Relating the Cultural Iceberg to Organizations and Information Warfare

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Abstract

The Iceberg as initially proposed by Schein is often used when considering organizational culture and to try to understand what leads to visible behaviors and actions through surfacing the assumptions, values and beliefs that led to the selection of strategies, goals etc. When considering C2 in a contested environment, decision-making should never take place without fully understanding the context within which the decisions are being made. From all that is observable, we select those aspects that interest us and interpret them in our personal context and give them meaning accordingly. We will draw conclusions having applied our existing assumptions, frequently without acknowledging them, and develop beliefs based on these conclusions. Finally, we take actions that seem right in our context. The actions we may take will be from our personal repertoire according to the means available to us, the strength of our drive (motivation), and any constraints or restraints imposed on us. However, we need to see the 'other' by standing in their shoes and seek to understand their beliefs, values, motivations, and drives. We need to understand the impact of their organizational structures and technology on their courses of action. However, we also need to recognize they are doing the same to us, so we also need to look within to assess as best as possible those actions being taken against us to influence our beliefs, values, motivations, structures, and technological enablers. Finally, we explore what the impact on organization and C2 approaches and the challenges that need to be addressed. This is the critical understanding we need to achieve success.

1 THE ICEBERG

The Iceberg as initially proposed by Schein [1] is often used when considering organizational culture and to try to understand what leads to visible behaviors and actions. Initially, when we are involved with another organisation, either because we wish to do business with them, or we are joining as a new hire, the actions and behaviors we see around us are different. Also, as a systems practitioner, when seeking to unearth causes of malcontent, or poor performance, it is important to determine, as far as possible, what the underlying strategies, goals and rules are. Furthermore, in order to understand why these were proposed, one needs to surface the assumptions, values and beliefs that led to the selection of strategies, goals etc.

The iceberg model is a metaphor where the 10% visible part of an iceberg relates to the visible actions and events involving people and organizations. Just below the surface, so hidden from view, are the patterns of behavior, the trends over time that give rise to the behavior and events observed. At a deeper level are the systemic structures that determine how the various parts are related, the processes imposed and the relationships between people which influence the patterns. These structures can include physical things such as roads, rivers, and terrain; organizations such as governments, universities, and companies; policies such as regulations, standards, and laws; rituals within social structures; as well as individuals' ways of thinking. The deepest part of the iceberg represents the mental models and cultures, the values, assumptions, and beliefs, that implicitly lead to the design, implementation, or establishment of the systemic structures.

This is most significant within organizational development when seeking to support change in an organisation. Just forcing changes to process and structures will not lead to sustainable change. Likewise, re-writing strategies and goals will effect short-term change, but sustained change is generally only achieved when the underlying assumptions, beliefs and values are surfaced and influenced. This cannot be forced onto people but may be addressed through conversation and involvement.

Additionally, in a contested situation, where one needs to understand 'the other', understanding what might be leading to their actions and behaviors is important in order to consider courses of action. One also needs to understand one's collaboration and coalition partners from the same perspective. Furthermore, it helps identify the information required to achieve such understanding,

enabling it to be acquired and shared as required.

In Hall [2], which was one of the contributions to Schein's work, the iceberg can be teased out into a little more detail as illustrated in Figure 1 below.

Our personal beliefs and values foster our mental models and culture. When shared, these also apply to an organisation whether it is a commercial company, a government department, or a social club. These, together, constitute our identity, or notion of self, and it is this 'self' that we defend when attacked verbally or our thoughts are criticized. Our identity distinguishes us from our environment, and we are structurally coupled with our environment. Indeed, we primarily interact with our environment to maintain our 'self' and respond to perturbations caused by our environment. This notion of self also applies to an organization.

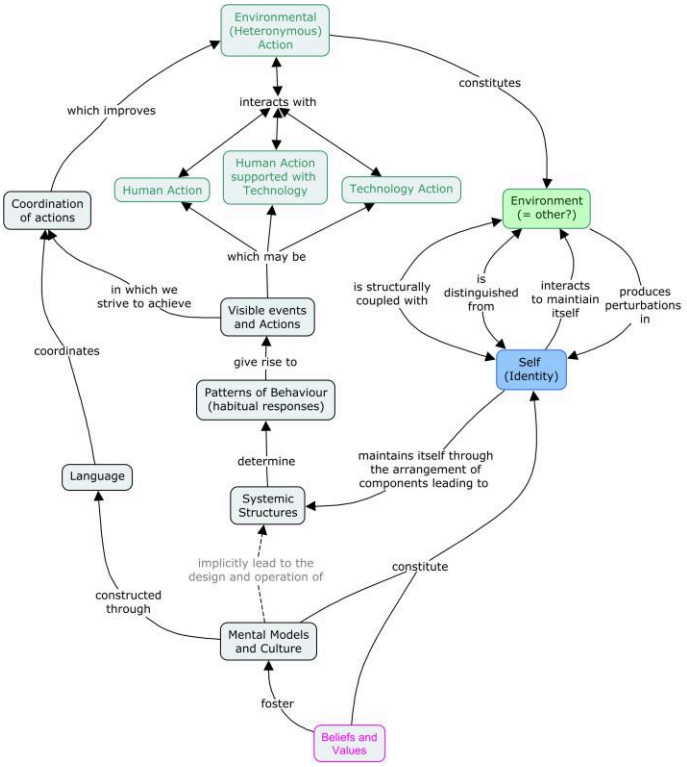

Figure 1 - Self and Environment

We, or the organisation, maintain our self through the setting and changing of systemic structures according to perceived need. These may be our network of family and friends, the structure of our day, our living arrangements, our way of thinking and seeing the world or, from an organizational perspective, the organizational structures, business processes, enterprise architecture, etc. These will determine the habitual responses and give rise to our interaction with the environment through visible actions and events which may or may not involve technology. From an organizational perspective, there may not be human involvement, and the action is pure autonomous technology. Angyal includes the term heteronymous in heteronymous action [3] to denote that the environment isn't passive, and will respond to the action undertaken, perhaps to 'push back' or resist it.

The final part of Figure 1 illustrates that we will express our mental models and culture implicitly through our language. We strive to achieve coordination of our visible actions and events and use our language to coordinate this coordination of actions. This coordination of actions is a key aspect of C2.

2 THE ENVIRONMENT

Angyal [3] argues that we can only interact with our environment and not directly with another (apart from a physical contact, that is). Hall [2, p. 100] notes that "it is impossible to separate the individual from the environment in which he functions". Context is critical in sharing understanding. The elements of the environment which influences what someone perceives is "status, activity, setting, and experience, as well as culture" [2, p. 101]. When we talk to another, or instruct another, we have no idea how what we say is received. They will take in our words (or not), potentially translating them into their own language, and position what we say along with their prior knowledge, their own beliefs, values and mental models, and construct meaning accordingly [4]. The exchange may be followed by an action, but we cannot claim to have caused that action, because we have no knowledge of what led to the action being taken by another. It is possible that we have caused the other to reflect on their values and beliefs and change their mental models. This will lead to them re-constructing their 'self' leading to a change in patterns of behavior and, thus, visible actions.

We create events and see events all around us. These are the visible actions in our environment which are the result of our and others' conscious and subconscious endeavors. These endeavors may be attributable to personal or organizational drives, or the outcome of an engineered physical or computing system. What is common to all is that the rationale behind the action is difficult to determine by observation alone. However, we will generally attribute some purpose behind the actions observed, probably based on our own perception of the situation. Let us consider this in more depth.

When we consider events from a personal perspective, it can be argued that there exists a series of connections between some deep desire within us through sub-conscious and conscious through and planning to an action being taken in our environment, observable by

others. Considering it this way, it is difficult to discern a boundary between self and environment.

The nature of military missions is that they have now risen "to the level of complex endeavors" [5, p. 29]. This led to the multi-dimensional evaluation through the lenses of PMESII, the Political, Military, Social, Information, and Infrastructure perspectives. This evaluation should be augmented by incorporating Cyber into each of these perspectives, but it is the linkages or relationships between these, especially the cognitive, virtual and physical perspectives that adds further complexity. Furthermore, "[c]omplex enterprises differ from traditional organizations [. . .] the degree to which they share mental models, values and priorities, the degree to which they develop shared awareness, and their ability to synchronize actions" [5, p. 30].

3 CHOOSABLES

Decision-making should never take place without fully understanding the context within which the decisions are being made, but frequently assumptions are made without a full understanding, and often without considering the context at all. From all that is observable, we select those aspects that interest us and interpret them in our personal context and give them meaning accordingly. We will draw conclusions having applied our existing assumptions, frequently without acknowledging them, and develop beliefs based on these conclusions. Finally, we take actions that seem right in our context. The actions we may take will be from our personal repertoire according to the means available to us, the strength of our drive (motivation), and any constraints or restraints imposed on us [6, p. 12], [7, pp. 106–107] as illustrated in Figure 2 below.

Our capabilities give us the means of doing or thinking things. We will always have a degree of drive or motivation to think or act, and though we desire autonomy, there will always be a greater or lesser degree of heteronomy that restricts our choice of action. This may be social norms, company rules, compliance obligations or environmental restrictions.

The degree to which you exploit the means available to you will depend upon your strength of motivation, or drive, and the limitations or freedoms resulting from the order imposed. Order is an environmental imposition, whereas drive is internal to you. Consider also the actions taken by individuals in disaster zones, or theatres of conflict. It can be quite insightful to consider the variety of options available to two parties in conflict especially when one is a sophisticated western power abiding by the international law of armed conflict, and the other a locally formed and armed group fighting for rights and values they passionately believe in.

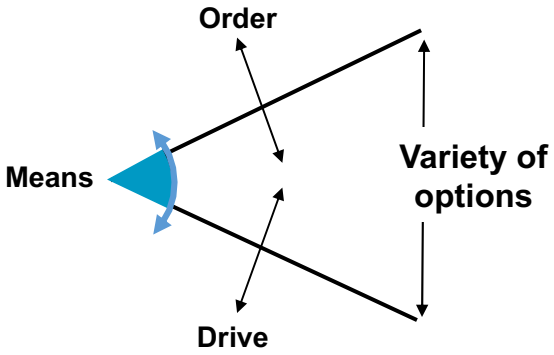

Figure 2 - Freedom of Options (derived from [6, p. 12]*)*

4 LINKING THE ICEBERG TO CHOOSABLES

The diagram at Figure 3 combines the thinking from above. Here we view the model from the perspective of an organisation[1]. The variety of options on the right-hand side refer to those options available to the organisation.

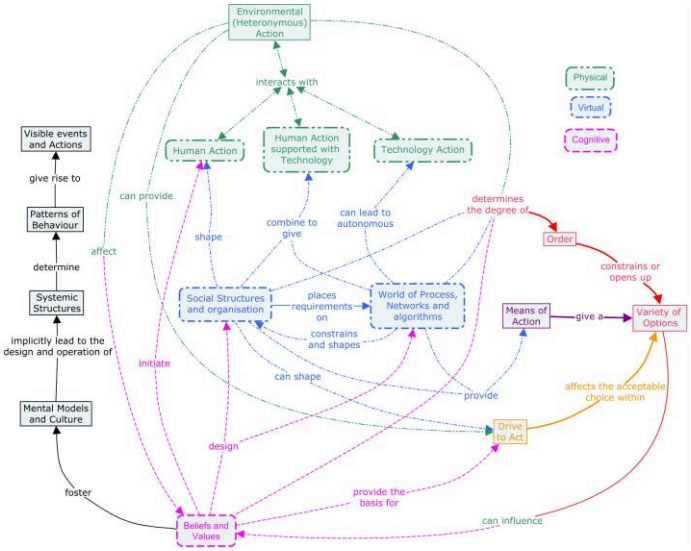

Figure 3 - Beliefs to action through choosables

The organizational beliefs and values will lead to the design of the organisation, and the implicit social structures therein, as well as the business processes and associated computing and communications and

[1] This is equally applicable to a society.

equipment (technical infrastructure) required to support it. Traditionally, it was considered that the organisation placed requirements on the technical infrastructure, but increasingly, it is the technical infrastructure that constrains and shapes the organisation structures and related processes.

The social structures and organisation shape human action, though if individuals are confounded by the organizational structures and technical infrastructure, a strong commitment to the organizational beliefs and values may lead them to act directly. The social structures and organisation, and the technical infrastructure can combine to give human action (driving a car, flying a plane, writing an email designing a building). Whereas autonomous technology can act without human involvement (driving a car, giving an insurance quote, identifying a computer network intrusion).

The organizational structures and technical infrastructure provide the means of action available to the organisation. The drive to act may come from the beliefs and values within the organisation exercised through the employees, or in response to heteronymous action from the environment. This drive can be shaped by the organizational structures in that a strong hierarchy may diminish an individual's drive to act or another structure may empower an individual and strengthen their drive to act.

The degree of order, or control, that constrains or opens up the variety of options may be determined by the organization's beliefs and values, the organisation structures, technical infrastructure, or actions and reactions from the environment. And finally, the environmental (heteronymous) response may affect the organization's beliefs and values.

Note, also, that the diagram at Figure 3 has been (color) coded to indicate those elements that relate to the cognitive aspects, physical aspects, and virtual aspects. The repertoire of actions available will differ according to these aspects; we will return to this later.

Operating in a dynamic environment, and in order to remain viable, an organisation will need to be constantly responding to perturbations and adapting as required. So, considering the self – environment interactions as expressed in Figure 1, there are a range of options available and where actions may be taken. They are in two distinct areas: internal change and adaptation; and in external actions with the environment. Many change initiatives consider taking action to change the organizational structure and technical infrastructure, but few consider the need to address the organizational beliefs and values.

5 CHOICES IN THE DEFENSIVE CONTEXT

Let us now consider a cyber context and consider a scenario where the organisation is vulnerable to a cyber-attack or is subject to a cyber-attack, illustrated here as the environmental (heteronymous) action leading to a drive to act.

The options available differ according to whether the cognitive, virtual, or physical elements are being considered. Action in the cognitive space may be an awareness campaign to help improve all staff awareness of the cyber threat and what they should be mindful of. This would include suspicious emails, messages, and activities with regard to the organisation as well as the need to ensure software updates are regularly undertaken and privacy and security controls are implemented according to the organization's range of policies. However, the organisation must consider how to influence the belief and values of their staff appropriately as well as to encourage the development of an organizational culture that is cyber-aware.

Actions in the virtual space might include addressing the organization's structure and establish appropriate protection and controls to mitigate cyber risk across the technical infrastructure. This would be enhanced were it undertaken by staff with appropriate beliefs and values that are mindful of the cyber threat. Some actions may be staff informed by or employing technology to notify breaches or may exploit autonomous actions to identify and respond to attacks.

Finally, actions in the physical space may include checks of ID badges and challenges by any staff member of those not displaying them, staff checking of audit logs and use of two-factor authentication, or Artificial Intelligence agents running on the network finding and destroying viruses autonomously.

6 ORGANISATIONS IN CONFLICT

It is helpful to extend the diagram to include another organisation as we are generally collaborating or competing with others. This is illustrated below in Figure 4. Here we have extended the options to illustrate the actions that could be taken against another[2] (indicated by the bold green arrows). Actions in the virtual space may

[2] Here we are considering actions undertaken by an organisation legally empowered to do so.

be taken to detrimentally affect the organization's structure and technical infrastructure, or in the cognitive space to influence their beliefs and values in such a way that any threat is negated. An important point to note is that actions in all three spaces must be coordinated due to their relationship to each other and the fact that beliefs and values are the fundamental drivers.

Significantly, the other organisation will not be passive and accept what happens to it. It, too, will be considering its options and taking action against us (indicated by the bold orange arrows).

When considering a conflict, in Figure 4 one can identify the two organizations interacting directly with each other across the range of human, human supported by technology and technology actions. Also, the wider environment will also interact with them. This may include natural activities such as weather, local affected communities, or international law

Whilst conflict is taking place directly in the physical space, there will also activities seeking to affect the virtual and cognitive spaces. This, as it is a dynamic environment, will be a continual 'dance' between the opponents, each seeking to gain the upper hand on the other. It is clear, however, that actions must be coordinated and, under international law, any before any action can be lawfully undertaken, the aggressor must be aware of the impact of their actions and not contravene international or national laws.

In order to determine what actions are appropriate, and how they must be coordinated to achieve the desired outcome, we must have a clear and shared understanding in the planning, development and execution stages of operations. This should include the identification of measures of effect such that we have confidence we have achieved the desired outcome and that we haven't contravened any relevant laws.

7 Open Eyes, Open Mind

It is important to recognize that the organizational (and individual) beliefs and values, as well as mental models, will shape how the situation is seen and therefore what is looked for to develop understanding. This can range from being 'closed eyed' and 'closed minded' to being 'open eyed' and 'open minded' [8].

Being of closed-mind with closed-eyes represents those who have a fixed view of the world and are not prepared to accept different ideas and perspectives. Many have fixed models and methods and seek evidence to confirm their thoughts. These views are closed, correlated to the organizational and, therefore, individual beliefs, values and mental models; "this is how we do things around here!".

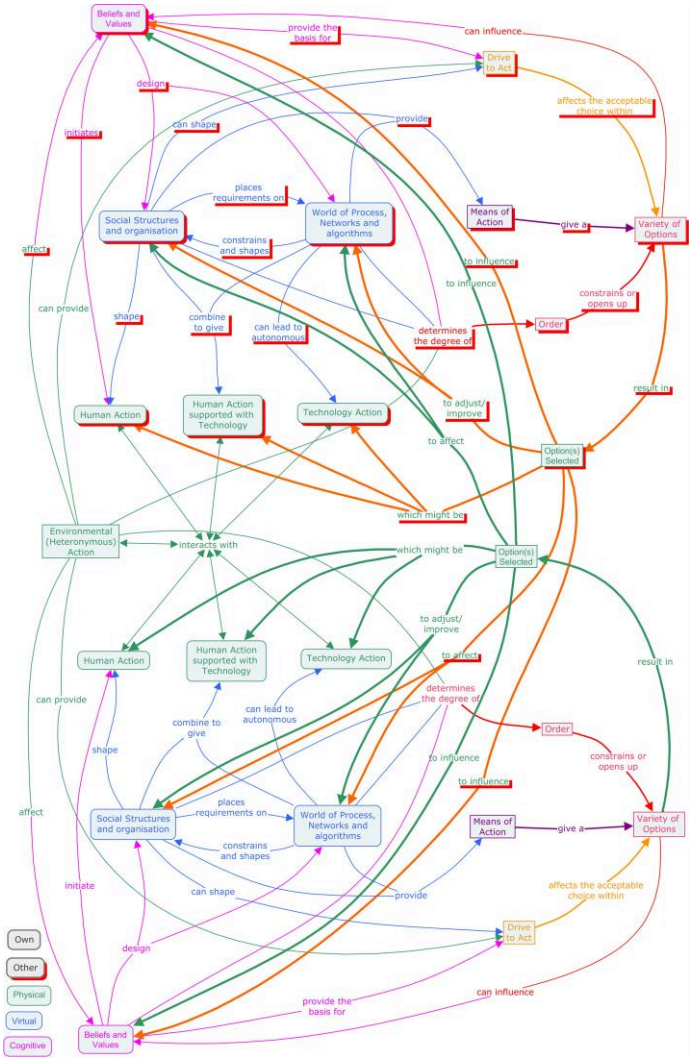

Figure 4 - Beliefs to action; Interconnected Organisations

In considering agility as a means of responding in a complex environment [5, pp. 33–34], innovation is seen as necessary. Just by increasing our access to information is not sufficient as we need to understand the results of our actions so we can adjust or respond differently if we are initially unsuccessful.

This is critical in unfamiliar situations when we cannot be certain of what our response should be. Also, in such complex environments, we are unlikely to be operating independently but as part of a coalition of other nations' forces and other government departments. Here one can surmise the impact of organizations with different beliefs and values seeking to work in harmony and agree both on the desired outcome of an endeavor, but also agree on the means available and the order imposed. There is also likely to be differences in the drive to act. NATO has

implicitly been addressing these issues since its inception.

A simple example to illustrate this is the change in use of IEDs by the Taliban. The Taliban beliefs and values in conflict revolved around the acceptance of face-to-face combat. You had sight of your opponent when fighting, and these beliefs and values (order) constrained your options around this. Hand-detonated explosive devices (command line or remote electronic detonation) were acceptable as they were manually initiated on sight of their enemy. However, when the West introduced Unmanned Aerial Vehicles (UAV), or drones, that launched missiles from a distance, out of sight, the Taliban's drive to act changed. The West's drive to act, and differing means being developed, resulted from the unacceptable level of injury and death of the forces in combat with the Taliban. The Taliban had neither a response to this, nor did it fit with their values and beliefs regarding warfare. This changed their drive to act and they, too, developed additional means by introducing pressure-plate (remotely, and unattended) detonated explosive devices.

Whether the West could have developed an appropriate level of understanding of the Taliban's beliefs and values such that they might have foreseen a change in Taliban methods is debatable, but this is what is required; to see through the eyes of another. To be open-eyed, and open-minded. To be aware of one's own way of thinking and acknowledge the differences in others'.

8 BUILDING UNDERSTANDING

Our approach to understanding will determine what we look for within the opponent and how we interpret it (see below in Figure 5). This resultant understanding will influence our options though our drive to act, the order imposed and the means of action available. In an asymmetric context, we must recognize the impact of imposing our approach to understanding onto an organisation of a completely different culture and mindset. Also, the actions we take will shape our understanding, especially within a complex environment where your sensemaking comes from seeing how the 'other' responds to the actions you take. Again, as with actions taken, this understanding must be developed by an integrated group as the interaction between differing skills and knowledge areas will generate a deeper understanding. Also, it is a level of understanding that cannot be developed by a group in isolation from the decision-makers as it is likely to be too complex to 'deliver' in a presentation. Understanding must be developed individually and collectively such that is becomes shared. There is a need to develop shared mental models, especially when the relationship between the elements is critical in terms of cause and effect (as far as they can be determined).

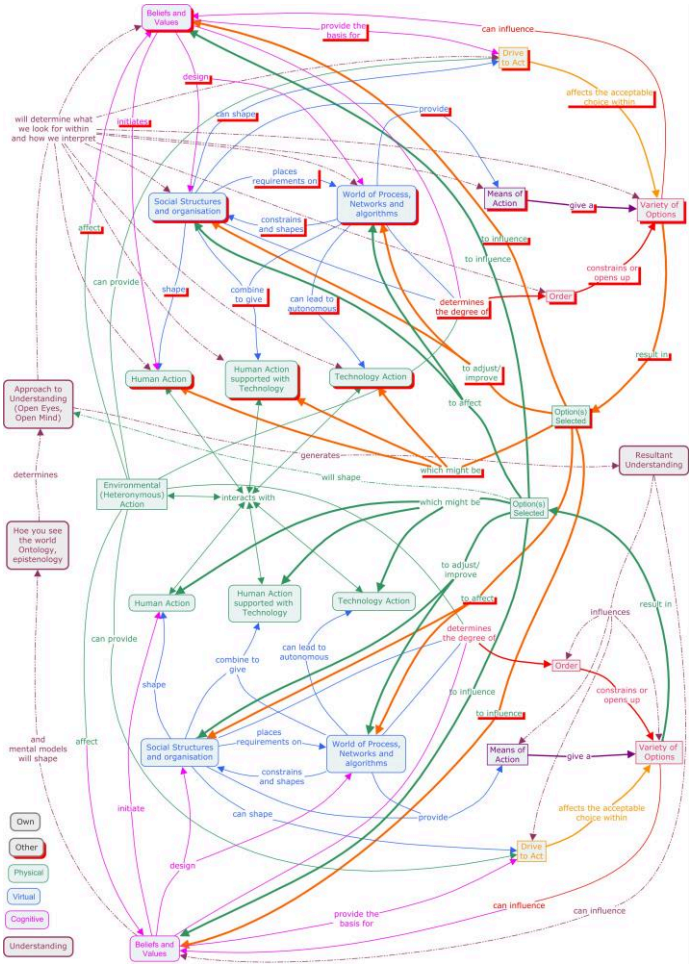

Figure 5 - Including understanding of the other in beliefs to action

However, we must not overlook that the 'other' is also likely to be acting on us. Therefore, a key part of our understanding of the holistic situation is our understanding of our 'self' as illustrated in Figure 6.

This represents the final illustration of the 'dance', the dynamics of maintaining our self in an ever-changing environment where we act and react not only in relation to others, but in relation to the environment itself. Continual adaption is necessary to be resilient, to maintain our identity and notion of self, and for that we need to be constantly aware of changes that affect us, and actions we take and are subject to. This is in all three aspects: the cognitive; virtual; and physical spaces.

The boundary of the organisation, as with the individual, is almost impossible to determine and is very context dependent; they are structurally coupled. It is in that context that we distinguish our self, and that will be in line

with our mental model. We react to perturbations, but more significantly, we act to maintain our self.

Aspects of the models illustrated in Figure 5 and Figure 6 can be seen in the C2 Conceptual Reference Model Variables diagram in the SAS085 report, Figure 4.2 [5, p. 74]. There the variables are identified, whereas this paper seeks to illustrate the relationship between them and the factors to be understood as well as those factors that influence understanding and choices of action. The variables contained in sensemaking include mental models, quality of (shared) awareness, quality of (shared) understanding and culture. Understanding better the relationship between these is important when considering improvements to C2 and in the selection and application of the C2 approach relevant to the situation.

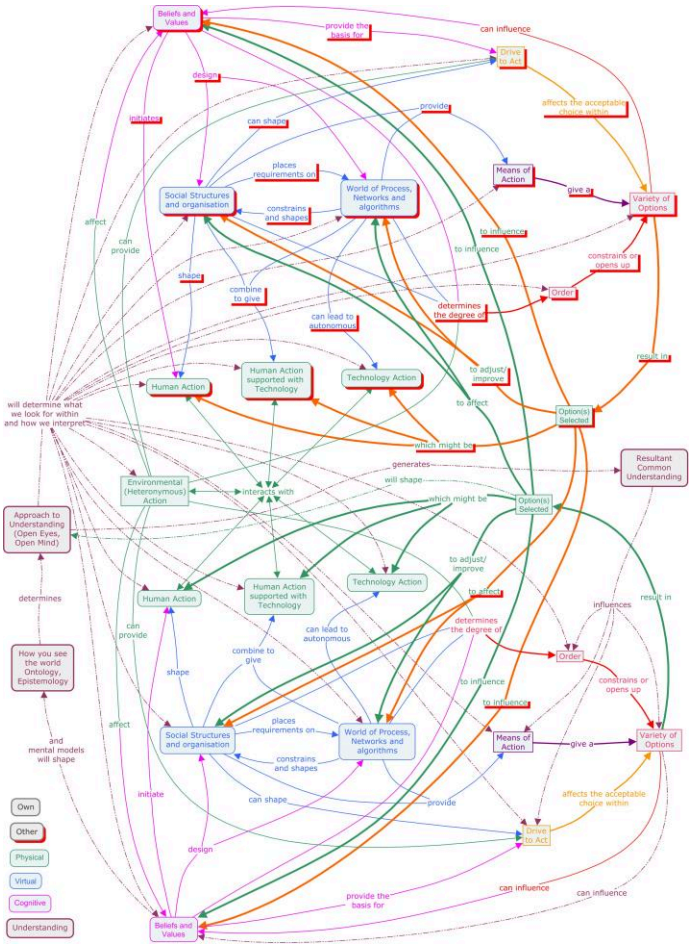

Figure 6 - Including Understanding of Self as well as Other

9 Impact on Organisation and C2 Approaches

The C2 approach space is defined in [5, pp. 38–39]. The 3-dimensional space is bounded by: a) the allocation of decision rights; b) patterns of interaction; and c) distribution of information. Furthermore, they are deemed to be inter-dependent. *"For example, how decision rights are allocated should shape the patterns of interactions that emerge, and together these two variables should determine the distribution of information."* And *"In Collectives, the degree to which the set of entities share intent may be the most significant factor in determining what, if any decision rights are allocated to the Collective. Trust between and among the participating entities will play a role in determining who interacts with whom and what information is shared. Systems capabilities as well as circumstances determine what is possible."* [5, p. 39] In tis paper, the collective being considered is NATO, or elements of NATO operating together.

When considering the iceberg, therefore, the underlying beliefs and values are key influences in the determination of order (decision rights) as well as the (social) structures of the collective. Likewise, the differing systems capabilities (world of process, networks, and algorithms) has a major impact on both the organizational structures and the means of action and order imposed.

Creating the endeavor space [5, p. 67] requires the need to look at *"potentially significant changes to both the current mission environment and to "Self""* [5, p. 68]. Understanding changes to the mission environment and to self appears analogous to the required understanding indicated in Figure 6.

Social structures can also include the individual's way of thinking as this is also a 'structure' within which an individual makes sense of the world. Alberts [9, p. 224] writes *"[i]n hindsight, the information that was needed to identify and prevent terrorist attacks was available, but was not known to the right individuals and organizations or, for other reasons, its significance was not understood. [. . .] This lack of agility has been attributed to the intelligence community's failure to transform itself from a cold war institution to one that is designed to meet today's challenges."* In other words, the structure of the intelligence process and the mindset of the intelligence community impacted on the development of a necessary level of understanding to the endeavor proposed.

Within a single organization's headquarters structure, there is already division between functions and stages in the operational-level planning processes [10]. The development of situational awareness, or understanding, is generally undertaken by the intelligence function, and briefed to the commander and their staff. As Figure 6 illustrates, the approach to understanding is that of the intelligence community, with their applied mindset, and

then briefed verbally with a briefing pack. It is argued that it is not possible for one element of a headquarters to develop a detailed understanding of the endeavor space, incorporating the current mission environment and 'self' and be able to transfer this understanding sufficiently for the commander and planning teams to be able to select appropriate options, understanding their potential impact so as to mitigate any undesirable effects, and achieve mission success.

Within a 'collective' this difficulty is significantly increased due to the differences in beliefs and values across the collective, the differing drives to act and the differing levels of order imposed. This will have an impact on the variety of options subsequently agreed to be available.

This surfaces several challenges to be addressed.

9.1 Beliefs and Values

It is the beliefs and values of individuals and organizations that lead to the approach to understanding, what is looked for and how it is interpreted. Within a C2 structure, there are a range of disciplines (intelligence, operations, logistics, cyber, etc.) involved and each of these develops differing beliefs and values based on knowledge, experience, and behaviors. Generally, the values are common, but there is often significant difference in knowledge and experience, especially across the hierarchy of command. This is especially true in the contested environments, as the commanders generally do not have a 'felt' understanding of cyber, as their experience is primarily kinetic warfare based, and they see cyber as a problem to be addressed by the communications (J6) function. However, in a contested environment, it is crucial that the commanders and operations staff develop an understanding of the cyber capability to integrate it into the variety of options available. This will require a significant change in their beliefs and values in order for them to seek understanding and acknowledge their critical dependency on Cyber and its impact in the contested environment.

In collectives, time should be spent in surfacing and acknowledging the various values and beliefs present in the situation. This is important in the consideration and allocation of decision rights which is fundamental in the enabling the more mature C2 approaches. This is rarely a consideration as the 'lead' component in the collective (usually the largest) assumes control of decision rights and carries the assumption of shared beliefs and values, i.e., their own.

9.2 Mental Structures

Leading on from beliefs and values, appropriate mental structures (open mind/open eyes) - a fundamental requirement for agility – need to be developed. Enablers of agility [9, p. 203] do not necessarily recognize this 'structural' necessity. Organizationally, structures and process should be adapted to enable consideration of uncertainty and ambiguity – a real challenge for evidence-based understanding amongst the intelligence community. However, as a generality, mental structures are culturally associated, and these cultural differences should be surfaced across the collective, and especially when considering the cultural difference of the opposition.

The inhibitors of agility should be addressed. These include [9, p. 222] *"an unrealistic, overly simplistic model of reality", "confidence that the best approach is known (knowable)", "restrictions on access to information", "fear of failure", and "lack of basic research"*. This is a not insignificant challenge and one that should be addressed al all level of personnel development across the collective.

9.3 Agility across the Approach Space

Understanding the beliefs and values, and mental structures across the collective, as well as agreeing the most appropriate decision rights, is an important contributor to agility across the C2 approach space, and in agreeing the spectrum of C2 approaches within which an organisation or collective can move to respond appropriately to its context. A significant enabler is the world of process, networks, and algorithms. Though processes can be designed by the collective, as with COPD [10], technology generally isn't. The information and communication systems are generally developed by commercial organizations and are founded on differing beliefs and values, and mental models. This is the persistent procurement challenge but results in the structure of the individual organizations and collective being shaped by the technology available, and so doesn't enable the desired patterns of behavior within the organization or collective.

In the contested space, this can reduce the means available, and result in inappropriate order being imposed, thus limiting the choice of options. The drive to act collectively may overcome some of the issues, especially with regard to information sharing by manual methods etc., but this can lead to a loss of information currency, completeness and security.

9.4 Trust across the Collective

"Trust between and among the participating entities will play a role in determining who interacts with whom and what information is shared."[5, p. 39] With reference to Figure 1, this trust leads to the systemic structures, the C2

approaches. This will determine the patterns of behavior, but also it should be noted that language is important as coordinates the coordination of actions. Misunderstandings can lead to confusion. Likewise, the distribution of information that follows is not just guided by trust, but the structures and compatibility of information systems across the collective. Another relevant structure here is that of classification of information. However, trust can lead to bypassing such controls when the drive to act insists on information sharing.

9.5 C2 IN A CONTESTED ENVIRONMENT

One of the structural barriers regarding C2 in the contested environment is the separation of C2 of Cyber Operations and Information Operations in the western world. Also, differing beliefs and values across the C2 hierarchy can impose order that limits effectiveness in the contested space. In the initial response to ISIS, use of social media, counterterrorism communications from the US using Twitter were in Arabic until this was stopped by more senior officers when they discovered this, and all subsequent responses had to be in English [11]. This is an example of how beliefs and values can impose order, closing down options that may be more effective. In another example, however, social media was a medium used effectively by Russia who flooded the information space to obfuscate the truth when annexing Crimea without firing a shot [12], [13]. This posed a challenge to the West and there were challenges on effecting an appropriate response.

The different approaches to C2 between the West as exemplified by the US and UK, and both Russia and China exacerbate the challenge. Russia and China consider the exploitation of information in its widest sense and do not separate the technical aspects of Cyber as we do in the West. For them Cyber is a means of exercising information warfare. In the West, there are different C2 structures for Information Operations and Cyber, and this impacts on effective operations in the contested space. Exploiting the spectrum of physical, virtual, and cognitive components in an integrated way requires the allocation of decision rights, integrated patterns of actions and distributed information across the range of capabilities in an integrated manner to be effective. This most closely resembles Edge C2, or Collaborative C2 at a minimum [5, p. 21], something that is challenging to achieve in a single western military organisation, let alone a collective.

9.6 C2 OF AUTONOMOUS ACTION

It is with autonomous action that C2 is the biggest challenge. Artificial Intelligence (AI) is a necessary capability to make sense of the terabytes of data generated by intelligence systems and the range of deployed sensors [14].

The extent of C2 within AI incorporates embedded decisions on trust, morality, and ethics, let alone the requirements of international law and the Geneva Convention. AI algorithms are frequently developed by commercial organizations and are generally proprietary information. Also, the operation of AI-based capabilities is very much dependent on the training data sets used, and there is significant evidence of inherent biases in them [14].

9.7 THE 'SO WHAT' FOR ORGANIZATIONS

What is needed, more generally, in organizational studies is to bring to bear the lessons from the iceberg model, e.g., consideration of systems thinking education and systems leadership development. What is needed, more specifically, for C2 and integration of AI and concerns about Cyber within organizations, is to employ systems methods to develop the necessary understanding; e.g., including Soft Systems methodology and the Viable System Model.

10 CONCLUSION

This conceptual paper has sought to surface the complexity of organizational constructs through the lens of the Iceberg Model. It has identified the often-unappreciated significance of beliefs and values, and mental models and culture, as the basis of organizational design and decision-making and feasible C2 approaches. They have a direct correlation with the patterns of behavior as embedded in C2 approaches and agile capabilities.

It demonstrates the need to address these deeper aspects in the ongoing consideration of C2 maturity across the collective. As the collective being considered is NATO, many of these challenges should be addressed at the NATO level as it would be too late to consider them at the beginning of a collective endeavor.

REFERENCES

[1] E. H. Schein, *Organisational Culture and Leadership*, 3rd ed. John Wiley & Sons, Inc., 2004.

[2] E. T. Hall, *Beyond Culture*, 2nd ed. New York: Random House, 1989.

[3] A. Angyal, *Foundations for a science of personality*, 4th printi. Cambridge, Massachusetts: Harvard University Press, 1958.

[4] F. C. Smuts, *Holism and evolution*. New York: Macmillan, 1926.

[5] NATO SAS-085, "SAS-085 Final Report on C2 Agility," *STO Tech. Rep.*, 2016.

[6] L. Dodd and A. Alston, “Complex adaptive and ‘inquiring’ systems theory for contemporary military operations: a multi-perspective approach,” 2009, [Online]. Available: https://pdfs.semanticscholar.org/d75a/c7722e5db65d6d6468977786e03ef5d7077a.pdf.

[7] L. Dodd, “Choice-making and choose-ables: making decision agents more human and choosy,” *EURO J. Decis. Process.*, vol. 7, no. 1–2, pp. 101–115, 2019, doi: 10.1007/s40070-018-0092-5.

[8] L. Dodd, “Techne and techniques for engaging in a socially complex world,” *J. Oper. Res. Soc.*, vol. 70, no. 9, pp. 1399–1409, Sep. 2019, doi: 10.1080/01605682.2018.1501461.

[9] D. S. Alberts, *The Agility Advantage : A Survival Guide for Complex Enterprises and Endeavors*. Washington, DC, USA: CCRP, 2011.

[10] *Allied Command Operations Comprehensive Operations Planning Directive*, COPD v2.0. SHAPE J5, 2013.

[11] “Private conversation with David Patrikarakos,” Defence Academy of the UK, 2019.

[12] D. Patrikarakos, *War in 140 Characters: How Social Media Is Reshaping Conflict in the Twenty-First Century*. New York: Basic Books, Inc., 2017.

[13] S. Sakkov and K. Geers, *Cyber War in Perspective: Russian Aggression against Ukraine*, Pdf., vol. null. Tallinn, Estonia: NATO CCD COE Publications, 2015.

[14] J. Bridle, *New Dark Age: Technology and the End of the Future*. London & New York: Verso, 2018.