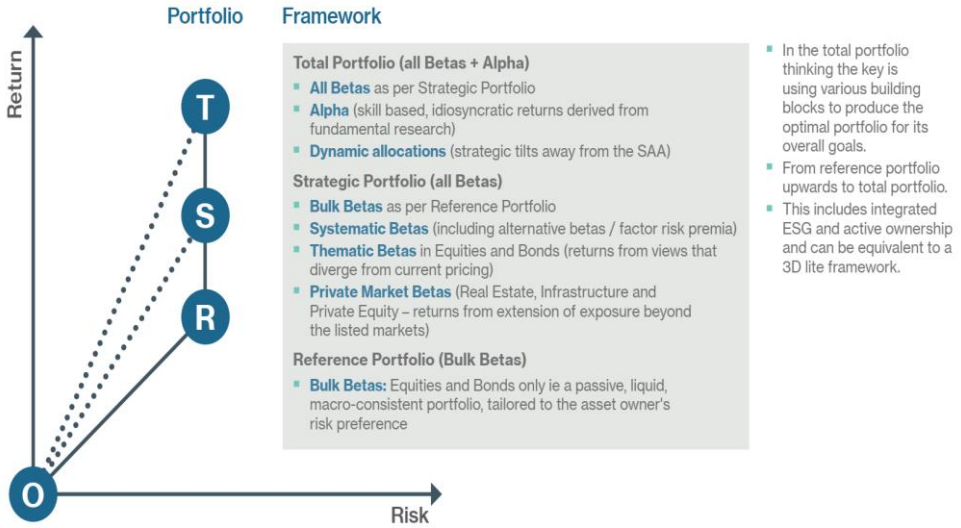
3D investing – universal ownership animation

Universal ownership theory applied to the total portfolio

Case study animation

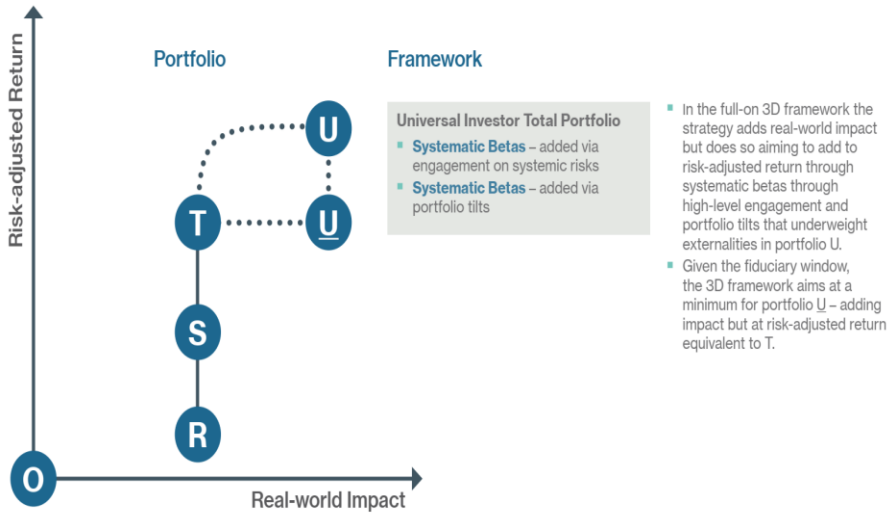
3D investing-lite

The governance budget for 3D-lite is expanded to integrate ESG and produces better risk-adjusted returns than the non-ESG alternative



3D investing full-on

The governance budget for 3D full-on is expanded to incorporate universal ownership theory and expanded stewardship and produces better returns and real-world outcomes than the 3D-lite alternative



Source: WTW Global Asset Owner Peer Study 2024

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Use of portfolio quality scorecard

Illustration of scorecard comparing SAA version vs TPA version

	Dimension	Metric	SAA	TPA	SAA illustration	TPA illustration
Prime factors	Return	Expected return vs cash (% pa)	3.0%	4.6%	The SAA Model is based principally on these 5 factors	The TPA Model is based on more factors
	Risk	Volatility (% pa)	7.5%	7.3%		
	Efficiency	Sharpe ratio	0.40	0.63		
	Relative risk	SAA/TPA relative risk	1% - 3%	3% - 5%		
	Low cost	MER	0.23%	0.54%		
Ancillary factors	Sustainability	ESG risk exposure (/100)	33	23		
	Climate	Implied Temperature Rise	2.8°C	2.5°C		
	Flexibility	% daily liquid	10%	26%		
	Access to skill	% contribution from skill	6%	31%		
	Governance	Oversight complexity	4/5	3/5		
Resilience factors	Diversity	Equity beta	0.63	0.37		
	Tail risk	Expected tail risk (% TCE)	26%	18%		
	Systemic risk factor	Systemic tail risk – 10Y % TCE	x	x		
	Climate risk factor	Climate tail risk – 10Y % TCE	x	x		
	Systems-stewardship	Systems-stewardship governance (%)	x	x		

3.3 Best practice for dealing with systemic risks; and takeaways

The big reset

Models, numbers and narratives	▪ Reality is more complex than we can model satisfactorily ▪ All models are wrong but some are useful ▪ Use the HI x AI principle to build the data and intelligence stack ▪ When there are no numbers we can always have narratives and scenarios

Governance scaffolding matters	▪ Best practice depends critically on good preparation and framing
	  ▪ extreme clarity and alignment of vision, goals and strategy
	  ▪ edgy investment beliefs and principles
	  ▪ adapting to new circumstances through pre-experience in scenarios
	  ▪ a risk culture that risk is deeply understood and owned

Evolving board practices	▪ Risk understanding, resilience and stakeholder communications are all areas where boards can do more

Board best practices

Build out the board's view of long-term risk	▪ Strengthening insight into the prevailing situations for the fund ▪ Reinforce the understanding and ownership of risk in the board ▪ Ensure that longer term considerations are fully weighted
Build up board capabilities in resilience and adaptability	▪ Strengthening the ability to learn from experience in general and crises in particular ▪ Evolving the ability to manoeuvre relative to certain crises ▪ Check in with the executive on the robustness of systems for managing crises
Strengthen the stakeholder communications	▪ Deepening the communications with stakeholders about key issues ▪ Reinforcing the apolitical mandate of the fund but working with the growing likelihood of a bigger political context

Takeaways from systemic risk

Socialise understanding. Reset modelling. Deepen resilience.

BaU – Business-as-Usual	BbU – Business-beyond-Usual
1A. Socialise understanding. Some structured learning	2A. Remodel the risk budget to integrate systemic risk allowing for the low-provenance
1B. Socialise the wider, softer, longer principles	2B. Evolve the scenarios and theory of change. Build out the intelligence stack. Develop the resilience

Resources section

Takeaways from systems primer – wisdom*

Having a system for balancing business-as-usual with business-beyond-usual

BaU – Business-as-Usual	BbU – Business-beyond-Usual
1A. Look out for systems angles – the mindset change, the growth	2A. Starts with socialising and learning new thinking. Systems Curriculum, other resources**, take the test***
1B. Systems leadership is a system of leadership that can be widely applied starting now	2B. Undertake beliefs work. Investment beliefs and values. Organisational beliefs and values

* ’Wisdom’ = What I should do on Monday
** Note reading options, Meadows, Senge, Donaldson
*** Take the test – are you a systems thinker?
Systems thinking as one part wiring, one part study, one part practice

Case Study – wider applications

Much of systems thinking is applied common sense. Ideas for systems

1. Considering All Perspectives

Every one of us works in a system, whether it's by yourself or with thousands of others. Systemic thinking considers both the heard voices in the room and the unheard voices that aren't in the room. What impact will our decision have on our team, our clients, our organisation, our industry, the environment and on future generations? Each voice plays an important role in the system we are working within.

2. Coaching Leadership Teams

It's useful to apply systems thinking in coaching leadership teams. These teams shape organizational direction and culture within complex systems, with far-reaching impacts. Often viewed as isolated entities, leadership teams overlook their interconnectedness within the larger organisational system. By facilitating systemic team dialogues, coaches can foster collaboration and alignment.

3. Facilitating Change Management

When implementing changes within a business or organisation, understanding the systemic implications is crucial. Systems thinking helps leaders anticipate ripple effects and unintended consequences, which facilitates smoother change management processes. This area is important because it is an ongoing process. Systems thinking encourages a mindset of continuous improvement.

4. Systems Thinking in Strategic Planning

Systems thinking overall is most effectively applied in strategic planning, especially for annual strategies and continuity of operations plans. Whatever strategies, goals and objectives are set annually, using systems thinking at the earliest stages of planning ensures that input from all affected areas, and how they operate and intersect, is incorporated and integrated.

5. Streamlining Technology Integration

In my experience, the most critical area calling for a systems thinking approach is technology. Too often, departments and programs in large organisations identify technological solutions for their specific needs without considering how they will integrate with other organisational technologies. It is essential to have a common systems committee to streamline integration and save money.

6. Improving Company Culture

Company culture is a system driven by values demonstrated through behaviours. Systems thinking helps leaders discover which behaviours need to be strengthened, which values are missing and which employee needs must be fulfilled to have a successful company. Then, leaders can improve those areas through their own behavioural examples and lead people toward the new culture that their company system desires.

7. Managing Complexity

A systems thinking approach can be effectively applied in managing complexity. Organisational leaders, more than ever, need deeper insights into their organisation's complexities to develop effective strategies for long-term success. Systems thinking equips leaders to manage complexity by breaking any task or process into more manageable components so that they can then understand how the components interact.

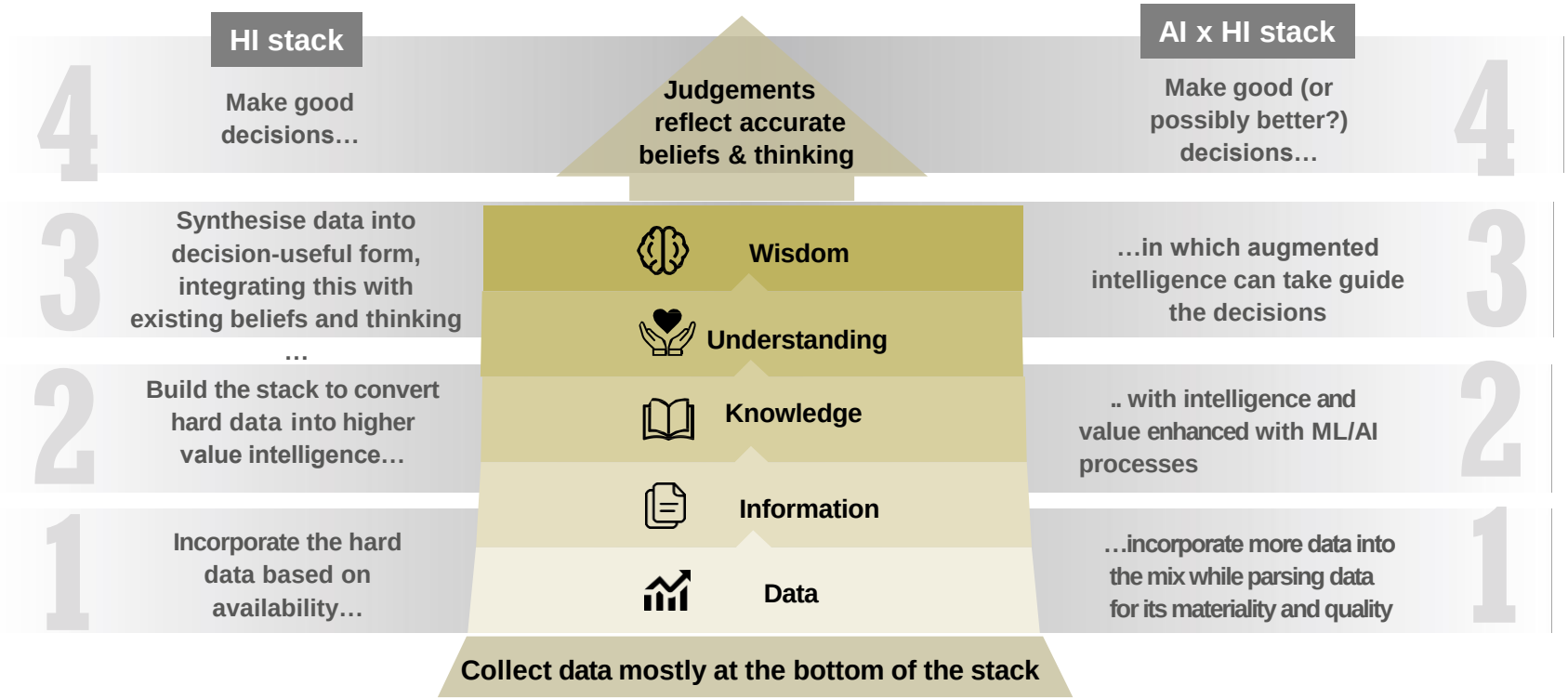
8. Building A Cohesive Team

Hiring and building a cohesive team is where a systems approach can be applied with great success. When an organisational chart is used as a blueprint, and you ensure each role is interconnected, operational effectiveness is part of the culture. In my organisation, I strive to hire individuals with the necessary skill set and whose individual purpose aligns with the company's mission and values.

Source: Forbes

All data, its analysis and associated decision-making exists within an intelligence stack

And the HI x AI combination can raise the quality of that intelligence



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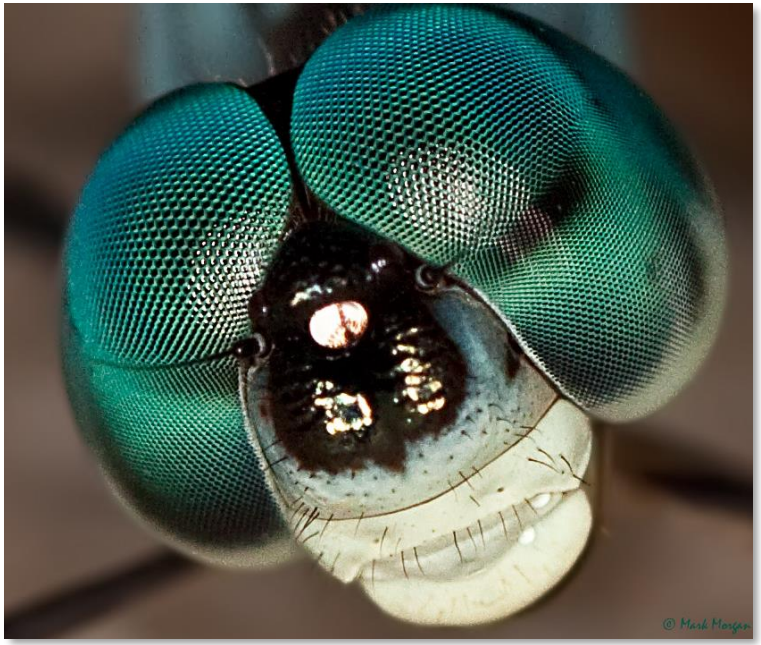
Multiple lenses – dragonfly eyes

- The challenge is to build better perspectives and take better decisions by reducing blind spots and enhancing the accuracy of our vision
- The best way to reduce our blind spots is to change our perspective
- Think of each new perspective as a model and a lens through which you can see the world. Models simplify the world into useable chunks



Dragonfly eyes have 30,000 lenses

Systems and systems thinking

Define your terms

Connecting dots - *seeing wholes as inter-connected not isolated parts*
Recognising patterns - *seeing moving patterns not static pictures*
Socialising solutions - *seeing solutions through a collective not individual effort*

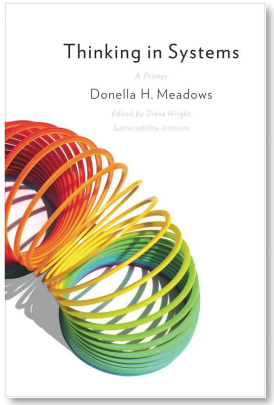
The definition of systems thinking in Arnold & Wade (2015)
Systems thinking is a set of synergistic analytic skills used to improve the capability of identifying and understanding systems, predicting their behaviours, and devising modifications to them in order to produce desired effects.

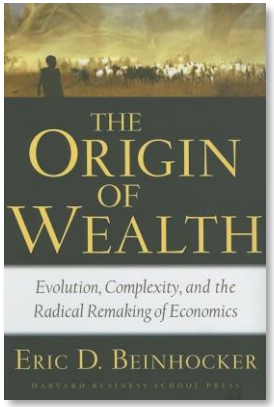
The system is defined as a collection of elements that are inter-connected and fulfil a certain purpose or function.

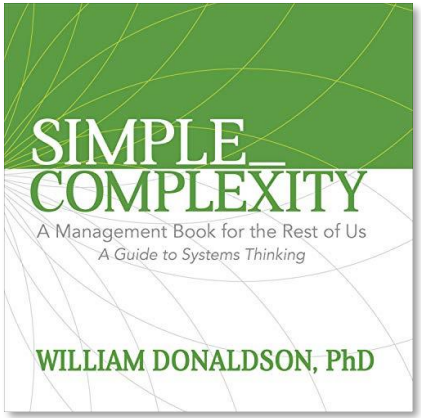
Three key characteristics

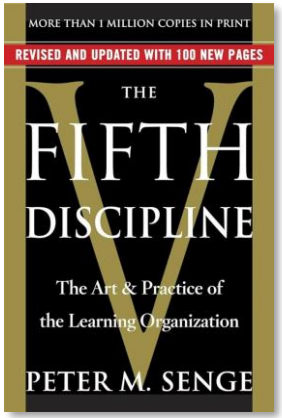
- Each system has its elements, its purpose or function, and, often, associated goals. The elements in the systems and the systems themselves are linked through various interconnections, some intended and some not
- There is no single system; there are multiple systems of which we are a part. These systems overlap and have a hierarchy, and some systems contain other systems
- Systems are always changing; they add new elements, lose old elements, change their interconnections, and evolve different functions. These systems are always adapting to changing circumstances hence *complex adaptive systems*.

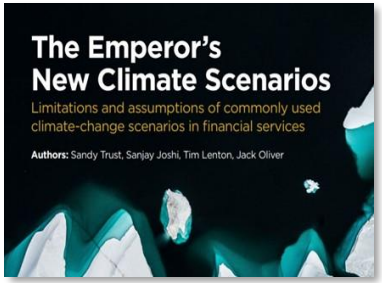
Book list and resources











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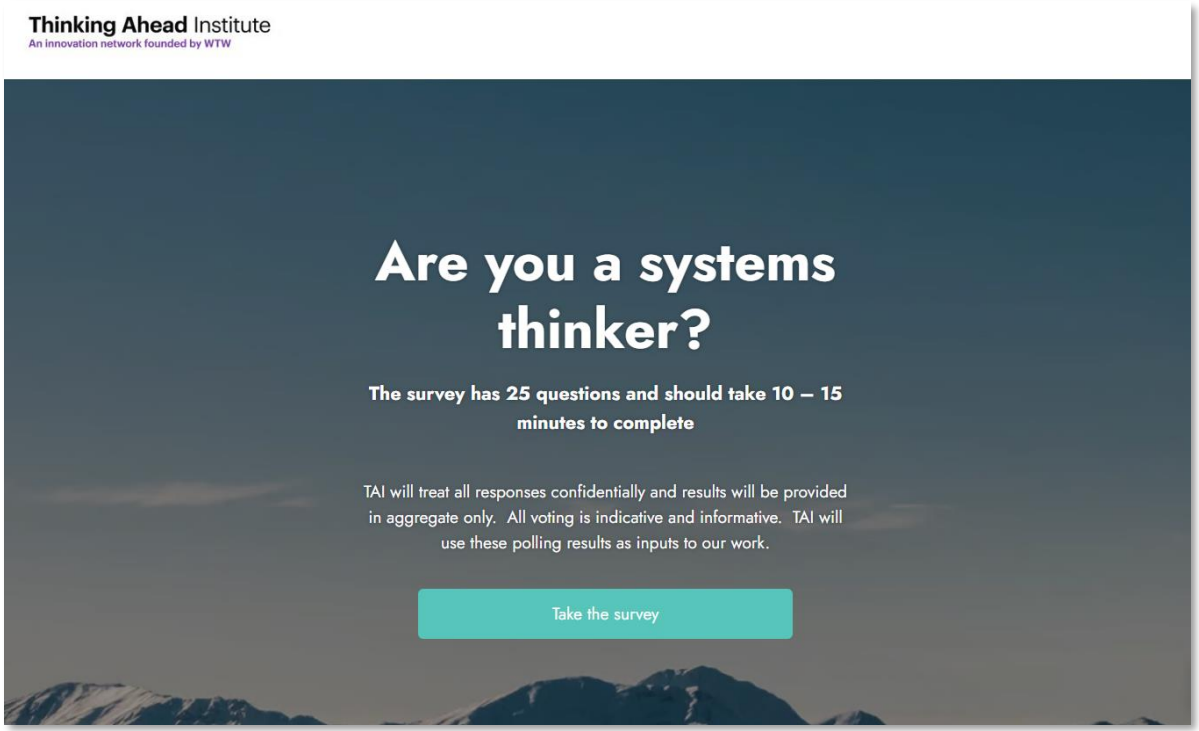

https://areyouasystemsthinker.scoreapp.com/

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