The New Resilience Paradigm - Essential Strategies for a Changing Risk Landscape[i]

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The Need for Resilience

Resilience is the capacity to survive, adapt, and flourish in the face of turbulent change (Fiksel, 2015, p. 5). A very common usage of resilience is in human psychology—a resilient person is able to recover from adversity, such as a traumatic accident or a job loss, and to forge ahead with confidence. At a broader scale, resilience is seen in social organizations such as tribal, ethnic, or religious groups, as well as entire cities and nations. Resilience is intrinsic in living things—for example, bacteria can develop resistance to antibiotics. Likewise ecosystems can recover from extreme damage such as an oil spill.

In the field of risk governance, the resilience of business enterprises and other organizations depends upon the resilience of people, products, processes, assets, markets, and communities. To cope with an increasingly networked and turbulent world, enterprise managers need to anticipate and embrace change rather than resisting it. Instead of merely seeking to return to a normal 'equilibrium' state, a strategic approach to resilience involves learning from disruptions and building capacity for rapid response and adaptation. In other words, rather than bouncing back, organizations need to 'bounce forward.'

For some types of risks, the likelihood and magnitude of random events can often be predicted with a fair degree of confidence based on historical data. For example, in the property and casualty insurance industry, actuarial tables provide a reliable basis for setting premiums. However, problems arise if shifting conditions make historical observations irrelevant. Moreover, hypothetical extreme events may never be observed in practice. Thus, risk assessment and management often becomes a subjective exercise based on human judgment, with pessimistic and optimistic assumptions sometimes differing widely. An alternative approach is to design systems that are **inherently resilient** to unexpected challenges.

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Beyond Traditional Risk Management

Embracing change and building inherent resilience will require a new approach to dealing with risk and uncertainty. In today's complex risk landscape, conventional risk management is inadequate for dealing with fast-moving, unfamiliar changes that may have catastrophic consequences. The most damaging disruptions are often a result of rare "black swan" events that seem highly unlikely until they actually happen, such as the tsunami that destroyed the Fukushima nuclear power plant in Japan (Taleb, 2007).

According to the National Academy of Sciences, risk-based methods are not adequate to address complex problems such as climate change and loss of biodiversity, and more sophisticated tools are available that go beyond risk management (National Research Council, 2011). The concept of a stable equilibrium, with steady growth punctuated by occasional isolated deviations, is no longer realistic. Similarly, the World Economic Forum has acknowledged the importance of resilience for addressing 'systemic' risks that are difficult to predict or manage effectively. Systemic risk is defined as "the risk of breakdowns in an entire system, as opposed to breakdowns in individual parts and components". Systemic breakdowns can result from tipping points that trigger a chain of cascading effects, such as floods, power blackouts, property destruction, and economic crises (World Economic Forum, 2014).

There are several key limitations to the classic risk management paradigm (Fiksel, 2015, p. 24): first, r**isks cannot always be anticipated**. A critical step in risk management is hazard identification; yet risks may result from cumulative changes that reach a tipping point. In a complex system, 'emergent' risks are often triggered by improbable events whose causes are not understood, and their potential consequences are difficult to predict *a priori*. Second, **risks may be hard to quantify**. Even if risks can be identified, the lack of an adequate dataset with reliable statistical information can make it difficult to assess the most significant threats. Managers may underestimate the probabilities or magnitudes of risks that they have never experienced, and faulty assumptions may lead to misallocation of resources. Finally, **adaptation may be needed to remain viable**. Risk mitigation and recovery practices are typically aimed at returning to 'normal' conditions. Instead, every disruption represents a learning opportunity, and should be viewed as a stimulus to drive process improvement based on root cause analysis and systems thinking. In today's fast-changing world, a philosophy of 'business as usual' may be untenable.

The established methods of risk management can be useful for protecting against familiar, predictable risks, such as fires or power failures. Resilience is not a substitute for risk management; rather it enables organizations to embrace change and counteract vulnerabilities by expanding their portfolio of capabilities. Early adopters of resilience have demonstrated how they can augment traditional risk management practices with new competencies that help them to anticipate, prepare for, adapt, and recover from unexpected disruptions, and in some cases to treat disasters as an opportunity for gaining competitive advantage. Companies like General Electric, IBM, and Swiss Re see the emerging interest in resilience as an opportunity for new products, services, and markets (Evans, 2013).

Strategies for Resilience Improvement

Resilience implies the capacity to overcome changes that are not predictable or quantifiable, representing unforeseen threats and opportunities. In the absence of predictive information,

resilience involves capabilities for sensing of discontinuities, rapid adaptation, and flexible recovery or transformation. Designing resilient systems may involve changing their physical configuration. For example, a collection of distributed electric generators (e.g., fuel cells) connected to a power grid can be more resilient than a central power station in handling disruptions. Similarly, a geographically dispersed workforce linked by telecommunications may be less vulnerable to catastrophic events that could disable a centralized facility.

There are many other opportunities to develop enterprise resilience, including both functional and structural initiatives. Functional initiatives range from increased agility in recognizing and resolving problems (e.g., emergency preparedness) to fundamental transformations in response to strategic threats or opportunities (e.g., business model innovation). Structural initiatives range from establishing safeguards against disruptions (e.g., supply chain flexibility) to reducing vulnerability to change and increasing versatility (e.g., business diversification) (Fiksel, 2015, p. 14).

Research at Ohio State, supported by Dow Chemical and other companies, has produced a comprehensive **supply chain resilience** framework that helps companies to identify important vulnerabilities and to set priorities for strengthening their capabilities (Fiksel, Polyviou, Croxton, & Pettit, 2015) . For example, a company that faces unpredictable market demand could strengthen a number of capabilities: flexibility in manufacturing to satisfy surges in demand; accurate, up-to-date visibility of demand status to support timely decision making; early anticipation and recognition of market changes to enable strategic responses; and close collaboration with customers and suppliers to ensure coordinated action. Similarly, a company concerned with dependence on a complex supply network could work on flexibility in sourcing by identifying alternative sources, flexibility in manufacturing by reducing lead times, and anticipation by recognizing early warning signals of possible disruptions.

Besides supply chain management, resilience strategies are relevant for every major business function, including capital budgeting, customer relationship management, human resource management, information management, and new product development. **Design for Resilience** can be defined as “adaptation or transformation of enterprise products, processes, or assets in order to reduce vulnerabilities and improve capabilities, enabling sustained or enhanced performance” (Fiksel, 2015, p. 174). Examples of resilient products include self-healing materials, reconfigurable computer chips, and adaptive communication networks.

Measuring Enterprise Resilience

While hundreds of resilience indicators have been developed by various organizations, the table below lists a number of fundamental attributes underlying enterprise resilience (Fiksel, 2015). Note that these attributes cannot simply be maximized; there are tensions that need to be balanced. Adaptability and Efficiency are opposed, since the pursuit of efficiency tends to eliminate sources of variability and unused capacity. For example, the ‘lean’ movement has increased the vulnerability of supply chains to unexpected disruptions. Likewise, Cohesion and Diversity are opposed, since the pursuit of cohesion may eliminate diversity of talents, opinions, and business models. The challenge of creating a resilient culture is to encourage individuality and resourcefulness while maintaining a sense of common identity and purposeful teamwork.

Attribute	Types of Indicators	Example
Cohesion	Strength of corporate identity or stakeholder trust	Interbrand ranking of brand value
Vulnerability	Presence of disruptive forces that can threaten business continuity	Country-specific political risk index
Adaptability	Capacity to rapidly modify key products, technologies, or business processes	Response time to execute modification
Efficiency	Productivity in terms of value delivered relative to resources required	Production volume per unit of energy input
Diversity	Variety of markets, suppliers, facilities, and employee capabilities	Number of qualified sources by component
Stability	Ability to continue normal business operations when disruptions occur	Surge capacity as a percent of normal output
Recoverability	Ability to overcome severe disruptions and restore business operations	Maximum tolerable damage without shutdown

Table 1: Measuring Enterprise Resilience

For each of these attributes for which resilience indicators can be defined in qualitative or quantitative terms. For example, *recoverability* can be measured in terms of the time required to recover, the cost of recovery, or the maximum tolerable degree of disruption. Note that some indicators may be correlated; for example, stability, vulnerability, and recoverability all depend upon a fundamental attribute called *precariousness*, which indicates how close the system is to a critical threshold (e.g., minimum inventory level) (Walker, Holling, Carpenter, & Kinzig, 2004).

It is sometimes helpful to aggregate resilience indicators into an index. For example, Cisco created a composite index of resilience indicators related to products, suppliers, manufacturing processes, and test equipment for outsourced components. This index is applied automatically to Cisco's top 100 products, accounting for about half of Cisco's revenue, and is included on the company's Supply Chain Operations Executive Dashboard. Meanwhile, IBM Corporation has worked with the United Nations to develop "ten essentials" of disaster resilience, and helped to develop a "resilience scorecard"—a self-assessment tool that cities could use to evaluate their preparedness, including collaboration, risk assessment, building codes, natural buffers, and warning systems.

Finally, it is important to understand that resilience is a necessary, but not sufficient condition for long-term sustainability. Indeed, there may be trade-offs between resource conservation to improve sustainability versus the need for resource buffers to increase resilience (Fiksel, Goodman, & Hecht, Resilience: Navigating Toward a Sustainable Future, 2014).

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