THE ORGANIZATIONAL VALUE FRAMEWORK – THE TWO MISSING LEGS OF FUTURE ORGANIZATIONAL REGULATORY FRAMEWORKS

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Traditional regulatory frameworks are clearly not completely effective in the prevention of catastrophes and other 'harmful' events. Where traditional regulation targets organizational procedures (particularly regarding system design), this paper examines a more comprehensive and novel approach to regulation with a focus that expands to include organization 'culture' and 'motivations.' The Organizational Value Framework (OVF) is a new model that represents the relationships between three key organizational elements: beneficiary stakeholders (and the managers who represent their interests), the personnel team and the system they design. The OVF also describes how each element relates with system performance metrics and levels. In so doing, the OVF both informs the organization on how to best invest and motivate is personnel to realize the most 'value,' and allows regulatory bodies to constrain value propositions to inherently motivate the organization to avoid harm.

The OVF helps define the nature and role of structural organizational relationships. Beneficiary stakeholders and their management representatives influence team behavior, who in turn influence system design. The system influences beneficiary stakeholder value through measures of effectiveness (MOEs) that (for example) include profit. Linking performance to all key elements allows personnel to be correctly motivated to produce the optimum system. The term 'optimum' refers to systems that correctly balance metrics such as time to market, overall functionality and reliability. As traditional regulation focuses on the process or design of the system, the OVF highlights two other organizational aspects that can be constrained: the value proposition (that motivates the organization) and the culture (which drives performance).

The OVF can help govern behavior that inherently motivates an organization to avoid 'harm.' It can be seen how this provides opportunities for regulators to constrain organizational value propositions and assess organizational culture. This effectively adds 'two legs' to the 'third leg' provided by traditional regulation. These approaches would likely have positively influenced previous incidents such as the Fukushima, Columbia, Challenger and Deepwater Horizon disasters. The OVF can be applied and shown how in each case, to be repeatedly perverted in a way that was effectively hidden until the disaster event.

By applying the OVF, it is clear that there are fundamental breakdowns in organizational 'value propositions.' By either not correctly assessing system performance in way that is inclusive of risk, reliability and quality, or not correctly motivating personnel, it is shown that organizational culture and motivation are causal factors of some of the world's most catastrophic accidents. Further, the OVF is demonstrated as having the potential to be the basis of future comprehensive regulatory frameworks which greatly minimizes the propensity of future accidents.

I. TRADITIONAL REGULATION – WHAT IT LACKS AND WHAT IT NEEDS

Regulation is a form of complex system management using rules or procedures.[1] In the context of things like risk, safety, quality and reliability, regulation is intended to preclude an organization from doing or creating something that may (for example) cause 'harm' to others. The aim of regulation is analogous to preventing organizations using 'roads' to get to 'harmful' places. Traditional regulation is like a set of 'roadblocks' erected on the roads to 'harmful' places. This narrowly constrains regulatory action to the use of 'roadblocks.' By inference, a system may be deemed safe, reliable or high-quality

[1] This definition is modified from several extant definitions such as that contained in Webster's dictionary, [1] and discussed at length in [2].

once an arbitrarily requisite number of roadblocks have been erected. This approach is restrictive, and as routinely demonstrated by the myriad of disasters that have occurred in 'regulated, safe systems,' does not guarantee success.

For an organization to get to a 'harmful' place, it needs three things: motivation, means and access. Traditional regulation deals with access only – 'roadblocks' attempt to preclude undesirable behaviors analogous with moving along a road to a 'harmful' place. Traditional regulation isn't intended to directly influence motivation or means. So when 'road systems' change from things like technological development, it may create access to 'harmful' places that was not apparent to the regulator when it installed the 'roadblocks.' Further, if beneficiary stakeholders realize more benefit when the organization goes to a 'harmful' place (such as by dumping untreated toxic waste into a river to save costs and increase profit) the organization will inherently be motivated to somehow circumvent 'roadblocks.' At its worst, organizations can ignore 'roadblocks' if they are confident that this will be oblivious to the regulator. The unintended acceleration of Toyota vehicles in the early 2000s is an example of criminal and organizationally pervasive actions to avoid regulatory requirements. [3] The Volkswagen fuel emission scandal is another. [4] Even if an organization defies history and somehow becomes inherently motivated to avoid 'harmful' places, it needs to have the means (associated with competent leadership and the culture it fosters) to do so. This reality establishes an ongoing and commercially adversarial relationship between regulators and regulated.

This paper outlines a fundamentally new approach to regulation – one that shifts away from the traditional exclusive focus on 'procedural compliance.' The proposed approach focuses on the structure of the organization, and how it can be constrained to be inherently motivated and have the ability to avoid 'harmful' places. This is achieved through an understanding of the 'organizational value framework' (OVF). The OVF sees traditional regulation that focuses on procedural compliance as one of three arms of a future regulatory framework.

I.A. Organizational Value Framework (OVF)

The OVF is a generic model that illustrates the key relationships within an organization that deals with risk, safety, reliability and quality and is illustrated in Figure 1. The OVF divides an organization into three key elements:

1. the **beneficiary stakeholders and the management or leadership team (management)** that represents their interests,

2. the **technical team** that is responsible for designing a system that provides a service or product, and

3. the **system** that provides value to beneficiary stakeholders.

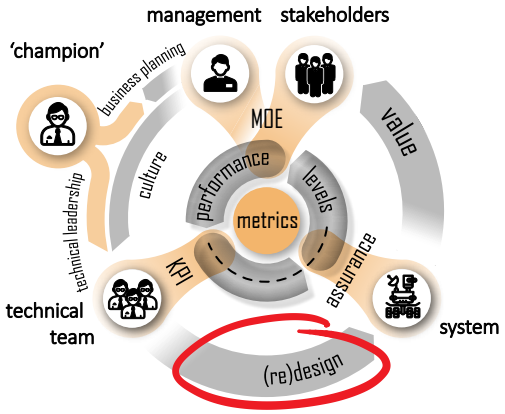

Figure 1: Organizational Value Framework (OVF)

Each element is structurally linked to the other in a cyclic manner. Management drives the professional culture of the organization, which motivates individual performance. The technical team designs and modifies (redesigns) the system in accordance with the culture created by management. The product or service created by the system then provides value to the beneficiary stakeholders. The relationships between each element, and how they relate to the proposed regulatory framework, will be covered throughout this paper. Importantly, the OVF does not involve new concepts – the concepts in Figure 1 are all well understood and thoroughly researched. What is novel is the interactions as represented in the OVF, providing clarity in perspective that assists a new regulatory approach.

The OVF revolves around the system's performance characteristics as captured through metrics. A metric is a standard for measuring or evaluating something. [2] One of the aims of systemic design is to ensure that all relevant metrics meet specific performance levels. Performance levels are sets of quantities of specific metrics that are designated as acceptable or desirable. The performance levels support organizational measures of effectiveness (MOEs). MOEs are the quantitative beneficial effects associated with a state of success or desirability. [3] MOEs are the key tenets of the organization's business plan and it is up to management to understand how this relates to value. For example, an MOE may be the revenue associated with electricity generation, or the number of submarines a military has available for national defense.

Once management has identified MOEs that can allow metrics to be identified along with corresponding performance levels, a framework needs to be enabled to measure performance. This is achieved through assurance, which is the state of being certain about something. Assurance is inherently challenging for concepts such as risk and reliability that are inherently uncertain. Assurance can involve a test regime or statistical inference that yields information about (for example) the mean time between failure of a product.

Once information about metrics can be obtained through assurance, people can be motivated to achieve them. A key performance indicator (KPI) is the quantitative extent to which the act of carrying out a task or providing a function contributes toward a state of success or desirability. [4] KPIs can be established for individual and team behavior that supports the realization of performance levels derived from MOEs.

The final part of the OVF is the 'technical champion.' He or she is responsible for technical leadership in risk, reliability, quality or other relevant technical fields. The idea of 'reliability' and 'quality' champions have been previously identified and discussed. [8] [9] The technical champion supports management through the provision of technical advice as it relates to their discipline. This could be through the generation of business cases that demonstrate profit increases associated with reliability improvement initiatives. They also provide technical leadership for the technical team, ensuring that the management intent is realized through their actions.

The underlying premise of this paper is that a mature and logical OVF is required to understand or model organizational outcomes. Once the model has been established, it can then be manipulated or controlled to meet regulatory intent. Traditional regulatory concepts apply to system design - it is the other two organizational relationships that form the basis of the regulatory framework proposed herein: motivational value and culture.

II. ORGANIZATIONAL MOTIVATION AND VALUE

A successful organization, by definition, is one that delivers value to its beneficiary stakeholders. A stakeholder is a person, group or organization that either can affect, can be affected by, have an interest in or have a concern in an organization. [10] A beneficiary is a particular form of stakeholder – one who gains a benefit from the organization. This is typically the owner of the organization (stockholders or shareholders). Non-beneficiary stakeholders include those who are likely to incur the cost of risk or safety. For example, the entire planet is a stakeholder of any nuclear power plant that can potentially have global catastrophic effects of failure. Estimates regarding the death toll from the Chernobyl Nuclear disaster range from 4 000 [11] to 985 000. [12] A 'Safe Confinement Shelter' is being constructed at a cost of $ 3.09 billion, funded by international donors through the European Bank of Reconstruction and Development. [13] The local Ukrainian town of Pripyat remains evacuated, and the costs incurred on the nuclear industry as a whole have been extraordinary. Virtually everyone in the world is or has been a stakeholder of the Chernobyl nuclear power plant, and by extension all others.

Regulation is generally needed when there is a conflict of beneficiary stakeholder interest (in the form of value produced by the system designed by the organization) and the interests of non-beneficiary stakeholders (such as those who incur a risk consequence in the event of harmful organizational practices). By definition, the premise of regulation in this context is that beneficiary stakeholder value motivates organizational behavior in potentially harmful ways from the perspective of non-beneficiary stakeholders. This requires a deeper understanding of what 'value' means.

Value is a measure of the net benefit or preference provided by a system or service to a beneficiary stakeholder, which is the ultimate aim or business of the organization. Value may be of the form of profit (which is disbursed amongst shareholders),

[2] Modified from the definition contained in [5].
[3] Definition is adapted from the military-centric definition contained in [6].
[4] Based on definitions and concepts discussed in [7].

or capability (such as national defense afforded by a well-equipped military force). The goal of corporations is explicitly to provide value in the form of profit to its owners.

Beneficiary stakeholders, such as shareholders or owners, are often not well-equipped to run the organization. They will often employ 'boards of directors,' 'chief executive officers' or other people with specialist skills to run the organization on their behalf. Collectively, these people are referred to as 'management.' Management is the group or function that coordinates the efforts of people to accomplish goals and objectives by using available resources efficiently and effectively. In effect – management teams are stakeholder (beneficiary) proxies who represent their interests.

So where can beneficiary value create a 'harmful' organizational motivation? For example, a company faced with a choice of disposing of toxic waste in a responsible but expensive way or cheaply dumping the toxic waste amongst an impoverished population is inherently motivated to pursue the latter to maximize profits. This occurred in 2006, when the Dutch company Trafigura Beheer BV elected not to pay the € 1 000 per cubic meter disposal cost for a mixture of fuel, caustic soda and hydrogen sulfide in the Port of Amsterdam. [14] They instead shipped it to Ivory Coast and paid a local contractor to dispose of the waste at various open sites across the port city of Abidjan. This caused 17 deaths and 30 000 injuries. [15] This sort of corporate conduct happens regularly. So if one wishes to control the inherent motivations of an organization, it must constrain the value proposition.

II.A. Leg 1 – Constraining the Value Proposition

Constraining an organization's value proposition motivates it to avoid 'harmful' places and situations. The organization will then not try to circumvent regulatory 'roadblocks' because it is not motivated to head towards 'harm.' This implies that the organization's beneficiary stakeholders is maximized when, and only when, non-beneficiary stakeholder 'harm' associated with risk, reliability and quality is acceptable or desirable. The complete development of ways in which the value proposition can be constrained through regulation is beyond the scope of this paper. It is necessary complicated by the fact that it will depend on judicious review on a case by case basis – not through compliance with a prescribed checklist of 'regulatory practices.' This will no doubt challenge the comfort of compliance checkers who favor prescribed checklists – but outsourcing thinking to a checklist does not work.

The idea of constraining the value proposition is to ensure 'stakeholder value fairness.' That is, the organization pays the costs associated with the risks it imposes on non-beneficiary stakeholders in a way that ensures they are no worse off. The resultant challenge then revolves around ensuring that beneficiary stakeholders effectively lose value when the organization deviates from this situation. Three possible methodologies are outlined below.

II.A.1. Mandatory Total Probabilistic Risk Based Insurance

Mandatory 'total' insurance with no exclusions based on comprehensive probabilistic risk analysis of an organization philosophically ensures that an organization's value proposition achieves 'stakeholder value fairness.' The reality is that for most catastrophic events, governments and populations (non-beneficiary stakeholders) pay the costs and suffer consequences in lieu of the organization responsible for the catastrophe. The cost of electricity to the Japanese has increased by $ 30 billion per year as nuclear power was replaced with fossil fuel generated power after the Fukushima disaster. [16] No private insurer covers the cost of changing public sentiment in response. The Japanese government and its people in effect are continuing to fund an ongoing insurance 'payout' due to their ultimate liability for catastrophic loss – fair or otherwise.

For total probabilistic risk based insurance to work, it needs to be analytical and not actuarial. Specifically, premiums need to be based on organizational analysis and not historical data. As the government and its peoples are ultimately liable for catastrophic consequences regardless of cause, typical exclusions like negligence can't exist. This is particularly obvious when (for example,) one considers that private insurance of Japanese nuclear facilities does not cover earthquake shock. [17] Exxon attributed the blame for the Exxon Valdez oil spill of 1989 to the ship's captain, in an attempt to absolve its liability. [18] However, the National Transportation Safety Board (NTSB) identified cultural practices with Exxon that involved over-working and under-staffing crews [19, p. 26] to enable quick turnaround times in port. The official and legal ramifications associated with the Exxon Valdez disaster (both compensatory and punitive) continue to this day. [20] Exxon made short-term cost cutting decisions that directly contributed to the disaster, [19] which lawmakers, fishing industries, indigenous peoples remain of the belief that this has not been accounted for. [21] [22] Actuarial policies that do not analyze individual company's cultures does little to motivate improvement. The premium must therefore be based on an assessment of the organizational culture and how it influences professionalism, and employee motivation to avoid 'harm.' This is discussed later.

Total probabilistic based insurance cannot be limited to 'cultural' consideration. In 2006, Tokyo Electric Power Company (TEPCO) executives ignored their own engineer's analysis regarding the prevalence of tsunamis that exceed 14 meters. [23] They internally decided not to build an appropriate sea wall at Fukushima (along with many other ultimately disastrous decisions) based on their dismissal of a thorough risk assessment. An external, independent body tasked with assessing the premiums associated with a total probabilistic risk based insurance would have taken such risk assessments into consideration, meaning that the premium TEPCO would had ultimately paid would likely have been prohibitively high in the absence of an appropriate sea wall. TEPCO, forced with a choice to pay this premium or install the sea wall, would have chosen the least expensive option, ultimately maximizing value for all stakeholders.

II.A.2. Mandatory fees for services

Organizations that need to undertake specific actions to avoid 'harm' can be forced to pay for these services up front and to a regulatory body tasked with implementing these actions. For example, the Dutch shipping company Trafigura Beheer BV (and other organizations in similar situations) could be asked to pay for mandatory toxic waste disposal via a service that is provided by the regulator. The fee could be based on production amounts or usage rates so that the organization would incur additional cost (and realize less value) if does not then use the service it has already paid for.

As an industry, organizations would also be inherently motivated to identify methodologies to reduce the fees for services. For example, if a more cost efficient way of disposing toxic waste was identified, it could then be put to the regulatory body who would have ultimate responsibility to validate its effectiveness. This is contingent on mature lines of communication between all parties, but based on an inherent and underlying motivation.

II.A.3. Mandatory responsibility for outcomes

If an organization will impose 'harm' on non-beneficiary stakeholders, it could be 'made' responsible for the risk consequence. For example, a chemical company is seeking permission to build a manufacturing plant. This company requires to pump waste into a river. As opposed to imposing just procedural constraints regarding waste treatment, the regulator could require the company to be responsible for water quality in its entirety. The removal of focus on process and procedure will also motivate the company to find more cost effective ways to treat waste. This is premised on the enduring ability of the regulator to rapidly and quickly assess water quality. The company in question would not be allowed to operate if the water quality is unsatisfactory. There is no ambiguity, legal argument or other impediment to challenge the constrained value proposition.

II.B. The Benefits and Barriers

The ability to constrain value propositions in the ways described above virtually eliminates the catastrophes that have become synonymous with risk and regulation case studies. Tokyo University professor emeritus Kiyoshi Kurokawa who led the investigation into Fukushima stated in response to the commercial motivations of TEPCO dominating operating decision making that:

> *… [the incident] cannot be regarded as a natural disaster … It was a profoundly man-made disaster – that could and should have been foreseen and prevented. [23]*

In direct response to the Space Shuttle Columbia Disaster (and indirect response to the Space Shuttle Challenger Disaster,) the Columbia Accident Investigation Board (CAIB) concluded that the:

> *… organizational causes of this accident are rooted in the Space Shuttle Program's history and culture, including the original compromises that were required to gain approval for the Shuttle, subsequent years of resource constraints, fluctuating priorities, schedule pressures, mischaracterization of the Shuttle as operational rather than developmental, and lack of an agreed national vision for human space flight. [24]*

The catalogue of man-made disasters virtually exclusively contains incidents that result from commercial or beneficiary stakeholder motivations that have actively resisted regulatory or 'safe' practices. Further, constraining organizational value propositions to drive motivation can often reduce costs. For example, had Trafigura Beheer BV and other similar organizations paid for toxic waste disposal up front in a way that the regulator knew that it would not be cost-effective for them to not use their services, there is little cause for expensive compliance checking or safety inspection.

However, implementing such measures involves substantial regulatory cultural change as well. Regulation is most easily imposed procedurally, via prescribed checklists and compliance auditing. What is called for in this paper will involve at least some subjective expert opinion

Concepts such as 'self-insurance' and 'self-regulation' are steps in the right direction without being robust solutions in their own right. In the case of the maritime industry, shipowner liability has been legislatively limited since 1734, when the United Kingdom enacted the Responsibility of Shipowners Act …

> *to promote the increase of the number of ships and vessels, and to prevent any discouragement to merchants and others from being interested and concerned therein. [25]*

Shipowner liability is limited today under two conventions [26] [27] that allows states to encourage local maritime industries. This sees maritime risk management deliberately constructed to provide fiscal incentives for shipowners that may contradict other implicit goals that seek to mitigate risk.

III. ORGANIZATIONAL CULTURE

NASA astronauts are subjected to intensive emergency action training before they embark on a mission. [28] The training is comprehensive and run by specific testing crews – not the astronauts themselves. As a result, no fatalities have been caused by astronaut error. In three spacecraft-related fatal incidents, it was NASA management that repeatedly failed to respond to the initiating events of risk scenarios. In the Apollo 1 spacecraft fire, NASA failed to identify the test as hazardous, had limited emergency response systems, [29] and had re-installed flammable material that the crew had asked to be removed due their concerns regarding onboard fire. [30] NASA Administrator James Webb and his deputies were criticized by a Senate Committee regarding a 'lack of candor' in the following investigation regarding enduring issues of quality and reliability throughout the program. [31]

In the aftermath of the Challenger disaster, famed Physicist Richard Feynman noted that …

> *[it] appears that there are enormous differences of opinion [within NASA] as to the probability of a failure with loss of vehicle and of human life. The estimates range from roughly 1 in 100 to 1 in 100,000. The higher figures come from the working engineers, and the very low figures from management. What are the causes and consequences of this lack of agreement? Since 1 part in 100,000 would imply that one could put a Shuttle up each day for 300 years expecting to lose only one, we could properly ask "What is the cause of management's fantastic faith in the machinery?" .. It would appear that, for whatever purpose, be it for internal or external consumption, the management of NASA exaggerates the reliability of its product, to the point of fantasy. [32]*

And in 2003, 36 years after the Apollo 1 crew compartment fire, and 17 years after the Space Shuttle Challenger disaster, NASA fundamentally failed to manage and understand risk in a way that caused the Columbia disaster. The CAIB concluded that amongst a litany of other failings:

> *… the workforce within [the Space Shuttle and International Space Station] programs thought there was considerable management focus on Node 2 (a module that NASA management wanted to be installed by the Columbia crew on the International Space Station as soon as possible) and resulting pressure to hold firm to that launch date, and individuals were becoming concerned that safety might be compromised. The weight of evidence supports the workforce view. [24]*

The gross discrepancies in the safety culture at NASA were again obvious for the investigation board. The specific issue that caused the Columbia disaster was identified before the Challenger Disaster, where one would think that the intensity of that event would result in something being done about it.

Organizational culture is the responsibility of management, who are driven by beneficiary stakeholder interest, in turn driven by the value proposition. One would reasonably expect to see cultural issues associated with flawed value propositions. In the absence of 'stakeholder value fairness' with organizations selfishly focusing on beneficiary value, distinct symptoms with regard to cultural characteristics will tend to manifest. Further, cultural shortcomings can emerge regardless of organizational motivation. This turns our attention of a new regulatory framework to one that looks at culture in a meaningful way.

III.A. Leg 2 – Testing Culture

Testing organizational culture may seem difficult, but there are several precedents for this type of assessment. Culture is the collective behaviors, motivations, beliefs, actions and thought processes in a place or organization. Militaries, emergency response teams, astronauts and other action oriented teams have their culture routinely assessed. Management often sees itself above the need for continuing development – particularly in Western societies. In 1970s Japan, when they were producing systems with the comparatively highest levels of quality contemporarily observed, managers were extensively trained when their US counterparts saw no need for it. [33] Noting similar challenges in constraining the 'apparent value proposition,' the development of techniques that can test and quantitatively assess organizational culture is beyond the scope of this paper. However, three possible methodologies are mentioned below.

III.A.1. Confidential Surveying – Organizational Maturity

The concept of 'reliability maturity' is associated with subjective surveys undertaken by reliability engineers. Questions are asked regarding specific areas that relate to reliability performance. Subjective assessment of importance is made using a five tier scale. The historical correlation between the resultant assessment of 'reliability maturity' and commercial effect are illustrated in Figure 2. This clearly illustrates the ability to identify a 'positive' trend between a 'culture metric' and some tangible effect.

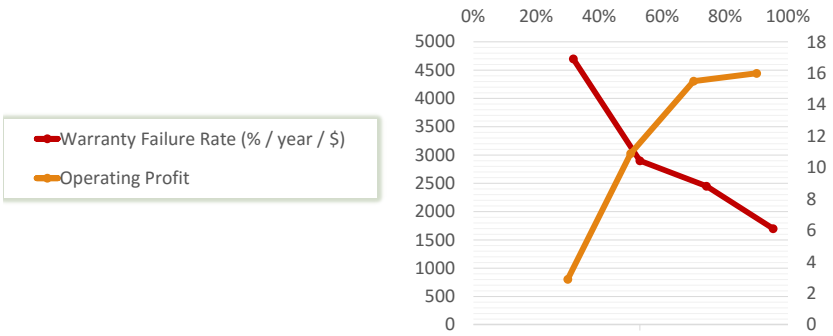

Figure 2: Correlation of 'Design for Reliability' Usage Score and commercial measures of effectiveness (MOE) [34]

The surveys upon which Figure 2 are based on complicit organizations. Recalcitrant organizations may bring pressure to bear on employees completing surveys like this. This may require anonymous, electronic surveys in 'high-risk' industries. The will allow two things: the provision of specific advice regarding likely organizational shortcomings, and precursors about generally harmful practices that may have immediate effects.

III.A.2. Confidential Surveying - Uniformity of Opinion

Of the many organizational failings that have routinely resulted in catastrophes, communication and trust is a recurring symptom. In 2006, a Royal Air Force Nimrod maritime patrol aircraft crashed in Afghanistan after fuel leak caught fire. The most probable cause of the leak was associated with air to air refueling. The Nimrod was originally never intended to be refueled in flight, and temporary modifications made in the 1980s were used continuously thereafter. In the five years before the crash in 2006, an aircraft safety case for the Nimrod aircraft was drafted by BAE systems. In conjunction with the UK's Ministry of Defence (MoD), this safety case was ultimately concluded to be a 'lamentable job' surrounded by an environment of general 'malaise.' There was a perception in the upper management and engineering levels of the MoD that the Nimrod was safe, and the safety case was a 'regulatory formality.' However, it failed to investigate the hazard that resulted in the crash. This was in spite of several previous fuel leaks and onboard fires. [35]

Particularly troubling was the fact that Nimrod ground and flight crew were highly concerned about a deterioration in airworthiness. [36] This was evident before the final review that identified damning organizational shortcomings. Again, there was a cultural and managerial downplaying of risk that directly caused the crash, and 14 fatalities. Again, an anonymous survey could have identified the discrepancy between managerial and technical perceptions of risk. This could have triggered many things in the case of the Nimrod, including a basic review of the underpinning capability plan of the MoD. Such a review would have very quickly identified that the UK's Defence Strategic Review of 1998 essentially cut budgets with not only no reduction

in operational intensity. Charles Haddon-Cave, author of the Nimrod Review, identified in particular how Defence strategists had simply sacrificed airworthiness to achieve the fiscal goals of the Strategic Review. [35]

III.A.3. Testing Management

There is no reason why testing organizational management to respond to the initiating events of risk consequences cannot be implemented. There may be plenty of reasons why it may be difficult, perhaps mainly revolving around commonly held perceptions of how 'management' ought to be treated. However, it is difficult to see how such a testing approach wouldn't have been particularly useful for all the catastrophe scenarios referenced herein.

For example, should an organizational test been conducted on NASA circa 2003 to gauge how it responds – as an organization – to a number of initiating event scenarios (where only some require remediation), it would have likely resulted in significant shortcomings being identified in its safety assurance program. In particular, it would have likely identified that the same individual was responsible for four separate roles within NASA administration, some of which were safety assurance, and others for quality assurance (subordinate to another manager) in an operational role.

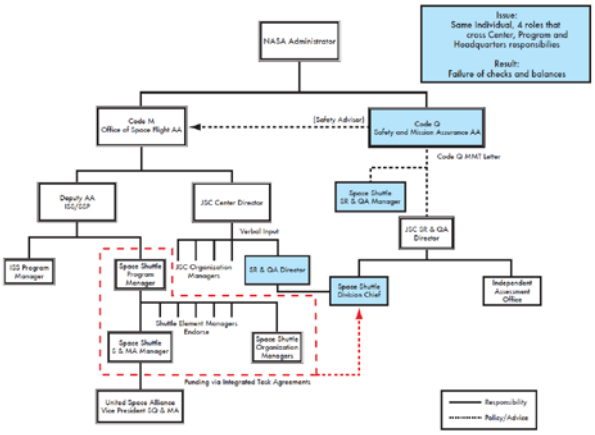

Figure 3: NASA Operational and Safety Organizations – the blue boxes represent the same individual concurrently responsible for safety assurance and operational team membership. [24]

Once management has been tested in such a way, identified formal processes for the handling of hazardous scenarios can be examined further to identify how similar issues had been handled. If no formal process can be identified as part of the test, then there is a significant problem has been identified that allows remediation.

IV. CONCLUSIONS

The frightening rate of occurrence of human-made disasters and catastrophes, all of which resultant from organizational shortcomings, demonstrates the limitations on extant traditional approaches to regulation. These approaches focus on procedural compliance and little else. However, the OVF illustrates two other aspects that future regulatory frameworks can address: value and culture. This involves inherent challenges, not least of which is the almost overwhelming bias for a 'checklist' approach to regulation or assessment. However, if nothing changes (in regard to regulation), then nothing changes (in regard to the extent to which regulation prevents disasters and catastrophes).

This paper described a possible regulatory framework that goes beyond procedural, traditional regulatory compliance. By constraining an organization's value proposition to ensure 'stakeholder value fairness,' the organization is inherently motivated to never 'test' the bounds of procedural regulation. In effect, the enduring adversarial role between the regulator and the regulated becomes moot. Further, by assessing an organization's culture, an objective analysis can be undertaken about underlying organizations motivations to provide early warning about harmful practices.

Future work is required in regard to implementation. Notwithstanding, a number of scenarios and methodologies are proposed above that demonstrate the feasibility of such a new regulatory approach. In examining the disasters and catastrophes referenced herein, the suggested approaches offer real utility for limiting the prevalence of these sorts of risks being realized again in the future.

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