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How can we make food supply chains more resilient?

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Food systems are composed of multiple activities, processes, value chains, actors, interactions both internal and external to the commercial relationships, and the impact of activities affect multiple stakeholders in diverse and sometimes conflicting ways.

Supply chain shocks: Shocks, economic disruption, wars and conflicts, harvest failure, supply issues, consumer boycotts of particular foods or organisations can influence across the food system.

Macro shocks defines those shocks that influence at the supranational, national, regional or supply chain level; **meso shocks** at the organisational level and **micro shocks** at the individual and personal level.

Delivering food security means there must be sufficient, affordable, nutritious, safe food that is accessible for all.

Consumers expect the food and drink they purchase to be high quality and to be safe

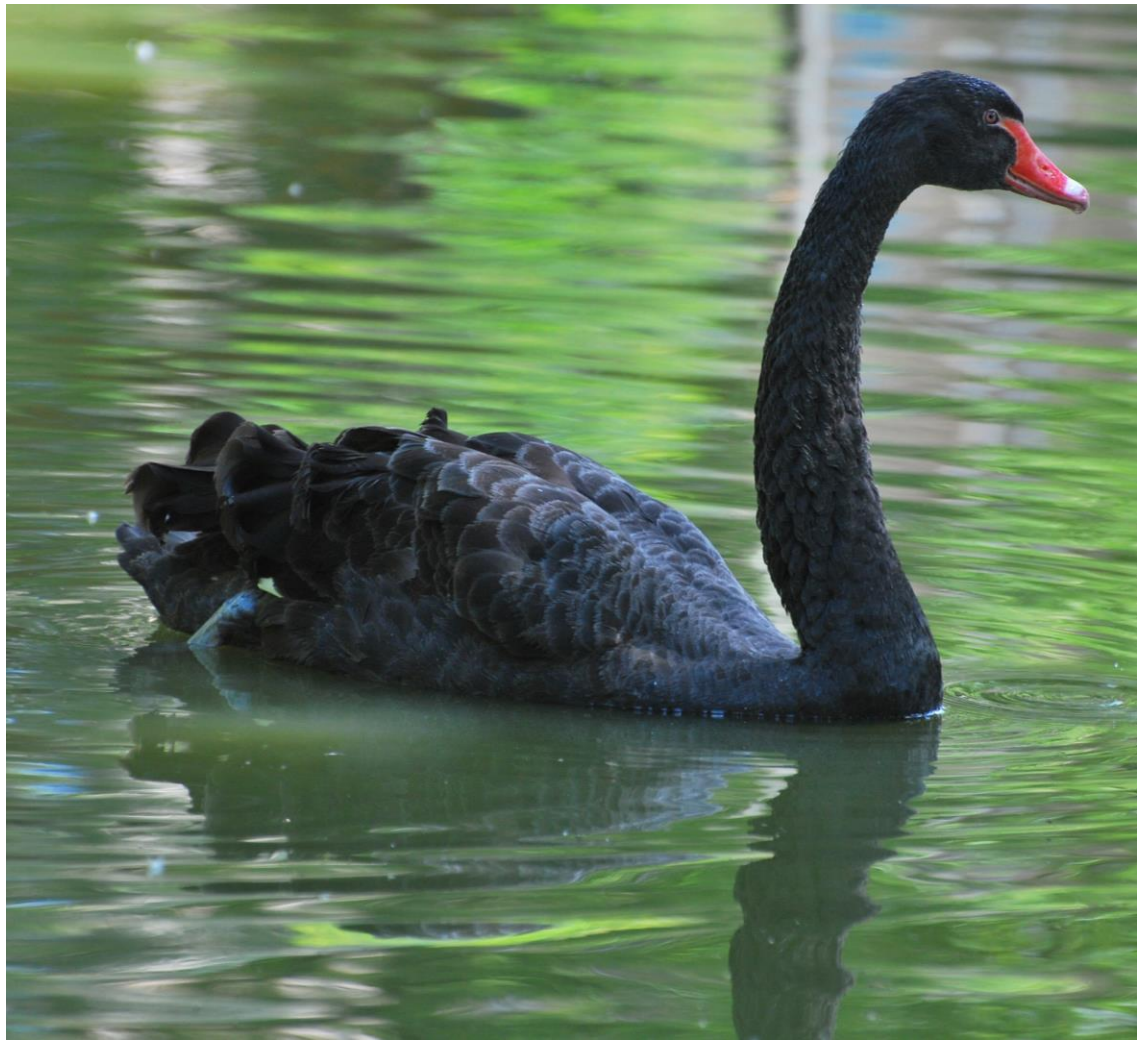
Upstream thinking

Upstream thinking means taking wise collective action to ensure better outcomes rather than simply responding to, and being overwhelmed by, crises we could have foreseen.

Black swan theory – see Taleb's work built upon by others

Black swan	unforeseeable risk
Grey swan	foreseeable risk
White swan	actual risk

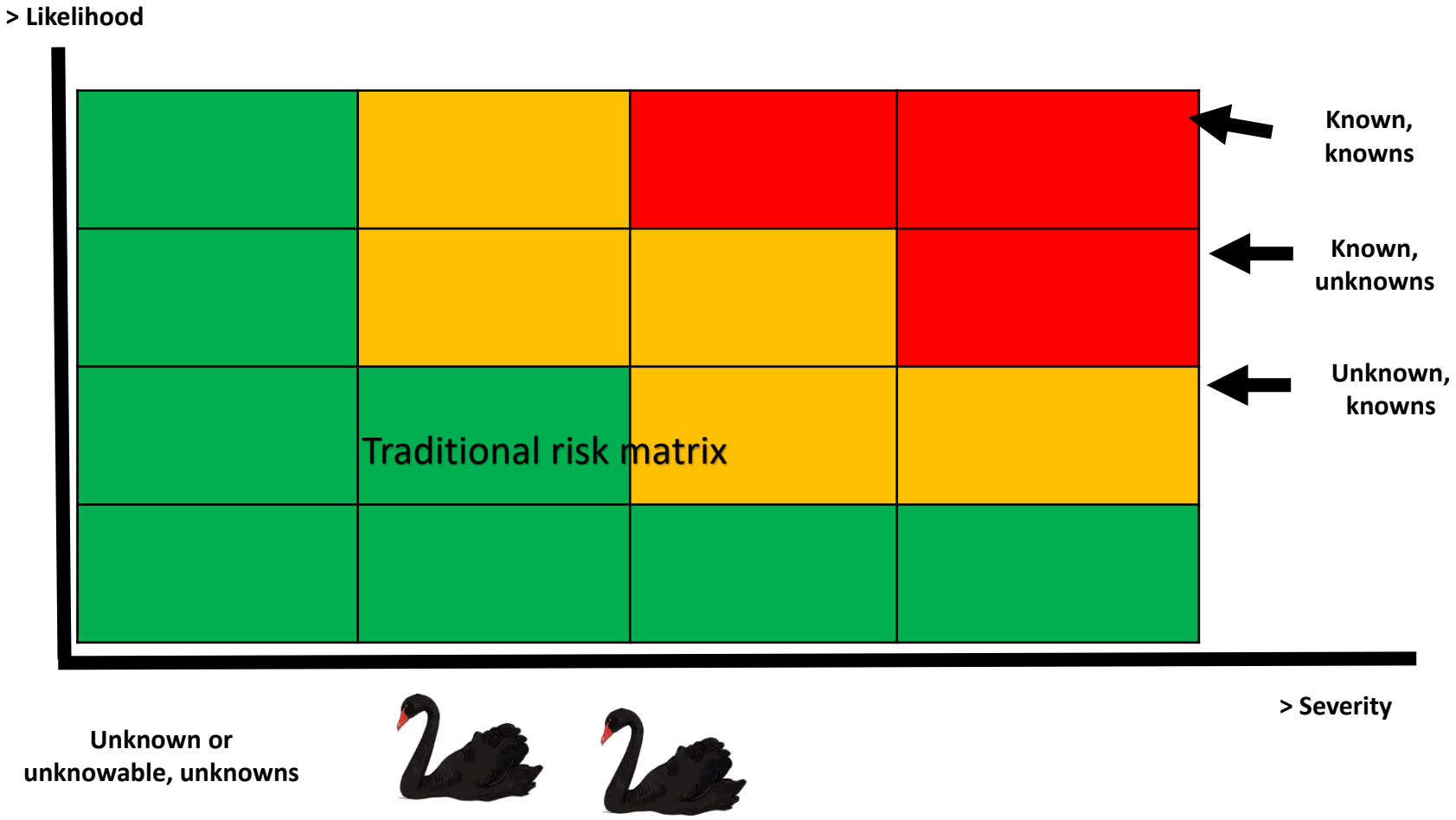
Source:
https://solutions.thischangeseverything.org/module/upstream-thinking



Or in the supply chain context….

Upstream thinking - considering your supply base, their ability to provide safe, legal food of the quality desired now and in the future.

Downstream thinking – shaping your relationships with customers and ultimately the consumer.


> Likelihood
Known, knowns
Known, unknowns
Unknown, knowns
Traditional risk matrix
> Severity
Unknown or unknowable, unknowns

Are food safety risks linear or non-linear?

Assessing risk in isolation is what we do..
what about knowable risk vs. unknowable risk, aggregate risk, cumulative risk?

Linear versus non-linear risks

Multiple risks can come together in a non-linear, complex event to produce an accumulated magnitude of risk and associated impact(s) that collectively could be greater than if the individual risks had occurred independently (Manning et al., 2020). This non-linear aggregated and complex event has been termed a “perfect storm” (Paté-Cornell, 2012).

Non-linear risk models are

- Complex
- Influenced by quantifiable and non-quantifiable factors
- Framed by risk-return trade-offs

Perfect storm: a combination of uncertainty, and aggregated “risky” events with singular and multiple negative outcomes occurring simultaneously (Paté-Cornell, 2012, Manning et al. 2020, p.291)

Uncertainty in food safety risk assessment…. how do we measure it? Do numbers matter? Is it about how it makes us feel?

Food system resilience

Food system resilience

The capacity over time of a food system, and its units at multiple levels, to provide sufficient, appropriate, [safe] and accessible food to all, in the face of various and even unforeseen disturbances (Tendall et al., 2015 p.19)

Aspects of Food System resilience

Buffer capacity

Adaptive capacity

Redundancy

Substitutability

Transformation

Resilience (in the face of a shock/disturbance)

Business as usual

‘bounce back’ to a steady state… (Christopher and Peck, 2004)

Survival

‘bounce without breaking’ (Shadbolt et al. 2013)

Business reimagined

‘bounce forward’ (Christopher and Peck, 2004)

a new sense of becoming (changing, renewing, growing see Wieland, 2021)

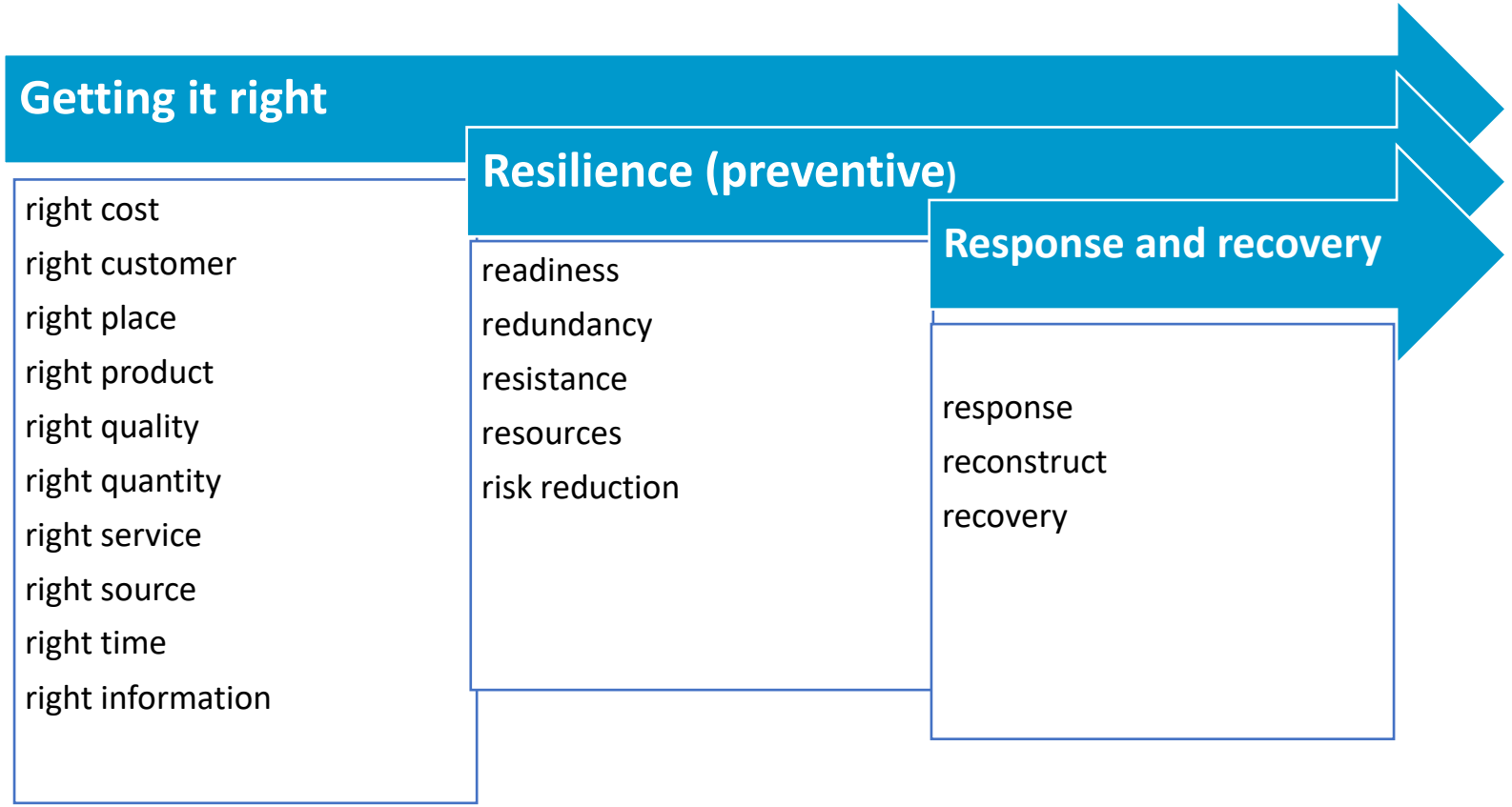
Resilient supply chains may not operate at the highest level of resource efficiency or the lowest cost, but they are more capable of coping with the level of uncertainty in the business environments that they operate within (Shadbolt et al. 2013).

"resilience it is not merely about withstanding stressors and shocks but more importantly the ability to build capacity to anticipate, prevent, absorb, and adapt from these experiences." (O'Meara et al. 2022)

"with resilience the key is the ability to **adapt** while the goal of conventional risk management approach is to **resist** (i.e., prevent or eliminate) food safety shocks" (Mu et al. 2022)

Adaptive capacity or resistance capacity

different mindsets..



The R's of supply chain resilience
(adapted from Hallegatte, 2014; Manning and Soon, 2016 in Kowalska et al. 2023).

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Closing thoughts

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Bibliography

Christopher, M., & Peck, H. (2004) Building the resilient supply chain. *International Journal of Logistics Management, 15*, 1–14.

Hallegatte, S. (2014). Economic Resilience Definition and Measurement, Available online: https://openknowledge.worldbank.org/handle/10986/18341 (accessed on 10 October 2023).

Kowalska, A., Lingham, S., Maye, D., & Manning, L. (2023). Food Insecurity: Is Leagility a Potential Remedy?. *Foods*, *12*(16), 3138.

Manning, L., Birchmore, I., & Morris, W. (2020). Swans and elephants: A typology to capture the challenges of food supply chain risk assessment. *Trends in Food Science & Technology*, *106*, 288-297.

Manning, L., & Soon, J. M. (2016). Building strategic resilience in the food supply chain. *British Food Journal*, *118*(6), 1477-1493.

Mu, W., van Asselt, E. D., & Van der Fels-Klerx, H. J. (2021). Towards a resilient food supply chain in the context of food safety. *Food Control*, *125*, 107953.

O'Meara, L., Turner, C., Coitinho, D. C., & Oenema, S. (2022). Consumer experiences of food environments during the Covid-19 pandemic: Global insights from a rapid online survey of individuals from 119 countries. *Global food security*, *32*, 100594.

Paté-Cornell, E. (2012). On “black swans” and “perfect storms”: Risk analysis and management when statistics are not enough. *Risk Analysis: An International Journal*, *32*(11), 1823-1833.

Shadbolt, N., Olubode-Awosola, F., & Rutsito, B. (2013) Resilience to ‘bounce without breaking’ in New Zealand dairy farm businesses. *IFMA 19 Transforming Agriculture*, *2*, 1-14

Tendall, D.M., Joerin, J., Kopainsky, B., Edwards, P., Shreck, A., Le, Q.B., Krütli, P., Grant, M. & Six, J., (2015). Food system resilience: Defining the concept. *Global Food Security*, *6*,17-23.

Wieland, A. (2021). Dancing the supply chain: Toward transformative supply chain management. *Journal of Supply Chain Management*, *57*(1), 58-73.