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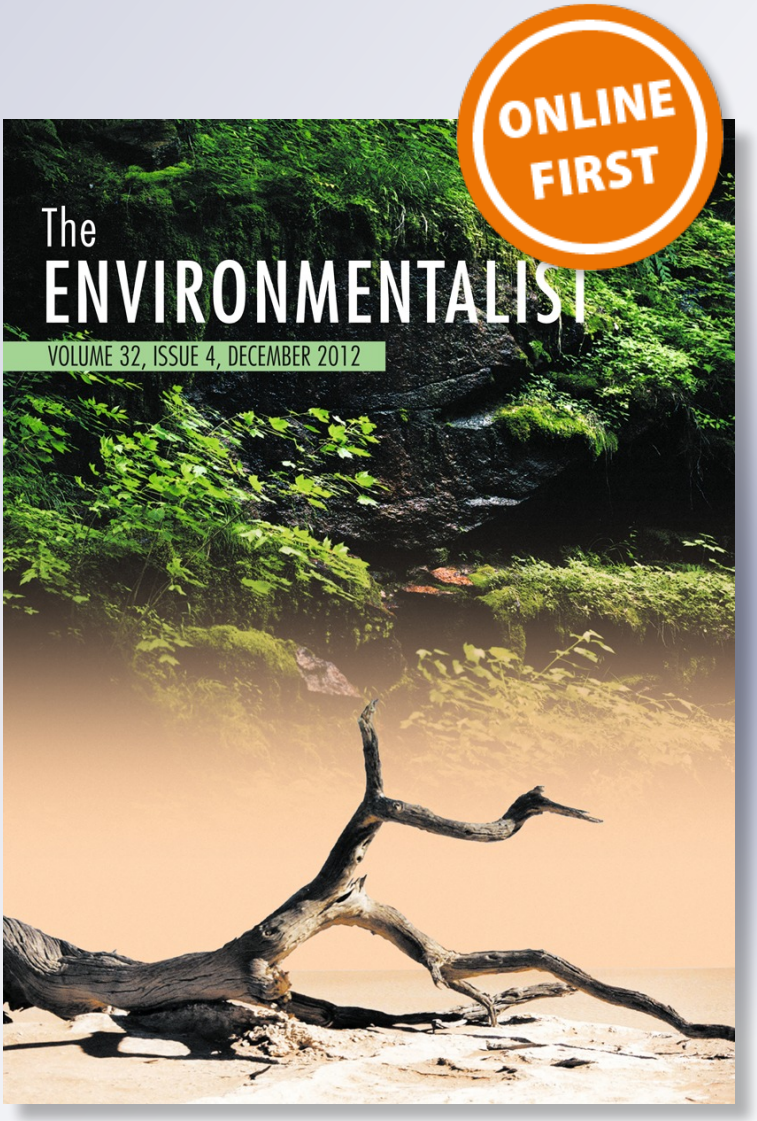

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The decision gym: decision insurance for organizations

Ben Sheppard · Mary Crannell

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Abstract Conducting decision calisthenics can help an organization win competitive advantage through harnessing its tremendous knowledge, imagination, and staff experience. The paper explores how knowledge and experience mined and refined through innovative approaches like scenarios and war gaming can turn visionary ideas into successful, working realities. To fully appreciate the value of novel frameworks requires contextualizing their utility in what can be called the decision gym. The decision gym offers a way to build powerful consensus and commitment to decisions, methods to optimize processes, and a way to create, evaluate, and execute critical strategies in the face of heuristics and biases that can distort decision making.

Keywords Scenarios · War gaming · Vision · Decision making · Heuristics

1 Introduction

Professional athletes undertake extensive mind and body training prior to taking to the field. Rigorous evaluation and testing is part of their daily routine. Organizations too can benefit from their own training gym—a decision gym that encourages developing and refining their decision muscles in a safe environment. Organizations operate in an ever-changing world where decision cycles are compressed, new entrants into the market abound, and vast amounts of data are available at all levels of an organization. Decision makers also face the challenge of making decisions based on uncertainty, complexity, and colored by prior experiences. These challenges are often referred to as heuristics and biases.

The complex adaptive system that often characterizes the environment organizations operate in (Dooley 1997; Stacey 1992) compounds the uncertainty in assessing the consequences of decisions made and identifying the data to inform decisions. Coupled with the cognitive processes found in the heuristics and biases of decision makers, organizations require a robust approach to meet challenges head on to thrive and, where necessary, reinvent themselves. The course an organization pursues is not fixed and the journey can be rough sailing. Strong, flexible decision muscles and the willingness to leverage new opportunities and change direction when necessary are critical for gaining and maintaining long-term success. A decision gym which includes visioning, scenarios, and war gaming provides an opportunity for decision makers to perform decision calisthenics—to build decision muscles ensuring an agile, quality response to leverage environmental changes. A decision gym[1] buys "decision insurance". Bad decisions are costly. It is better to work out a decision in the gym rather than making a decision where the organization suffers long-term adverse consequences.

The paper is divided into three areas. First, anchoring the decision making through developing a compelling vision and narrative. Second, understanding an organization's needs in the decision gym through assessing its stage of growth. Third, decision techniques, tools and approaches

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[1] Decision Gym is a Trademark of Idea Sciences, Inc.

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to frame decisions through collaborative technology, and tools to rehearse decisions through war gaming and scenarios. First, the paper explores how the decision gym uncovers the heuristics and biases that challenge decision makers.

2 Heuristics and biases

Extensive research exists on how heuristics and biases influence decision making (Kahneman and Tversky 2000; Tversky and Kahneman 1981; Gilovich et al. 2002; Fischhoff 2002, Slovic 2000). Although providing an extensive literature review is beyond the scope of this paper, understanding how heuristics and biases can adversely affect the quality of decisions helps contextualize the decision gym concept. Heuristic and biases are decision rules, cognitive mechanisms, and subjective opinion people use to assist in decision making (Busenitz and Barney, 1997), particularly in uncertain and complex conditions. They can help approximate and guide the appropriate decisions (Tversky and Kahneman 1974; Haley and Stumpf 1989). According to Schwenk (2007), evidence suggests "biases may affect strategic decisions by restricting the range of strategic alternatives considered and the information used to evaluate these alternatives". The use of bias and heuristics may explain a significant proportion of how decisions are made (Haley and Stumpf 1989). Faulty judgments can lead to misdirected strategic plans (Barnes 1984).

Key heuristics include the availability bias where judgments of probability of easily recalled events are distorted, and hindsight bias, where there is an over estimation of predictability based on past events (Schwenk 2007). Business management has taken the heuristic and biases research to identify approaches to mitigate bad decision making, some of which can even ruin a company and one's career (Hammond et al. 1998; Barnes 1984). Characteristics of poor decisions making include anchoring (giving disproportionate weight to the first information one receives); status quo: favoring alternatives that perpetuate the existing situation; confirming evidence: seeking information that supports an existing point of view; and estimating and forecasting: being overly influenced by vivid memories when estimating (Hammond et al. 1998). Organizations cannot predict the future but they can help create the future and be agile in responding to change when faced with a shifting landscape and priorities. Awareness of how biases affects decision making can better inform judgments of planners and managers. A decision gym provides decision makers with the safe environment to explore, test, and refine approaches to capitalize on higher value opportunities.

3 Anchoring the decisions

3.1 Vision: first context for organizational decision making

Context and a strong anchor are imperative for an organization to make high-quality and aligned decisions. Vision is the North Star for decision makers and crystallizes the purpose of an organization. A clear and compelling vision requires a strong emotive bond with the organization to define its ideas, aspirations, and soul. Visioning plays a central role in the decision gym concept by clarifying an organization's credible, yet aspirational goals. Without realistic strategies to achieve them, visions are only lofty ideals. While trends and scenarios are "futures for the head" that help organizations to think systematically about future possibilities, visions are "futures for the heart".[2] A successful vision is a "living vision—as opposed to words on paper—that people share, feel deeply about, believe is possible, and commit themselves to achieving".[3]

Compelling visions must meet five criteria (Bezold 2009): *Be legitimate*—a vision must have emotional power and be inwardly accepted, but not forced upon an individual or group. *Be shared*—a vision only works when it is shared and viewed as a collective challenge, aligning individuals and departments across an organization. *Aspirational*—Visions must go beyond non-emotive statements of "we want to be the largest in our sector" or "develop market dominance". It must be compelling to engage people reach their highest aspirations for making a difference. *Contain audacious goals*—bold goals that go beyond current reality is a major source of power giving people the sense they can surpass what they thought were personal and organizational limits and ask themselves "is this really possible?". Bezold states that "Once the answer is 'yes', the boldness of the vision becomes a major source of power" (Bezold 2009). *Achievable*—Individuals must believe their compelling vision can happen and ultimately be possible no matter the challenges (Bezold 2009).

A vision can be augmented by a technology-based creative problem-solving process. One such approach is called CoNexus[4] which is a "backward from perfect" future-based decision-making process. This technique is based on the question "what is the ideal world you want to create" and then work backward from that vision or idea. Starting with the ideal future and then asking, "What strategies did we employ to achieve that ideal?" helps groups to generate completely new solutions. However, for a vision to breathe

[2] See altfutures.org "Wiser Futures Workshop Compendium". July 2012.

[3] Ibid.

[4] CoNexus is a registered trade mark of Idea Sciences, Inc.

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life, it must be told in story. An organization's narrative is key in communicating the vision and providing boundaries for acceptable decisions within the context of the organization's vision.

3.2 Narrative to communicate the vision, reinforce identity and articulate aspirations

A compelling narrative helps communicate and support an organization's identity in how they want to be viewed and what they aspire to be. A robust narrative should sustain organizations through good times and bad—what can also be referred to as a narrative umbrella. The narrative goes beyond public relations and communicating risk; if managed correctly, it should reflect the aspirations and vision of an organization and be consistent with its values. The narrative can be employed at different levels: Strategic narrative that supports the vision, and then, sub-narratives that support an organization's operations and tactics. From the strategic narrative flow the sub-narratives. A narrative can be defined as a collection of compelling stories that represent the cultures, history and purpose of individuals, organizations, and nations. A narrative continuously flows, like a current in a stream, determined by the actions and inactions of the parties involved (Crannell and Sheppard 2011). Whereas vision is the 'north star' that an organization aspires to move toward, the narrative is how an entity is perceived by others and how it wants to be perceived.

Failure to define a compelling strategic narrative can create difficulties when leading, particularly in the face of crises. How an organization or a government handle events from day-to-day activities to crisis can very much determine how an organization is defined by its stakeholders—for better or for worse. Individuals and organizations cannot choose to opt out of a narrative. Like individuals, organizations are surrounded by a narrative whether they actively define their own or it gets defined by others. Letting others define a narrative may produce one that may not be aligned with how an organization wants to be portrayed.

The narrative is not a short adventure—it is long-term life sustaining from periods of prosperity and productivity to crisis and emergencies. Critical factors in developing a narrative are: knowing the value of the narrative and what it can do; creating a narrative that resonates with the story of the organization and its people; maintaining message consistency; ensuring the communicator's own personal narrative resonates and reinforces the strategic narrative; recognizing how, when and where a narrative is communicated can reinforce or undermine the message (Crannell and Sheppard 2011). "Appendix 1" contains narrative case studies from Japan's handling of the 2011 Fukushima nuclear disaster, and the US State Department's employment of the narrative as a counter-terrorism tool.

Developing and sustaining a compelling narrative is a two-way process. Individuals and organizations must define what their narratives are while also seeking to counter other narratives in the cacophony of stories and perspectives. Robust strategic narratives require alignment with the vision, from which sub-narratives can be developed. Without the vision driving the narratives as the North Star, the narrative is at risk of drifting. Vision drives and sets the direction of an organization and its stakeholders' narratives.

4 Understanding the context for organizational decision making

With the vision and narrative anchors in place, understanding the decision-making context helps frame an organization's needs in the decision gym. People entering an exercise gym require a specific routine tailored to their health, experience, and needs. Similarly, organizations entering into the decision gym require an organizational profile to match their characteristics and needs.

4.1 Phases of growth

Understanding the organization's growth stage is critical for understanding the context and needs of decision making. Change is a natural process. All organizations progress through three major cycles over time: phase 1 invention; phase 2 improvement; phase 3 innovation (see image below) (Land 1997). If an organization is to survive the breakpoints between each phase—*it must shift gears* and the decision-making within each phase needs to adapt as well (Peters and Waterman 1982). A decision gym needs to recognize what growth cycle stage an organization is into ensure maximum effectiveness of customizing decision-making tools. Treating a phase 2 organization as if it were a phase 1 entrepreneurial start up can be counterproductive, for example.

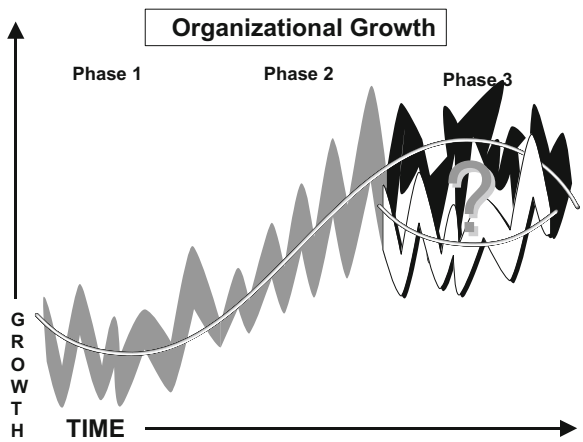

Image: Land, 1997.

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4.1.1 Phase 1

A phase 1 organization discovers the world and "*invents*" itself as it experiments with finding the right ingredients to assemble its unique growth pattern. Phase 1 for an organization is the entrepreneurial stage. Common characteristics of phase 1 entrepreneurs include creating a compelling vision, possessing an acute awareness of their customers' needs (finding and meeting the need), and combining creativity and high energy.

4.1.2 Phase 2

The second phase system concentrates on extending, modifying and improving the successful patterns discovered in phase 1. Attention centers on a narrow and "orderly" path of possibilities. Anything not fitting the pattern is ignored, avoided, or attacked—depending on the magnitude of the perceived threat. How long the second phase lasts depends on the extent, size, and complexity of the initial pattern. However, ultimately phase 2 exhausts itself by tapping out the opportunities in the market identified in phase 1 and extending beyond its ability to maintain control. The organization exhausts itself by losing customers and income. In Phase 2 organizations need to create policies and procedures, norms and standards in order to achieve the efficiencies that result in replicating a product or service. In contrast to the first phase that is characterized by invention, the second phase is considered the improvement phase. A successful pattern is discovered and the organization recognizes incremental changes, improving the pattern that emerged from the discovery phase in phase one.

4.1.3 Phase 3

Once the system outgrows the effectiveness of its repetitive pattern, it reaches yet another and very different breakpoint. In order to keep growing, it shifts to a totally new way of relating to its environment. Phase 3 is a time when the pattern of the system continually moves in a state of flux (Porters 1987). It needs to shift from repeating what was a successful pattern identified in phase 1 and refined in phase 2, to constantly "innovating" by making new relationships with the world around it. The third phase prepares the system for its transformation to a new and even higher cycle of growth. The system must now open its boundaries to admit "new and different" approaches that may have previously been discounted in phase 2 in favor of keeping with a tried and tested routine.

Behaviors that enable organizations to successfully navigate breakpoints include adaptability to situations and accepting change; possessing analytical ability; creative thinking techniques; and ability to accept criticisms. Examples of organizations that failed to rediscover and reinvent themselves in the face of changing climates and growth are IBM (Dittrich et al. 2007) and Kodak (Lucas and Goh 2009). Both organizations arguably suffered from the lack of a decision gym. Each discovered significant emerging trends (IBM the personal computer and Kodak the digital camera) but did not leverage the knowledge discovered within the system that was determined to replicate the existing pattern even if though there were signs that the successful pattern in phase 2 had exhausted itself. The result was that competitors leveraged this emerging trend and both organizations found themselves in "catch up" mode. New entrants into the market place were open to new ways of thinking and approaches and not burdened by a bureaucracy created to protect the existing pattern. If the organizations had employed decision calisthenics to explore the potential of these discoveries, it would have helped them accept and capitalize on the emerging trend rather than dismiss both innovations "out of hand." IBM and Kodak were held captive in a phase 2 growth cycle despite the new discoveries made within their own research and development departments. IBM, however, radically changed direction to survive from an exploitation strategy to exploration strategy by transforming from a hardware manufacturing company to a global services provider (Dittrich et al. 2007).

Organizations reaching "breakpoints" at the end of growth stages may also possess cognitive biases among their decision makers. The decision-making process for entrepreneurs is thought to be different to managers in large organizations. Entrepreneurs may assess situations less risky by being more willing to generalize from limited experience and feeling over confident that they can overcome major obstacles (Busenitz and Barney 1997). If different individuals and organizations are cognitively biased in different ways as Busenitz and Barney's study suggests, then they may make strategic choices in fundamentally different ways (Stumpf and Dunbar 1991). For organizations seeking to rekindle the entrepreneurial spirit of phase 1, the cognitive biases that characterized the more entrepreneurial nature of phase 1 may be less prevalent when an organization operates in phase 2 and develops a different culture when heading into phase 3.

Decision gyms build capacity in these areas and provide a safe environment for staff to learn and to grow—increasing their "decision muscles." By establishing a capacity to test decisions, employees are able to rehearse decisions before there is a crisis. Organizations can then better manage and mitigate risks and opportunities as their growth cycle and external environment evolves.

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5 Decision techniques, tools, and approaches for decision gym to frame decisions

There are a range of decision support theories, methods, and tools that frame problems and offer solutions in pursuit of organizational aims. Below is a selection that illustrates the key tools and techniques that are valuable in the decision gym. Emphasis is given to scenario and war gaming techniques to illustrate how future tools will be able to exercise decision muscles of leaders at all growth phases of the organization's lifecycle.

5.1 Technological tools to frame decisions

5.1.1 Collaborative technology

Technology can provide valuable problem-solving tool options when applied appropriately. Collaborative technology can be used to produce organizational transformation plans to help define and develop a pathway toward achieving a compelling vision. One such example is the "backward from perfect" approach where small stakeholder groups are taken through a structured creative problem solving process. Stakeholder groups typically include representatives of different layers and management functions within an organization, or across several organizations that work together, for example, a supply chain. Electronic voting technology is employed to elicit views from the stakeholder group and to document stakeholder perceptions of the organization's performance and the viability of the strategic direction outlined.

Having identified the ideal future as discussed in Sect. 3.1, the stakeholder group can work backward to assess how they might achieve their preferred future. The ideal future is divided into a series of measurable audacious goals to work toward. Pinpointing critical diversity within the group identifies critical decision points. Addressing these points informs decision making that will create a successful organizational strategy. Comparing snapshots of where an organization currently stands and what it wants to achieve identifies gaps that need to be addressed to pursue its vision. The creative strategic thinking process frames questions in such a way as to compare opportunities rather than focus on problems.

Another technological approach is confrontation management to manage multiple stakeholders with potentially conflicting objectives. The negotiating positions of the various parties within a frame of conflict are used to identify information requirements (i.e. questions) concerning preferences and options—which are used to uncover appropriate decisions to resolve the confrontation. When combined with other decision-making processes, collaborative technology can provide a force multiplier effect to better understand the decisions made and creating a shared vision. Integrating decision technologies into war gaming decisions to rehearse decisions is one such example. The war game designer could, for example, insert voting technology sessions to capture perceptions and perspectives of participants at different simulation timeline points to create graphical representations of key decisions throughout a game.

5.2 Tools to rehearse decisions

5.2.1 War gaming

War gaming in the decision gym enables organizations to play out, test, and refine strategies. Mention war gaming and images of military training is often the first thing that comes to mind. While war gaming originated in the military sphere, it has evolved into a core decision tool for many public and private sector entities testing and developing strategies from organizational development to emergency planning. The corporate environment has increasingly accepted the value war gaming provides with companies running them reporting greater demand to simulate the interactions of multiple actors in a market (Kurtz 2003; Economist 2007; Oriesek and Schwarz 2008; Schwarz 2009, Sheppard and Stanton 2008).

War gaming in the western military can be traced back to Prussians where their victory over the second French Empire in the second Franco-Prussian War (1870–1871) is partly credited to the senior officers receiving training from playing a *war game,* in German, called "Kriegspiel". In 1898, naval analyst and writer Fred T Jane who founded Jane's Fighting Ships developed a series of rules depicting naval actions through the use of model ships and miniatures. Military war games evolved rapidly into more complex systems during the first half of the twentieth century which included the US 'gaming' their military campaign in the east (Asia and the Pacific Rim) during World War Two (Wilson 1970).

Whether it is testing pandemic flu preparedness (Sheppard 2007), UN AIDS strategies in Africa,[5] or pharmaceutical companies evaluating partnerships to develop drugs, all simulations possess common themes: to test, to develop, and where required, train participants in hypothetical yet credible environments that identify the intended and untended consequences of decisions made. While the field of war gaming and simulations is very broad, the following focuses on innovative approaches that bring a high value to return. A more detailed discussion of war

[5] See Booze Allen Hamilton simulation report http://www.boozallen.com/media/file/137999.pdf.

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gaming in the business setting can be found in Sheppard 2008.

Customized war game simulations can meet a range of training and mission support requirements, with exercises ranging from half-day to multi-day events that can be held at a single or multiple sites. The experiential approach means participants can experience and understand firsthand the opportunities available and address risks in innovative ways. Simulations can be set up to focus on how an organization can develop and test long-term strategies to meet audacious goals aligned with their vision, through to focusing on tactical decision making, for example, marketing plans. Furthermore, simulations can be employed to aid an organization's shift through growth stages to move from phase 1 to 2, and from phase 2 to 3 in an effective manner, as discussed earlier.

War gaming is a powerful tool to accelerate learning and decision making through credible and challenging scenarios. The time horizon of a war game exercise is flexible ranging from crisis games to meet immediate national security or product recall demands through to long-term strategy development and decision support such as 10 or 20 years in the future. Core benefits of strategy gaming in the decision gym are:

- Accelerate decision making and interagency planning.
- Facilitate education and training as of part a curriculum.
- Identify and test the robustness of strategies across diverse stakeholders.
- Integrate subject matter experts to co-design games encompassing a range of critical issues.
- Test the robustness and identify the intended and untended consequences of strategies in a safe environment including organizational structures, inter-departmental planning and coordination.
- Evaluate and capitalize upon complex environmental shifts, such as disruptive technologies, current and emerging trends and threats.
- Explore new stakeholder engagement and collaboration opportunities.
- Incorporating futurists to develop challenging future operational environments.
- Deliver in-depth war game reports analyzing critical decision paths and provide strategic recommendations.

"Appendix 1" contains a case study example of a Pfizer war game. For a simulation to work effectively, the designers must ensure the variables are sufficiently weighted. Regardless of the type of strategy game designed, a series of questions are required to develop a game. These include:

- What is the simulation seeking to achieve (aims and objectives)—focusing on strategic/tactical issues?
- How many teams will there be and the number of participants in each team?
- How many days are available to run the simulation?
- What is the time horizon to examine in game play (weeks, months, years)?
- What is the division of game play time over the 2–3 moves to be? Typically a 2-day game has three moves followed by a back brief session. The tradeoff is more moves at the expense of less time available on each move.
- Which geographic region/s is to be examined?
- What are the key scenario developments to examine (e.g., arrival of a new competitor, launch in a new market)?
- How many and what type of competitors will there be?
- What are the external variables to represent (subject matter experts)—if any? For example, a pharmaceutical simulation may include subject matter experts role playing regulatory, payers, providers, and patient groups.

War gaming can, however, be resource intensive in lead time to develop, requiring clients to invest time (preparation and execution), and financial resources. Collectively these can constrain the number of iterations that can be run to assess alternative scenarios. To address potential bias in the types of participants invited to the game, the designers need to be aware of these attributes as part of their post simulation analysis.

A novel war gaming approach for the decision gym is Reverse Evolution (RevEv[6]) strategy gaming which immerses participants in a unique decision-making process to explore, exploit, and abandon conditions to accelerate their organization's ability to achieve and sustain their vision and mission. RevEv takes the approach that organizations should dedicate a small part of their resources to continually set conditions to achieve their desired outcomes, the path of which may change. Organizations should also not focus on just short-term decision making and crisis management (often referred to in the military as D-90—that is to say 90 days before conflict), but on an undefined future point to first, avoid reaching a crisis point in the first instance, and second, set conditions to define the environment. The capability to engage in a D-90 context remains critical (whether a government entity needs to prepare for war or a company needs to effectively manage a crisis). RevEv, however, seeks to set conditions over the long term so a conflict environment does not come to pass in the first place. Setting favorable conditions up stream must also be aligned with an organization's desired visions to mitigate the prospect of a crisis occurring in the first instance.

[6] RevEv is a trademark of Center for Applied Strategic Excellence and developed by Al Elkins.

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5.2.2 *Scenarios for making current decisions with future context*

Scenarios in the decision gym can provide organizations with the ability to identify opportunities and challenges that more conventional techniques omit. Conventional techniques focus on past and current trends. Depending on the scenario technique employed, scenario development first requires an environmental scan to craft a series of provocative forecasts which are then developed into scenarios. It is suggested a decision gym contains a series of scenario options, each of which has its own particular value depending on the circumstances an organization seeks to explore.

Scenarios are used extensively across many public and private sector organizations. Royal Dutch Shell's scenario planning of the early 1970s is often cited as one of the earlier and prominent successes where the oil giant was able to better anticipate and mitigate the consequences of the turbulent oil prices (Chermack et al. 2001). The scenario work equipped Shell employees to rehearse decisions given a set of circumstances. Unlike Shell's competitors, Shell's employees had rehearsed the 1973 oil crisis. Rehearsing the decisions gave them a strategic advantage where as their peers were tackling the scenario for the first time and in real life. Many government agencies, such as the US Transportation Security Administration and the US Army, have engaged futures organizations to develop scenarios to better understand the threats and opportunities that are likely to emerge in the external environment. This trend is even more pronounced outside the US.

For example, in 1995, the United Kingdom established the UK Foresight program, which identifies potential risks and opportunities across science and technology areas to inform decision-making within and across government departments.[7] Similarly, since the 1980s the Singaporean government has engaged in forecasting activities that postulate future geopolitical, economic and social trends that include the Risk Assessment and Horizon Scanning (RAHS) program that is part of Singapore's National Coordination Secretariat.[8] RAHS explores methods and tools that complement scenario planning in anticipating strategic issues with significant possible impact on Singapore. Singapore's approach is based on the view that by identifying the key drivers that may shape long-term change, one can start preparing for the future today.[9] A number of consulting groups have emerged providing futures tools employing a variety of techniques as discussed below.

This paper summarizes five methods: 'two axes', 'branch analysis', 'cones of plausibility', Causal Layered Analysis (CLA) and aspirational futures method.

The "two axes" method is valuable for testing the robustness of medium to long-term policy options in a range of scenarios extending 10–20 years and beyond. The two axes are illustrative rather than predictive (Rhydderch 2009). Shell is one such organization that uses the two axis method which seeks to develop four contrasting scenarios on two axes to form a quadrant. Identifying the two key axes is an interactive group process, and once developed, the groups can populate the four scenario quadrants on how they might come about, and what management and mitigation measures may be appropriate.

Consulting firm Global Business Network (GBN), one firm who employs the two axis method, takes the approach of identifying the most important factor for one axis and the most uncertain factor for the second axis to construct a grid. For example, scenarios done for the California wine industry identified the regulatory and wine consumer's preferences as the two key driving axes. The four scenarios included "Safe at Home" scenario where scientific studies would state a glass of wine a day was good for you while there was a protectionist regulatory regime producing high demand and high prices. Conversely, a more prohibitionist regulatory regime in an open trade environment would produce a 'World Awash' scenario characterized by weak demand for wine, excess supply, and falling prices (Ogilvy and Schwartz 1998). The two axis method is good for crystallizing key factors that may impact future decisions.

Branch analysis is developed around critical turning points known to be taking place in the future, for example, an election or a referendum (Rhydderch 2009). Therefore, a shorter time horizon of up to 5 years is most effective to capture upcoming established events. Successfully implementing this approach requires a detailed understanding of the topic area to assess the possible ripple effects. However, this assumes that those ripple effects and unintended consequences can be identified and takes a short-time horizon that limits what the futures field can truly offer.

Cone of plausibility approach seeks to identify drivers that lead to particular outcomes. It is more deterministic of the way drivers lead to outcomes, by explicitly listing assumptions and how these might change (Rhydderch 2009). Its more deterministic approach makes it better suited for short-term horizons of several months to 2–3 years. The scenarios are based on the most likely pathways as well as the more extreme or less likely future pathways (Rhydderch 2009). Users include the UK Ministry of Defence. The process first requires identifying the

[7] See www.foresight.gov.uk.

[8] See http://app.rahs.gov.sg/public/www/home.aspx.

[9] See *Future Studies workshop*, The National Security Coordination Secretariat and the S. Rajaratnam School of International Studies. p. 5 www3.ntu.edu.sg/rsis/publications/conference_reports/RSIS_Future_Studies.pdf.

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driver and trends, assessing the behavior of each driver producing a list of up to seven assumptions, developing an expectable scenario (e.g. low economic growth is expected in the Euro zone through to the mid 2020s), and then changing one of the assumptions (e.g., a deep depression in Europe from the collapse of the Euro) to then assessing their impact.

Other scenario-based approaches include Causal Layers Analysis (CLA) that builds on post-structuralism. CLA focuses on the development of alternative futures rather than attempting to predict the future. CLA contains four levels of analysis that require moving through each of them sequentially: the litany, special causes, discourse/world view, and myth/metaphor. Litany is the unquestioned view of reality and contains qualitative forecasts and extrapolation of existing problems. For example, current population demographics. The second level, social causation takes a systematic approach to question and explain the litany content through assessing social causes including cultural, political, economic, and historic factors. The third level is discourse/worldview that identifies deeper social, linguistic, and cultural structures. The final level myth/metaphor provides the gut or emotional experience to worldview under inquiry. CLA's post-structural approach is valuable for proving a cultural lens to help contextualize and understand how an issue was constructed as an event or trend in the first place, and to go beyond the conventional framing of issues. For example, what do we mean by the term regulatory? How might out preconceptions of the term regulatory influence our futures discussion in using regulatory as a key driver?

The final scenario technique incorporates an aspirational approach of asking the question what is the more visionary future that an individual or organization would like to achieve? This differs from other approaches like those discussed above where drivers and scenarios tend to center more on the expectable future or zone of desperation, rather than also considering the higher value opportunities that individuals and their organizations can identify. Ideally, scenarios should also explore paths that include visionary outcomes (Bezold 2009).

Aspirational Futures captures the higher achievable aspirational goals and aids an organization to achieve their vision. Scenarios through the aspirational approach are developed along three hypothetical yet credible views of the future designed to stimulate discussion on what organizations should do and how. Three paths of the future are: likely, challenging, and visionary. Scenarios are different stories describing how the future may unfold, and help bound uncertainty into a limited number of paths (Bezold 2009). These paths help organizations to consider creative probabilities in a larger space of possibilities, rather than developing plans based only on the past and present (Bezold 2009).

- The likely scenarios examine expectable future based on past and current trends. This is sometimes called the "official future".
- The challenging scenarios assess the zone of growing desperation to examine what could go wrong. Nestled in the zone of desperation, the challenging scenarios should not create such a dire environment that an organization cannot act, but to assess how they might prepare and respond to adverse events.
- The visionary scenarios in the zone of aspiration which develop a compelling and credible narrative on what the real opportunities and rewards may be. Visionary explores a future where a critical mass of stakeholders successfully purse visionary strategies (Bezold 2009).

All three must be credible narratives and visionary to push the boundaries. The four accompanying cyber security scenarios in "Appendix 2" at the end of this paper were developed using the aspirational approach. Seminal work on the aspirational approach includes Alvin Toffler's *Future Shock* (Toffler 1970), Jim Dator's work on his alternative futures approach (Dator and Bezold 1981), and Clem Bezold's work with Toffler, Dator, and others on Anticipatory Democracy (Bezold 1978) in communities, legislatures, and agencies (Bezold 2006). Typically, the scenario process first starts with an environmental scan to craft a series of provocative forecasts covering the Social, Technological, Environmental, Economic, Political and Values (STEEPV). STEEPV is similar to the US military's use of PMESII approach—Political, military, economic, social, infrastructure, and information system. Through STEEPV trends, emerging developments and key forces are identified through literature reviews and subject matter expert elicitation. Forecasts are typically short yet compelling narratives (a couple of paragraphs) in each of the three zones (likely, challenging, and visionary). The futures field often refers to the likely, challenging, visionary forecasts as Alpha, Beta, and Delta forecasts.

The forecasts project key forces or important elements in the environment into the future with the time frame ranging from 10 to 50 years depending on the organization and the speed of change in their environment (Bezold 2009). Provocative forecasts are, according to IAF's Wiser Futures compendium,[10] designed to elicit responses, generate important ideas, and are useful for exploring transformative change or visionary options. Forecasts are typically presented to subject matter experts (SMEs) in one-on-one interviews to elicit their thoughts for credibility, robustness, and identify potential gaps. For example, technology SME's review forecasts to assess the feasibility of the developments outlined over the next 5–10 years or more. The

[10] See altfutures.org "Wiser Futures Workshop Compendium". July 2012.

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forecasts are then condensed down into broader scenarios still covering the three zones (typically 2–3 pages in length).

With the forecasts updated incorporating the feedback from the review process, scenarios are then developed incorporating key trends and forecasts across STEEPV to assess their robustness and viability (Bezold 2009). Scenarios through the aspirational approach helps to bound and reduce uncertainty, display the range of possibilities including dangers to be avoided and managed, while also developing a preferred vision of the future.

The aspirational scenario approach is tightly linked in with the vision that creates a preferred future.

The four scenarios on cyber security in "Appendix 2" demonstrate the value of scenarios for an uncertain environment and unmet challenges. Given the urgency and uncertainty over how cyber security threats could evolve, and what actions could best manage and mitigate these, the scenarios describe the three different paths through to 2022. They are not designed to predict the future but stimulate discussion through identifying threats and opportunities that may otherwise be missed through alternative methods.

6 Conclusion

Building a decision gym requires tools for framing decisions, rehearsing decisions, identifying key questions for the future, locating the necessary resources to answer those questions, and feeding the results back into the decision-making process. It needs to be done in real-time and in the presence of competing day-to-day demands. Ideally, a small proportion of an organization's resources should be devoted to the decision gym throughout the year. A decision gym not only exercises current processes to continue replicating successful patterns, but also encourages decisions to embrace knowledge and to create new value. It encourages employees to embrace change and make decisions that leverage emerging trends. Denise Shekerjian (1990) observed that "The person who can combine frames of reference and draw connections between ostensibly unrelated points of view is likely to be the one who makes the creative breakthrough." Constant, unpredictable, and accelerating change forces organizations to deal with many new paths in the process of organizational and personal growth. Scenarios and war gaming allow for rehearsing future decisions that are aligned with aspirational and audacious goals.

Response to change can be categorized in four ways: fleeing—running from change; fighting—resisting change; reacting—"fixing" change; and pro-acting—creating, anticipating and leveraging change. A decision gym aids organizations to navigate uncertainty and accelerate the ability to anticipate and leverage change. When building a decision gym, it is important to remember the two elements that create decision context: vision (including creating a compelling narrative to communicate the vision), and its stage of organizational growth and culture. If either of these elements is not aligned with the strategic, operational, and tactical decision making, the organization's progress will be sub-optimal. A decision gym with multiple customizable tools provides a pervasive, comprehensive, real-time, enterprise decision-making capability. Building up decision-making muscles prepares organizations to make rapid, agile, and robust decisions, and achieve higher value opportunities. Achieving mastery requires practice. A decision gym is an institutional practice arena for individuals to rehearse decisions and to prepare decision muscles for an ever-changing, complex world.

7 Appendix 1: Narrative and war gaming case studies

7.1 Narrative

7.1.1 Fukushima

The handling by Japan's government and the energy firm TEPCO of the radiation release at the Fukushima nuclear power plant undermined the narrative of the benefits nuclear energy can provide. Individual and organizational narratives must be able to sustain and to evolve throughout a variety of events. Failure to do so can undermine an organization's strategic message allowing it to be undermined by competing storylines. The narrative of mismanagement and incompetence surrounding the handling of the Fukushima nuclear disaster in 2011 undermined public confidence in nuclear energy. The lack of public trust in Japan's nuclear energy sector contributed to all nuclear power stations to be taken off line by May 2012 (Associated Press 2012). Japan was the world's third largest nuclear consumer. By July 2012, reactors were slowly restarted against the backdrop of the public narrative that doubted the safety of nuclear power. This undermined the government's and TEPCO's narrative of nuclear energy offering the most effective energy route for a natural resource constrained country, and TEPCO's vision of an "affluent and comfortable future".[11]

[11] See Tepco, "2020 Vision: Medium to Long-term Growth Declaration" Press Release September 13, 2010 at http://www.tepco.co.jp/en/press/corp-com/release/10091301-e.html [accessed July 30, 2012].

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7.1.2 US State Department and counter terrorism

There are organizations that may not explicitly link their narrative with vision, but nevertheless view the narrative as essential to their operations at the tactical level. The US State Department's adoption of the narrative as a critical counter-terrorism tool illustrates how a government department has imbedded the concept in strategic planning. In September 2011, the White House signed an Executive Order for Developing an Integrated Strategic Counterterrorism Communications Initiative. The Executive Order signed by President Obama required the State Department to "reinforce, integrate, and complement public communications efforts across the executive branch that are (1) focused on countering the actions and ideology of al-Qaeda, its affiliates and adherents, and other international terrorist organizations and violent extremists overseas, and (2) directed to audiences outside the United States" (White House 2011). The objectives are "monitoring and evaluating narratives" to develop and promulgate for use throughout the executive branch there to "counter the messaging of violent extremists and terrorist organizations, especially al-Qa'ida and its affiliates and adherents" (White House 2011). The initiative has extended to then Secretary of Defense Gates encouraging Special Forces involved in counter terrorism to be equally comfortable in sitting down with local leaders as conducting kinetic operations. This shift reflects the perspective that the fight against Al-Qaeda is not confined to a kinetic operation but from the outset required a narrative where war fighting is just one instrument in the overall counter-terrorism toolbox. Terrorist groups use narratives to reinforce their views on global grievances, recruit new members, justify their actions, and develop new ideas on organization and tactics (Quiggin 2009). Terrorists are skilled at dominating the narrative and it is important for State Department and Department of Defense to consolidate and coordinate efforts to "dominate the narrative."

To increase success, the State Department could also focus on jointly developing a compelling government-wide narrative at home and abroad to be aligned with its vision, rather than focusing on repelling the terrorists' narrative that is more tactical in approach. For example, undermine the perceived narrative that the US war on terrorism is a war on Islam (Leuprecht et al. 2009). Opinion surveys of Muslims in the US, UK, Indonesia, and Egypt have found this perspective entrenched (Leuprecht et al. 2009).

7.2 War gaming

7.2.1 Pfizer

An example of an effective strategy game is a drug-diagnostic simulation conducted for Pfizer in early 2007 (Williams 2010). Pfizer possessed a number of drugs that required a diagnostic device to identify the best patients to receive drugs targeted at specific subpopulations. Pfizer at the time did not own a diagnostic company unlike many other pharmaceutical companies. The 2-day game invited representatives from four diagnostic companies to develop mock deals to explore what type of collaborations could be developed with Pfizer to make the drug-diagnostic combinations commercially successful and 'win–win' alliances. Other questions included: Would the deals be viewed as acceptable by internal management?; how might external circumstances affect the relationship between Pfizer and the diagnostic company?; and what if Pfizer brought a diagnostic company of its own? (Williams 2010). Each diagnostic company operated as a separate team, competing against each other. Each diagnostic team selected drugs from a portfolio of Pfizer products to propose what package they could offer.

The Pfizer drug portfolio was developed by the company surveying its drug teams developing new therapies to establish what they actually needed and then tweaking those requirements to retain confidentiality but not so much that they became unrealistic (Williams 2010). To facilitate the simulation process, the Pfizer "deal team" and the four diagnostic companies were taken through three sequential time frame moves covering 2007–2013 to create the external political and healthcare environment. With the 2008 US Presidential elections around the corner when the war game was held in early 2007, the invited subject matter experts were first tasked with identifying the next US President and possible healthcare reforms. In February 2007, the subject matter experts using a scenario-facilitated process identified that then Senator Obama would win the Democratic nomination and go on to become President. Following outlining the healthcare legislation, the invited experts projected that the Democrats would lose one or two Congressional chambers in the mid-term elections 2010 elections. At the end of the three sequential time periods, the Pfizer "deal team" and the diagnostic companies presented what mock deals they had developed to a hypothetical Pfizer management team to reflect the internal decision-making process.

The simulation accelerated decision making through compressing discussions that would normally take weeks or months into 2 days. The hypothetical, yet credible, environment encouraged the exploration of mock deals which following the simulation could be developed into real deals. The simulation demonstrated how strategy gaming can enable organizations to explore higher value strategic partnerships that considerably shorten the time normally required through more conventional approaches.

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8 Appendix 2: Cyber security scenarios

Below are four cyber security scenarios employing the aspirational futures approach: Expectable, desperation, and two on aspirational. The scenarios are designed to stimulate discussion through identifying threats and opportunities that may otherwise be missed through alternative methods.

Scenario 1: Expectable—the cyber rumble
Scenario 2: Desperation—failure to defend
Scenario 3: Aspirational scenario—networks and technology for a new world
Scenario 4: Aspirational scenario—values from ashes

Scenario 1: Expectable—the cyber rumble

The expectable scenario illustrates the view of the 'official future' extrapolated from current trends.

The bouts of recession in Europe and North America combined with political stagnation in the US and EU in 2013 saw the rise of online social revolutionary anti-capitalist movements frustrated with the lack of economic development and ineffective governance. Highly skilled computer programmers were among the throngs made unemployed in Europe and the US as public and private organizations downsized. Disgruntled IT professionals banded together through online forums seeking to take revenge on parts of the capitalist system they felt had let them down and cost them their livelihoods, while senior executives continued to award themselves record bonuses. By 2013, radical elements of the occupy movements of 2011–2012 established the online social revolutionary group called Xoso.

Xoso's manifesto posted online at the New York Times, BBC and Le'Monde sites called for economic equality and significant constraints on financial sectors. The ejection of Greece from the Euro in 2013 fueled a deep recession in Europe and support for Xoso in Europe. Germany and Italy's prior experience of social revolutionary groups in the 1960s made both countries ripe for their revival. Xoso tapped into the same malaise—recruiting a large cadre of followers.

The US Veterans Affairs and social security payments were frequently disrupted in 2013 as systems were attacked delaying social security checks. The rise of Xoso was accompanied by cyber criminals in 2014–2015 accelerating their attacks under the Anonymous banner to steal credit card details from major banks. Bank customers of May Finance and Avidale were worst hit with anonymous group Foreg posting credit card details on bit torent sites to freely download. $1.3 million was stolen from customer's accounts during a 3-day period. Xoso's recruiting successes included 'reformed' ex-hackers from Anonymous switching from private sector security firms back to hacking—this time in support of the online social revolutionary cause.

By 2015, the reemergence and rise of social revolutionary groups like N17 in Greece, the Red Army Faction in Germany saw virtual terrorism becoming real terrorism as groups began a limited bombing campaign against leading bankers and politicians. The great depression that hit Latin America in 2017–2018, a region with a long history of social revolutionary groups, further galvanized support for Xoso as the economic successes in Brazil and Argentina turned sour. A transnational social revolutionary movement developed, transcending borders capitalizing on the world's economic malaise.

By 2020, the 2010s were seen as the lost decade as cycles of recession and economic malaise, the underlying contribution to many of the cyber attacks, continued to plague leading economies as successive politicians failed to address their financial problems. The Cyber Robin Hood hackers positioned themselves as the champions of the people's cause to bring companies and governments to account for their actions. The lack of public and private funds curtailed the ability of institutions to successfully defend against cyber attacks. It was not until the gradual return to economic boom and sustained growth by 2021 that attacks subsided and governments were able to regain stability in the virtual world.

Scenario 2: Desperation—failure to defend

The scenario of growing desperation presents a set of plausible challenges that organizations and governments may encounter.

In April 2014, a pesticide plant in New England had its control room hacked into forcing the facility to release a plume of methyl isocyanate toxic gas over Boston killing 2,400 and injuring 9,000. Three days later, the San Onofre and Diablo Canyon nuclear power plants were attacked with reactors taken off line and overheating causing a major radiation leak. The National Security Agency (NSA) tracked down the origins of the systems and infrastructure attack to Iran in what they thought was in retaliation for an US cyber attack that Washington conducted three months earlier on Iran's nuclear power station suspected of enriching uranium. Four months after the US launched military operations against Iran, revised intelligence suggested that a new extremist religious group called the Party of Heaven based in Venezuela was behind the chemical and nuclear attacks and they had successfully masked their data trail. Party of Heaven had hacked into and stolen China's cyber warfare programs. China began limited cooperation to mitigate further attacks but it was too late: In early July 2015, the US Federal Reserve's Automated clearing house bank in New York that processes $18 trillion a year was attacked and data corrupted. Market and public confidence in the US banking system collapsed.

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On August 12, 2015, the US President in a prime time television address informed the nation that the US was fighting World War Three—but when WWIII started was unclear. China's codes were not stolen. The cyber attacks on industry and government that accelerated during the 2000s were not the work of random criminal activists but a larger coordinated effort by Iran, China and Russia to probe and test the West's defenses—to ultimately change the world order to end the West's dominance in international affairs. Iran's creation of its own internal internet in 2012 was part of a defense strategy for the coming war. The Stuxnet and Flame attacks on Iran in early 2010s were allowed to happen by Tehran to test the offensive cyber capabilities of the West. WWIII therefore began almost 10 years earlier—but the West did not realize it until 2015.

By 2016, it was clear traditional cyber approaches were failing. The West was losing WWIII. Only the mashing of neuroscience with cyber to immerse individuals into the cyber environment in 2017 provided some glimmer of hope to stem the tide. But the darkest hour came on June 13, 2018 when hacking group AQC announced it would execute 26,000 Americans and Western Europeans at noon Eastern time the following day. In the early afternoon of June 14, emergency rooms around the US and Europe reported a surge in heart attack patients. Pace makers and remote heart monitoring systems previously celebrated as providing effective cardiac care were turned into weapons. AQC remotely hacked and disrupted the monitors with fatal consequences administering mass heart attacks at a key stroke. The day would be known as "black heart".

Scenario 3: Aspirational—networks and technology for a new world

Aspirational scenarios assess how a critical mass of stakeholders can pursue visionary strategies and achieve surprising success. This is the first of two aspirational scenarios in order to offer two alternative pathways to surprisingly successful or visionary futures.

The nation-state became increasingly powerless in controlling monetary policy, organizing production, and providing social benefits. Commentators coined the rise of the powerless state. In 2014, Phoenix, a citizen online network group comprised of computer programmers and anonymous senior company information officers, took the bold decision that the internet had to be replaced for two reasons. First, nation-states could no longer be relied upon to as partners to provide the legislative environment, resources, and co-ordination to combat cyber and hardware attacks. Second, the traditional web could not be repaired.

Phoenix sought not just a new web, but a new way of running the web. Access to knowledge and collaboration with users on the new web was earned and not a given right as with the old web. To encourage the best and brightest wisdom, and deter malicious intentions, Phoenix established a "wise council" of web guardians and self-policing model to design and oversee a series of higher value concentric rings where users based on what and how they contributed, and engaged with the new web were rewarded with higher access. The top rings were wisdom.

The old wild web still existed. But unlike the old web which cannot clearly differentiate who was connecting and whether they intended to perturb the net, the automatic protocols guarded and facilitated the hierarchical system. By 2015, advances in 3D printers and development of hardware printers provided communities with the technological capabilities and knowhow to build the new web. By 2017, hardware printers provided the core ground based circuitry to develop and maintain the web. A printer that printed a hardware printer from the ground up was even invented.

The internet could be fed to ground based circuitry through electricity pylons and later new satellites launched in 2018 funded by philanthropists. Cyber criminals attempted to hack into and release viruses, but the concentric rings and coordinated architecture of the new web meant as soon as a new virus were released, automatic security algorithms contained and removed malicious programs and were often contained at the lower concentric rings. The success and robustness of the governance structures that formed the architecture of the new internet with citizen councils and regional policy development were viewed as a framework to extend into new domains. The involvement of higher levels of cooperation and governance above the state at a globalized level showed how supranational networks could overcome constraints of the nation-state system to address the legitimacy crisis of government institutions.

Scenario 4: Aspirational—values from ashes

Aspirational scenarios assess how a critical mass of stakeholders can pursue a visionary strategy and achieve surprising success. This is the second of two aspirational scenarios in order to offer two alternative pathways to surprisingly successful or visionary futures.

336 people died including 83 on the ground when a passenger jet crashed on August 13, 2014, while approaching Los Angeles airport in poor visibility at night. Four days later a second Air Zero flight approaching Chicago airport crashed under similar conditions, killing 354. Both Air Zero flights were flying on instruments due to adverse weather conditions. Al-Qaeda Arabian Peninsula (AQAP), based in Yemen, claimed responsibility for both crashes, saying they had compromised the aircrafts' systems, and announced other aircraft were 'infected'. The attacks facilitated a values shift among the public that a perceived lack of action against cyber and hardware

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hacking was now costing not just loss of data, but lives. Public revulsion at the attacks and political stalemate led to the birth of Protest Security (#ProSec) in 2015—an international online protest group with the purpose of naming and punishing companies who failed to protect their privacy and safety. Companies were being shunned and destroyed. Consumers became the collateral fall out and people laid off as companies crashed. The National Security Agency could not stop the war.

Out of the cyber chaos emerged New Cyber Values group, a business consortium established in 2016 by financial firm Capital Ex, airline Air Zero and technology firm Techzo Inc. The New Cyber Values group warned the business sector that unless they changed their approach to cyber, any business could be attacked and forced into bankruptcy in the anarchic world. Recognizing that Washington and its allies were failing to stop CybAx attacks, Secure Net opened back door discussions with CybAx via ProSec to arrange a ceasefire and created cyber safe haven. Representatives from ProSec policed the agreement with what became a conglomerate of computer specialists vetting New Cyber Values member companies. By 2018, the EU controversially incorporated parts of the CybAx peace accord into the EU's cyber legislation. Brussels gave immunity from prosecution to 3 CybAx leaders in return for "laying down their arms" to help implement and design the EU legislation. The EU recruited additional CybAx members to join the cyber fight. Poachers became game keepers. It took a cyber terrorist group to force industry into a values shift—bringing commerce back from cyber anarchy. A terrorist manifesto had formed the basis of cyber best practices.

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