ONLY HUMAN

Towards a neuroscience-based understanding of future-facing organizational culture

by

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ABSTRACT

Providing its goal is continued existence, every organization has a stake in the future. The very notion of sustainability is rooted in the desire to exist in the future, to endure shifts in values, behaviours, and needs of our society. The human brain is inherently predictive, but there are several human factors that prevent us from considering the future.

Strategic foresight is an organization's realization of their preferred future, and their capacity to imagine, invent, and align their business goals with this vision. But for many, institutional dynamics stimulate a myopia that makes imaging and realizing a preferred vision of the future a near impossible task. This work argues that the brain's temporal wayfinding networks play a significant role in strategic myopia, and that there are several neurological interventions that organizations need to consider to nurture future-facing culture. It explores the relationship between strategic foresight and organizational culture and uses neuroscience to better understand the human factors of futuring. And using foresight maturity principles developed by Terry Grim and René Rohrbeck, it will outline key areas from which organizations can learn to build culture that gazes into the future.

Key words: Organizational Culture, Neuroscience, Strategic Foresight, Leadership, NeuroLeadership, Organizational Psychology, Team-Building

ACKNOWLEDGEMENTS

DEDICATION

This work is for my parents, who left their cultures behind to afford their children our preferred futures. Their tireless and downright enabling support of education makes me feel like anything is possible.

And for my chosen family, who support me unconditionally. Thank you for being my people. You are all fierce and brilliant, and inspire me every day. You are my great loves.

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1.0   PREAMBLE

Mental time travel is one of the brain's most complex, most tacit functions. Our predictive powers allow us to project images of ourselves in the future, using those images to inform decisions we make in the present. From the day we are born, the brain is gathering a cumulative capacity for futures thinking, and reflexively draws upon this repertoire of experiences to anticipate future needs. Those experiences nurture a temporal way-finding system that responds to environmental stimulus, mediating how we navigate our relationships, our jobs, and our connections to the world.

We draw upon this way-finding system to help us navigate culture. When Darwin spoke of *survival of the fittest,* he underlined the most profound origin of the human spirit; the need to belong, to contribute value, and meaningfully *fit* into a social system. The brain's neural networks are shaped by stimulus in its environment, and *culture* represents the cadence of that environment. Culture, thus, plays a strong role in how the brain navigates the world, and by proxy, how it navigates the future.

The very notion of sustainability is rooted in the desire to *exist in the future*, to stay relevant and endure shifts in the environment. Strategic foresight provides organizations with intentional frameworks to imagine potential futures and act upon a preferred future. It empowers organizations to think about the future not

as an inevitable extrapolation of the present, but rather as a state we can carve out for ourselves. It offers organizations some agency over realizing their preferred future, offering tools to imagine, invent, and align their business goals with a vision of the world in the (not-too-distant) future. But for many, institutional dynamics stimulate a myopia that challenges its ability to imagine and realize a preferred vision of the future, suggesting a lack of cognitive resources for considering the long view.

We are occupying a moment in history categorically defined by mass disruption across every sector. With that disruption comes uncertainty, to which the human brain does not respond particularly well. The brain is designed to keep us alive, to minimize threats to our survival and maximize comfort. It prefers routine and predictability over chaos and uncertainty. Drawing upon past experiences, the brain reflexively labels stimulus as either a threat or a reward within a fifth of second, leveraging the same neural networks used to process survival needs (Rock, 2008). An organization is simply a group of people, a *gathering of brains* if you will, bound by a combination of personal and collective goals. The result is a complex cooperative system, complete with "physical, biological, personal and social components," (Barnard, 1961) defined by a series of relationships that extend beyond the organization itself. This system is more colloquially referred to as *organizational culture*, which we unconsciously navigate via our individual wayfinding systems.

Strategic foresight not only provides a competitive advantage and builds more sustainable practices, but can also help us build more sophisticated *temporal wayfinding* for the human brain. As we build a more nuanced understanding of organizational culture that takes into account neurological responses, we can gain some understanding of some of the barriers that starve the brain of critical cognitive resources and ultimately limit the capacity to consider the long view. The hope is that we can help organizations create the optimal conditions for futures thinking across all levels of the company.

This work begins with a thorough review of organizational culture literature, exploring the instruments for measuring culture put forth by the academic world with a critical eye. It observes organizational culture through the lens of neuroscience, suggesting a few cognitive factors that influence our capacity for futures thinking. Armed with those factors, we then dive into the primary research component of the project, wherein ten foresight consultants identify the foresight maturity and several cultural dimensions of one of their respective clients, and that data is considered through a social neuroscience framework. The outputs of this exercise then give rise to several first principles of a future-facing organizational culture, which can act as points of intervention for organizations trying to cultivate long-view thinking. Finally, these principles are integrated into the Foresight Maturity Model (FMM), a tool that developed by Terry Grim

(Grim, 2009) that articulates the best practices of strong strategic foresight, and supports the journey of gazing into the futures.

This work aims to challenge the ways in which we think about organizational culture, and reveal some of the human factors hindering futures thinking. It posits that to build more future-oriented strategic practices, we need to challenge the vestiges of organizational theory that remain highly mechanistic and ambiguous. And to do that, we must begin with an understanding of the human brain, drawing on evolutionary neuroscience, psychology, biology, and group dynamics. After all, organizations are *only human*.

At the intersection of organizational theory, strategic foresight, and neuroscience, this work asks the question ***how can neuroscience help us address the wickedness of organizational culture to empower future-facing decision making?***

2.0   PHILOSOPHICAL UNDERPINNINGS

The concept of time, and an enduring present, exists in every human society that we know of, whether in the form of prediction, rites of passage (a marked transition from youth to future social roles), migration, or simple calendars, "conceptions of time and future exist-and have existed- in human consciousness everywhere" (Bell, 1994). The study of futurism began with "the emergence of divination by mediums, oracles, or augurs," that were used to learn about potential future occurrences (Barrett, 1996). Astrology, used to anticipate the destinies of individuals, groups, and nations through planetary movements and the positioning of the stars, is a more recent example of futuring that dates back to 3300 BCE in Mesopotamia (ibid). Other ways of predicting the future over the course of history include "haruspication, bibliomancy, alectryomancy, cartomancy, clairvoyance, oneiromancy, ichthyomany, palmistry", and others (Milojevic, 2002).

Considerations of the future are "an integral aspect of the human condition," because "by assuming a future, man makes his present endurable and his past meaningful" (McHale, 1969). One interpretation of the future is that it simply marks every moment after right now, as described by the American Industrial Arts Association;

> The future starts now, this moment, and extends forever. The future as viewed from today, any today, is made up of a multiplicity of possible alternative futures toward which we can move, with or

without control. The further ahead we project, the more alternatives exist (1974).

Through this lens, one can argue that the future is everyone's business, and particularly compelling is the idea of a *preferred future;* that is to say, the capacity to pick a future from a range of potential futures. Using scenarios that are carved out by critical uncertainties within an organization's context, the goal is to empower organizations to work towards a future that is socially, technologically, economically, ecologically, politically, culturally, and ethically sustainable. Strategic foresight can be defined as "the ability to create and maintain a high-quality, coherent and functional forward view, and to use the insights arising in useful organizational ways. For example to detect adverse conditions, guide policy, shape strategy, and to explore new markets, products and services. It represents a fusion of futures methods with those of strategic management" (Slaughter, 1999).

Driving the desire to carve out a preferred future is an urgency provoked by an accelerating culture. "Every human has the right and even a responsibility to respond to the future by intensifying his planning and elaborating his alternatives, even at the expense of the present. To believe that time, without planned change, will take care of our societal problems, is sheer nonsense" (DeVore & Lauda, 1976). There is a profound tension from an organizational standpoint that DeVore & Lauda reveal here, and that is the following: *even at the expense of the present*. If we understand the present as being a moment catapulting us into a

future, then the present must instead be a representation of everything that happened leading up to now. Which reveals a challenge from a strategic foresight perspective - in order to prepare ourselves for a future, we must reconcile our knowledge of the past, and reason from a position of first principles.

Strategic foresight in organizations helps us to mitigate some of the uncertainty in a world facing exponential change. Using data from 77 large multinational companies, René Rohrbeck and Jan Oliver Schwarz, of Aarhus University and Germany's EBS Business School, respectively, found that formal strategic foresight efforts add value through "(1) an enhanced capacity to perceive change, (2) an enhanced capacity to interpret and respond to change, (3) influence on other actors, and (4) an enhanced capacity for organizational learning" (Rohrbeck & Schwarz, 2013). These benefits all contribute to a corporate agility to best position organizations to drive innovation.

Arguably, the single most significant barrier to considerations of the long view in organizational settings is the challenge of reconciling the present strategic goals with our preferred future. This is largely because "The pay of many C.E.O.s is tied to factors like short-term earnings, rather than to longer-term metrics, which naturally fosters myopia," incentivizing leadership to focus on quarterly reports, instead of the long-view (Surowiecki, 2015). But in more abstract terms, there are certain cognitive barriers that prevent organizations from considering the long

view. Strategic foresight is regulated by human factors that ignite biases, challenge assumptions, and potentially disrupt convention. The Maslowian perspective provides insights into some of these factors:

> It seems quite clear that the need to know, if we are to understand it well, must be integrated with the fear of knowing, with anxiety, with needs for safety and security. We wind up with a dialectical back and forth relationship which is simultaneously a struggle between fear and courage. All those psychological and social factors that increase fear will cut our impulse to know; all factors that permit courage, freedom and boldness will thereby also free our need to know. (Maslow, 2013)

This tension reflects a common barrier to innovation, described by Roger Martin in *The Opposable Mind*, "The ability to face constructively the tension of opposing ideas and, instead of choosing one at the expense of the other, generate a creative resolution of the tension in the form of a new idea that contains elements of the opposing ideas but is superior to each" (Martin, 2009). In the case of strategic foresight, past or present strategic goals are opposed to future ones, and balancing the tension of the past and the future is subject to a series of significant human factors. For business sustainability consultant Jim Collins, "Great companies foster a productive tension between continuity and change," (Collins, 2009) where *continuity* represents strategic plans *in the shorter term* and where *change* represents *working towards a preferred future.* By definition, strategy is future-oriented; it is a process of mapping the organization's future goals. But more often than not, strategy tends to be extrapolated from the past events and expectations, rather than being future-*facing*. Strategic foresight inherently deals with multiple time

horizons; the past, the near future, *and* the long view, all of which have strategic priorities, maintaining the *tension* between continuity and change. Organizations that work towards their preferred state *not* at the expense of more immediate time horizons provides a posteriori evidence of future-facing culture, and represents a crucial component of strategic foresight capacity-building.

Some organizations are incredibly adept at balancing strategic time horizons. While the drivers of that capability are not immediately obvious, organizational culture can provide profound insights into how companies prioritize, incentivize, and manifest the long view in their strategic processes. Organizational culture is quite an enigma; rarely monolithic, riddled with sub-cultures and outliers, and in a constant state of flux, it is incredibly challenging to track its successes and failures (Watkins, 2013). An organizational culture is a tango of individual human factors, legacy structures, disproportionate incentivization bias and a range of other elements that make for a complex system.

As a complex system, an organization's culture has lots of moving parts, points of intervention, and reinforcing behaviour loops that make it tricky to influence. And many organizations present with cultural barriers that incentivize poorly, encourage dogma, and ultimately generate myopic strategic goals. The rather academically agreed-upon definition of organizational culture is "a set of cognitions shared by members of a social unit" (O'Reilly, Chatman, & Caldwell,

1991), or more fully: "a system of shared values and beliefs that produces norms of behavior and establish an organizational way of life" (Koberg & Chusmir, 1987). These definitions are a bit mechanistic, and fail to capture the nuances of the complex system that is an organization's culture. That is because an organization is made up of individuals, with their own values, beliefs, and norms, who are constantly reacting to stimulus whether implicitly or explicitly. And that creates an ecosystem with a kind of *indeterminacy* that prevents any one clear way of articulating and influencing an organization's culture.

In that way, organizational culture has all the makings of a wicked problem. First coined by Horst Rittel in the early 1960s, wicked problems are a "class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing." (Churchman, 1967). The *wickedness* of organizational culture is born out not only out of its many individuals' cognitive processes that impact one another, but also its shape-shifting nature, wherein both internal and external conditions are constantly and seemingly sporadically changing over time.

As previously stated, the inquiry for this work began with the question; *how can neuroscience help us address the wickedness of organizational culture to empower future-facing decision making?*

An organization's capacity to sustain and thrive throughout massive disruption still remains unexplored. This research is concerned with the relationship between an organization's culture and the maturity of its strategic foresight. If organizations are simply a collection of people working towards a common goal, we need to better understand how the brain approaches considerations of the long view. The human brain has the capacity to shift over time, thus understanding the human factors behind culture reveals a critical intervention in stagnant, past-oriented strategic practices.

> "Our brains are vastly different, in fine detail, from the brains of our ancestors...In each stage of cultural development...the average human had to learn complex new skills and abilities that all involve massive brain change...Each one of us can actually learn an incredibly elaborate set of ancestrally developed skills and abilities in our lifetimes, in a sense generating a re-creation of this history of cultural evolution via brain plasticity. It implies two-way traffic: the brain and genetics product culture, but culture also shapes the brain." (Doidge, 2007)

In an era defined by uncertainty, understanding how to nurture the brain through change and work towards a preferred vision of the future will have an invaluable impact on our planet. If we can understand how the brain is impacted by organizational culture, especially in organizations with a particularly strong foresight practice, we can encourage these conditions in organizations who are struggling to navigate uncertainty.

3.0   ORGANIZATIONAL CULTURE PRIMER

Culture is not just produced by the brain; it is also by definition a series of activities (experiences) that shape the mind … we become "cultured" through training in activities, such as customs, arts, ways of interacting with people and the use of technologies and the learning of beliefs and shared philosophies and religion.

ROBERT DOIDGE

3.1   Etymology

Ideas of culture and belonging have appeared in literature that far predates modern social theory. Emerging from the latin root *colere* or *cultura,* early appearances of culture embodied the idea of tending or cultivating (Berger, 2000). This would later lend itself to the french verb *culturer,* or *to cultivate.* These early renditions saw the shift from culture as a verb inciting action, to a noun that implicates culture as a concept or object (ibid). The Oxford English dictionary articulates culture as "the cultivating or development... of the mind, faculties, manners, etc.... improvement or refinement by education and training... the training, development and refinement of the mind, tastes and manners" (Dictionary, 2004). This is a particularly important view of culture in the context of organizations because it implies that culture is not simply something an organization *has,* that remains fixed, but rather that culture is something that can evolve and shape-shift. Organizational culture can be crafted, and should be viewed as a process, rather than a static state.

Another important reference is the use of the word *culture* in the context of

biology, as "the cultivation of bacteria, tissue cells, etc, in an artificial medium

containing nutrients." It implies that the cells of an organism can proliferate

readily in suitable conditions, and offers a rather cute analogy in our study of

organizational culture; that when we provide people with a healthy ecosystem,

they have a natural desire to collaborate to make great things happen.

3.2   What the literature tells us

Identifying and examining organizational culture is an avidly researched area of

management theory. Some 4,600 articles on the role of culture in organizational

life are devoted to parsing a theory of organizational culture from which we can

extract meaning and impact performance (Hartnell, et al., 2011). Perhaps the

most widely cited definition of organizational culture was penned by Edgar H.

Schein as "a pattern of shared basic assumptions that was learned by a group as it

solved its problems of external adaptation and internal integration, that has

worked well enough to be considered valid and, therefore, to be taught to new

members as the correct way to perceive, think, and feel in relation to those

problems" (Schein, 2004). While this definition captures the spirit of

organizational culture, it demonstrates many opportunities for subjectivity,

misunderstanding, and misalignment. Its ambiguity reflects the challenge we have

to interpret, identify, and parse culture; both qualitative and subjectivity-ridden,

the construct of culture remains one of the most elusive - and most valuable - components of an organization's identity.

It is widely accepted that organizational culture is an important component of a healthy organization, but there is no real consensus on a finite list of dimensions that are relevant to measuring organizational culture (Gordon & Di Tomaso, 1992). Further, even if this list existed, part of the challenge in parsing organizational culture is the abstract nature of culture itself; more than just a cluster of shared values, organizational culture is complex living system with many moving parts.

Much of the research exploring the relationship between organizational culture and *performance* reveals that shared norms that are well enforced among members of an organization promotes greater strategic alignment and attainment of core goals in strong-culture firms (Bezrukova, Thatcher, Jehn, & Spell, 2012; Rousseau, 1990; Tushman & O'Reilly, 2002.). But other sources tell quite a contradictory story: in 2002, Sorensen suggested that strong shared values only went so far in times of radical change:

> [...] Strong-culture firms gain advantages in stable environments but, because of the corresponding social control that promotes conformity among members, their financial performance may be worse or less reliable in dynamic environments and during periods of external change. Since many organizations operate in dynamic environments, this view suggests that having a strong culture in

these circumstances may reduce a firm's financial performance. (Caldwell, et al, 2014)

What this overt contradiction and subsequent equivocal support tells us, is that a comprehensive and compelling theory that links organizational culture and performance is lacking (Ibid, and Hartnell, et al., 2011). Equally lacking is an exploration of the relationship between organizational culture and strategic foresight. Strategic foresight is a tool in the design thinker's toolkit that helps to organize our thinking about the future. It helps to contend with the uncertainty stimulated by dynamic conditions, consider a range of possible scenarios, and build strategy based on a preferred vision of the future. As Haridimos Tsoukas and Jill Shepherd note in *Managing the Futures: Foresight in the knowledge economy,* "The role of foresight is to provide business executives and government policy makers with ways of seeing the future with different eyes and fully understanding the possible implications of alternative technological / societal paths" (2009). Strategic foresight is not a sector, nor is it really a discipline in a traditional sense; rather it offers us *ways of thinking about the future* that best position us to act on it. Strategic foresight as a *way of thinking,* must be considered on a cultural level, rather than simply as a business activity in which an organization participates.

Hierarchical reductionism "consists not of *replacing* one field of knowledge with another but of *connecting* or *unifying* them" (Pinker, 2003). Introducing core concepts from the emerging field of neuroleadership to the conversation about

organizational culture can help us unify some of the thinking in both fields. Organizational neuroscience encourages thinking that deconstruct discrete brain processes in individuals (Ashkanasy, 2003; Barsade, Ramaraan, & Westen, 2009;), broadening our understanding of what it means to be an individual in an organization.

Much of the literature around organizational culture is based upon one of a handful of organizational cultural assessment tools. While not at all comprehensive, a review of four of these instruments provides some insight into how academia approaches the topic of organizational culture, and provide context for how social neuroscience principles can help organizations consider the future.

Edgar Schein's Model of Organizational Culture: Edgar Schein, former professor at the MIT Sloan School of Management built a theoretical framework for organizational culture that remains oft cited in the organizational development field. He identified three core layers of organizational culture: *Artifacts*, *Espoused Beliefs & Values*, and *Underlying Assumptions* (Schein, 2010)*:*
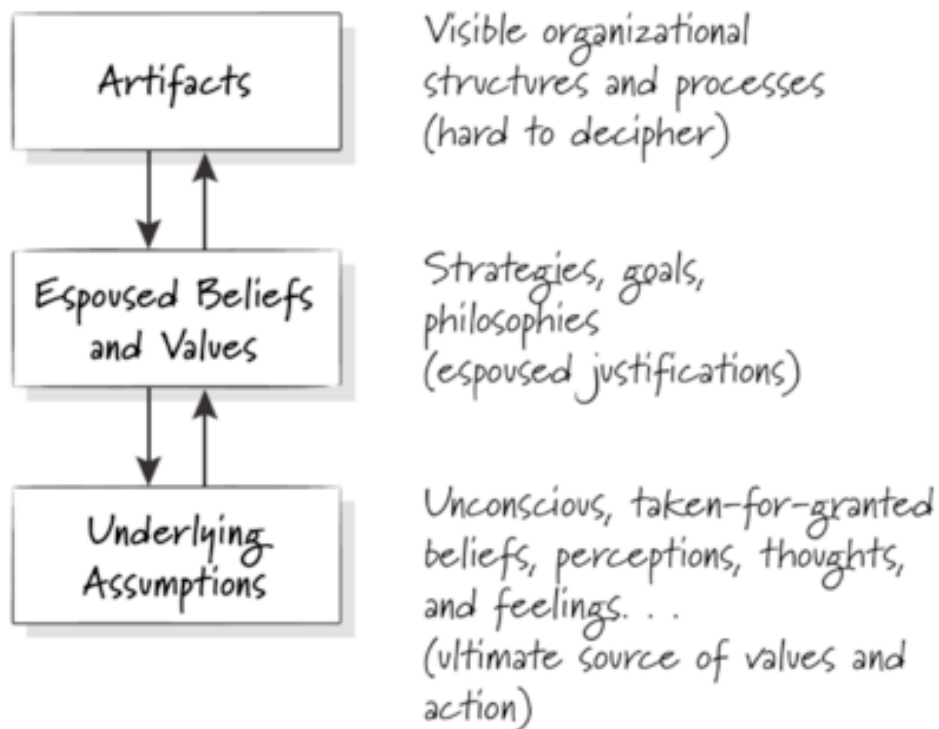
Figure 1: Edgar Schein's three layers of culture (Schein, 2010)

At the very surface, says Schein, are the artifacts of an organization, including "the visible products of a group, such as the architecture of its physical environment; its language; its technology and products; its artistic creations; its style, as embodied in clothing, manners of address, emotional displays, and myths and stories told about the organization; its published lists of values; its observable rituals and ceremonies; and so on" (2006). Artifacts are manifestations of an organization's culture, and not always immediately obvious. To infer too much about an organization's artifacts is highly dangerous, as it often demands a great deal of subjectivity (ibid).

Espoused beliefs are those core pieces of an organization's culture by which it lives. They are often clearly articulated, aspirational goals. They evoke a kind of modus operandi within an organization, setting the tone for behaviour without revealing much about the authentic nature of organizations. "Often such lists of beliefs and values are so abstract that they can be mutually contradictory, as when a company claims to be equally concerned about stockholders, employees, and customers, or when it claims both highest quality and lowest cost" (ibid).

Underlying assumptions are the intangible, often subjective philosophy underpinning the organization. This is the oft taken-for-granted layer of organizational culture, representing the very foundation of the context in which lives. "Basic assumptions, in this sense, are [...] "theories in use" -the implicit assumptions that actually guide behaviour, that tell group members how to perceive, think about and feel about things" (ibid; Argyris and Schon, 1974).

Schein's work presents a fairly unsophisticated view of culture, and does not capture the complex, systems-nature of culture that is rife with nuances and shape-shifts with market conditions and attitudes. It does, however, present a strong theoretical foundation out of which much of academic thinking was born, and developed much of the language that the academic community, making the topic more accessible to business thinkers on a significant scale.

The Organizational Culture Assessment Instrument (OCAI): This tool employs a set of scenarios to establish fundamental aspects of an organization's culture. Participants are invited to rate their organization's resemblance to the described scenarios by dividing 100 points across four scenarios as they see fit, each one reflecting a particular quadrant in the competing values framework. The OCAI considers the following dimensions: (1) the dominant characteristics of the organization; (2) the leadership style that permeates the organization; (3) the organizational glue or bonding mechanisms that hold the organization together; (4) the strategic emphases that define what areas of emphasis drive the organization's strategy; (5) the criteria of success that determine how victory is defined and what gets rewarded and celebrated; and (6) the management of employees or the style that characterizes how employees are treated and describes the working environment (Cameron, 2004). These dimensions reflect the core cultural values and assumptions that exist within the organization and represent "how things are." Though not comprehensive, these dimensions are seen by the organizational psychology community as providing "an adequate picture of the type of culture that exists in an organization" (Cameron and Quinn, 1999). "By having organization members respond to questions about these dimensions, the underlying organizational culture can be uncovered" (Cameron, 2004). The OCAI is conducted by members of the organization, who may be particular sensitive to the nuances of the organization's culture. These are participants, who

may be engaged in implementing large-scale change initiatives, and whose strategic position in the organization requires that these changes be run past them before being initiated (Cameron 2004). After participants' individual scores are calculated, a group discussion to achieve some consensus of the organizational culture is conducted, with ongoing input regarding the way in which consensus is achieved among the group.

> Considering the potentially disparate perspectives of individual raters is a rich and enlightening part of culture assessment since it uncovers multiple perspectives that may go unnoticed otherwise. This discussion builds understanding, opens lines of communication, and reveals elements of the organization's culture that a single individual or task force may miss. (Cameron, 2004)

Following this conversation, the OCAI is then conducted a second time, with the same group of participants. This time, participants are asked to consider a preferred vision of the organizational culture. Based on a time horizon of their choosing, participants uncover a preferred future culture, answering specific questions around what change they would like to see and how their preferred culture will allow them long-term success. This aspirational assessment is first established individually, and followed up with another consensus-building group discussion.

This emphasis on a preferred future could make this model a natural integration with the FMM. Because the FMM takes a snapshot of where an organization sits and then carves a potential pathway to achieving higher levels of maturity, the

OCAI could provide a useful visioning exercise for a preferred organizational culture. Having said that, the particular items used to measure culture reveal little about the state of foresight practices. Considerable changes would have to be made to the OCAI to provide data on the particular activities as they relate to ongoing horizon scanning, external climate analysis, resilience, and strategic planning.

The categorization of the OCAI outcomes is also quite polarizing. The competing values framework is mapped across a matrix whose polarities cannot each be 100 percent at the same time. As such, they are competing in nature. The polarities are Internal focus and integration or External focus and differentiation, and Stability and control or Flexibility and discretion (Bremer and Lamers, 2016).
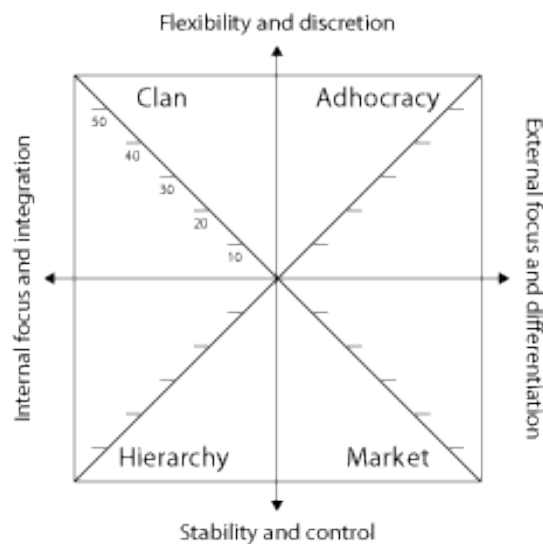
Figure 2: The Competing Values Framework, used in the OCAI (Bremer and Lamers, 2016)

The left side of the graph represents an internally-focused organization preoccupied with what is important to the members of the organization and how they want to work, whilst the right side of the graph represents an outward lens, focused on the state of the world, the market, and clients. The northern portion of the graph represents a desire for flexibility and discretion, whereas its southern counterpart values stability, order, and control.

Each cultural type represents a kind of trope that has emerged in the organizational culture space and fails to capture the nuances of the culture in which the individuals identify. Whilst the focus on a preferred vision of culture could be useful in the context of a maturity model, the OCAI and subsequently, the competing values framework, does not offer any reference of a time horizon in its valuation.

Schneider's Culture Model: Schneider's colloquial definition of organization culture is "How we do things around here to succeed," and uses two axes to plot the orientation of the organization. The x-axis, People Oriented to Company Oriented, articulates the spectrum from personal to impersonal, wherein the former is more focused on elevating the individual strengths, goals and relationships of its members and the latter is more focused on creating a well-oiled machine wherein each group member fulfills a specific purpose. The Y-axis is defined by Possibility and Reality, wherein the latter makes way for iteration,

ambiguity and exploration, whereas the former focuses on actualities and tried-and-true fact.

Schneider's model is deeply rooted in behavioral psychology, leveraging Edgar Schein's philosophy, wherein organizational goals "emerge initially from the kind of person or persons, who establish (found) the organization," (1985). Schein goes on to say:

> As an organization confronts both its larger environment and its internal environment, the processes and structures that are appropriate for survival will emerge and evolve. The processes and structures that emerge in a bank will differ from those in a YMCA - the environments they confront will be different because the people who formed them were different. (Ibid)

Schneider positions both individuals and sector as incredibly formative in an organization's culture, wherein the kind of work an organization produces is representative of the kind of culture that emerges. Arguably, the way these organizations approach risk, the length of the decision-making cycle, and the financial structure of the organization may all be factors of what Schneider describes in his culture model. Below, the Schneider culture matrix is visualized with in situ considerations throughout.

CULTURE = "How we do things around here to succeed."

[=] "The Reengineering Alternative." William Schneider

REALITY (Actuality) ORIENTED

"We succeed by working together."

Affiliation Synergy

COLLABORATION

Partnership Trust

Interaction People Diversity

Teams

Egalitarian

"We succeed by getting and keeping control."

POWER

Predictability

CONTROL

Process

SECURITY

Standardization Hierarchical

Stability Order

PEOPLE ORIENTED

(Personal)

COMPANY ORIENTED

(Impersonal)

"We succeed by growing people who fulfil our vision."

CULTIVATION

GROWTH

Purpose/Faith Dedication

Let things Evolve Subjectivity

Creativity

"We succeed by being the best."

Efficiency

Professionalism

COMPETENCE #1

Meritocracy

Achievement

Craftsmanship Expertise Be the Best

Creativity

cc Agilitrix 2011

POSSIBILITY ORIENTED

Figure 3: Schneider's culture matrix interpreted to reflect behavioural nuances (Sahota, 2011)

Where this model is most compatible with the study of foresight is in its use of Possibility – Reality orientation. Related to how those within an organization experience time, this axis has the potential to expose attitudes around future scenarios, horizon scanning, systems thinking, and sensitivity to possibilities that extend beyond traditional strategic planning cycles. Schneider's model tells us more about the people in an organization than about the specific practices and processes. It might reveal insight around questions like "What do people value in organizations who practice foresight," and "What kind of people are more likely to integrate futures thinking into their business." But it does little to investigate

the best practices of organizational culture, and is least likely to address the hypothesis in question.

Like the OCAI, Schneider's model is highly ideological, inadvertently driving bias and encouraging participants to align themselves with highly dogmatic, polarized values. It encourages an almost partisan approach, wherein most organizations would likely self-identify with the quadrant they feel emotionally committed to, yet likely embody qualities from all four quadrants.

The Organizational Culture Profile (OCP): This model is based on the Q-sort method and provides a quantitative assessment of organizational culture. Using 54 norm statements (e.g., fast-moving, being precise) emerging from academic- and practitioner-oriented writings on culture, participants are asked to sort the statements that are designed to act as wide-ranging and inclusive descriptors (Chatman, 1989; 1991) of organizational culture. The OCP has been used extensively in organizational research (Sarros, Gray, Densten, & Cooper, 2005), using consensus and intensity to measure the strength of values present within culture. The Q-sort method requires participants to limit their categorization of norms in the *Strongly Disagree* and *Strongly Agree* columns in a way that prompts them to reflect and be highly selective.

-4	-3	-2	-1	0	+4	+3	+2	+1
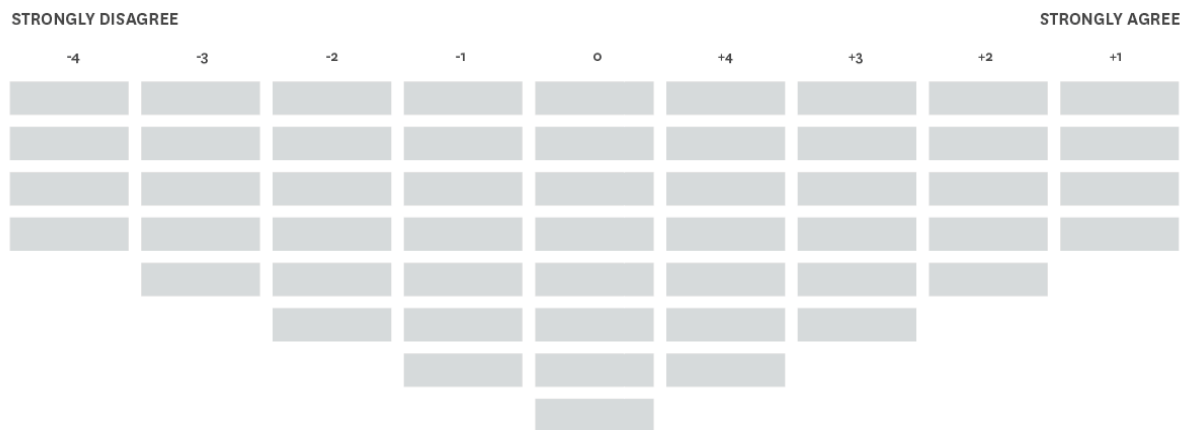
Figure 4: Example of a Q-sort framework, used by OCP participants to rank cultural dimensions.

Norms are marked expressions of a group's core values and beliefs, and positions how members interact with one another and prioritize activities and objectives (Bettenhausen & Murninghan, 1991; Feldman, 1984). Culture has been defined as a pattern of shared assumptions, beliefs, and expectations that guide members' interpretations and actions by defining appropriate behavior within an organization (Fiol, 1991; Schein, 1985). Emerging from an organization's values, norms are socially-created standards which help members interpret and evaluate events and set expectations for organizational performance and behaviours (O'Reilly & Chatman, 1996, Chatman, Caldwell, O'Reilly and Doerr, 2014). Norms can help members to solicit and appropriate the information and behaviors that are likely valued or useful within the context of their organization (Ashford & Northcraft, 1992).

In stable market conditions, shared norms throughout organizations that are strongly enforced across all levels of management encourage growth, helps organizations to attain their goals and promotes strategic alignment (Bezrukova, Thatcher, Jehn, & Spell, 2012; Rousseau, 1990; Tushman & O'Reilly, 2002). However, in more volatile, uncertain market conditions, a strong organizational culture promotes a kind of social control that enforces conformity, which may not be ideal in dynamic environments and during periods of intense external change (Sørensen, 2002). Having a strong culture, in these environments may not present any real advantage. The OCP allows researchers to avoid conformity by distinguishing "between conformity to a norm and uniform behavior emerging from such conformity," (Chatman, Caldwell, O'Reilly and Doerr, 2014) emerging with a more nuanced understanding of how members of a culture relate to norms. The OCP evaluation reveals: (1) *culture consensus*, which we define as the degree to which members agree about a broad set of cultural norms, (2) *norm intensity*, which we define as the force with which a specific norm is held, and (3) *norm content*, which we define as the actual substance of particular norms which give rise to the attitudes and behaviors defining that content (ibid).

While this instrument is the most complex and calculating of all instruments, the researchers made faced challenges that are emblematic of organizational culture assessment. It is highly mechanistic, and fails to capture the human factors at play in organizational culture.

3.3   Paradox of the Cultures

Assessing culture demands observation by the organization's insiders. Culture

requires membership. It demands to be articulated by those within, that is to say,

identification with culture validates its presence. The very nature of culture is that

it only exists if the members of that culture relate to it. Thus you must be a

member of a culture, or subject to that culture's values, to identify them.

But paradoxically, the insiders of a culture are often too close, too subjective, to

accurately identify their cultural values. And thus, they are incapable of providing

an objective assessment of an organization's culture. What emerges is a gap

between what they believe or prefer to be true about their culture, and what their

culture is really like. This gap between who an organization thinks it is, and what

it *truly* is, leaves it especially vulnerable in times of uncertainty.

What makes for a strong organizational culture? In stable conditions,

organizations with homogenous cultures may have an advantage, but that is not

enough to ensure an organization can endure in times of uncertainty. This is

"because of the corresponding social control that promotes conformity among

members," these advantages are often less reliable in "dynamic environments and

during periods of external change" (Sorensen, 2002). Thus, in times of increased

ambiguity, exponential advancements in technology, and massive changes in

human behaviour, breeding an *adaptive* culture that thrives in ambiguity is crucial.

Connections have been made in the organizational culture research around adaptability and financial performance. A recent study in the United States revealed that "Firms with higher levels of consensus across many norms, as well as an intensive emphasis on adaptability that may promote conformity without the inertial effects of uniformity, performed better financially over a volatile three-year period." (Chatman et. al, 2014) This suggests that a shared understanding of an organization's culture is important, but that organizations should not encourage *sameness.* Organizations often confuse *harmony* with *conformity;* a 2003 survey revealed "82% of people who make hiring decisions felt culture fit was important in the hiring process; 59% had rejected candidates who didn't fit in" (Aarts, 2015). For organizations who lack a nuanced understanding of organizational culture, it is tempting to hire people who superficially reflect the organization, especially in a period of growth where everything seems to be going well. But conversely, organizations struggling in the face of disruption will often hire against the grain, in the hopes that the 'fresh perspective" can turn things around. Both Sorensen and Chatman et. al suggest that conformity and uniformity work against organizations in times of great change.

By analogy, this is a common phenomenon in natural systems. Crops with low levels of biodiversity tend to be more likely to be completely wiped out when there is a change in conditions. This is because crops in a monoculture share genetic

traits, making them more susceptible to disease to which they have little to no resistance (Shiva, 1993). Conversely, biodiversity allows for more potential solutions for future scenarios, because plentiful plant DNA translates to more information about survival when environmental circumstances change. Likewise in strategic foresight, scanning the periphery and engaging a broad network are important facets of a healthy foresight culture. Diversity in futures thinking promotes the propagation of multiple views of the future, many of which are plausible, and better prepares its members for all the possibilities. A strong foresight practice is one wherein members cultivate rich future worlds, where *the future* is not simply an extrapolation of the present. Instead, foresight acts as a heuristic strategic thinking tool, offering a safe space to *test* concepts of the future, cultivating rich, sensory narratives of *what could be*. In experimenting with a diverse set of potential futures, we build new mental models that help in "reducing the likelihood and magnitude of surprise," (Hines & Bishop, 2006) and build a kind of cognitive agility that reduces the discomfort of uncertainty.

We know that some degree of heterogeneity is a crucial component of a future-facing organizational culture, and we know that organizations who identify with adaptability tend to perform better in changing conditions. What we do not yet know, is how the brain adapts to change and the neurological impact of uncertainty.

3.4   The Neuroscience of Organizational Culture

Straddling human psychology, sociology, anthropology, behavioural science, and organizational theory, the topic of organizational culture has become a topic of fascination for countless scholars for over fifty years. It has only been in the last decade or so that management scholars began to explore the relationship between human biology and workplace behaviours and attitudes. The empirical evidence is scarce, but it generally spans across three areas of study: evolutionary psychology, behavioural genetics, and physiological conditions (Becker et. al., 2011). Evolutionary theories descend from the ancestral development of Homo Sapiens. As Nicholson (2000) and Price (2006) explain, examining natural selection allows us to better understand leadership and reputation in work teams. For example, to deal with "free riders," humans evolved to develop a set of cognitive tools that help us detect cheating (Becker et. al., 2011; and Tooby, Cosmides, & Price, 2006). Scientists have also studied a series of genetic influences that impact individuals in their work environments. Some research reflects upon the relationship between genes and leadership qualities (Ilies, Gerhart & Le, 2004), while others focused on how genes relate to entrepreneurship (Shane, Nicolaou, Cherkas, & Spector, 2010). Some research found evidence that some individuals are more genetically predisposed to stable attitudes or dispositions (Arvey, Bouchard, & Ilies, 2006), and that some genetic traits impact workplace values and job satisfaction (Arvey, Bouchard, Cavanaugh, McCall, & Taubman, 1994).

Physiological responses to stress at work have also been a point of interest for

some scholars. Becker et. al. provide an excellent summary of the research

conducted in this space:

> [For example,] Wright, Cropanzano, Bonnett, and Diamond
> (2009) found that workers who had higher well-being tended to
> have lower pulse pressure than did their lower well-being
> counterparts. Perrewé and colleagues (2004) concluded that
> political skill could help workers maintain good cardiovascular
> health even when their environment was characterized by role
> conflict. Similarly, Wagner, Feldman, and Hussy (2003) found
> that employees had higher blood pressure when they worked with a
> troublesome supervisor and lower blood pressure when they
> worked with a more supportive supervisor. (2011)

These three areas of study; evolutionary psychology, behavioural genetics and

physiological responses to our environment, all reinforce one another. Darwinian

evolution shaped our behaviours (Ilies et. al., 2006), natural selection gave rise to

the human genome, and genes express themselves differently in human beings

through our individual physiology on a daily basis (Becker et. al., 2011). Social

neuroscience aims to identify how group dynamics form from individual

physiology, and identify patterns that can be used to help us understand

organizational culture. As Canadian neuroscientist Merlin Donald argued,

"culture changes our functional cognitive architecture, meaning that, as with

learning to read and write, mental functions are reorganized" (Donald, 1991).

Significant cultural change actually impacts the architecture of the brain, and we

"find familiar types of stimulation pleasurable; we seek out like-minded

individuals to associate with, and research shows we tend to ignore or forget, or attempt to discredit, information that does not match our beliefs, or perception of the world, because it is very distressing and difficult to think and perceive in unfamiliar ways" (Doidge, 2007). Exponential change in the market can be exceedingly challenging for organizations because on an individual level, the lack of familiarity with images of the future neurologically presents as a threat. It also means that understanding the neuroscience behind future-facing organizational culture has the capacity to extend far beyond the workplace. "Learned cultural beliefs and behaviours are not simply learned cognitive constructs. Rather, they are deeper changes in brain structure and neuronal interconnectedness, and therefore much more difficult to change" (Weitz, 2015). It may be more difficult to shift deep structures of the brain to consider the long view, but if successful, could stimulate societal ripples that extend far beyond the individual and their organization.

The gap between *what an organization believes its culture to be* and *its authentic culture* is an important piece of the cultural puzzle. This gap represents an organization's aspirational appraisal of itself, and how those aspirations play out across its members in reality can reveal a lot about the barriers in shifting organizational mindset. This is where neuroscience can help, by exploring how the brain responds to certain environmental stimuli. This gap is challenging to

examine, largely because it demands a focus on *implicit attitudes* within an organization, rather than simply *explicit* ones.

First coined by psychologists Thomas Suddendorf and Michael C. Corballis, *mental time travel* is the human capacity to "mentally project themselves backward in time to relive, or forward to prelive, events" (1997). We spend an overwhelming amount of our cognitive capacity considering the future, through tasks like planning and problem-solving. In fact, according to several studies, envisioning and anticipating future scenarios takes up a whopping one third of spontaneous cognition (Andrews-Hanna et.al., 2010; Atance & O'Neill, 2001; Peters & Büchel, 2010; Sheldon et. al., 2001; Suddendorf & Corballis, 2007).

The neural networks that are responsible for imagining future outcomes are the same ones activated when we recall past experiences (see *Figure 5*, on the following page). In 2007, researchers revealed that we draw on details from the past and reconfigure them "into a novel future event," yielding a vision of the future that "is plausible given one's intentions for the future" (Addis & Schacter, 2008). This tells us that we essentially *remember the future;* that imagining events in the future happens via the same neural networks as remembering the past (Addis et. al., 2007).
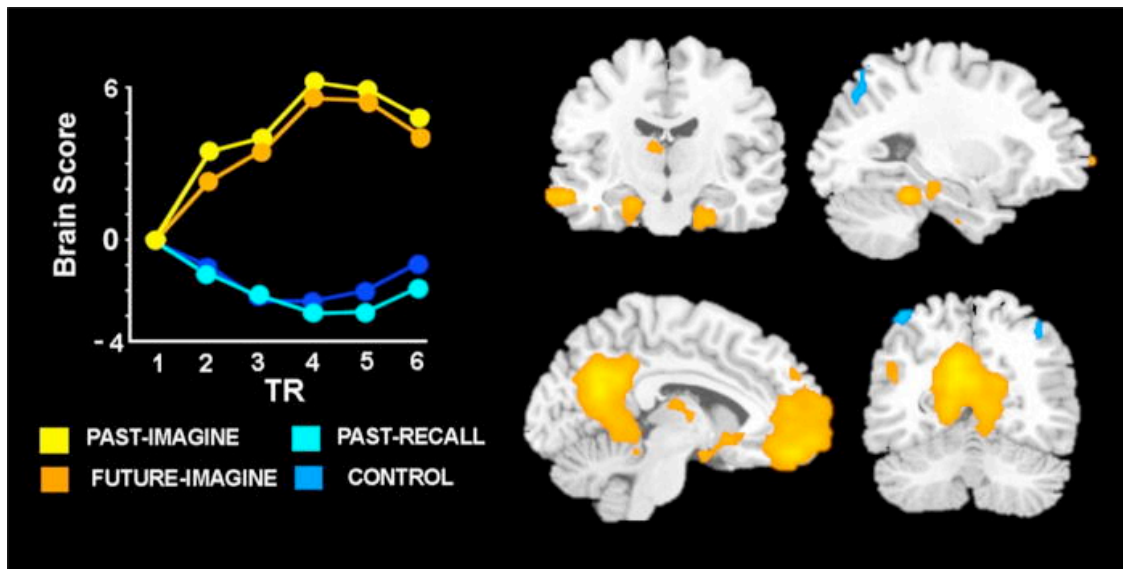
Figure 5: Brain activation, when remembering past events and imagining future events. (Addis et. al., 2009; Schacter et. al., 2012)

Psychologist Thomas Suddendorf, aptly refers to this phenomenon as the 'The

Janus Hypothesis.' Janus is a roman god with two faces on his head that gaze in

opposite directions, one of which is said to be staring into the past, and the other

into the future. "The human brain, like Janus, seems to recycle at least some

aspects of its temporal perspective on events and facts, whether what it is 'looking

at' is 'behind' it or 'ahead' of it in time" (La Fontaine, 2014), utilizing similar

networks of brain for either activity. Suddendorf and Corballis outline two types

of memory in their mental time travel paradigm; *declarative*, and *non-declarative*

(2007).

Declarative memory is that which *can be clearly identified*. Information stored in

declarative memory gives rise to *explicit attitudes,* which are manifestations that

can be voluntarily and consciously accessed and are "at least partly verbalizable

(Tulving, 2005). Declarative memory can be further broken down into two

categories; *semantic* memory, and *episodic* memory (Suddendorf & Corballis,

2007). Our *semantic memory* stores information about the world that endures,

general knowledge that can be consciously leveraged to help understand the

future, what Suddendorf & Corballis refer to as "semantic prospection" (ibid).

Information stored in our semantic memory is agnostic in that it happens

separately from the *experience* of learning it. Episodic memory, on the other hand,

is highly experiential, personal, and specific. When we recall episodic memories,

we gain "access to the personally experienced event, rather than just the

knowledge extracted from the event" (ibid). See *Figure 6* on the following page.

Past   Future

EPISODIC ◄ ─ ─ ─ ─ ─ ─ Mental Time Travel ─ ─ ─ ─ ─ ─ ► EPISODIC

DECLARATIVE
(voluntary access)

SEMANTIC   SEMANTIC

MEMORY -- PROSPECTION

PROCEDURAL   NONDECLARATIVE   PROCEDURAL
e.g.   (stimulus driven)
Priming
Conditioning
Non-associative learning

Flexibility
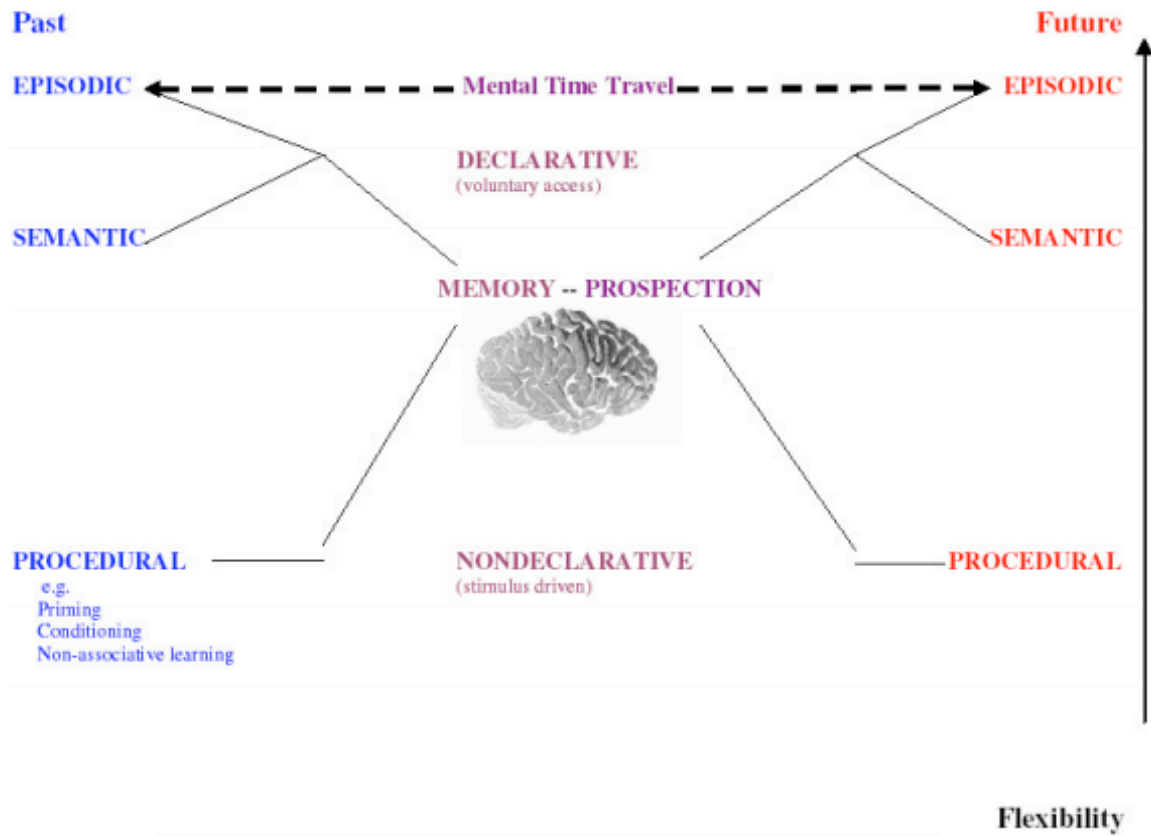
Figure 6: The past to future spectrum, informed by episodic, semantic and procedural memory (Suddendorf and Corballis, 2007).

On the flip side, *non-declarative* memory is *procedural* (ibid), forming our implicit attitudes about the world (Becker et., al., 2011). These are below the surface, instincts we have developed through ongoing conditioning from our environment. These are challenging to identify, as they cannot always be identified or articulated, but can trigger intense reactions in the brain. Implicit attitudes are highly emblematic of organizational culture. Implicit attitudes are responsible for our *gut feelings*. They draw upon experiences and past outcomes in our long-term

memory to develop *instincts* about the world. Implicit attitudes are provoked when individuals are presented with stimulus and reflexively engage with that stimulus, forming the je-ne-sais-quoi that organizations often struggle to articulate. *In aggregate*, the implicit attitudes of individuals of an organization *set the tone*, and represent the somewhat ethereal facets of an organization's culture that are tough for even insiders to identify. The implicit attitudes of an organization's members are incredibly powerful catalysts within an organization's ecosystem, and generate the coveted *dynamics* that organizational culture theorists are continuously seeking to define.

Current organizational culture assessments and approaches all share one very important thing in common; they all seem to focus largely on these *explicit* attitudes in the workplace. This is information stored in the *declarative memory* that Suddendorf and Corballis (2007) outline in their taxonomy of memory in *Figure 6 (page 37)*. Most organizational culture research measure explicit attitudes because they are more deliberate. We can form patterns and build more concrete cultural models from these features because they are identifiable and we are usually more "aware of the considerations and comparisons that went into formulating our explicit opinion." (Becker et al., 2011). Explicit attitudes are more malleable over time, and are processed in newer structures of the frontal lobe.

Implicit attitudes are considerably tougher to measure (see *Figure 7*, for *Important Differences Between Implicit and Explicit Attitudes*). These are *reflexive* attitudes (rather than *reflective*), automatic reactions that happen in the brain, that are often so subconscious we are not even aware of them. These are the non-declarative, stimulus-driven responses stored in procedural memory, identified by Suddendorf and Corballis (2007). The following chart from Becker et. al breaks down the differences in how explicit and implicit attitudes manifest:

Important Differences Between Implicit and Explicit Attitudes

Implicit Attitudes	Explicit Attitudes
Automatic	Deliberate
Limited cognitive access to processing	Extensive cognitive access to processing
Associative	Reflective
Relies primarily on past outcomes stored in long-term memory	Relies primarily on future outcome projections in working memory
More stable over time and resistant to change	More dynamic and malleable over time
Occurs primarily in older, deep brain structures of temporal lobe	Occurs primarily in newer, executive control structures of frontal lobe

Figure 7: Important Differences Between Implicit and Explicit Attitudes (Suddendorf and Corballis, 2007)

Implicit attitudes are "produced in phylogenetically older regions [of the brain]," (Becker et al., 2011) and as such, are much more resistant to change. They are very much informed by past experiences, and are "essentially primed by the current environment," without "consideration of future consequences." (ibid) Further, "Brainstem – Limbic networks process threat and reward cues within a fifth of a second, providing you with ongoing non-conscious intuition of what is

meaningful to you in every situation of your daily life," (Gordon et al., 2008),

making it tough to *identify* implicit attitudes and craft meaningful interventions.

Often our non-conscious (read: *implicit*) bias is confused with unintentional, self-

justifying rationalizations (Haidt, 2006; Westen, 2007). To make matters more

complicated, strong implicit attitudes may "impede the processing of

contradictory information," (Westen et. al., 2006; Becker et. al., 2011) which

points to the challenge of maintaining multiple time horizons when articulating

an organization's strategic goals.

Why is this important to the conversation around organizational culture and

strategic foresight? Because one of the most significant aspects of a future-facing

culture is that it can shapeshift and be amenable to change initiatives. And it has

been suggested in the organizational neuroscience field that one of the major

reasons change initiatives fail, is because management is focused on the

organization's *explicit* attitudes and neglect to target *implicit* ones. "As a result,

organizational researchers and managers who do not consider the influence of

implicit attitudes will tend to overestimate the ease with which individuals can

adapt to change" (Becker et al., 2011; T. D. Wilson, Lindsey, & Schooler, 2000).

Social neuroscience can help us build a general understanding of how the brain

responds to social stimuli, nodding to the implicit attitudes that inform explicit

attitudes, and providing important benchmarks that we can use to understand

organizational dynamics.

4.0   HOW NEUROLOGICAL CONDITIONS MANIFEST IN ORGANIZATIONS

Change almost never fails because it's too early. It almost always fails because it's too late.

SETH GODIN

4.1   The Icarus Paradox

We are in an epoch of massive, ubiquitous, exponential change. It is an incredible

moment in civilization where we are sitting at the very edge of what we know and

the opportunities for better futures are ripe for the picking. With that, comes a

great deal of uncertainty, which strategic foresight helps organizations to navigate

and make intentional efforts to work towards its preferred vision of the future. But

as we have seen in previous chapters, there are several neurological processes that

temper the way we calculate uncertainty.

One of the most significant human factors impeding considerations of the long

view is a syndrome often referred to as the Icarus Paradox.

> Icarus was a figure in Greek mythology who fashioned some wings
> out of feathers and beeswax to escape an island. So enamored of his
> newfound ability to fly, Icarus ignored warnings not to fly too close
> to the sun. Upon getting close to the sun, the beeswax melted, his
> wings fell off, and he plummeted to his death. This tale forms the
> Icarus Paradox: The same thing that had made Icarus successful is
> what led to his downfall. In his overconfidence he had become
> blind to the dangers of flying too close to the sun. (Vermeulen,
> 2009)

The tale of Icarus represents an important lesson that many organizations fail to learn; that an organization's greatest asset can become its greatest downfall if it fails to grasp the context of the bigger picture. What results is a kind of myopia, occupying what Manfred F.R. (2001) refers to as a "splendid isolation," wherein they are protected from ambiguity from the outside world (Palma, P., & da Costa, N.G., 2006). These mental barriers limit the strategic capacity of leaders to take in larger scale, 'sticky' problems and examine the long view within the context of their organization. It represents a significant barrier to considerations of the long view, wherein "managers tend to ignore or postpone problems that require reflection, systematic planning, or creative thinking, and for which there is no external pressure for immediate action." (Palma, P., & da Costa, N. G., 2006).

This challenge extends to the assessment of organizational culture itself. Members in a culture are often too close, too embedded, to give a good read on it, but one must be close in order to fully grasp the nuances of organizational culture. Membership in a culture demands identification with cultural tenants, and identifying with the culture is validating and proof that it exists. The result is the need for a kind of subjective objectivity, wherein members must be embedded enough to observe the cultural dimensions of the organization, yet remain neurologically unburdened by the dynamics.

To understand the way that the human brain processes its environment, we turn to the limbic system, specifically the amygdala. This small, almond-shape object is core "remembering whether something should be approached or avoided" (Rock, 2008). What is really interesting about the amygdala and its associated networks is that they activate proportionately to the *intensity of the emotional response*. This processing is often subconscious; one study revealed that the amygdala categorized nonsense words that merely mimicked threatening ones in *very same way* that it categorized threatening words (Naccache et al, 2005). This is often why organizations opt to bring in external consultants to deal with profound strategic questions, and why consultants were chosen to be participants in this research. In theory, a consultant is less encumbered by the hierarchical power dynamics and does not need to navigate organizational culture quite as diligently as other members of the culture. Simply stated, the stakes are lower; they are not as close to the organization, and thus, less emotionally impacted by its culture.

Systemic, future-oriented, macroscopic approaches tend to be less prioritized by managers. "Time horizons have become shorter and instead of considering long-term horizons (4-5 years), organizations try to develop a more appreciative understanding of their current environment and its likely evolution" (M.P. Cunha et al, 2006). Economic pressures to understand the perspectives currently plaguing the organization mean that managers often turn to superficial metrics (social media imprints, for example). These metrics could actually represent weak signals

in the landscape, but reactive environments demand a high level of resources.

"Because the validity of knowledge contained in plans becomes rapidly obsolete,

even before the plan is implemented, organizations may prefer to give priority to

the realities of the present rather than to the prediction of the future[s]" (M.P.

Cunha et al, 2006).

4.2   *Neuroplasticity – The brain's propensity to change (to a point)*

Evolutionary psychologists argue that human beings all share certain core

departments in the brain, and that our experiences shape these modules to

account for differences in language, perspectives, mating, etc. (Doidge, 2007).

These modules evolved from the Pleistocene age, roughly 1.8 million to ten

thousand years ago, and have remained genetically unchanged (ibid).

Neuroplasticity reveals that though these brain structures descend from the same

genes, our brains shift in changing conditions. The brain has the capacity to

change structurally and functionally, stimulated by both environment and personal

experience (Shaw & McEachern 2001). From the moment we are conceived, our

brains are undergoing a series of developmental activities with the intent on

preparing us for the future. The human brain is "constructed for change. It's all

about change. It confers on us the ability to do stuff tomorrow that we can't do

today, things today that we couldn't do yesterday" (Merzenich, 2004).

Neuroplasticity is "an intrinsic property of the human brain and represents evolution's invention to enable the nervous system to escape the restrictions of its own genome and thus adapt to environmental pressures, physiologic changes, and experiences" (Pascual-Leone, et.al, 2005). In some ways, the human brain is designed to evolve for a changing future, adapting to new circumstances and responding to experiences that we expose it to on a repetitive basis. There is evidence, for example, that meditation has the capacity to increase gray matter and improve overall cognitive function in at least eight different regions of the brain (Fox et. al, 2014). Buried in the limbic system, the hippocampus was one such area that showed an increase in gray matter in participants who participated in an eight-week mindfulness program (Congleton, Holzel, and Lazar, 2015).

However, the brain's plasticity is a double-edged sword. As much as we can positively influence our brains and even build grey matter over time, we also adapt our brains to cultural patterns that are unhealthy, and often, not future-facing. "The plastic paradox teaches that neuroplasticity can also be responsible for many rigid behaviors, and even some pathologies, along with all the potential flexibility that is within us. As the idea of plasticity becomes the focus of human attention in our time, we would be wise to remember that it is a phenomenon that produces effects we think of as both bad and good—rigidity and flexibility, vulnerability, and an unexpected resourcefulness" (Doidge, 2007). We train neural circuits to create mental maps that we use to navigate the world, and if we are stuck in overly

bureaucratic, rigid organizational structures, and reinforce those neural circuits for years, those become our primary cognitive reference points. Our plastic brains adopt the values and norms of the organization if for no other reason than to survive. That is what makes it so challenging to influence organizational culture - one must shift the culture, before it shifts *you.*

The other challenge in changing the brain is that plasticity declines as we age. "As we age and plasticity declines, it becomes increasingly difficult for us to change in response to the world, even if we want to" (Doidge, 2007). Significant cultural shifts can be more challenging as we age, which can be a challenge in traditional organizations where leadership maintains its tenure for several decades. Our brains' primary function is to keep us alive, and as such, prioritize routine and predictability. Coupled with declining plasticity, this reinforces the need for a diverse leadership.

4.3   *Uncertainty and the brain's need to know*

There is often a lot of talk about risk when scholars engage with the topic of strategic decision-making. As CEO of Toronto Financial Services Alliance and former Ontario Finance Minister Janet Ecker remarked that in a "In an increasingly risky world, a CEO needs to be increasingly flexible and adaptable. You also need to have a team and know what the latest threat might be"

(Israelson, 2016). But commentary like this points to an important distinction

that must be made when we talk about organizational decision making: there is a

significant difference between *risk*, and *uncertainty*. Speculative reasoning, an

emerging school of modern philosophy, makes a provocative point about this

misnomer:

> One can contrast philosophical speculation, which is open-ended, with financial speculation, which is always done with the aim of ultimately turning a profit. Speculation by hedge funds in today's derivative markets is conceived as a way to calculate and quantify risk. By taking account of the laws of probability, investors are able to make a profit, no matter what happens in the market. Financial speculation is thus a way to manage and control the future. It rests on the unquestioned assumption that the future will be commensurate with the present. In contrast, metaphysical speculation confronts, not risk, but irreducible uncertainty. This distinction was first made by the great economist John Maynard Keynes. *Risk is governed by statistical rules that divide the chances among a fixed number of possible outcomes: think of tossing coins or throwing dice. But uncertainty cannot be quantified in probabilistic terms. We have no way of knowing which outcomes are possible, let alone how many of them there are, and how likely any of them is.* Today, most economists and financial experts ignore Keynes's analysis, and wrongly assume that derivatives and futures markets can be understood in terms of risk rather than uncertainty. (Shaviro, 2015) (emphasis added)

Today's world is governed by laws of metaphysical speculation, wherein most

scenarios have complex critical uncertainties. Yet, our brains are wired to calculate

risk based on laws of probability. As Peggy Seriès, Senior Lecturer at the

University of Edinburgh's Computation Cognitive Neuroscience and Psychiatry

department noted: "To perform optimally, at each moment in time, our brains

need to combine the current information with prior beliefs, or past experience, so

as to form 'best guesses' about what's going on in the world or the best action. In mathematical terms, the optimal way is to use probabilities and the framework of probabilistic or 'Bayesian' inference" (The University of Edinburgh, 2013). But as new technology is formulated and complex problems emerge with which we have no past experiences to relate, our ability to form probabilistic hypotheses is compromised. We must instead confront uncertainty to make future-facing business decisions, which is processed by an entirely different part of the brain.

In the human brain, uncertainty is registered as an 'error' by the orbital frontal cortex (OFC) (Rock, 2008), which draws attention towards the error and away from one's goals (Hedden & Garbrielli, 2006). Why we resist change is not necessarily obvious, and "an individual who is overly distressed by uncertainty might legitimize his or her opposition to change by attacking specific features of a planned change effort" (2011). Uncertainty manifests implicitly and is processed by older brain structures, and "the explicit opinions serve only as creative rationalizations" (ibid). And *implicit* attitudes usually trump *explicit* ones:

> Logical discourse is unlikely to be effective since it does not address the underlying implicit attitude that is actually driving the resistance to change. In addition, implicit and explicit attitudes are fundamentally different in terms of when and how they are produced in the brain. Implicit attitudes arise first, are affectively loaded, and remain largely outside of consciousness. Because they arise first, they can short-circuit other beneficial nonconscious and conscious processing. Thus, implicit attitudes can be especially pernicious since they can distort subsequent cognitive processing and bias our decisions and behaviours in detrimental ways. (ibid)

Thus, implicit attitudes are more stubborn, underpinning attitudes that oft go unnoticed but are significant to the way that we process uncertainty. They are however, incredibly challenging to detect, articulate, and monitor, making it challenging to develop integrate into systemic organizational culture change efforts. However, the argument can be made that strategic foresight offers a way of mitigating implicit attitudes, as they have a powerful galvanizing effect. In his book *Competitive Advantage*, Michael Porter refers to strategic foresight "a powerful device for taking account of uncertainty in making strategic choices" (Porter, 1985).

But there is potentially a dark side to futures thinking as a means of mitigating uncertainty. Take scenarios, for example. Scenarios use narrative to build powerful images of the futures. Scenarios are powerful because they evoke a sense of empathy. They often use personas with whom we can relate, drawing compelling connections between characters in the future and our own lives. But scenarios can also be highly triggering and "yield mixed psychological effects, some of which might actually impair judgment and decision making" (Healy and Hodgkinson, 2007). For better or for worse, strategically speaking, scenarios have the potential of being highly persuasive. And because *implicit* attitudes play such a significant role in mediating uncertainty, the brain may reflexively reject futures thinking as an evolutionary response. Neuroscience may help us understand why many organizations seem to be held back by mental models that are biased towards the

past, and are "vague or based on faulty assumptions about the future" (Hines & Bishop, 2006); because even when confronted about evidence of impending futures, the brain has an evolutionary mandate to err on the side of caution.

A strong future-facing organizational culture must be cognizant "of the anxiety and decisional stress that can arise when users imagine and simulate future threats with scenarios," (Healey and Hodgkinson, 2007) and find ways mitigate the neurological triggers associated with uncertainty. Any theoretical consideration of organizational culture must tackle the human factors associated with decision making, and the neurological conditions that limit or expand our cognitive capacity for abstraction, innovative thinking, and long-term strategic considerations.

5.0   RESEARCH DESIGN

Without memory, there is no culture. Without memory, there would be no civilization, no society, no future.

ELIE WIESEL

5.1   *Measuring Strategic Foresight: Capability Maturity Models*

What began as a means of establishing success metrics in the software industry, maturity models help us to create a sense of measurement for qualitative aspects of an organization that are otherwise tough to measure. In 1986, a man by the name of Watts Humphrey set out to create an evaluation of software subcontractors based on specific criteria. In the past, evaluations were ad-hoc and lacked rigour and consistency. "The premise was that if developers use practices that have been determined to be 'best practices' in the field, the probability that the resulting system or product would have a chance of working would be higher and would reduce the risk of investment in the program overall" (Grim 2009). Thus, the U.S. Department of Defense collaborated with Carnegie Melon University to develop the Capability Maturity Model *Carnegie Mellon University, 1994).* Capability maturity models help to add a sense of scientific measurement to qualitative processes and create benchmarks within a sector. They help formalize practices and suggest a roadmap to optimize them. Maturity models help us to articulate

best practices and encourage organizations to continuously improve, maturing over time.

The Foresight Maturity Model (FMM) functions is a centralized reference for good futures work and unifies the language of foresight (Grim, 2009). Developed by Terry Grim, a futures student of the University of Houston, Partner at Foresight Alliance, and IBM alumni, the FMM serves to answer questions like "*What does good futures work look like? How to excel at futures work? What is the level of the current practice so that it can be compared to other enterprises, so changes can be demonstrated over time?*" (Ibid) Furthermore, it captures what informal practices look like relative to deeply embedded practices that lead the industry.

The Foresight Maturity Model engages the following six disciplines to define the best practices within the field of foresight:

> 1. Leadership: Helping organizations to translate foresight into action...on an ongoing basis. 2. Framing: Helping the organization identify and solve the right problems. 3. Scanning: Helping organizations to understand what's going on in its immediate environment and in the world at large. 4. Forecasting: Helping organizations consider a range of future possibilities. 5. Visioning: Helping organizations decide what they want in the future. 6. Planning: Helping people develop plans, people, skills, and processes that support the organization's vision. (Grim, 2009)

Where framing, scanning, forecasting, visioning, and planning are specific disciplines or phases in a typical foresight practice or project, leadership stands as more of a latent state, one that must prevail in order for all the other disciplines to exist. Grim describes Leadership as the "Clear ownership and active leadership to

implement and institutionalize foresight capability," highlighting five primary

leadership activities:

1. Engage people in conscious and thoughtful actions to proactively create the future they have chosen.
2. Create an environment that provides timely anticipation of change, embracing positive changes and responding creatively to negative changes.
3. Communicate clearly the goals, results, and implications of foresight activities.
4. Create an environment and processes that drive foresight knowledge into action.
5. Recognize the cultural artifacts and mental models operating in the organization and how they influence organizational decisions.

While leadership is not synonymous with culture per se, this discipline best

captures the relationship between people and the foresight process, the willingness

to engage in foresight activities, and the way foresight is carried out within the

organization. One concern around the Grim model is that leadership cannot exist

in a silo. Foresight stewardship must exist throughout an organization, across all

disciplines. It invokes the idea that leadership in the context of foresight exists

separately from other stages of the process, rather than be embedded in every

stage. It is this integration of leadership that helps to drive foresight processes,

and does not capture the more profound cultural context of foresight maturity.

Grim's model also offers a much more explicit, formalized approach to strategic

foresight. It can be argued that a strong, forward-facing culture implicitly drive

many of the practices articulated in the FMM, without being formalized in the

organization's executive handbook. That is to say, an organization may innately be

future-facing, but they do not necessarily employ the labels invoked by the foresight community.

Another instrument was developed by Danish scholar René Rohrbeck, whose work with Deutsche Telekom Laboratories and Volkswagen received international acclaim. Adapted from George S. Day and Paul J.H. Schoemaker's 2005 work entitled *Scanning The Periphery*, Rohrbeck's approach to culture centres around an organization's capacity and commitment to execute on foresight as a core component of strategy. In this context, Rohrbeck's model aims "to describe the extent to which the corporate culture supports or hinders the foresight effort." He calls upon four elements derived from Day and Schoemaker, namely:

1. Organization's attitude toward periphery
2. Readiness to listen to external sources
3. Willingness to share across functions
4. Willingness to challenge assumptions

A fifth element, *Informal diffusion of insights*, was observed by Rohrbeck in organizations that struggled with formal foresight processes, but still managed to maintain strong track records in "times of discontinuous change" (Rohrbeck, 2011). Focused largely on capability (I would rather say "attitude"), Rohrbeck sees culture as an enabler of corporate foresight systems, and in some cases, these cultural elements can replace formal foresight processes. On culture, Rohrbeck remarks: "it can be argued that if a company manages to encourage (through cultural means) its employees to be open to external information and to diffuse it

effectively throughout the company, then it can be expected that this will support

strongly its ability to retain a competitive advantage in times of discontinuous

change" (Rohrbeck, 2011). As such, Rohrbeck sees information diffusion of

foresight as evidence of existing foresight culture.

Both of these models tip their hats at the cultural elements of a mature foresight

practice, gently teasing at the activities most commonly associated with foresight,

but without a formal interpretation of the role that culture plays in the maturity of

foresight activities.

5.2   *Rationale & Methodology*

Several tools exist to assess strategic foresight maturity and organizational culture,

respectively. To establish whether there is a relationship between organizational

culture and strategic foresight, empirical data will be gathered around foresight

maturity and organizational values and norms.

By first assessing foresight maturity, and then cross referencing maturity with

values and norms established in the field of organizational culture research, we can

form a theoretical understanding of potential best practices for creating future-

facing culture. Both instruments will be administered in the form of an online

questionnaire, using a platform called *Typeform*. The questionnaire will consist of

83 questions, which can be completed in approximately forty-five minutes. The

first half of the assessment will ask participants to evaluate foresight maturity, and the second presents them with a list of norms and values gathered from various culture assessment instruments, and asks participants to rate them using a Likert scale.

5.2.1   Foresight Maturity

Participants were asked to assess the foresight maturity of their respective organizations using an amended version of Terry Grim's Foresight Maturity Model (FMM). Using components from René Rohrbeck's *Corporate Foresight Maturity Model*, the FMM was adapted to include a more robust assessment of human factors, specifically: internal and external networks, the development of a healthy scanning climate within the organization, and the inclusion of a range of stakeholders in the futuring process.

5.2.2   Organizational Culture

Using a Likert scale, participants were asked to rate how strongly certain values and norms reflected the organization they were assessing, on a scale of *Not at all* to *Very Much So*. These values and norms were compiled from a couple of organizational culture instruments, namely, the OCP, OCAI, as well as some norms contributed by the researcher through extensive research. These were factors that appeared to be missing from these instruments but represented strong themes in the strategic foresight literature. The goal of this structure was to

establish the relationship between the values and norms associated with organizations that practice great foresight, or conversely, those values and norms associated with a particularly weak foresight practice.

5.2.3   Participant Criteria

Criteria for selecting participants were that individuals a) needed to be trained in strategic foresight or have considerable experience using foresight methods in an organizational setting; b) have intimate knowledge of the organization and be able reflect on their culture; and c) be working or have worked in a consultative capacity in order to gather a sample of foresight consultants or futurists, who work closely with organizations for the purpose of establishing foresight as a strategic practice. The logic here was that consultants are well positioned to observe and navigate organizational culture, and thus reasonably reflect on the way the organization works, but that they were not so close that they suffered Icarus Paradox-like symptoms.

Participants were approached via the Association of Professional Futurists (APF). Founded in 2002, the APF is self-described as "…a growing community of professional futurists dedicated to promoting professional excellence and demonstrating the value of futures thinking" in "global corporations, small businesses, consultancies, education, non-profits and government" (APF, 2016).

5.2.4 Synthesis & Analysis

After assessing their foresight maturity, each organization's cultural dimensions

will be filtered through a social neuroscience model for collaboration, called

SCARF. Emerging from NeuroLeadership principles, SCARF identifies five

areas that impact collaboration in groups on a neurological level; *Status, Certainty,*

Autonomy, Relatedness, and *Fairness* (Rock, 2008). By filtering cultural dimensions

through a collaboration model built on social neuroscience principles, we can start

to understand which parts of the brain are stimulated with *threat* or *reward*

responses in relation to the organization's foresight maturity. How the brain reacts

in organizations with lower foresight maturity versus organizations with higher

foresight maturity will help us understand which triggers the brain are subject to

in these environments.

5.3   High-Level Findings: Foresight maturity and organizational culture

While observing cultural similarities and differences is valuable, the prima facie

observation of values and norms only tells part of the story. Values and norms

represent the explicit attitudes of the organization, which can then be analyzed

further to develop some understanding of the implicit ones. It tells us that

participants in the research - in this case consultants, were exposed to these values

and able to identify them. But indeed it does not imply a causal relationship, and

as discussed previously, these dimensions in and of themselves do not reveal the deeper human compulsions that have subconscious neurological implications.

While this work is not in pursuit of the *causes* of strategic myopia (as outlined in previous chapters, there are many causes woven into the complex system that is organizational culture), it is interested in alternative ways of making sense of organizational culture dimensions as they relate to our neurobiological experience of foresight.

5.3.1   *The Participants*

The sample was made up of data from ten organizations across a range of different sectors. The organization with the highest foresight maturity was from the Oil & Energy sector, whilst the lowest foresight maturity was found in a Political Organization. *Figure 8* (on the following page) breaks down the sample according to the sector in which they reside.
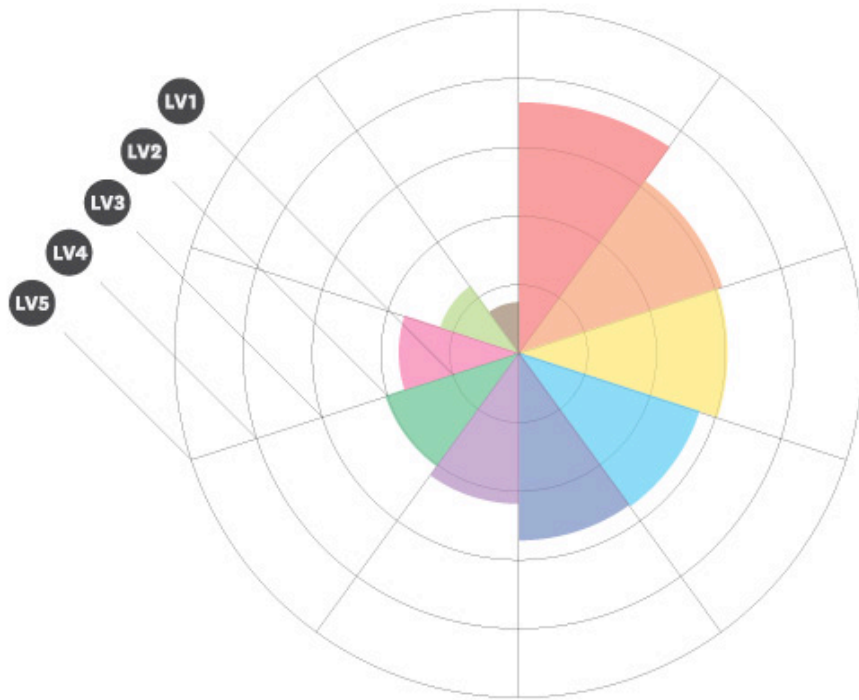
CODE	SECTOR		CODE	SECTOR
C-10	OIL & ENERGY		C-02	EDUCATION MANAGEMENT
C-01	PUBLIC SAFETY		C-15	NON-PROFIT ORGANIZATION MANAGEMENT
C-05	MANAGEMENT CONSULTING		C-08	HUMAN RESOURCES
C-13	ELECTRICAL / ELECTRONIC MANUFACTURING		C-12	MANAGEMENT & ENGINEERING SERVICES
C-07	GAMBLING / CASINOS		C-11	POLITICAL ORGANIZATION

Figure 8: Foresight maturity levels across sample

The average foresight maturity was 2.14, whilst the median was 2.77. On average, the survey took 46 minutes and 26 seconds for participants to complete online.

5.3.2   High(er) Foresight Maturity Organizations

It is important to note that across the entire sample, the highest foresight maturity

was 3.69 (out of a maximum of 5), which does not provide a fully representative

sample from which we can draw conclusive observations. The range of data

collected however, can give us a relative sense of how culture might shift as an

organization's foresight maturity increases, and potentially form some helpful

observations from which we can work. *Figure 9*, on the following page, breaks

down the foresight maturity of C-10, the organization with the highest maturity

score in the sample.

FRAMING   LEADERSHIP

CLIMATE &
COMMUNICATION   PLANNING

VISIONING   PEOPLE &
NETWORKS

FORECASTING   SCANNING

1   Overall
Rank Across
Sample

3.69   Overall
Foresight
Maturity

4.75   Highest Scoring
Discipline: *People
& Networks*

Figure 9: Foresight maturity of C-10, organization in the Oil & Energy sector

The participant assessing the highest-scoring organization (3.69 maturity), which

is a company in the oil & energy sector, identified 'bottom lines' as their

obsession; the company that scored second-highest (3.2 maturity), a public safety

organization, identified 'protecting the public in an effective and cost-efficient

way' as their core obsession; and a management consultancy came in as the third-

most mature organization (3.12 maturity), and identified 'useful substance' as their core obsession.

Culturally speaking, those organizations on the higher end of the foresight maturity spectrum seem to have very few dimensions in common. Only two dimensions were common across all three higher-ranking organizations; 'Organization presents the same externally to customers and stakeholders as it does internally to staff'; and 'Avoidance; members deflect and dodge difficult conversations' to which all organizations *did not* identify with. The spirit of these two dimensions could reflect a desire to represent authentic organizational values both throughout and outside the organization. While this is deduced rather than definitive, all three scored considerably higher on the maturity practices that relate to people & networks, and / or leadership, implying that there may play an emphasis on their networks, scanning the periphery, and ensuring communication across channels.

Interestingly, however, all three of these organizations were identified as being neutral towards the 'willingness to challenge assumptions' dimension in the foresight maturity assessment. On the likert scale used in the cultural assessment, *neutrality* towards a particular dimension is the midpoint between *strongly disagree* and *strongly agree*, and two out of three of these higher-foresight maturity

organizations were identified as *neutral*. So it is fair to say that at this stage of

maturity, organizations do not encourage their members challenge assumptions.

5.3.3   Low(er) Foresight Maturity Organizations

One broad observation was that organizations with lower foresight maturity tend

to have very mechanistic, ego-centric obsessions. For example, the lowest scoring

organization (C-11), a political group with a 0.69 maturity (out of a possible 5)

cited "Gaining advantage internally within the party" as their driving force. *Figure*

10 (on the following page), breaks down C-11 foresight maturity across all

disciplines.

Figure 10: Foresight maturity of C-11, a political organization

Likewise, the second-lowest scoring organization (coming it at 1.23 foresight maturity) cited 'legacy' as its driving force. The third lowest-scoring organization (1.72 foresight maturity) described an obsession with hierarchy and safety; Senior executives are obsessed with bonuses, mid-level staff with growing and advancing,

working level staff are obsessed with doing a good job, and support staff were obsessed with keeping the jobs they had.

Common to these low foresight-maturity organizations is a distinct lack of experimentation, playfulness, and curiosity. They are all identified as power-oriented, conventional, and oppositional (meaning, new ideas and strategy are *often* met with resistance). Participants reflected that none of their respective organizations fostered a provocative or stimulating environment, or that they made scientific decisions based on empirical or measurable evidence.

These low-foresight maturity organizations seem to all share a lack of encouragement and reward system for divergent thinking. None of these organizations were identified by participants as encouraging their people to challenge the status quo, which fits in with their more traditional, conventional approaches, and reflects the reality that these organizations are highly detached from new ideas. Core to the practice of strategic foresight is a willingness to consider alternative futures. The lack of such willingness coupled with the distinct lack of curiosity and playfulness, paints a grim picture as to whether these organizations are well-positioned to endure in times of disruption.

Further, and perhaps most discouraging, is that the low-foresight maturity organizations were also all reported to be less humanistic and not encouraging of self-actualization. Without a safe space for members of an organization to reflect

and have their skills nurtured, they are likely to encounter some significant

cultural challenges and disempower individuals from achieving personal goals. All

three of the lowest-maturity organizations scored relatively higher in the

Leadership discipline than all the other disciplines. This paper will delve into the

neurological implications of these findings in the following chapter.

5.4 *Social Neuroscience: A foundation for analysis*

The human brain is complex, a virtue that extends to the business world when you

put a bunch of people in a room together and ask them to work towards a

common goal. Thus far, we have explored how the social laws that govern

organizational culture— human factors like reactions to uncertainty, approaches

to problem-solving, and propensity to change— are all moderated by the brain's

implicit attitudes, forming organizational dynamics. The word *dynamics* here is

critical; organizational culture is constantly changing over time, but also shifts

according to whomever is in the room. These dynamics are dialectical in nature,

and both shape, and are shaped by, individual experiences. To consider foresight

an the organizational context, we need to first consider how futures thinking

impacts us on an individual level (Eriksson & Weber, 2008), and further, how

those brain insights can be applied to group theory. "The study of the brain,

particularly within the field of social, cognitive and affective neuroscience is

starting to provide some underlying brain insights that can be applied in the real

world" (Lieberman, 2007). Though challenging to identify and influence,

understanding the way the human brain reacts to stimulus in its environment can

help us reveal barriers and opportunities to thinking about the future. Indeed,

studying the brain through "...social, cognitive and affective neuroscience" (Rock,

2008) is revealing insight about the real world; the way humans relate to one

another, to themselves, and to their places of work (Lieberman, 2007).

To interpret the data collected about organizational culture through a social

neuroscience lens, I used a tool called SCARF. The following is a breakdown of

the principles;

> *Status* is about relative importance to others. *Certainty* concerns
> being able to predict the future. *Autonomy* provides a sense of
> control over events. *Relatedness* is a sense of safety with others, of
> friend rather than foe. And *fairness* is a perception of fair exchanges
> between people. These five domains activate either the 'primary
> reward' or 'primary threat' circuitry (and associated networks) of
> the brain. For example, a perceived threat to one's status activates
> similar brain networks to a threat to one's life. In the same way, a
> perceived increase in fairness activates the same reward circuitry as
> receiving a monetary reward. (Ibid)

These criteria emerged from two core premises 1) that social behaviour is largely

governed by the principles of *minimizing threat* and *maximizing reward* (Gordon,

2000), and 2) the same neural networks that govern primary survival needs (like

food and water) are the very same networks used to minimize threats and

maximize rewards (Lieberman and Eisenberger, 2008). This tells us that some of

the values and norms that make up the fibre of an organization's culture could be

activating the same neural networks that are used to process primal needs. While

that can be a positive thing (i.e. triggering the reward response), there is a dark

side; values and norms that trigger the threat response essentially "...activates

similar brain networks to a threat to one's life" (Rock, 2008). Further, values and

norms that are contradictory could create a highly exhausting, frustrating

environment for members whose brains cycle between threat and reward

responses at work.

Evaluating the values and norms associated with both low- and high-maturity

foresight practices through the SCARF framework can help us understand how

workplace dynamics impact individuals and reinforce patterns of behaviour within

an organization. The 'minimize danger and maximize reward' principle (see

Figure 11) is critical organizing principle of the brain (Gordon, 2000), which

David Rock, author of *SCARF: a brain-based model for collaborating with and*

influencing others describes as "...analogous to a concept that has appeared in the

literature for a long time: the approach-avoid response." Rock extrapolates further;

> This principle represents the likelihood that when a person
> encounters a stimulus their brain will either tag the stimulus as
> 'good' and engage in the stimulus (approach), or their brain will tag
> the stimulus as 'bad' and they will disengage from the stimulus
> (avoid). If a stimulus is associated with positive emotions or
> rewards, it will likely lead to an approach response; if it is
> associated with negative emotions or punishments, it will likely
> lead to an avoid response. (Rock, 2008)

Figure 11: Minimizing Danger, Maximizing Reward (Gordon, 2000, and Rock, 2008)

The approach-avoid principle is critical to the discourse around foresight culture for three reasons. One, is that strategic foresight triggers the fear of "engaging with the outside, and fear of the future" (Burt & Van der Heijden, 2003), which implies that foresight in an organizational setting *could be* triggering a threat response in the brain. And the second is that this work points to a definition of organizational culture that is inextricably linked to strategic foresight - culture as the *internal capacity to process external/environmental ambiguity.* And the third is that the differential between *threat* and *reward* could reveal some valuable opportunities for foresight intervention; that is to say, the need to reduce the former and increase the latter simultaneously could reveal critical opportunities to trigger shifts in organizational behaviour.

Threat- and reward-responses also trigger the release of different hormones in the brain, which impact cognitive capacity. In the avoid state, we typically see a surge in cortisol, which researchers believe can harden the neural pathways connecting the hippocampus and the amygdala such that the brain becomes 'hard-wired' to be in a constant fight-or-flight state (Chetty et. al., 2014). Leading the research was Daniela Kaufer, UC Berkeley Associate Professor of Integrative Biology, who said "You can imagine that if your amygdala and hippocampus are better connected, that could mean that your fear responses are much quicker, which is something you see in stress survivors. On the other hand, if your connections are not so good to the prefrontal cortex, your ability to shut down responses is impaired. So, when you are in a stressful situation, the inhibitory pathways from the prefrontal cortex telling you not to get stressed don't work as well as the amygdala shouting to the hippocampus, '*This is terrible!*' You have a much bigger response than you should." (Sanders, 2014). Hormones like oxytocin, serotonin, dopamine, norepinephrine are secreted in the approach state, which are known to increase trust, satisfaction, and competence (Rheeder, 2015). *Figure 12* illustrates the benefits of each of these hormones.
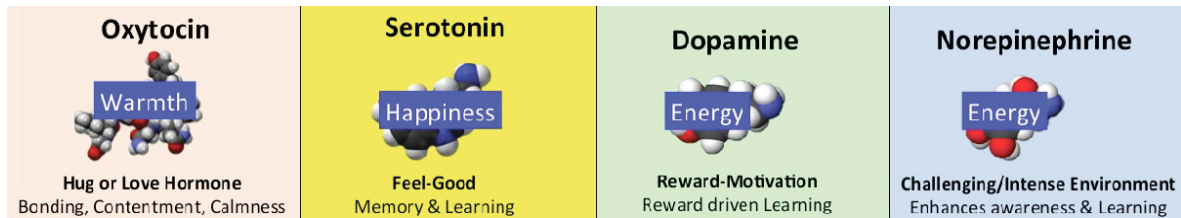
Figure 12: Hormones secreted in the approach state (Rheeder, 2015)

Changes in brain chemistry can impact the amount of resources the brain has to tackle complex, non-linear problems. Conventional cognitive thinking wisdom tells us that there is a formula to be followed when we solve problems. In the software world, we call this the 'waterfall method,' wherein one goes through a discovery period, gathering and analyzing data. One then frames the problem, establishing its boundaries and limiting its scope. And using this information, a solution is designed and implemented. *Figure 13* visualizes traditional wisdom for linear problem-solving.
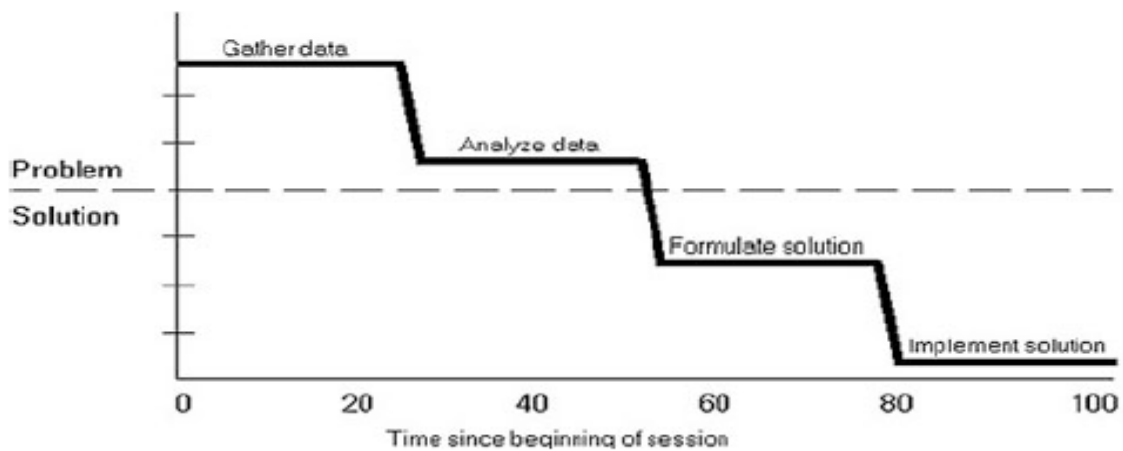
Figure 13: Traditional wisdom for solving complex problems – the 'waterfall' (Guindon, 1991)

A 1991 study conducted at the Microelectronics and Computer Technology Corporation (MCC) headquartered in Austin, Texas, examined the cognitive processes in problem solving and rather unsurprisingly revealed that the reality is not very linear at all. A team of designers was asked to design an elevator control system for an office building, all of whom were expert designers but had no specific industry knowledge. They were asked to vocalize their thoughts as they worked through the problem, and sessions were videotaped and later analyzed (Guindon, 1991). Analysis revealed that designers focused on 1) understanding the problem, and 2) formulating a solution (Conklin & Weil, 2007). The researchers then mapped their thinking processes against the waterfall method of problem solving and found patterns that were "both chaotic, for obvious reasons, and opportunity-driven, because in each moment the designers are seeking the best opportunity to progress toward a solution," (ibid) as captured in *Figure 14* below.
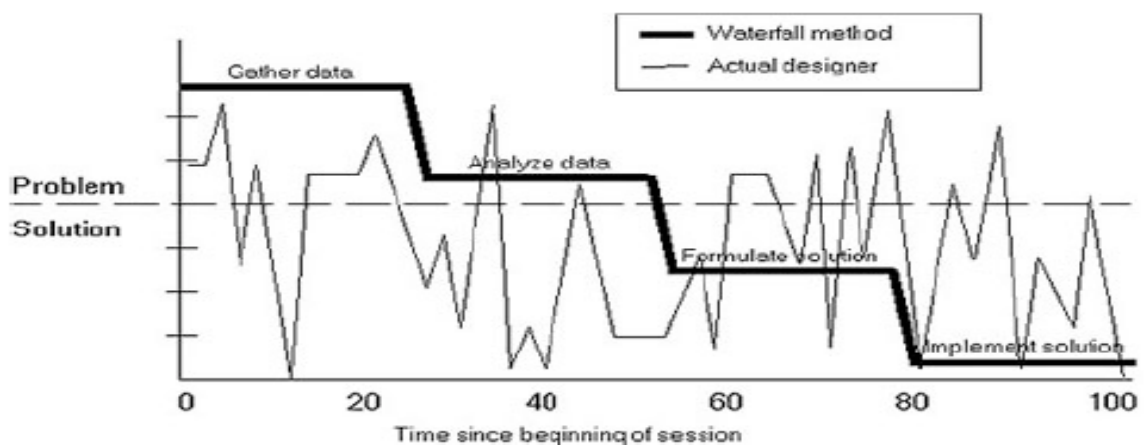
Figure 14: Seismograph; Actual pattern of problem-solving activity (Guindon, 1991)

When you add another brain into the mix, a second designer, the problem-solving

process becomes that much more convoluted. Each member generates a cognitive

map that shifts between problem finding and framing, to exploring possible

solutions. *Figure 15* demonstrates the presence of two designers and their

respective problem-solving patterns MCC study:
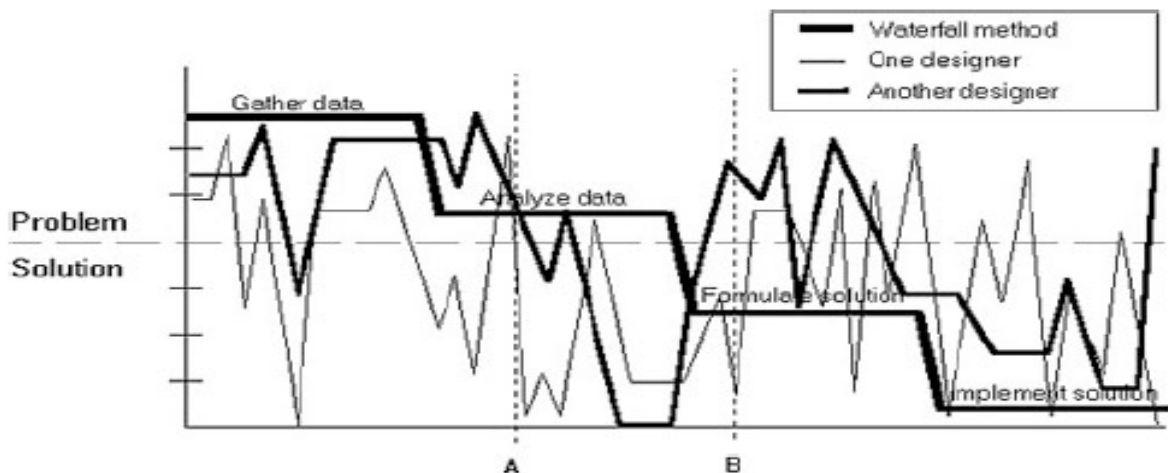
Figure 15: Seismograph; pattern of problem-solving activity when a second designers is added to a wicked-design project (Guindon, 1991)

The problem proposed in this exercise was complicated, not complex or wicked.

And still, arriving at a solution demands non-linear cognitive capacity.

Approaching problems, especially in collaborative settings with multiple human

factors in play, demands significant cognitive capacity. In a heightened threat

state, the brain is deprived of the necessary resources, decreasing the ability to

detect nuances and think creatively about problems.

Understanding the cognitive processes that take place in the face of uncertainty, and how collaboration, reasoning, and problem solving are carried out in the brain, can help us to foster the optimal neurological conditions for longer-term strategic thinking.

6.0   DATA INTERPRETATION

Optimism is a strategy for making a better future. Because unless you believe that the future can be better, you are unlikely to step up and take responsibility for making it so.

NOAM CHOMSKY

On their own, organizational culture dimensions give us insight into the *explicit* attitudes present within an organization. This is useful, but does not adequately lend itself to an understanding the implicit attitudes present in the organization. The SCARF model helps us to view organizational culture dimensions through a more social neuroscience lens. SCARF gives us the framework to build an understanding of implicit attitudes by filtering which cultural dimensions trigger a threat response in the brain, and which trigger a reward response.

6.1   Reducing Neurological Barriers

Part of the challenge in identifying implicit attitudes is that they are governed by subjectivity. Informed by experiences, implicit attitudes are formed in the limbic system and do not reflect future considerations. As they are reflexive and unconscious, it may not always be clear how implicit attitudes are triggered by environmental stimulus. One of the few ways to conclusively measure implicit attitudes is to measure brain activity in the brain in response to various stimuli using an fMRI machine.

We can, however, reasonably associate some cultural dimensions with threat- and reward-responses triggered in the brain, as articulated through the SCARF model. The brainstem-limbic system is designed to reflexively, unconsciously, and continuously minimize danger and maximize reward as we move through the world. The brain uses the same circuitry for social interactions as we do for physical danger and rewards, and as such, "someone feeling threatened by a boss, who is undermining their credibility, is less likely to be able to solve complex problems and more likely to make mistakes" (Rock, 2008). Strategic foresight initiatives are inherently complex, demanding the neurological dexterity to consider multiple human systems concurrently.

The SCARF model provides us with a framework that helps us to better understand the implicit attitudes emerging from the limbic system, and provide some cues as to how to build more rewarding leadership practices. When we look at organizational culture dimensions in high (and low) foresight maturity organizations through the SCARF lens, we can start to understand the conditions associated for both weak and strong foresight practices. The cultural dimensions have been organized to reflect the kind of neurological response we might expect when exposed to that dimension in the workplace. What emerged is a kind of scoresheet for the social neuroscience of organizational culture, allowing us to get a sense of the kind of neurological environment that is best suited for futures

thinking. For a complete breakdown of how all the cultural dimensions were categorized according to SCARF principles, see **Appendix C.**

Each set of data was filtered according to whether the dimension triggers a *reward response* or a *threat response*. For example, *aggression* emerges from a desire to impose social dominance over others and enforce hierarchy, thus, a workplace that is defined by aggression subconsciously threatens the status of its members. On the other hand, a participatory environment, where members are actively included in conversations, bolsters one's status and ignites a reward response in the brain.

In cases where *participatory* strongly *failed* to represent the organization's core values, members of the organization face "a reduction in status resulting from being left out of an activity lit up the same regions of the brain as physical pain (Eisenberger et al., 2003). Likewise, when an organization holds management to the same rigorous standards as other members of the organization, it triggers a reward response, satisfying our desire for fairness. Unfair exchanges, on the other hand, stimulate a significant threat response (Tabibnia & Lieberman, 2007), so participants who **strongly did not** identify this quality with their respective organization would have this dimension filed as a *reward* in the scoring process. When someone is perceived as unfair, it breaks down one's ability to empathize, further triggering threat responses in the brain (Singer et. al., 2006).

6.2   SCARF Results
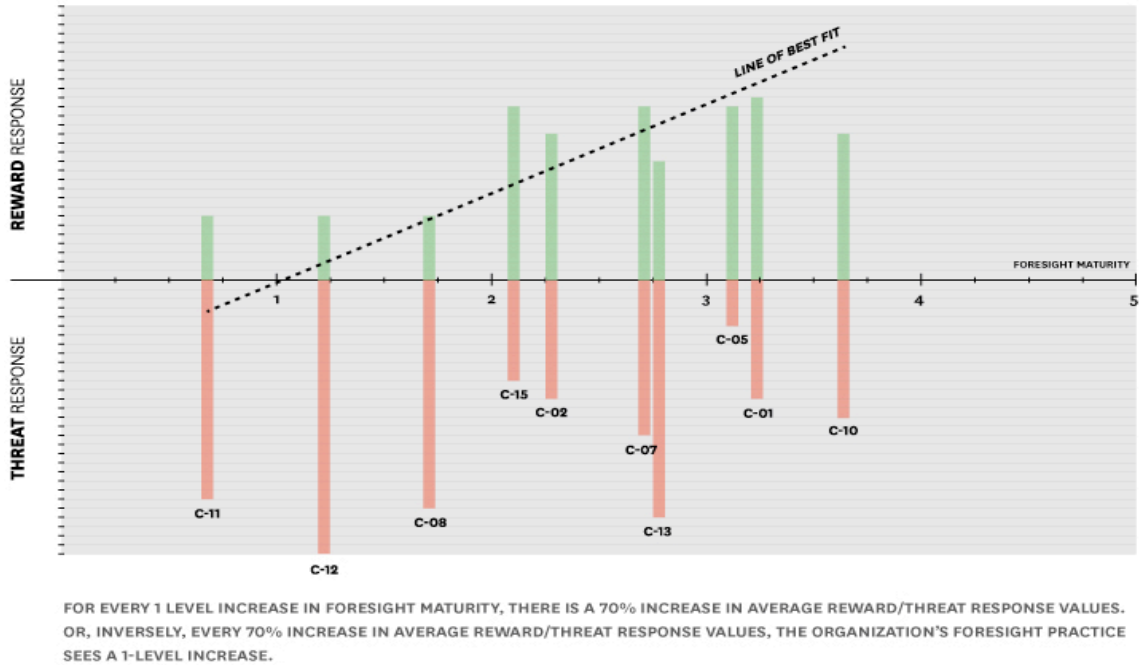
FOR EVERY 1 LEVEL INCREASE IN FORESIGHT MATURITY, THERE IS A 70% INCREASE IN AVERAGE REWARD/THREAT RESPONSE VALUES. OR, INVERSELY, EVERY 70% INCREASE IN AVERAGE REWARD/THREAT RESPONSE VALUES, THE ORGANIZATION'S FORESIGHT PRACTICE SEES A 1-LEVEL INCREASE.

Figure 16: Mapping Threat– and Reward Response–Triggering Cultural Dimensions Against Foresight Maturity

The sample ranged from a foresight maturity level of 0.69 to the highest score of 3.69, yielding an average foresight maturity of 2.14. The median maturity was 2.77. *Figure 16*, *Mapping Threat– and Reward Response–Triggering Cultural Dimensions Against Foresight Maturity* captures all of the organizations in the sample, with their respective levels of threat-triggering dimensions marked in red, and reward-triggering dimensions marked in green. Generally speaking, there is a positive correlation between organizations that stimulate more reward-responses in their members, and the maturity of the organization's foresight practice.

6.2.1   High(er) Foresight Maturity Organizations

Across the three organizations with highest foresight maturity (*C-10*; 3.69, *C-01;*

3.2, and C-05; 3.12, respectively), *all* of them reflected *more reward response-*

triggering values and norms. For comparison's sake, *Figure 17* (on the following

page) captures the threat- and reward-response levels across the three

organizations with the highest foresight maturity; C-10, C-01, C-05, respectively.
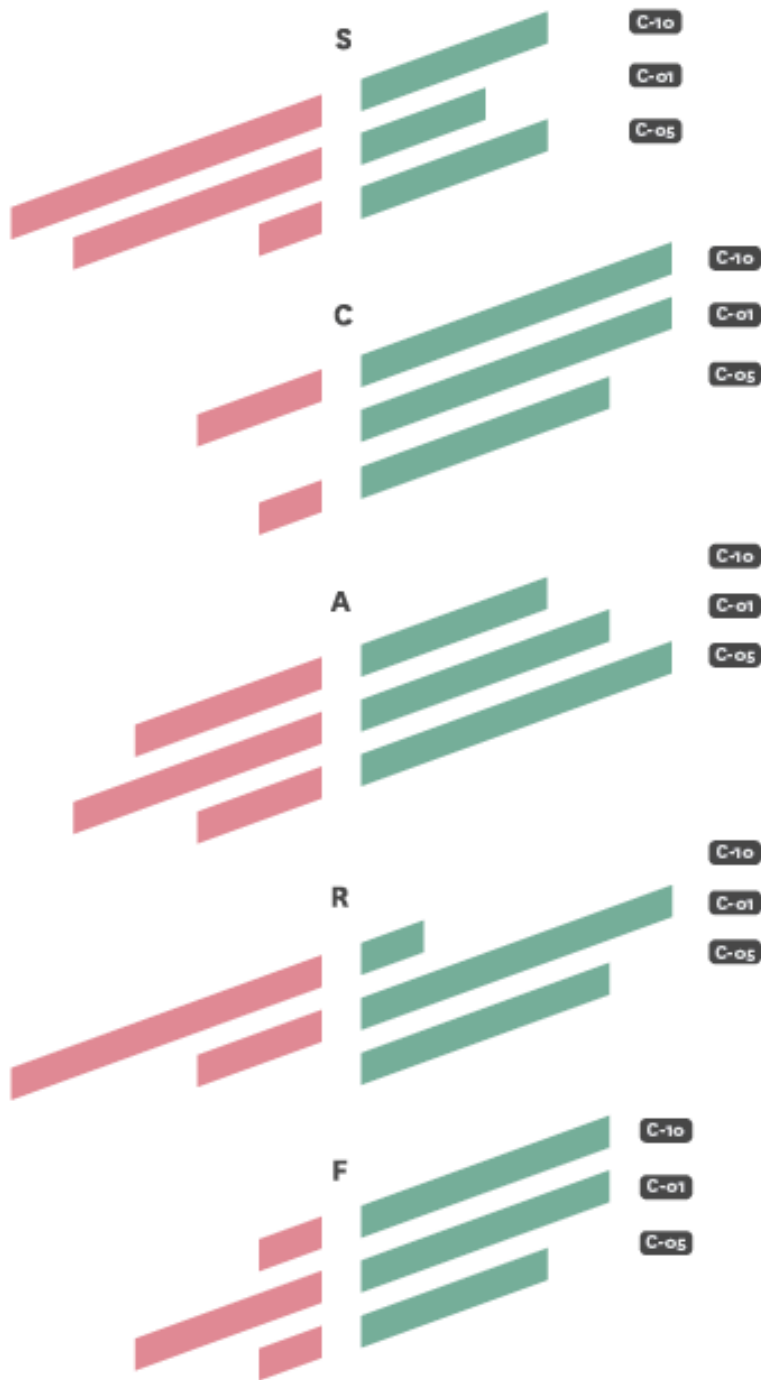
Figure 17: Comparing SCARF results across the three organizations with the highest foresight maturity

The top foresight maturity organization, C-10 from the Oil & Energy sector, did have a very close margin however, with 15 threat response triggering dimensions and 16 reward response triggering dimensions, which could suggest that some balance of threat and reward responses is helpful in future-facing organizational culture (see *Figure 18* below). Without more context however, it is tricky to understand the nuances of such a balance in threat and reward triggers.

C-10

S
C
A
R
F

SECTOR:
OIL & ENERGY

NUMBER OF EMPLOYEES:
500+

THREAT TO REWARD RATIO
15 : 16

Figure 18: Threat- and Reward-Responses in C-10

Generally, this organization's cultural dimensions were quite evenly distributed across all five SCARF principles, with slightly more emphasis on *Certainty,* which featured five reward-inducing dimensions (values; *communicative*; *disciplined*; not *perfectionistic*, and norms; *scientific*; and *fast-moving and responsive.*) and *Relatedness*, which featured five *threat*-inducing dimensions (values; *not participatory*, and norms; *siloed*; *not playful*; *not self-actualizing*; and *not humanistic*. *Figure 19* shows a complete breakdown of the cultural dimensions and their

respective neurological responses for C-10, to serve as an example of how the analysis of cultural dimensions was carried out.

	STATUS	CERTAINTY	AUTONOMY	RELATEDNESS	FAIRNESS
REWARD RESPONSE		Communicative			
		Scientific; decisions are analytical, use empirical/measurable evidence.			Org resents the same to external stakeholders as it does internally.
	Achievement-driven	Disciplined; ritualistic about certain key roles, tasks, and functions.	Trusting; org trusts its people to do great work.		Highly Moral
	Aggressive	Members must be fast-moving and responsive	Optimized for Productivity		Organization is culturally and socially diverse
	Incentivizes Winning	Perfectionistic	Controlled	Avoidant; members deflect and dodge difficult conversations.	Oppositional; new ideas and strategy are met with resistance.
THREAT RESPONSE	Individualistic	Members are encouraged to be competitive with one another	Procedural	Siloed; lack of communication across departments.	Consensus-Driven
	Humility-inducing activities; organization breeds humbleness.	Consistent	Curiosity is at the heart of the org; an almost child-like desire to learn	Participatory; activities for members that encourage bonding	
	Democratic; feels like everyone has a say, and all opinions are considered.		Experimental and encourages members to get their hands dirty.	Playful; the org has worked play into daily operations in different forms.	
	Uniform			Self-actualizing; members are afforded space to reflect and grow	
				Humanistic and places high value on the people working for the org.	

STATUS	CERTAINTY	AUTONOMY	RELATEDNESS	FAIRNESS
Relative importance, pecking order, and seniority.	Sense of job security, value to the organization, and a sense of place.	Perception of exerting control over one's environment, the sensation of having choice	Whether one is 'in' or 'out,' and a deep sense of belonging to one's tribe.	Sense of democracy, and that there are no double-standards for management.

Figure 19: Distribution cultural dimensions across SCARF principles, for C-10

From the Public Safety sector, C-01 was the second highest foresight maturity organization, which came in at 3.2 (out of a maximum of 5) and had a much more significant discrepancy between threat- and reward-triggering values and norms, with 13 threat-response dimensions and 20 reward-response dimensions (see *Figure 20*, on the following page).

C-01

SECTOR:
PUBLIC SAFETY

NUMBER OF EMPLOYEES:
100 - 500

THREAT TO REWARD RATIO
13 : 20

Figure 20: Threat- and Reward-Responses in C-01

This indicates that overall, the organization's culture likely tends to trigger more reward responses in its members, and fosters an environment that triggers fewer threat responses. It too was fairly balanced across all five SCARF principles, though the participant identified five reward-response dimensions in the ***Certainty*** *category (values; consistent; disciplined;* and *risky;* and norms: *fast–moving; not risky*; and *not competitive),* and did not identify any threat-response dimensions. This indicates a strong sense of "being able to control the future" (Rock 2008), job security, and members' sense of value to the organization. The other strong category for C-01 was also ***Relatedness,*** whereby five reward-response dimensions were recorded (values; *participatory*; *highly loyal, committed;* and *empathetic;* and norms; *humanistic;* and *not avoidant*) and only two thread-response dimensions (both norms; *siloed;* and *not playful*).

C-05, The organization with the third-highest foresight maturity is a Management Consultancy with a score of 3.12. It too had a significantly high ratio of reward-triggering cultural dimensions to threat-triggering cultural dimensions (see *Figure 21,* below).

Figure 21: Threat- and Reward-Responses in C-05

A total of 19 reward-response dimensions were recorded, and 5 threat response dimensions. The strongest category was ***Autonomy,*** with five reward-response dimensions (values; *not controlled; not traditional;* and norms; *curious; rewards divergent thinking;* and *not dependent on management.)* and only two threat-response dimensions (both values; *conventional;* and *not trusting).* This was closely followed by ***Relatedness,*** with four reward-response dimensions recorded (values; *empathetic;* and norms; *self-actualizing, not siloed;* and *not avoidant.*) It is worth noting that ***Certainty*** nearly tied with ***Relatedness,*** reflecting four reward-response

dimensions (values; *communicative; risky;* and *perfectionistic;* and norms; *not disciplined;* and *scientific)* and only one threat-response norm (*not disciplined).* All three highest foresight maturity organizations had a few reward-response dimensions in common that are worth reflecting upon. Three of these commonalities were in the *Fairness* category of SCARF. All three shared a common commitment *representing the organization the same way both externally and internally to its members.* This would seem to demonstrate a desire to appear transparent, even authentic, to all those who engage with the organization. All three organizations also *do not present with an oppositional culture,* where new ideas and strategic directions are shot down. This would imply that the organization is open to exploring alternative strategies, which is a crucial component of a future-facing organizational culture. The other dimension common to all three of the highest foresight maturity organization was a lack of consensus-seeking. Categorically, this triggers a threat response in members that concede this to be unjust. But in combination with not being oppositional, this reflects the organizations' ability to hear multiple ideas and strategies, but not require all the members to agree on a strategic direction. Not only does that represent an important strategic imperative in the business world, it is also provides the right conditions for strong scenario planning.

All three were also identified as not being avoidant, that is to say, members of the organization do not deflect and dodge difficult conversations. An organizational

culture is willing to tackle challenging, complex realities is critical for conversations around alternative futures, and represents the kind of agility that is highly characteristic of future-facing culture. Not being avoidant is also a crucial step towards confronting the fear of uncertainty that organizations face in times of exponential change.

6.2.2   Low(er) Foresight Maturity Organizations

The three organizations with the lowest foresight maturity (*C-11;* 0.69, *C-12;* 1.23, and *C-08;* 1.72, respectively) had the inverse relationship of the highest foresight maturity organizations. All of these organizations triggered far more threat-responses in the brain, and unlike their higher foresight maturity counterparts, this was very consistent across all three. *Figure 22*, on the following page, compares the threat- and reward-responses across the three lowest foresight maturity-ranking organizations in the sample.
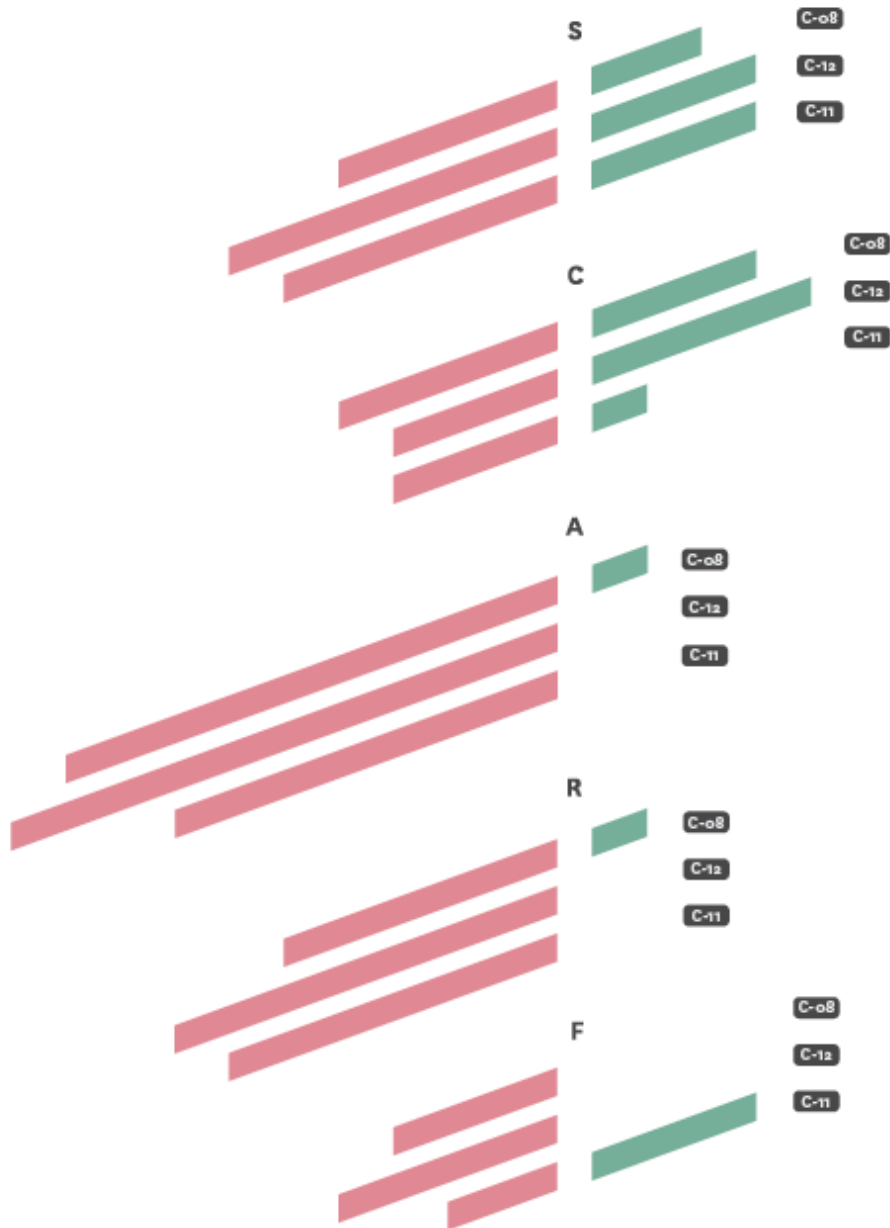
Figure 22: Comparing SCARF results across the three organizations with the lowest foresight maturity

C-11, a Political Organization that scored the lowest foresight maturity with just 0.69. It was recorded as having 24 threat-response cultural dimensions and 7 reward-response triggering dimensions (see *Figure 23*, on the following page).

C-11

SECTOR:
POLITICAL ORGANIZATION

NUMBER OF EMPLOYEES:
100 - 500

THREAT TO REWARD RATIO
24 : 7

S
C
A
R
F
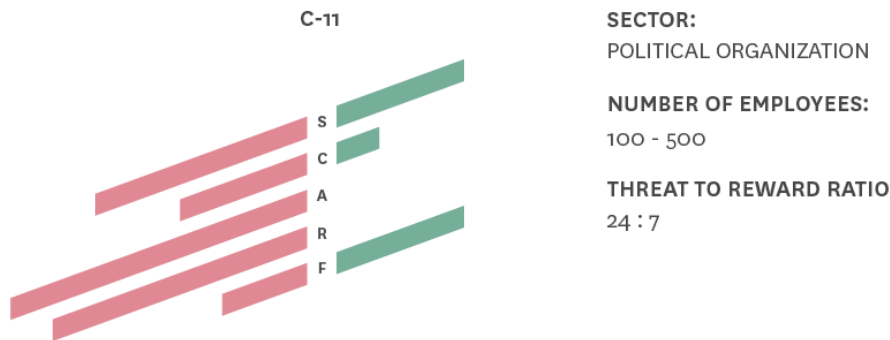
Figure 23: Threat- and Reward-Responses in C-11

The reward responses were fairly negligible, with three dimensions in both the *Status* and *Fairness* SCARF categories, and absolutely no reward-responses in the *Autonomy and Relatedness* categories. Particularly notable was the high concentration of threat-response dimensions that were recorded in the *Autonomy* category (values; *traditional; conventional; procedural; not trusting;* and norms; *not rewarding of divergent thinking; not curious; not experimental*). Likewise in the *Relatedness* category, another 6 threat-response dimensions were identified (all norms; *siloed; avoidant; not playful; not self–actualizing; not humanistics;* and *not empathetic.*)

The second-lowest foresight maturity organization was C-12, with score of 1.23. The organization was recorded as having a whopping 30 threat-response dimensions, and 7 reward-response triggering dimensions (see *Figure 24*).
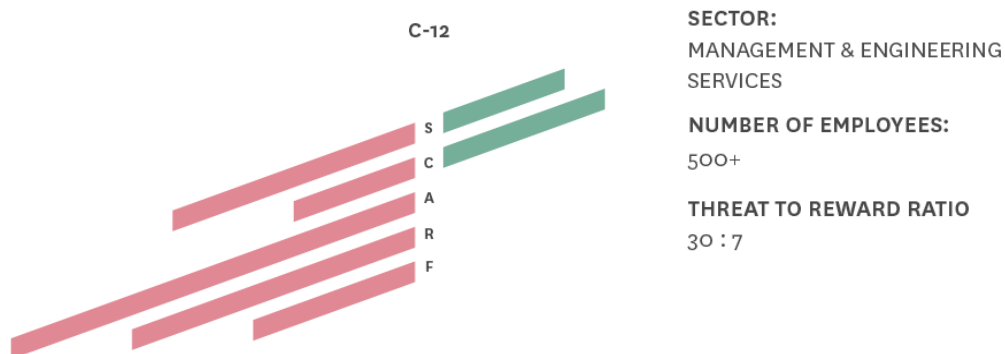
Figure 24: Threat- and Reward-Responses in C-12

Similarly to C-11, this organization lacked reward-response triggering dimensions in some categories, namely *Autonomy, Relatedness, and Fairness*. Thus, all 7 reward-response triggering dimensions were divided between *Status* and *Certainty*. The most threat-response laden SCARF category was *Autonomy*, with 10 dimensions (values; *traditional; conventional; controlled; procedural; not trusting;* and norms; *dependent on management; not experimental; not rewarding of divergent thinking; not curious;* and *not provocative or stimulating.*) The *Relatedness* category was identified as having 7 threat-response cultural dimensions (values; *not loyal / committed; not empathetic;* and norms; *siloed; avoidant; not playful; not self-actualizing;* and *not humanistic*)

C-08 scored 1.72, the third-lowest foresight maturity recorded in the sample. This organization had 25 threat-response dimensions and also had just 7 reward-response triggering dimensions (see *Figure 25*).

C-08

SECTOR:
HUMAN RESOURCES

NUMBER OF EMPLOYEES:
500+

THREAT TO REWARD RATIO
25 : 7
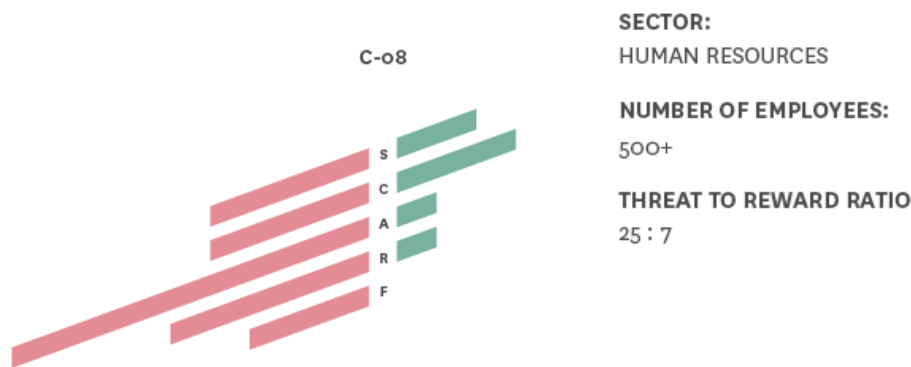
Figure 25: Threat- and Reward-Responses in C-08

This organization had quite sporadic distribution of reward-response triggering dimensions, with *Autonomy* and *Relatedness* having just one respectively, and *Fairness* reflecting no reward-response dimensions. The *Autonomy* category however, had 9 threat-response dimensions (values; *traditional; conventional; controlled; procedural; not trusting;* and *not optimized for productivity;* and norms; *not experimental; not curious; not rewarding of divergent thinking*). Another 5 threat-response dimensions were captured in the *Relatedness* category (values; *not empathetic;* and norms; *siloed; not playful; not self-actualizing;* and *not humanistic*).

Unlike the higher foresight-maturity organizations, the organizations with lower foresight maturity share a great deal of cultural dimensions in common across all SCARF dimensions. It is important to note however, that the dimensions they share are all *threat-response triggering dimensions*. In the **Status** category, all three organizations are highly power-oriented, fail to challenge the status quo, and do not engage in humility-inducing activities to discourage hierarchy. In the **Certainty** category, all three organizations are internally competitive, and do not make highly scientific, data-driven decisions. All three organizations have the most threat-response dimensions in the **Autonomy** category, meaning that they are quite abysmal at empowering their members. They are all highly traditional, conventional, and procedural, and not trusting of their members to make decisions on behalf of the organization. Unsurprisingly, they do not provide experimental environments, and do not reward divergent thinking. These organizations lack a curious spirit. The **Relatedness** category is also full of threat-response triggering cultural dimensions. All are reported to be highly siloed, not playful environments. They are also not very human-centred environments; recorded as not humanistic, not self-actualizing, and not placing an importance on empathy. In direct inverse of their high-foresight maturity counterparts, all three of the lowest-foresight organizations are highly oppositional in the **Fairness** category, meaning, they have an organizational culture that is not amenable to new ideas and strategies.

6.3   Data Insights

Integrative Neuroscientist Evian Gordon identified 'maximize reward' and 'minimize danger' as an overarching, central, organizing principle of the brain (Gordon, 2000), also known as the *approach-avoid response* (Rock, 2008). "This principle represents the likelihood that when a person encounters a stimulus their brain will either tag the stimulus as 'good' and engage in the stimulus (approach), or their brain will tag the stimulus as 'bad' and they will disengage from the stimulus (avoid)" (ibid). The more time the brain spends *maximizing rewards,* the higher the engagement level of members in the organization.

The most provocative insight gleaned from the research is that *we generally see more reward-response triggering cultural dimensions as foresight maturity increases.* Specifically, with every 1-point increase in foresight maturity, there is roughly a 70% increase in the organization's *average* reward/threat dimensions (see *Figure 16, Mapping Threat/Reward Cultural Dimensions Against Foresight Maturity,* on page 79)***.*** While we cannot make a statistically significant argument due to the small sample size, we can argue that as foresight maturity increases, reward-response triggering cultural dimensions trend positively. That is to say, the stronger an organization's foresight maturity, the more time the brain spends in the *approach* state, leading to higher engagement.

One could also hypothesize the inverse relationship; for every 70% increase in the average of the reward/threat dimensions, the organization's capacity for strategic foresight increases. That is to say, fostering a culture that is more neurologically rewarding could actually be prompting stronger foresight practices. In this context, more time spent in the *approach* state could be helping to reduce myopia and mitigate uncertainty. "The approach-avoid response is a survival mechanism designed to help people stay alive, by quickly and easily remembering what is good and bad in the environment," says Rock (2008). By that logic, nurturing a more rewarding organizational culture, wherein members do not feel threatened by mundane dynamics in the workplace, frees up our limbic system to grapple with the uncertainty of the futures. This supports the hypothesis that nurturing a culture which increases the amount of time that members spend in the *approach* state (versus the *avoid* state) creates the optimal conditions for tackling the ambiguity associated with futuring.

In either case, this data tells us that there is a positive relationship between neurologically rewarding organizational culture and strong strategic foresight practices. This is not surprising, given the significant impact that the approach-avoid response "can have on perception and problem solving, and the implications of this effect on decision-making, stress-management, collaboration, and motivation." (Rock, 2008)

This becomes especially clear when we observe the discrepancies between the extremes of the sample, the SCARF results of organizations with the lowest foresight maturity to those with the highest foresight maturity. Lower-foresight maturity organizations are very much *defined* by the avoid state. When asked what *C-11*, the lowest-ranking organization in the data, was obsessed with, the participant identified *Trying to gain advantage within the party.* This intensely individualistic approach activates reward circuitry (specifically, the striatum), which releases dopamine for the individual gaining advantage (Izuma et. al., 2008) but for those *not* gaining advantage, ignites the same regions of the brain as physical pain (Eisenberger et. al., 2003). Both *C-12* and *C-08*, the organizations with the second- and third-lowest foresight maturity, identified status-related obsessions, demonstrating that organizations dominated by an avoid or threat state fail to produce the conditions for effectively considering the future.

On the other end of the spectrum, higher-foresight maturity organizations tend to be more obsessed with macro, outward-facing values. *C-10*, the organization with the highest-foresight maturity cited *Bottom Lines* as their core obsession. While not exactly human-centered, this is a core driver that prioritizes momentum and growth in the sector. Both *C-01* and *C-05*, the organizations with the second- and third-highest foresight maturity, were identified as prioritizing community and substance, which both demonstrate a vision for the organization that goes beyond the individuals who work there.

7.0 FIRST PRINCIPLES

First principles is kind of a physics way of looking at the world. You boil things down to the most fundamental truths and say, "What are we sure is true?" and then reason up from there. Somebody could say, "Battery packs are really expensive and that's just the way they will always be… Historically, it has cost $600 per kilowatt hour. It's not going to be much better than that in the future."

With first principles, you say, "What are the material constituents of the batteries? What is the stock market value of the material constituents?" It's got cobalt, nickel, aluminum, carbon, some polymers for separation and a seal can. Break that down on a material basis and say, "If we bought that on the London Metal Exchange what would each of those things cost?" It's like $80 per kilowatt hour. So clearly you just need to think of clever ways to take those materials and combine them into the shape of a battery cell and you can have batteries that are much, much cheaper than anyone realizes.

ELON MUSK (*Quote edited for clarity*)

7.1 *What are First Principles?*

As Elon Musk explained above (Musk 2013), *first principles* are a way of reasoning

only from the data we *absolutely know to be true*. Most organizations reason from

analogy, leveraging past learnings and building on previous experiences. They

allow us to create new understandings of the world based on evidence, rather than

simply building off of old paradigms. In this context, first principles take on a dual

purpose; firstly, they offer an alternative way of looking at organizational culture,

articulating the physiological human factors that inform the way companies make

decisions under uncertainty; and secondly, they encourage organizations to lead

from first principles - what they absolutely know to be true about their *people,*

process, and product - rather than arbitrarily trying shift culture by observing other companies.

In combination with the extensive literature review, this research has revealed a few first principles about the culture of organizations with strong foresight practices. Neuroscience allows us to leverage what *we know to be true about the brain,* to build more robust theories around organizational culture. Though each organization will have a unique context from which they are operating, they all have one thing in common: they are made up of a cluster of brains, working towards a common goal. Understanding the science behind how the brain responds to stimulus can prompt the story about how a particular organization's dynamics form, revealing some of the levers available to influence organizational culture over time.

7.2 First Principles of a Future-Facing Organizational Culture

People without culture feel insecure and are obsessed with the acquisition of material things, which give them a temporary security that itself is a delusional bulwark against future insecurity. Without culture, a community loses self-awareness and guidance, and grows weak and vulnerable. It disintegrates from within as it suffers a lack of identity, dignity, self-respect and a sense of destiny.

WANGARI MAATHAI

ONE   *Organizational culture is a wicked, shifting ecosystem*

An organization's culture is a sensitive, shifting ecosystem, governed by social and cultural laws. The addition or subtraction of one member can greatly influence its culture, as can changes in peripheral systems seemingly removed from the organization. Circumstances in the personal system of individual member can stimulate virtually undetectable shifts in an organization's culture. As such, the conditions need sensitive detection systems for regulating and maintaining an engaging culture.

As such, cultivating a future-facing an organizational culture is an ongoing process, for which there is no real 'end.' We do not really *arrive*, there are simply opportunities to adjust the social trajectory towards a more desirable (future) state. As a living system that is in a constant state of flux, members (and in particular, leaders) must be sensitive to shifts in the ecosystem that could be activating significant threat responses or failing to activate adequate reward responses. Any assessment of organizational culture is simply a snapshot of a moment in time. When we evaluate culture, we have a tendency of letting that data represent the organization almost dogmatically. The dynamics that emerge when there are even subtle shifts internally or externally, have the capacity to dramatically impact our neurological processing. A future-facing organization must develop a culture of self-monitoring, powered by a sense of self-awareness that allows members to be sensitive to shifts in the culture that might be causing myopia or negatively impacting the organization.

In many ways, organizational culture is similar to a fitness regimen; in order to be healthy, one needs to get into the habit of exercising regularly and make healthy consumption choices every day. In the same way fitness becomes integrated into our lifestyles, building a neurologically healthy culture must become part of an organization's daily ritual. When we commit to fitness, it does not mean we quit our jobs and all become personal trainers - it means that we make the conscious decision to consider our health every single day and work towards our optimal self. A future-facing organizational culture is one wherein each member wakes up every day with a renewed stake in its company's vision of the future. To build a strong strategic foresight capacity internally is to ask questions like "*What can I do today to make incremental progress towards our preferred vision of the future,*" "*Does our strategy consider ways to engage with our vision of the future? How might we improve our strategy to be more future-facing?*" and "*What needs to change in society for us to make our preferred future happen?*"

A term that captures this spirit of this continuous progress towards a future-facing organizational culture is *Kaizen* (改善), the Japanese term for *improvement*. This term was popularized by Toyota, who sought to improve manufacturing processes in their plants by engaging all members of the organization - everyone from the janitorial staff, to the senior most executives - in an active, intentional effort to improve. "The idea is to nurture the company's people as much as it is to praise

and encourage participation in kaizen activities" (Bunji, 1995). The idea is that all members of the organization need to unite around a common objective.

Engaging an organization in Kaizen is a way of aligning everyone around a shared vision, and having that vision become the beacon in the distance that all members gaze towards. It ensures that each member has a stake, and it falls under everyone's jurisdiction to work towards that vision regardless of where they sit in the company. This points to critical component of a future-facing organization; that the collective is greater than the sum of its parts, and that each individual - and their respective neurological reflexes - plays a crucial role in imagining, planning, and realizing the future.

TWO   The human brain is inherently predictive, but informed by past experiences

When a ball is launched in a person's direction, the human brain's anticipatory networks trigger the necessary coordination, best positioning the body to catch it. In this scenario, the brain is *predicting* where the ball is going to land, and attempting to be in the right place when it happens. These reflexes are built upon past experience; when we experience catching a ball over and over again, our brain's predictive powers increase and our coordination improves.

The relationship between memory (and the implicit attitudes that emerge from past experiences) and our capacity to imagine future events, tells us a lot about the way we form ideas about the future, and "has potentially important implications for understanding decision-making and performance under stress where conditions such as fatigue may impair the ability to effectively make use of past experiences to simulate or predict upcoming events" (ibid). A culture that is characterized by threat-response qualities has fewer resources to draw on experiences and consider the long view.

THREE   *There are ideal neurological conditions for considering the long view*

Navigating the uncertainty of the futures and solving complex problems require certain cognitive resources. The brain is deprived of these resources when it is in a threatened state; which was the strongly characterized those organizations with a less mature foresight practice. This research revealed that taking a strategic approach to the future could actually help to brain to mitigate uncertainty. Exploring alternative futures with scanning, research, and scenario planning can help to bolster confidence in the strategic planning process, and render the uncertainty of the future less daunting. Even if scenarios and strategies shift, "learning about the environment is the critical tool that successful agents use to reduce uncertainty as much as possible" (Chiao, et. al., 2016). Thus, we can see strategic foresight– and all the scanning, forecasting, and scenario-planning that

goes with it– as a way of decreasing uncertainty in the workplace. Working towards a preferred future could actually be a way for organizations to decrease some of the threat responses triggered by not knowing what the future will bring.

A strong strategic foresight practice can create a more engaged, reward-response triggering environment, one that supports the brain's cognitive performance. Our hyper-vigilant amygdala responds more strongly to threats, making it "easier to cause aggravation (activate an avoid response) than it is to help others think rationally and creatively (the approach response)" (Rock, 2008). If we reduce those threats, and use foresight as a means of reducing perceived uncertainty, we can create organizational culture that is more rewarding. Strategic foresight also has a strong creative component, one that requires the open minds of members to engage playfully with possibilities of the future.

The following explores neurological conditions that are optimal for consideration of the long view, in that they free up resources in the brain that are required for cognitive processes.

Reducing Brain Barriers: The human brain is a complex organ that modern medicine has yet to decipher entirely. Yet, what we have learned from fMRI imaging has taught us a lot about the ways in which the human brain typically responds to stimulus. We know that when the human brain senses a threat, there is a sharp decline in the amount of resources available for "overall executive

functions in the prefrontal cortex," (Rock, 2008) and that there is "a negative correlation between threat activation and resources for the prefrontal cortex" (Rock, 2008; Arsten,1998). This means less oxygen, and thus, less glucose available to fuel working memory, in turn impacting what Rock refers to as "linear, conscious processing" (2008).

An organization overrun with threat-response stimulus will be made up of members whose pre-frontal cortex do not physically have the resources to problem-solve effectively. As the brain seeks the safety of the familiar, these conditions can play a significant role in strategic myopia, depriving the brain of the necessary nutrients to innovate. In leadership, when we talk about nurturing staff to do their best work, the organization has a responsibility to foster a culture that is neurologically healthy. This is especially true when engaging with the complex challenges that arise from uncertainty, as we do when we are working towards a preferred future.

Further, and most relevant to nurturing future-facing organizational culture, when the brain is threatened, its heightened, over-activated state prevents its user from observing subtle cues and signals, which is a critical component of the strategic foresight process. Gathering cues about our environment and articulating subtle shifts in the human behavioural tides is a crucial component of good futuring. Foresight exposes us to the complexity of human systems, demanding abstraction

and non-linear thinking. In its threatened state the oxygen- and glucose deprived brain lacks the *capacity* to approach non-linear problems. This points directly to the Icarus paradox that particularly impacts leaders who are faced with crises, or are stuck in the myopic cycle of making decisions that keep shareholders happy in the short-term, while avoiding the complexity of long-term shifts in their environment. Creating a rewarding organizational culture that mitigates uncertainty and reduces the threat response is critical to stronger futures thinking.

From an evolutionary standpoint, the brain is designed to prioritize safety, which means that it instinctively wants to prioritize familiar, more predictable paths. This is what we often refer to as our 'comfort zone,' a threshold for risk that is informed by our individual experiences. When we extend beyond that threshold, our amygdala is activated and becomes hypersensitive to stimuli. The brain is more likely to generalize, draw tenuous connections, and shrink from alternative opportunities in this hypersensitive state (Rock, 2008). Often, stimuli that would not ordinarily cause stress, become disproportionately stressful (Phelps, 2006). The threat response has a far more profound, faster onset, and longer-lasting impact on the limbic system than its reward counterpart (Beaumeister, 2001), making it far more harmful for our health and placing much more stress on our organizational culture. Rock uses this to explain why the evening news is much more focused on threatening stories, and why humans have such a propensity for self-criticism (2008).

Increasing Brain Rewards: The key to an organization that is extremely effective at mitigating uncertainty and considering the long view could lay in creating the conditions for more approach-state emotions. Significant research shows that those experiencing positive emotions see more connections and perceive more potential options in problem-solving scenarios (Frederickson, 2001). Research also reveals that reward responses lead to solving more non-linear problems in an insightful way (Jung-Beeman, 2007).

Most importantly, an approach state is nearly synonymous with *engagement,* which is critical to a strong strategic foresight practice, especially as it relates to scanning the periphery. As renowned management consultant Peter Drucker commented when questioned about his highly accurate predictions, said "I don't forecast. I look out the window and identify what's visible but not yet seen." (Butterfield, 2006) A highly mature foresight practice is constantly engaging with potential futures, and the culture of the organization must create the neurological conditions for an engaged membership to work towards a preferred vision of the future.

FOUR   Diversity better prepares us for a range of possible futures

As previously explored, we can learn a lot about adapting to changing conditions from agricultural systems. Crops in a monoculture, which share genetic traits, are

more susceptible to succumbing to disease because their common DNA renders them more vulnerable. Biodiversity is important because more genetic variance translates to more resistance to a particular disease. If one organism within the crop lacks the resistance, the whole crop will not necessarily go down with it. It is a system of checks and balances that allows for survival in a range of possible scenarios. Likewise, diversity in the workplace decreases the chance of being blindsided by shifts in the market.

This research helped to validate the need for more diversity in organizational culture. Organizations with stronger foresight practices all cited diversity or inclusion as cultural dimensions, and conversely, those organizations with weak foresight practices strongly *did not* identify with these dimensions. Michael Merzenich beautifully articulates the adaptive quality of diversity:

> Our individual skills and abilities are very much shaped by our environments. And that environment extends into our contemporary culture, the thing our brains are challenged with because what we've done in our personal evolutions is build up a large repertoire of specific skills and abilities, that are **specific to our own individual histories**. And in fact they result in **a wonderful differentiation in humankind in a way that in fact, no two of us are quite alike.** Every one of us has a different set of acquired skills and abilities that all derive out of the plasticity - the adaptability of this remarkable adaptive machine [the human brain]." (2004)

Obvious ethical arguments aside, diversity presents us with a wealth of skills and abilities that help to increase our adaptive capacity in the market. Further, it provides a diversity in *thinking* that can help us build more thorough, well-

articulated visions of the future. As in crop diversity, diversity can help cast a wider net of signals and trends, expand our peripheral vision, and reveal more of nuances in our ideas of the future. This is not a particularly novel idea – multi-disciplinarity has long been seen as a driver of innovation, helping us to forge new connections and approach problems from a variety of lenses. But the true challenge of diversity lies in cultivating the right conditions for all members to feel heard. Diversity is a trope in the organizational culture space, where affirmative action and *diversity for diversity's sake* is a common practice, with which many leaders struggle to contend.

From a brain science perspective, diversity means creating a neurologically rewarding organizational culture, where all members feel heard and their ideas are considered. It is the absence of threat-response provoking cultural conditions, where the individual experiences that inform our implicit attitudes are considered, and there is an intentional effort to leverage the knowledge and skills that individuals bring to the table.

In this context, diversity is not for the organization to make an effort to hire more persons from protected classes per se. Rather, we should see each individual as a purveyor of a unique perspective of the future, and see their experiences has contributing a perspective that we do not yet have. And rather than exploiting their neuroplasticity and indoctrinating individuals into the current organizational

dogma, organizations have the opportunity to broaden their own perspective by extension of each individual. Diversity only works when there is a deep, sincere, and persistent commitment to inclusion; there will always be a tendency for some voices to be louder than others, and diversity must extend beyond affirmative action mandates and human resources policy. True diversity is about leadership that is skilled at bringing out the best of its people.

This means fostering a culture that does not indoctrinate new hires, but instead invites them to be constructively critical during the onboarding process. Maintaining a cultural mosaic means discouraging compliance and incentivizing members to challenge the status quo. How organizations do this will vary, but a deep understanding and sensitivity towards how the brain responds to social stimuli goes a long way in creating safe spaces for all members of an organization.

FIVE   *The shared vision of a preferred future acts is critical*

If you want to build a ship, don't drum up the people to gather wood, divide the work, and give orders. Instead, teach them to yearn for the vast and endless sea.
ANTOINE DE SAINT-EXUPERY

Another critical principle for stimulating the conditions for futures thinking in organizations, and perhaps the most important, is that organizations need to have a strong stake in the future if they are going to survive to experience it. A strong

future-facing organizational culture is bound not only by a preferred future, but also by the spirit of agility. Their core purpose should not be to build the same product or provide the same service into oblivion. But rather, they should be joint by a shared enthusiasm for their redundancy. Part of the challenge is that the brain simply does not like change. It takes time to adjust to new realities, as our brains need to shift structurally and build new pathways. As we learned, neuroplasticity declines as we age, making it more challenging to accept change as we age. However, if we build businesses that are *designed to change*, then it will not be so frightening for individuals to accept expansion into a new domain, or a complete teardown of the organization's core product.

Leading with strategic foresight makes *a preferred vision* the company's core offering, a beacon in the distance that guides them. It allows individuals to focus on the pursuit of a preferred future, one that has the potential to evolve with the needs of our society, rather than be emotionally tethered to a particular product or service offering. This naturally affords organizations the agility to let go of legacy ideas and convention, and shape-shift with the ebbs and flows of changing market tides. Organizations are simply a group of individuals working towards a common goal, and we need to foster organizational culture that encourages (and mandates) its members to gaze into the future.

SIX   To err is human – and crucial to building the cognitive toolkit for futuring

Mistakes are the brain's *predictive errors.* It demonstrates that our brains expected one outcome, and reality played out in way that the brain did not predict. When we make mistakes, it is the result of our brains miscalculating or misjudging a particular scenario. Our brains *mis-take* the conditions. When a baby's brain is developing, we do not watch them fumble with their first steps and say *look at all the mistakes that baby is making*; we afford them the space to practice over and over until they build the cognitive capacity to predict what happens when they put one foot in front of the other.

A strong foresight practice is one wherein there are sincere opportunities to practice, and opportunities to err when the stakes are low. There are lots of cognitive barriers that prevent the human brain from considering the future. The discomfort of *uncertainty*, the cognitive safety of conformity, outdated mental models, the brain's decline in neuroplasticity, and balancing the demands of one's daily routine against a future that has not yet happened, creates the perfect conditions for strategic myopia and flawed futures thinking. Encouraging futures thinking in a low-risk context facilitates members of an organization to *practice* thinking about the future, where mistakes can be made in a way that is not neurologically threatening, but instead, provides rewarding learning experience and carves new neural pathways. This is a crucial component of nurturing

members of an organization that are continuously and subconsciously scanning for

signals of change in their environment that nod to potential futures.

8.0   TOWARDS A MEASUREMENT TOOL FOR FUTURE-FACING ORGANIZATIONAL CULTURE

My interest is in the future because I am going to spend the rest of my life there.

CHARLES KETTERING

This research revealed some best practices that organizations can leverage to stimulate a culture that is well suited to foresight and foster the neurological conditions that are necessary for considerations of the long view. The hope is that these cultural practices can help to mitigate uncertainty and reduce some of the myopia that we see in many organizations struggle to contend with disruption. Leveraging our learnings about neuroplasticity, diversity, implicit attitudes, and the ideal neurological conditions for futures thinking, we can expand the Foresight Maturity Model (FMM) to build a more complete picture of future-facing culture. This iteration of the FMM includes the original disciplines of L*eadership, Framing, Planning, Scanning, Forecasting*, and *Visioning*, and has been expanded to include two new sections: Climate & Communication and Culture. The *Leadership* discipline underwent the most reconfiguration, with the shift of some core practices and the addition of several others. *Framing, Scanning* and *Visioning* all expanded to include one new practice in each. Included in ***Appendix A*** is the foresight maturity model distributed to participants for reference.

The expansion of the FMM reflects some of the more tacit, implicit attitudes that

emerged throughout the research. For example, the *Leadership* discipline (see

Figure 27 on the following page) was expanded to include a focus on futures

literacy and ongoing low-risk learning opportunities. It was also expanded to

capture shifting time perspectives cognitive bias, as well as to mandate diversity in

the futuring process.

LEADERSHIP

Clear ownership and active mandates to implement and institutionalize foresight capability

	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
Engage people in conscious and thoughtful actions to proactively create the future they have chosen.	Foresight activities are rarely held, and result in only a coincidental relationship to planning activities and resulting execution	Foresight projects are on the annual calendar for an organization. The process and the results trickle through the organization and unevenly become part of the future of the organization.	Foresight activities are regularly on the agenda for all levels of management. The results of these activities play an important role in deciding and executing the future agreed upon for the organization.	Foresight activities and discussions of the future are a considered part of planning activities of the organization. The organization effectively and consistently executes to deliver the plan for the future.	The organization is recognized by peers as being able to envision a vibrant future and then effectively enlist all its members to engage and live their collective vision.
Empower members to embracing positive changes, anticipate change in a timely fashion, and respond creatively to negative shifts	Changes tend to be surprises, and responses are reactive based on superficial analysis and without a full understanding of the implications.	The organization has created an informal structure that anticipates major changes and can quickly put together response plans.	The organization has developed different scenarios of the future and uses these to anticipate and respond effectively to changes as they arise.	A systematic approach to monitoring ongoing changes, combined with well thought-out plans and implications, allow the organization to provide timely and successful responses to their environment.	The organization not only has very successful processes to monitor and respond to environmental changes but is out in front enough to influence the changes in the direction that is beneficial.
Foster an achievement-driven environment that focuses on foresight strategy literacy and provides overt futures-thinking learning opportunities	No resources provided for building foresight literacy or broadening knowledge that could contribute to futures thinking	Some resources for professional development are available, but strategic foresight opportunities are not specifically encouraged.	Members can seek out foresight literacy opportunities and leadership supports learning. Resources are not usually provided.	Organization encourages and provides resources for strategic foresight learning opportunities.	Organization celebrates and rewards futures-thinking. Members are incentivized to participate in activities that broaden foresight capabilities and knowledge base. Members are recognized for increasing foresight literacy.
Actively challenge time perspectives, engage critically with strategic planning process and 'zoom in and out' to challenge cognitive bias.	Little critical thinking about strategic planning. Leadership does not reflect on bias that may be impacting decision-making.	There is recognition of the cultural differences and heritage of the organization. It uses this information to implement major policy changes.	All members of the strategic team have access to foresight practice, only within the context of imminent strategic initiatives.	All members of the strategic team engage in futures thinking within the context of imminent strategic initiatives. They are sometimes engaged in foresight outside of strategic initiatives.	Leadership is perceptive and self-critical. Ongoing commitment to challenge bias. Leaders regularly argue from first principles and zoom in and out to gain perspective throughout strategic activities, embedding foresight throughout
Commit to diversity, with mechanisms to capture contributions from all members of the organization.	Leadership is insular, makes unilateral decisions with little to no engagement with other members in the organization.	Superficial commitment to diversity. Members are not overtly called upon and there are few opportunities for members outside of leadership to engage in foresight activities.	Leadership is actively working towards more diversity, and occasionally calls upon members to contribute their opinions.	Foresight practice is diverse, shaped by many different voices at the organization.	Highly diverse staff, who are regularly called upon to contribute and can easily access leadership to share ideas. Diversity is a core tennent of the organization and leadership regularly engage in the topic of diversity.

Figure 27: Expanded Leadership Discipline in the FMM

Culture also became its own discipline in this expanded version of the FMM (see

Figure 28, on page 117*)*. Within this discipline are practices that encourage a

more neurologically-rewarding culture, reducing threat stimulus where possible to

free up the cognitive faculties for processing uncertainty. A commitment to

Kaizen is also a core practice, encouraging continuous incremental improvement

and ongoing monitoring of the complex system that is organizational culture.

This discipline also articulates futures thinking as a heuristic to help members

mitigate uncertainty and develop foresight as a *temporal wayfinding mechanism*

through which they navigate their relationship to the world.

CULTURE

Stimulating and sustaining the conditions for consideration of the long view

	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
Create an environment and processes that drive foresight knowledge into action.	The organization responds in an ad hoc manner to any foresight knowledge. Activities are undertaken without a clear sense of how it will be acted upon.	There is an informal process to include foresight information in formal plans. Organizational leaders may or may not be aware of it. If the situation allows, they try to include it.	Formal processes exist to make sure that knowledge gained during foresight activities is moved into the strategic and operational activities of the organization.	Systematic processes exist to drive foresight knowledge and implications into all existing organizational processes in a timely and non-disruptive manner.	Foresight knowledge is a basic pillar for all organizational activity. There is a tight feedback loop that provides additional insight from operational results back through to the foresight process.
Recognize the cultural artifacts and mental models operating in the organization and how they influence organizational decisions.	Members of the organization are not specifically aware of their culture and its impact on their operational processes.	There is recognition of the cultural differences and heritage of the organization. It uses this information to implement major policy changes.	Members of the organization have considerable understanding of how their culture works and use this knowledge explicitly in building effective strategic and operational plans and policies.	Members of the organization have a thorough understanding of their culture and have done a comprehensive analysis of how this interacts with strategic and operational aspects of the business.	The deep understanding of cultural elements creates a dynamic ethos that crafts new traditions and stories to continually evolve with change.
Build habitual, consistent practice of scanning the periphery	Limited and myopic; few people care.	Some people are looking into the periphery, but they are not known and called upon.	Some people are looking into the periphery, they are known but not called upon.	Active and curious; scanning the periphery is commonplace.	Robust, consistent scanning. Organization has set the bar for others and share their best practices.
Committment to Kaizen; incremental, continous improvement of future-facing organizational culture	Culture is scarcely referenced, or referred to in passing. There is little talk of a future vision on a day-to-day basis.	Culture is identified as a problem. The desire to be more future-facing is there, but not a priority for leadership. Members are not actively encouraged to spark change.	Organization considers its culture periodically. Leadership engages members in dialogue about creating more future-facing cultural conditions. Small changes are made, sporadically.	Disciplined effort to foster more future-facing culture. Members are encouraged to work on culture on an individual basis, and there is an ongoing conversation about culture.	Organization makes healthy, visible decisions to improve its culture every day. All members are encouraged and incentivized to be more future-facing and foster a more rewarding culture.
Cultivate testing environment for inquiry; welcome divergent perspectives, question assumptions, and challenge bias.	Foresight inquiry is not thoughtful. There is little discussion about why organization is engaging in futures thinking.	Foresight inquiry is basic and fairly obvious. Problem space is mandated by leadership with little input from other members.	Problem framing is disciplined and collaborative, and members are welcome to provide feedback to foresight inquiry areas. There is som knowledge of basic assumptions.	Members are rewarded for providing feedback and divergent thinking is encouraged. Basic assumptions are explicit, much talked about, and frequently challenged.	Strong system of checks and balances for challenging bias and framing foresight inquiry. External network that provides feedback and all members are rewarded for challenging dominant mindsets.
Use foresight as a heuristic to reduce uncertainty about the future.	When approaching uncertainty, organization refers to tried-and-true strategies that have worked in the past.	Organization looks to other strategies in the existing landscape to reduce uncertainty about the future.	When faced with uncertainty, organization considers foresight as a tool for planning and strategy.	Members are encouraged to use futures thinking as a mental model in times of uncertainty. Foresight is a strong component organizational thinking.	Organization uses foresight as a way of thinking to reduce uncertainty and challenge bias. Strong sense of checks and balances in place to challenge bias that engages external stakeholders as well as internal ones.

Figure 28: Newly formed Culture discipline in the FMM

The addition of organizational cognitive neuroscience insights helps to bolster our understanding of the ways in which organizations engage with futures thinking, and some of the barriers that prevent them from considering the long view. Though a work in progress, this addition to the FMM stimulates an important conversation that needs to be had about competing mental models in strategic environments and the cognitive nuances of futuring.

For the fully expanded Foresight Maturity Model, please see *Appendix E*.

9.0   APPLICATIONS OF THIS WORK

During the participant recruitment phase of this project, it was clear that organizations are uncomfortable talking about their culture. When the project began, the goal was to engage organizations themselves in the research, a strategy that did not ultimately fit the research goals. In speaking with organizations about their culture, the overarching theme was that the leadership was aware that *something* needed to change, that there were aspects of the culture that were highly stagnant, bureaucratic, or simply *stuck,* but that the roadmap to improving culture was lacking. This is largely because there is no such thing as 'good' culture or 'bad' culture, when it comes to innovation. The reality is that culture simply *is,* and improving culture is really a process of building stronger relationships, which requires intuition, sensitivity, and ongoing reflection of the human experience. These are intimidating qualities to throw around in the business world, which prides itself on a kind of corporate rigour driven by data, process, and mitigating risk. Nuance is not something the business world does particularly well, and organizational culture is defined by nuance. Technological disruption did, however, give rise to the necessity for organizational introspection, and many companies are recognizing the need to critically examine their culture. As such, they are often interested in the *output* of the research, but are adverse to reveal their vulnerabilities by *participating* in the research themselves.

Giving rise to the million-dollar question: how might we apply the findings in this work? The simple answer is, *each organization will need to establish its own interventions.* Every organization is a unique system with its own institutional dynamics, filled with individuals with their own sets of experiences that yield unique implicit and explicit attitudes. This is what makes organizational culture so complex and wicked.

Having said that, the only real way to process and make sense of an organization's culture is to establish a strong system of self-reporting implicit attitudes. Because our implicit attitudes are so reflexive, we are often not immediately aware of them. A strong future-facing organizational culture begins at the individual level, with a foundation of self-awareness around our implicit and explicit attitudes. One way of doing this would be to build software that encourages members of an organization to self-report their interactions, and develop an authentic, meaningful understanding of how our wayfinding systems are built. Understanding how our experiences inform the way in which we approach problems can go a long way towards building an organization-wide taxonomy of the implicit and explicit attitudes informing our strategic decision-making processes.

Armed with data about implicit and explicit attitudes on an individual level, organizations can begin to identify patterns across project teams, departments, and levels of leadership. Analyzing the data across the organization can help to establish key points of intervention where members might be subject to harsh neurological conditions that hinder problem-solving capacity, empathy, collaboration, and innovative thinking.

Organizations can then focus on a roadmap for a culture that is more future-facing. The FMM offers core best practices and improving culture by offering a roadmap to help organizations to level up.

Future-facing organizational culture is not about achieving specific, measurable objectives. It is more about empowering individuals to consider the long view, on an individual level, on the organizational level, and in a societal sense. It is based on the premise that the human brain has a finite amount of cognitive resources, and when an organization's culture is rife with threats, the brain *lacks the resources to thrive in times of uncertainty.* Building strong organizational culture is about properly allocating the brain's resources, and not squandering them on unnecessary neurological threats. To do so, organizations must be incredibly sensitive to the cultural conditions we foster.

10.0 CONCLUSION

Neuroscience shows brain activity *precedes* behaviour; that is to say, the brain shows activity before we demonstrate *a conscious decision to act*. In a study by neuroscientist John Dylan Haynes, participants were asked to press one of two buttons, and the fMRI revealed activity in the prefrontal cortex (the part of the brain responsible for thought and consciousness) a full 7 to 10 seconds before they were consciously aware of their own selection (Soon et. al., 2008). *This* is why organizational culture is so important; we need to create the optimal *conditions* for futures-thinking to take place. It is about far more than simply changing *behaviour;* in fact, behaviour is simply a symptom of cognitive processing. Behaviour helps to reveal cognitive patterns, but culture is *informed by* our unconscious reasoning, our implicit attitudes towards the world. A more robust understanding of organizational culture is one that reflects upon the cognitive processes that happen a full 7 to 10 seconds before it manifests as behaviour.

Much akin to the first law of thermodynamics, organizational culture cannot be created nor destroyed, it can simply change its form. Because of the exponential shifts across all sectors, the business world is on the pursuit for an almost mythical, utopian organizational culture. But an organization's culture simply just *is*; they are dynamics that emerge among a group of brains in a particular context. The wickedness of organizational culture emerges from the idea that it can never

be fully 'solved,' there is no optimal culture. We do know, however, that there are more neurologically optimal conditions for mitigating uncertainty and productively considering the future. Using that knowledge and building strategic practices that respect the architecture of the human brain is a critical part of integrating foresight into organizational culture and practicing responsible futures.

Moving forward, this research suggests that we need a new way of defining organizational culture, particularly as it relates to adopting more future-facing perspectives. This work proposes the following definition of organizational culture:

A living system, made up of individuals with respective temporal wayfinding systems, all working towards a shared vision of their preferred future.

The hope that others in the academic and business communities will contribute to this definition and that it will evolve over time. Through publication of this work via academic journals and online think-pieces, as well as presenting this material to various businesses and conference audiences, the hope is that we can shift the way we assess organizational culture and foster the neurological conditions that empower individuals to consider the long view. All organizational culture is inherently future-facing in that the future is inevitable, but working towards responsible preferred futures *with intention* is perhaps the most important thing the business community will do at this junction of human history.

10.1 Further Research

The contributions of this work include: a critique of existing organizational culture assessment tools; an exploration of the human factors that may impede considerations of the future; an expanded Foresight Maturity Model to include more cultural considerations; mapping of cultural dimensions to SCARF principles; and an alternative definition of organizational culture that reflects mental time travel.

There are many possibilities to continue this research within the disciplines of organizational neuroscience, neuroleadership, and the neuroscience of culture, as well as psychology and sociology. Perhaps the most poignant opportunity would be to use fMRI technology to observe which parts of the brain are activated when participants are questioned about their attitudes towards the future. If we could build a map of brain as it engages with the future, we could better understand how we process our thoughts about the future and explore the cognitive barriers and opportunities in fostering cultural conditions for foresight. This would not only expand on the work of Rock and his peers, but could also introduce the neuroscience of futures thinking that would have significant implications on the practice of strategic foresight, sustainability, and psychology. This kind of work would advance our thinking about our own personal futures, as well as expand that thinking to community, organizations, and society.

Another fascinating topic of research would be to establish whether some people experience uncertainty differently than others, neurologically speaking. For example, if we scanned the brains of the some of the world's most future-facing leaders, or those of futurists who tour the world lecturing on creating more resilient futures, would their limbic systems show more subtle threat-response reactions than the average person? It would be interesting to explore whether there is any evidence that some brains are more oriented towards future-thinking than others.

Another avenue would be to deepen the study of future-facing organizational culture, with a larger sample, and gathering more *over time*. This dimension is a crucial one, as culture shifts greatly over time, and could reveal more context-specific triggers (acquisitions, changes in the market, the loss of a key leadership figure) that could prove important to the organization's culture. A cultural tool that can capture subtle shifts in an organization's culture is an invaluable next step for this research, as none of the current instruments adequately captures this data. The challenge here is going beyond the *explicit* attitudes, and building a more profound, authentic understand of the *implicit* attitudes underpinning them.

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APPENDIX A: FORESIGHT MATURITY PRINCIPLES DISTRIBUTED TO RESEARCH PARTICIPANTS

LEADERSHIP

Clear ownership and active mandates to implement and institutionalize foresight capability

	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
Engage people in conscious and thoughtful actions to proactively create the future they have chosen.	Foresight activities are rarely held, and result in only a coincidental relationship to planning activities and resulting execution	Foresight projects are on the annual calendar for an organization. The process and the results trickle through the organization and unevenly become part of the future of the organization.	Foresight activities are regularly on the agenda for all levels of management. The results of these activities play an important role in deciding and executing the future agreed upon for the organization.	Foresight activities and discussions of the future are a considered part of planning activities of the organization. The organization effectively and consistently executes to deliver the plan for the future.	The organization is recognized by peers as being able to envision a vibrant future and then effectively enlist all its members to engage and live their collective vision.
Create an environment that provides timely anticipation of change embracing positive changes and responding creatively to negative changes.	Changes tend to be surprises, and responses are reactive based on superficial analysis and without a full understanding of the implications.	The organization has created an informal structure that anticipates major changes and can quickly put together response plans.	The organization has developed different scenarios of the future and uses these to anticipate and respond effectively to changes as they arise.	A systematic approach to monitoring ongoing changes, combined with well thought-out plans and implications, allow the organization to provide timely and successful responses to their environment.	The organization not only has very successful processes to monitor and respond to environmental changes but is out in front enough to influence the changes in the direction that is beneficial.
Clearly comunicate the goals, results, and implications of foresight activities	There are implicit and often undocumented goals and plans from foresight activities. The senior leaders may or may not be aware of the general direction and implications of this effort.	Goals and results from foresight activity are usually documented but are primarily communicated to managers and key people in the organization.	Goals and plans from foresight activity are conveyed to the organization. Everyone is aware of the implications and aligns work and responsibilities appropriately.	Everyone in the organization considers and uses the goals and plans from foresight work to inform their decisions and perform their daily activity	In addition to informing day-to-day decisions with implications from foresight activity, all organizational members become part of the immediate feedback loop that refines and adjusts the goals and results
Create an environment and processes that drive foresight knowledge into action.	The organization responds in an ad hoc manner to any foresight knowledge. Activities are undertaken without a clear sense of how it will be acted upon.	There is an informal process to include foresight information in formal plans. Organizational leaders may or may not be aware of it. If the situation allows, they try to include it.	Formal processes exist to make sure that knowledge gained during foresight activities is moved into the strategic and operational activities of the organization.	Systematic processes exist to drive foresight knowledge and implications into all existing organizational processes in a timely and non-disruptive manner.	Foresight knowledge is a basic pillar for all organizational activity. There is a tight feedback loop that provides additional insight from operational results back through to the foresight process.
Recognize the cultural artifacts and mental models operating in the organization and how they influence organizational decisions.	Members of the organization are not specifically aware of their culture and its impact on their operational processes.	There is recognition of the cultural differences and heritage of the organization. It uses this information to implement major policy changes.	Members of the organization have considerable understanding of how their culture works and use this knowledge explicitly in building effective strategic and operational plans and policies.	Members of the organization have a thorough understanding of their culture and have done a comprehensive analysis of how this interacts with strategic and operational aspects of the business.	The deep understanding of cultural elements creates a dynamic ethos that crafts new traditions and stories to continually evolve with change.

FRAMING

Establishing the boundaries and scope of the endeavor

	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
Identify the root questions and true issues driving the project request, reconciling with those that have been explicitly stated.	Project work is taken at face value and addresses the stated request.	Discussion on requirements and issues takes place with project sponsors to clarify and further communicate project goals.	Prior to a the start of a project, detailed requirements and fundamental assumptions are documented, reviewed, and agreed upon by all parties.	A systematic process is in place prior to initiating work to understand, validate, and document the underlying base objectives, goals, and assumptions of the project.	A process is in place to efficiently highlight base issues and requirements, yielding a project that achieves goals which the sponsors did not initially know how to articulate but now recognize as addressing their real questions.
Set measurable and documented objectives which have the agreement of stakeholders.	Goals of the project are basically to complete the work and to satisfy customer requests.	Project sponsors discuss their priorities and expectations for project completion.	Participants agree to and document a set of defined and prioritized goals and objectives for the project.	A well-established process is in place, using best practices to create and build consensus for meaningful and objective outcomes.	The organization is well-known for its ability to arrive at insightful measurements that clearly illuminate and calibrate prioritized outcomes.
Track progress toward the objectives and reframe root problems and issues against progress and changes external to the endeavor.	Basic goals and objectives are not significantly changed from their inception regardless of external or internal changes.	Progress is sporadically monitored to see if it is on course. If major events occur or core issues are found to be wrong, adjustments are made.	Periodic reviews of progress are consistently held. There is a change process in place to adjust plans and reframe goals based on new information.	Insightful organizational processes ensure that the project is flexible and on target to address any course corrections and meet real end-date needs of sponsors.	Plans are seamlessly attuned to changes, dynamically adjusting to provide resources for efficient and timely proactive responses.

PLANNING

Ensuring that the plans, people, skills, and processes support the organizational vision

	LEVEL 1 Ad-Hoc	**LEVEL 2** Aware	**LEVEL 3** Capable	**LEVEL 4** Competent	**LEVEL 5** World-Class
Identify the implications and consequences of alternative futures and actions.	Alternative futures are rarely considered—the expectation is that the future will be a continuation of today.	Alternative futures are occasionally considered, and these generally follow major trends identified and highlighted by the media.	Organization regularly looks at different possible futures and uses the documented implications and consequences of these exercises to determine their plans.	Organization has processes in place to review environmental indicators and develop a range of possible futures. For each of these, a thoughtful and thorough analysis is developed.	Organization has developed its own process and framework for efficiently and accurately reviewing downstream implications of a wide range of possible futures.
Explore a variety of potential strategies and options	The organization has a de facto strategy that may be inferred from the actions and investments that it makes.	A variety of strategies are considered quickly without any real exploration of their implications.	The organization has a best-practice process for evaluating potential strategies and uses clear criteria for deciding which strategy best meets its needs.	A systematic process is used to routinely re-evaluate strategies as new information and feedback are available. Strategy is often tested before implementation.	Members of the organization are recognized by their industry peers for their continual creative and breakthrough strategies.
Choose and refine a strategy that optimizes progress toward the organizational vision.	The organization expects that the normal course of events and smart daily operational decisions will achieve their vision.	On a periodic basis, such as yearly, the organization reviews and adjusts its strategy to make sure it is on plan to meet the stated vision.	There is a process in place to continually review and evaluate trendy or novel occurrences happening in the fringes of society.	Strategic alternatives are frequently evaluated via well-maintained quantitative models. Adjustments are made which optimize strategic decisions.	Strategic decisions are continuously refined based on real time data captured in a highly integrated intelligence system.
Develop a plan to address the activities, processes, talent, and communications required to achieve the strategy.	There are no formal project plans. Actions and decisions are made as needed and communication generally occurs when someone thinks to do so.	High-level planning matches skills and needs with periodic assessment of missing skills. Communication can occur frequently but generally does so in an unstructured format.	Formal plans and processes are in place for most or all areas of the organization to efficiently engage and manage employees, including communication structure.	Organizational structures and procedures have been redefined to eliminate bureaucracy and inefficiency. Detailed plans and processes are an inherent part of every employee's vocabulary.	Innovative new structures and policies have been created that engage the ability of the "learning" organization to grow and adapt as it smoothly executes well thought-out plans.

SCANNING

Collection of appropriate and relevant information in a format and timeframe that support useful retrieval.

	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
Map the domain of the system into a framework of areas to explore	The domain map is created from those areas directly and explicitly connected to the area of interest.	In addition to the directly connected areas, the domain map is augmented with other areas "called-out" by the information collected.	A recognized framework (such as STEEP) is used to create a complete domain map, supporting evaluation of many different facets of the system.	Organizational processes exist to define and build a comprehensive domain map, exploring domains such as second-order impacts.	An anticipatory domain map adjusts dynamical-ly to changes to provide insightful observations from underlying streams.
Collect pertinent information from a range of diffuse and credible sources	Information is gathered from easily accessible resources commonly used by the project, and collected only as needed.	Information is collected from traditional resources as well as some novel sources. Effort is made, when time allows, to do general scanning.	Information is collected routinely from varied sources ranging from the traditional to alternative. Analysts consider information from other domains that could provide insight.	A systematic process collects information from a wide range¬ of resources and media formats on a consistent cycle providing for a comprehensive view of the topic.	Sophisticated methodology and tools provide timely and continuous collection of information, allowing for visibility on many dimensions with unique views of the topic.
Identify outliers or "outside-the-system" signals of impending changes that could impact the system	The media are the primary source for any signals of change.	High-impact and low-probability events are considered in addition to media spotlights when looking for potential surprises.	There is a process in place to continually review and evaluate trendy or novel occurrences happening in the fringes of society.	Best practices such as ethnographic journeys or wild cards, are part of the organization's culture to consistently identify outliers.	The organization has created unique practices in the industry to highlight potential changes including those not related directly to the topic.
Integrate external and internal information into a common framework and language	Scanned information points are taken as is, with minimal effort to understand and integrate them.	Linkages are informally made and generally within a category, providing a variable view of information.	Connections are made between different categories providing a comprehensive and cohesive view of scanned information.	Universal models provide a powerful world-view framework for deep understanding and an integrated picture of the information collected.	New, innovative, and dynamic models created by the organization bring context and insight to diffuse and wide-ranging data points.
Create a useful and accessible information repository	Scanned data is stored in an unstructured and ad hoc manner. Retrieval is generally by the person who collected the information.	An informal process is in place to collect, tag, and store information. Information can be retrieved but may take some time.	Information is tagged and stored in an organization-wide repository providing easy access to retrieve information of interest.	A high-tech repository with an intuitive structure helps facilitate insight and organize thoughts as information is retrieved.	Organization provides leadership in state-of-the-art content storage and retrieval, pushing out information in anticipation of need.

FORECASTING

Collection of appropriate and relevant information in a format and timeframe that support useful retrieval.

	LEVEL 1 Ad-Hoc	**LEVEL 2** Aware	**LEVEL 3** Capable	**LEVEL 4** Competent	**LEVEL 5** World-Class
Acquire insight into emerging ideas or themes with the aggregation of information into categorized clusters.	Information is organized based on identifiable surface information.	Information is collected and organized in a manner which supports the generation of ideas of interest.	Information is organized such that useful ideas and themes clearly emerge.	Organizational processes for aggregating information are based on established models, providing additional perspective and comprehensive framing for themes and ideas.	The organization is recognized for creating a framework which sets the standard for illuminating underlying discoveries in the information collected.
Consider the widest possible set of plausible alternative futures in evaluating choices or decisions affecting the system.	Alternative futures are generally in the comfort zone of the probable, and are variations on the expected future for the domain of interest.	Alternative futures are established from the domain of interest and directly related areas and provide for a range of possibilities.	Plausible alternative futures are drawn from analysis of all contextual categories to understand broader possibilities for the domain of interest.	Exploration of most of the plausible options is an integral part of developing alternative futures and provides complete coverage of the domain of interest.	The set of alternative futures covers the highly probable to the extremes of what's plausible, providing comprehensive coverage of the system.
Distill and detail plausible alternative futures into the working set for consideration.	Alternative forecasts are primarily used "as is" from the information collected.	Alternative forecasts are reviewed and a subset is selected. Additional information is documented to support the selected alternatives and present a more understandable view.	A manageable set of alternative futures covering the full range of topics is produced. Each alternative contains significant detail, supporting the key implications.	A systematic process is in place to produce a set of alternative futures. Each alternative is presented in a clear and comprehensive way	An optimal set of alternative futures is generated. Each alternative makes critical elements immediately apparent and the accompanying depth provides unchallengeable support.
Validate foresight to create an integrated set of credible and coherent alternative futures.	The set of distilled and detailed alternative futures is used "as is."	Follow-up research is done on a fact-checking basis.	Alternative futures are checked and revised so that they tell a coherent story.	Preliminary implications are identified to test the alternative futures for relevance.	The set of alternative futures is reviewed and revised to ensure that a balanced set of view-points and perspectives is represented.

PLANNING

Ensuring that the plans, people, skills, and processes support the organizational vision

	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
Identify the implications and consequences of alternative futures and actions.	Alternative futures are rarely considered—the expectation is that the future will be a continuation of today.	Alternative futures are occasionally considered, and these generally follow major trends identified and highlighted by the media.	Organization regularly looks at different possible futures and uses the documented implications and consequences of these exercises to determine their plans.	Organization has processes in place to review environmental indicators and develop a range of possible futures. For each of these, a thoughtful and thorough analysis is developed.	Organization has developed its own process and framework for efficiently and accurately reviewing downstream implications of a wide range of possible futures.
Explore a variety of potential strategies and options	The organization has a de facto strategy that may be inferred from the actions and investments that it makes.	A variety of strategies are considered quickly without any real exploration of their implications.	The organization has a best-practice process for evaluating potential strategies and uses clear criteria for deciding which strategy best meets its needs.	A systematic process is used to routinely re-evaluate strategies as new information and feedback are available. Strategy is often tested before implementation.	Members of the organization are recognized by their industry peers for their continual creative and breakthrough strategies.
Choose and refine a strategy that optimizes progress toward the organizational vision.	The organization expects that the normal course of events and smart daily operational decisions will achieve their vision.	On a periodic basis, such as yearly, the organization reviews and adjusts its strategy to make sure it is on plan to meet the stated vision.	There is a process in place to continually review and evaluate trendy or novel occurrences happening in the fringes of society.	Strategic alternatives are frequently evaluated via well-maintained quantitative models. Adjustments are made which optimize strategic decisions.	Strategic decisions are continuously refined based on real time data captured in a highly integrated intelligence system.
Develop a plan to address the activities, processes, talent, and communications required to achieve the strategy.	There are no formal project plans. Actions and decisions are made as needed and communication generally occurs when someone thinks to do so.	High-level planning matches skills and needs with periodic assessment of missing skills. Communication can occur frequently but generally does so in an unstructured format.	Formal plans and processes are in place for most or all areas of the organization to efficiently engage and manage employees, including communication structure.	Organizational structures and procedures have been redefined to eliminate bureaucracy and inefficiency. Detailed plans and processes are an inherent part of every employee's vocabulary.	Innovative new structures and policies have been created that engage the ability of the "learning" organization to grow and adapt as it smoothly executes well thought-out plans.

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CLIMATE & COMMUNICATION

How an organization's ideas are communicated, and how the appropriate actions are triggered.

	LEVEL 1 Ad-Hoc	**LEVEL 2** Aware	**LEVEL 3** Capable	**LEVEL 4** Competent	**LEVEL 5** World-Class
Willingness to share across functions.	Poor: information is ignored and hoarded.	Exchange of information is rare and happens only in predefined formal channels.	Exchange of information occurs on various levels but mostly in formalized channels.	Excellent: ongoing information sharing on many levels.	Other organizations learn best practices from them in how to share information (are invited to speak on the topic, have published material that is oft cited, etc)
Informal communication	Poor: no informal communication.	Limited informal information across functions.	Informal communication is encouraged, part of casual conversation.	Future insights are diffused effectively and often reach the relevant decision-makers through informal communication. Members regularly refer to the preferred vision of the future	Informal communica-tion is a core value and organization has a system to evaluates its communication regularly. Members regularly refer to the preferred vision of the future with external stakeholders.
Willingness to test and challenge basic assumptions.	The basic assumptions are neither known nor made transparent.	Some basic assumptions are known but not challenged.	There is a good understanding of basic assumptions and they are tested.	Basic assumptions are explicit, much talked about, and frequently challenged.	Others look to this organization to learn best practices. Challenging assumptions is part of the organization's fibre.
Readiness to listen to scouts	The organization is very closed. Contact with the outside is discouraged.	Some external personal contacts are called upon, but gathered insights are disguised as coming from the inside.	Personal contacts are regarded as valuable. Few have a variety of external contacts.	The organization is very open. Building and maintaining an external network is encouraged.	Organization has a mandate to build and maintain external network and provide resources to do so.
Characteristics of foresighters	Strategists lack deep knowledge of their domain.	Foresighters have deep knowledge in their domain.	Foresighters have both deep and broad knowledge.	Foresighters have deep and broad knowledge and are selected for being curious and open-minded.	Foresighters have a strong internal and external network and deep and broad knowledge and are passionate, curious, and open-minded.

PEOPLE & NETWORKS

Stimulating and sustaining the conditions for consideration of the long view

	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
External network	No formal or informal external contacts - organization is isolated.	Some of their team have formal and informal external contacts.	Formal contacts are encouraged and in addition, informal contacts are maintained by some employees.	Formal and informal external contacts are encouraged.	Building and maintaining a web of external partners is not only encouraged, it is perceived as important for every employee.
Internal network	No formal and informal contacts in other units - teams are very siloed.	Some of the team have formal and informal contacts in other units.	Cross-functional formal contacts are encouraged.	Cross-functional formal and informal contacts are encouraged.	Building and maintaining a web of internal partners is not only encouraged, it is perceived as important for every employee.
Characteristics of foresighters	Strategists lack deep knowledge of their domain.	Foresighters have deep knowledge in their domain.	Foresighters have both deep and broad knowledge.	Foresighters have deep and broad knowledge and are selected for being curious and open-minded.	Foresighters have a strong internal and external network and deep and broad knowledge and are passionate, curious, and open-minded.

APPENDIX B: CULTURAL DIMENSIONS LIKERT SCALE, DISTRIBUTED TO RESEARCH PARTICIPANTS

	1 = I STRONGLY DISAGREE THAT THIS VALUE REPRESENTS THE ORG	2 = I DISAGREE THAT THIS VALUE REPRESENTS THE ORG	3 = NEUTRAL	4 = I AGREE THAT THIS VALUE REPRESENTS THE ORGANIZATION	5 = I STRONGLY AGREE THAT THIS VALUE REPRESENTS THE ORGANIZATION
Consensus-Driven					
Highly Moral					
Traditional					
Highly Loyal, Committed					
Communicative					
Individualistic					
Participatory					
Collaborative					
Experimental					
Risky					
Aggressive					
Incentivizes Winning					
Optimized for Productivity					
Perfectionistic					
Consistent					
Conventional					
Controlled					
Procedural					
Power-oriented					
Achievement-driven					
Uniform					

	1 = I STRONGLY DISAGREE THAT THIS VALUE REPRESENTS THE ORG	2 = I DISAGREE THAT THIS VALUE REPRESENTS THE ORG	3 = NEUTRAL	4 = I AGREE THAT THIS VALUE REPRESENTS THE ORGANIZATION	5 = I STRONGLY AGREE THAT THIS VALUE REPRESENTS THE ORGANIZATION
Participatory; organization offers activities for members that encourage bonding.					
Siloed; lots of stuff happens in other parts of the organization that is not communicated in others.					
Organization is provocative and stimulating.					
Scientific; decisions are deeply analytical and dependent on empirical or measurable evidence.					
Organization presents the same to external stakeholders as it does internally to staff.					
Playful; the organization has worked play into daily operations in different forms.					
Curiosity is at the heart of the organization; almost child-like desire to learn about the world.					
Disciplined; ritualistic and almost religious about certain key roles, tasks, and functions.					
Organization encourages and rewards divergent thinking.					
Staff members are encouraged to challenge the organizations's dominant mindset / status quo.					
Humility-inducing activities; organization breeds humbleness.					
Experimental and encourages members to get their hands dirty.					
Members are encouraged to be competitive					
Organization feels democratic; like everyone has a say, and all opinions are considered.					
Members must be fast moving and responsive					
Oppositional; ideas and strategy is often met with resistance.					
All members are encouraged to question their own assumptions (even management)					
Organization is culturally and socially diverse					
Organization is inclusive and encourages ongoing dialogue about inclusion.					
Avoidance; members deflect and dodge difficult conversations.					
Self-actualizing; members are provided a safe space to reflect and grow					
Humanistic and places high value on the people working for the organization.					
Dependent on management to make things happen.					
Trusting; organization encourages trust between all members of the organization.					
Empathetic; all members are encouraged to practice empathy and relate to one another.					

APPENDIX C: BREAKDOWN OF CULTURAL DIMENSIONS INTO SCARF PRINCIPLES

	THREAT RESPONSE	**REWARD** RESPONSE
STATUS Relative importance, pecking order, and seniority.	Individualistic Aggressive Incentivizes Winning Power-oriented	Achievement-driven Members are encouraged to challenge the status quo. Humility-inducing activities; organization breeds humbleness. Democratic; feels like everyone has a say, and all opinions are considered. Participatory; activities for members that encourage bonding Uniform
CERTAINTY Sense of job security, value to the organization, and a sense of place.	Members are encouraged to be competitive with one another Risky Perfectionistic	Communicative Scientific; decisions are analytical, use empirical/measurable evidence. Disciplined; ritualistic about certain key roles, tasks, and functions. Members must be fast-moving and responsive Consistent
AUTONOMY Perception of exerting control over one's environment, the sensation of having choice	Procedural Controlled Conventional Dependent on management to make things happen. Traditional	Organization is provocative and stimulating. Curiosity is at the heart of the org; an almost child-like desire to learn Experimental and encourages members to get their hands dirty. Trusting; org trusts its people to do great work. Optimized for Productivity Organization encourages and rewards divergent thinking.

(Continued on next page)

	THREAT RESPONSE	**REWARD** RESPONSE
RELATEDNESS Whether one is 'in' or 'out,' and a deep sense of belonging to one's tribe.	Siloed; lack of communication across departments. Avoidant; members deflect and dodge difficult conversations.	Empathetic; all members are encouraged to practice empathy Collaborative Humanistic and places high value on the people working for the org. Self-actualizing; members are afforded space to reflect and grow Playful; the org has worked play into daily operations in different forms. Highly Loyal, Committed
FAIRNESS Sense of democracy, and that there are no double-standards for management.	Oppositional; new ideas and strategy are met with resistance.	Members are encouraged to question assumptions (even management) Organization is inclusive, encourages ongoing dialogue about inclusion. Consensus-Driven Org presents the same to external stakeholders as it does internally. Highly Moral Organization is culturally and socially diverse

APPENDIX D: THREAT- AND REWARD-REWARD RESPONSE LEVELS, CATEGORIZED BY SCARF PRINCIPLES

THREAT- AND REWARD-RESPONSE LEVELS
CATEGORIZED BY SCARF PRINCIPLES

RANK highest to lowest

■ THREAT-RESPONSE   ■ REWARD-RESPONSE

1

3.69
FORESIGHT MATURITY

C-10

S C A R F
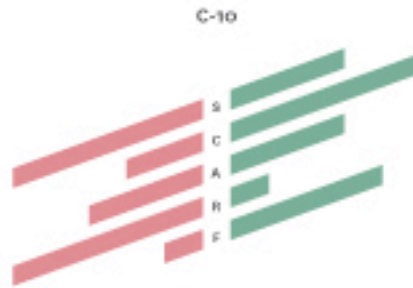
SECTOR
OIL & ENERGY

NUMBER OF EMPLOYEES
500+

THREAT TO REWARD RATIO
15 : 16

2

3.2
FORESIGHT MATURITY

C-01

S C A R F
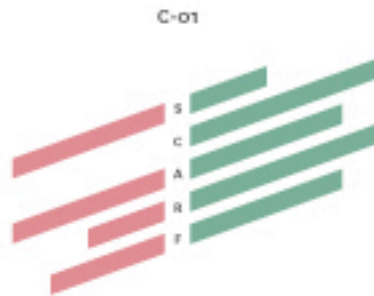
SECTOR
PUBLIC SAFETY

NUMBER OF EMPLOYEES
100 - 500

THREAT TO REWARD RATIO
13 : 20

3

3.12
FORESIGHT MATURITY

C-05

S C A R F

SECTOR
MANAGEMENT CONSULTING

NUMBER OF EMPLOYEES
< 100

THREAT TO REWARD RATIO
1 : 4

4

2.77
FORESIGHT MATURITY

C-13
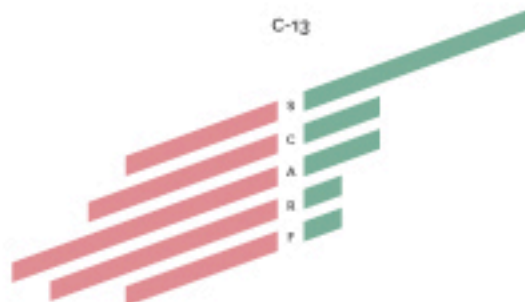
S C A R F

SECTOR
ELECTRICAL / ELECTRONIC MANUFACTURING

NUMBER OF EMPLOYEES
500+

THREAT TO REWARD RATIO
2 : 1

THREAT- AND REWARD-RESPONSE LEVELS
CATEGORIZED BY SCARF PRINCIPLES

RANK
highest
to lowest

■ THREAT-RESPONSE   ■ REWARD-RESPONSE

C-07

5

2.7
FORESIGHT
MATURITY

SECTOR
GAMBLING & CASINOS

NUMBER OF EMPLOYEES
100 - 500

THREAT TO REWARD RATIO
17 : 19

C-02

6

2.27
FORESIGHT
MATURITY

SECTOR
EDUCATION MANAGEMENT

NUMBER OF EMPLOYEES
500+

THREAT TO REWARD RATIO
13 : 16

C-15

7

2.13
FORESIGHT
MATURITY

SECTOR
NON-PROFIT ORGANIZATION
MANAGEMENT

NUMBER OF EMPLOYEES
500+

THREAT TO REWARD RATIO
11 : 19

C-08

8

1.72
FORESIGHT
MATURITY

SECTOR
HUMAN RESOURCES

NUMBER OF EMPLOYEES
500+

THREAT TO REWARD RATIO
25 : 7

THREAT- AND REWARD-RESPONSE LEVELS

CATEGORIZED BY SCARF PRINCIPLES

RANK
highest
to lowest

THREAT-RESPONSE
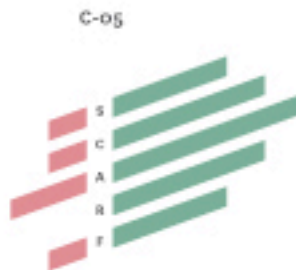
REWARD-RESPONSE

C-12

9

1.23

FORESIGHT
MATURITY

S
C
A
R
F

SECTOR
MANAGEMENT &
ENGINEERING SERVICES

NUMBER OF EMPLOYEES
500+

THREAT TO REWARD RATIO
30 : 7

C-11

10

0.69

FORESIGHT
MATURITY

S
C
A
R
F

SECTOR
POLITICAL ORGANIZATION

NUMBER OF EMPLOYEES
100 - 500

THREAT TO REWARD RATIO
24 : 7

APPENDIX E: FULL EXPANSION OF THE FORESIGHT MATURITY MODEL

LEADERSHIP

Clear ownership and active mandates to implement and institutionalize foresight capability

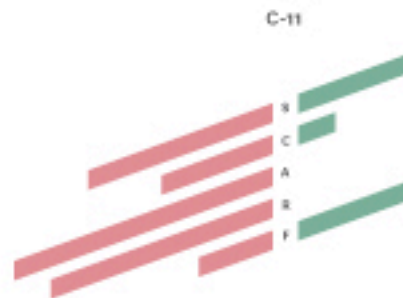|	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
Engage people in conscious and thoughtful actions to proactively create the future they have chosen.	Foresight activities are rarely held, and result in only a coincidental relationship to planning activities and resulting execution	Foresight projects are on the annual calendar for an organization. The process and the results trickle through the organization and unevenly become part of the future of the organization.	Foresight activities are regularly on the agenda for all levels of management. The results of these activities play an important role in deciding and executing the future agreed upon for the organization.	Foresight activities and discussions of the future are a considered part of planning activities of the organization. The organization effectively and consistently executes to deliver the plan for the future.	The organization is recognized by peers as being able to envision a vibrant future and then effectively enlist all its members to engage and live their collective vision.
Empower members to embrace positive changes, anticipate change in a timely fashion, and respond creatively to negative shifts	Changes tend to be surprises, and responses are reactive based on superficial analysis and without a full understanding of the implications.	The organization has created an informal structure that anticipates major changes and can quickly put together response plans.	The organization has developed different scenarios of the future and uses these to anticipate and respond effectively to changes as they arise.	A systematic approach to monitoring ongoing changes, combined with well thought-out plans and implications, allow the organization to provide timely and successful responses to their environment.	The organization not only has very successful processes to monitor and respond to environmental changes but is out in front enough to influence the changes in the direction that is beneficial.
Foster an achievement-driven environment that focuses on foresight strategy literacy and provides overt futures-thinking learning opportunities	No resources provided for building foresight literacy or broadening knowledge that could contribute to futures thinking.	Some resources for professional develop-ment available, but strategic foresight opportunities are not specifically encouraged.	Members can seek out foresight literacy opportunities and leadership supports learning. Resources are not usually provided.	Organization encourages and provides resources for strategic foresight learning opportunities.	Organization celebrates and rewards futures-thinking. Members are incentivized to participate in activities that broaden foresight capabilities and knowledge base. Members are recognized for increasing foresight literacy.
Actively challenge time perspectives, engage critically with strategic planning process and 'zoom in and out' to challenge cognitive bias.	Little critical thinking about strategic planning. Leadership does not reflect on bias that may be impacting decision-making.	There is recognition of the cultural differences and heritage of the organization. It uses this information to implement major policy changes.	All members of the strategic team have access to foresight practice, only within the context of imminent strategic initiatives.	All members of the strategic team engage in futures thinking within the context of imminent strategic initiatives. They are sometimes engaged in foresight outside of strategic initiatives.	Leadership is perceptive and self-critical. Ongoing commitment to challenge bias. Leaders regularly argue from first principles and zoom in and out to gain perspective throughout strategic activities, embedding foresight throughout
Commit to diversity, with mechanisms to capture contributions from all members of the organization.	Leadership is insular, makes unilateral decisions with little to no engagement with other members in the organization.	Superficial committ-ment to diversity. Members are not overtly called upon and there are few opportunities for members outside of leadership to engage in foresight activities.	Leadership is actively working towards more diversity, and occasionally calls upon members to contribute their opinions.	Foresight practice is diverse, shaped by many different voices at the organization.	Highly diverse staff, who are regularly called upon to contribute and can easily access leadership to share ideas. Diversity is a core tennent of the organization and leadership regularly engage in the topic of diversity.

FRAMING

Establishing the boundaries and scope of the endeavor

	LEVEL 1 Ad-Hoc	**LEVEL 2** Aware	**LEVEL 3** Capable	**LEVEL 4** Competent	**LEVEL 5** World-Class
Identify the root questions and true issues driving the project request, reconciling with those that have been explicitly stated.	Project work is taken at face value and addresses the stated request.	Discussion on requirements and issues takes place with project sponsors to clarify and further communicate project goals.	Prior to a the start of a project, detailed requirements and fundamental assumptions are documented, reviewed, and agreed upon by all parties.	A systematic process is in place prior to initiating work to understand, validate, and document the underlying base objectives, goals, and assumptions of the project.	A process is in place to efficiently highlight base issues and require-ments, yielding a project that achieves goals which the sponsors did not initially know how to articulate but now recognize as addressing their real questions.
Set measurable and documented objectives which have the agreement of stakeholders.	Goals of the project are basically to complete the work and to satisfy customer requests.	Project sponsors discuss their priorities and expectations for project completion.	Participants agree to and document a set of defined and prioritized goals and objectives for the project.	A well-established process is in place, using best practices to create and build consensus for meaningful and objective outcomes.	The organization is well-known for its ability to arrive at insightful measure-ments that clearly illuminate and calibrate prioritized outcomes.
Track progress toward the objectives and reframe root problems and issues against progress and changes external to the endeavor.	Basic goals and objectives are not significantly changed from their inception regardless of external or internal changes.	Progress is sporadically monitored to see if it is on course. If major events occur or core issues are found to be wrong, adjustments are made.	Periodic reviews of progress are consistent-ly held. There is a change process in place to adjust plans and reframe goals based on new information.	Insightful organizational processes ensure that the project is flexible and on target to address any course corrections and meet real end-date needs of sponsors.	Plans are seamlessly attuned to changes, dynamically adjusting to provide resources for efficient and timely proactive responses.
Cultivate healthy debate around problem frame; establish mental models that welcome divergent perspectives, question assumptions, and challenge bias.	Problem space is arbitrary and there is little discussion around problem frame.	Problem frame is basic and fairly obvious. Area of inquiry is mandated by leadership with little input from other members.	Problem framing is disciplined and collaborative, and members are welcome to provide feedback to foresight inquiry areas.	Members are rewarded for providing feedback around problem frame and divergent thinking is encouraged. Members regularly ask if they are asking the right questions and challenging bias.	Strong system of checks and balances for challenging bias and framing foresight inquiry. Organization consults with external network that provides feedback and all members are rewarded for challenging dominant mindsets.

PLANNING

Ensuring that the plans, people, skills, and processes support the organizational vision

	LEVEL 1 Ad-Hoc	**LEVEL 2** Aware	**LEVEL 3** Capable	**LEVEL 4** Competent	**LEVEL 5** World-Class
Identify the implications and consequences of alternative futures and actions.	Alternative futures are rarely considered—the expectation is that the future will be a continuation of today.	Alternative futures are occasionally considered, and these generally follow major trends identified and highlighted by the media.	Organization regularly looks at different possible futures and uses the documented implications and consequences of these exercises to determine their plans.	Organization has processes in place to review environmental indicators and develop a range of possible futures. For each of these, a thoughtful and thorough analysis is developed.	Organization has developed its own process and framework for efficiently and accurately reviewing downstream implications of a wide range of possible futures.
Explore a variety of potential strategies and options	The organization has a de facto strategy that may be inferred from the actions and investments that it makes.	A variety of strategies are considered quickly without any real exploration of their implications.	The organization has a best-practice process for evaluating potential strategies and uses clear criteria for deciding which strategy best meets its needs.	A systematic process is used to routinely re-evaluate strategies as new information and feedback are available. Strategy is often tested before implementation.	Members of the organization are recognized by their industry peers for their continual creative and breakthrough strategies.
Choose and refine a strategy that optimizes progress toward the organizational vision.	The organization expects that the normal course of events and smart daily operational decisions will achieve their vision.	On a periodic basis, such as yearly, the organization reviews and adjusts its strategy to make sure it is on plan to meet the stated vision.	There is a process in place to continually review and evaluate trendy or novel occurrences happening in the fringes of society.	Strategic alternatives are frequently evaluated via well-maintained quantitative models. Adjustments are made which optimize strategic decisions.	Strategic decisions are continuously refined based on real time data captured in a highly integrated intelligence system.
Develop a plan to address the activities, processes, talent, and communications required to achieve the strategy.	There are no formal project plans. Actions and decisions are made as needed and communication generally occurs when someone thinks to do so.	High-level planning matches skills and needs with periodic assessment of missing skills. Communication can occur frequently but generally does so in an unstructured format.	Formal plans and processes are in place for most or all areas of the organization to efficiently engage and manage employees, including communication structure.	Organizational structures and procedures have been redefined to eliminate bureaucracy and inefficiency. Detailed plans and processes are an inherent part of every employee's vocabulary.	Innovative new structures and policies have been created that engage the ability of the "learning" organization to grow and adapt as it smoothly executes well thought-out plans.

SCANNING

Collection of appropriate and relevant information in a format and timeframe that support useful retrieval.

	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
Map the domain of the system into a framework of areas to explore	The domain map is created from those areas directly and explicitly connected to the area of interest.	In addition to the directly connected areas, the domain map is augmented with other areas "called-out" by the information collected.	A recognized framework (such as STEEP) is used to create a complete domain map, supporting evaluation of many different facets of the system.	Organizational processes exist to define and build a comprehensive domain map, exploring domains such as second-order impacts.	An anticipatory domain map adjusts dynamically to changes to provide insightful observations from underlying streams.
Collect pertinent information from a range of diffuse and credible sources	Information is gathered from easily accessible resources commonly used by the project, and collected only as needed.	Information is collected from traditional resources as well as some novel sources. Effort is made, when time allows, to do general scanning.	Information is collected routinely from varied sources ranging from the traditional to alternative. Analysts consider information from other domains that could provide insight.	A systematic process collects information from a wide range¬ of resources and media formats on a consistent cycle providing for a comprehensive view of the topic.	Sophisticated methodology and tools provide timely and continuous collection of information, allowing for visibility on many dimensions with unique views of the topic.
Identify outliers or "outside-the-system" signals of impending changes that could impact the system	The media are the primary source for any signals of change.	High-impact and low-probability events are considered in addition to media spotlights when looking for potential surprises.	There is a process in place to continually review and evaluate trendy or novel occurrences happening in the fringes of society.	Best practices such as ethnographic journeys or wild cards, are part of the organization's culture to consistently identify outliers.	The organization has created unique practices in the industry to highlight potential changes including those not related directly to the topic.
Integrate external and internal information into a common framework and language	Scanned information points are taken as is, with minimal effort to understand and integrate them.	Linkages are informally made and generally within a category, providing a variable view of information.	Connections are made between different categories providing a comprehensive and cohesive view of scanned information.	Universal models provide a powerful world-view framework for deep understanding and an integrated picture of the information collected.	New, innovative, and dynamic models created by the organization bring context and insight to diffuse and wide-ranging data points.
Create a useful and accessible information repository	Scanned data is stored in an unstructured and ad hoc manner. Retrieval is generally by the person who collected the information.	An informal process is in place to collect, tag, and store information. Information can be retrieved but may take some time.	Information is tagged and stored in an organization-wide repository providing easy access to retrieve information of interest.	A high-tech repository with an intuitive structure helps facilitate insight and organize thoughts as information is retrieved.	Organization provides leadership in state-of-the-art content storage and retrieval, pushing out information in anticipation of need.
Establish broad set of external contacts, both formal and informal, to build network of futures thinkers.	No formal or informal external contacts - organization is isolated.	Some employees have formal and informal external contacts	Formal contacts are encouraged and in addition, informal contacts are maintained by some employees	Formal and informal external contacs are encouraged.	Building and maintaining a network of external partners is encouraged and perceived as important for every employee.
Inclusive and broad data collection. Gather diverse perspectives from across the organization	Only leadership are aware of and engaged in scanning, in a very narrow area of inquiry.	Some members are aware of foresight engagements. No clear way of contributing.	All members are aware of foresight engagements and encouraged to contribute thinking.	All members are incentivized to participate in foresight engagements.	All members are incentivized to build internal contacts and engage those contacts in futures thinking. All members have futures thinking as part of their individual mandates.

FORECASTING

Collection of appropriate and relevant information in a format and timeframe that support useful retrieval.

	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
Acquire insight into emerging ideas or themes with the aggregation of information into categorized clusters.	Information is organized based on identifiable surface information.	Information is collected and organized in a manner which supports the generation of ideas of interest.	Information is organized such that useful ideas and themes clearly emerge.	Organizational processes for aggregating information are based on established models, providing additional perspective and comprehensive framing for themes and ideas.	The organization is recognized for creating a framework which sets the standard for illuminating underlying discoveries in the information collected.
Consider the widest possible set of plausible alternative futures in evaluating choices or decisions affecting the system.	Alternative futures are generally in the comfort zone of the probable, and are variations on the expected future for the domain of interest.	Alternative futures are established from the domain of interest and directly related areas and provide for a range of possibilities.	Plausible alternative futures are drawn from analysis of all contextual categories to understand broader possibilities for the domain of interest.	Exploration of most of the plausible options is an integral part of developing alternative futures and provides complete coverage of the domain of interest.	The set of alternative futures covers the highly probable to the extremes of what's plausible, providing comprehensive coverage of the system.
Distill and detail plausible alternative futures into the working set for consideration.	Alternative forecasts are primarily used "as is" from the information collected.	Alternative forecasts are reviewed and a subset is selected. Additional information is documented to support the selected alternatives and present a more understandable view.	A manageable set of alternative futures covering the full range of topics is produced. Each alternative contains significant detail, supporting the key implications.	A systematic process is in place to produce a set of alternative futures. Each alternative is presented in a clear and comprehensive way	An optimal set of alternative futures is generated. Each alternative makes critical elements immediately apparent and the accompanying depth provides unchallengeable support.
Validate foresight to create an integrated set of credible and coherent alternative futures.	The set of distilled and detailed alternative futures is used "as is."	Follow-up research is done on a fact-checking basis.	Alternative futures are checked and revised so that they tell a coherent story.	Preliminary implications are identified to test the alternative futures for relevance.	The set of alternative futures is reviewed and revised to ensure that a balanced set of view-points and perspectives is represented.

VISIONING / REALIZING

Creation of a preferred future that imaginatively captures values and ideals

	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
Elicit and incorporate goals, values, and aspirations of members and stakeholders.	The leader sets their values and vision for the organization, and then communicates it to the organization.	The leader establishes the vision and then promotes it within the organization, highlighting its benefit and rationale.	Consulting with close advisors and senior leadership, the leader creates the vision that best represents their collective values and ideas.	The leader engages the majority of stakeholders using a facilitated process to develop a robust vision.	Vision and values are co-created with the full participation and energy of stakeholders.
Bring to the surface the underlying assumptions, espoused beliefs and values, and operational artifacts which establish the culture.	Members of the organization assume that that are the norm or that they follow the norm. and that their culture and the way it works are both obvious and consistent with what is generally portrayed by the media.	The organization recognizes some of the limitations of its culture ("that won't work here") but hasn't articulated how the culture works and how to leverage it.	The obvious aspects of the culture of the organization are known and are challenged as appropriate to move the organization forward.	Members of the organization have evaluated their culture, providing a solid understanding of both the obvious and subtle, enabling challenge and change for some of the underlying but more impactful areas.	A keen grasp of their culture enables members of the organization to create new ways to leverage themselves by purposely challenging current cultural modes of operation.
Articulate the unique contribution that frames the organization's view moving forward.	Members of the organization assume that providing industry standard offerings that are better some way (e.g., cheaper, faster) makes them unique.	The organization includes its internal strength (people or process) to help define its value to the industry.	The organization clearly articulates its value proposition by identifying and defining the unique contribution it is able to make.	The value proposition the organization has framed makes it unique among industry peers and easily identifiable by all industry clients.	The organization's value statement and identity become a synonym and standard for the industry.
Craft the vision in a manner that is both inspirational and motivational, resonating with the hearts and minds of those who will follow it.	The vision statement exists but is known to only a few people inside the organization and none outside the organization.	The vision statement is communicated across the organization and is used in selected exercises and venues.	The vision statement, known by most members of the organization, resonates with employees and customers alike and is identifiable with the organization.	The organization's vision is used to craft all external and internal communication, keeping the vision visible, current, and providing energy for organizational activity	Members of the organization are inspired and enabled to make decisions and take action to bring the vision to life providing a framework for all internal and external encounters.
Clearly articulate strategic foresight mandate. Display outcomes of foresight engagement and ensure they are accessible to all.	Members are unclear on the purpose of foresight engagement. No articulated vision of desired outcomes.	Some members are engaged with strategic foresight. Outcomes are superficial, and often have little impact on strategic initiatives.	Members are engaged with strategic foresight and purpose is clear. Outcomes generated are published and available for members to engage with.	Members are aligned on the purpose and value of strategic foresight engagement. Outcomes are clearly articulated and communicated throughout organization and inform strategic initiatives.	Preferred future is clearly articulated and is the organization's top priority. It is known to all members at the organization and are at the core of all strategic activities. Outcomes of foresight projects are shared externally and embody the organization's identity.

CLIMATE & COMMUNICATION

How an organization's ideas are communicated, and how the appropriate actions are triggered.

	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
Build strong mechanisms to share futures thinking across all functions of the organization.	Poor: information is ignored and hoarded.	Exchange of information is rare and happens only in predefined formal channels.	Exchange of information occurs on various levels but mostly in formalized channels.	Excellent: ongoing information sharing on many levels.	Other organizations learn best practices from them in how to share information (are invited to speak on the topic, have published material that is oft cited, etc)
Encourage strong Informal communication of futures thinking, integrating foresight into 'water cooler' conversation	Poor: no informal communication.	Limited informal information across functions.	Informal communication is encouraged, part of casual conversation.	Future insights are diffused effectively and often reach the relevant decision-makers through informal communication. Members regularly refer to the preferred vision of the future	Informal communication is a core value and organization has a system to evaluates its communication regularly. Members regularly refer to the preferred vision of the future with external stakeholders.
Clearly comunicate the goals, results, and implications of foresight activities	There are implicit and often undocumented goals and plans from foresight activities. The senior leaders may or may not be aware of the general direction and implications of this effort.	Goals and results from foresight activity are usually documented but are primarily communicated to managers and key people in the organization.	Goals and plans from foresight activity are conveyed to the organization. Everyone is aware of the implications and aligns work and responsibili-ties appropriately.	Everyone in the organization considers and uses the goals and plans from foresight work to inform their decisions and perform their daily activity	In addition to informing day-to-day decisions with implications from foresight activity, all organizational members become part of the immediate feedback loop that refines and adjusts the goals and results

CULTURE

Stimulating and sustaining the conditions for consideration of the long view

	LEVEL 1 Ad-Hoc	LEVEL 2 Aware	LEVEL 3 Capable	LEVEL 4 Competent	LEVEL 5 World-Class
Create an environment and processes that drive foresight knowledge into action.	The organization responds in an ad hoc manner to any foresight knowledge. Activities are undertaken without a clear sense of how it will be acted upon.	There is an informal process to include foresight information in formal plans. Organizational leaders may or may not be aware of it. If the situation allows, they try to include it.	Formal processes exist to make sure that knowledge gained during foresight activities is moved into the strategic and operational activities of the organization.	Systematic processes exist to drive foresight knowledge and implications into all existing organizational processes in a timely and non-disruptive manner.	Foresight knowledge is a basic pillar for all organizational activity. There is a tight feedback loop that provides additional insight from operational results back through to the foresight process.
Recognize the cultural artifacts and mental models operating in the organization and how they influence organizational decisions.	Members of the organization are not specifically aware of their culture and its impact on their operational processes.	There is recognition of the cultural differences and heritage of the organization. It uses this information to implement major policy changes.	Members of the organization have considerable understanding of how their culture works and use this knowledge explicitly in building effective strategic and operational plans and policies.	Members of the organization have a thorough understanding of their culture and have done a comprehensive analysis of how this interacts with strategic and operational aspects of the business.	The deep understanding of cultural elements creates a dynamic ethos that crafts new traditions and stories to continually evolve with change.
Build habitual, consistent practice of scanning the periphery	Limited and myopic: few people care.	Some people are looking into the periphery, but they are not known and called upon.	Some people are looking into the periphery, they are known but not called upon.	Active and curious: scanning the periphery is commonplace.	Robust, consistent scanning. Organization has set the bar for others and share their best practices.
Committment to Kaizen; incremental, continous improvement of future-facing organizational culture	Culture is scarcely referenced, or referred to in passing. There is little talk of a future vision on a day-to-day basis.	Culture is identified as a problem. The desire to be more future-facing is there, but not a priority for leadership. Members are not actively encouraged to spark change.	Organization considers its culture periodically. Leadership engages members in dialogue about creating more future-facing cultural conditions. Small changes are made, sporadically.	Disciplined effort to foster more future-facing culture. Members are encouraged to work on culture on an individual basis, and there is an ongoing conversation about culture.	Organization makes healthy, visible decisions to improve its culture every day. All members are encouraged and incentivized to be more future-facing and foster a more rewarding culture.
Cultivate testing environment for inquiry; welcome divergent perspectives, question assumptions, and challenge bias.	Foresight inquiry is not thoughtful. There is little discussion about why organization is engaging in futures thinking.	Foresight inquiry is basic and fairly obvious. Problem space is mandated by leadership with little input from other members.	Problem framing is disciplined and collaborative, and members are welcome to provide feedback to foresight inquiry areas. There is som knowledge of basic assumptions.	Members are rewarded for providing feedback and divergent thinking is encouraged. Basic assumptions are explicit, much talked about, and frequently challenged.	Strong system of checks and balances for challenging bias and framing foresight inquiry. External network that provides feedback and all members are rewarded for challenging dominant mindsets.
Use foresight as a heuristic to reduce uncertainty about the future.	When approaching uncertainty, organization refers to tried-and-true strategies that have worked in the past.	Organization looks to other strategies in the existing landscape to reduce uncertainty about the future.	When faced with uncertainty, organization considers foresight as a tool for planning and strategy.	Members are encouraged to use futures thinking as a mental model in times of uncertainty. Foresight is a strong component organizational thinking.	Organization uses foresight as a way of thinking to reduce uncertainty and challenge bias. Strong sense of checks and balances in place to challenge bias that engages external stakeholders as well as internal ones.