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Collaborative Decision Making in Operations-Centre Environments

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Abstract

The oilfield of the future vision, as pursued by almost all of the oil and gas majors, has wide-reaching implications for the way that the industry operates that go beyond mere technology implementation. To date the industry has focussed on the acquisition and transport of data to decision makers so as to capitalise on the opportunities to optimise productivity, efficiency and recovery of the field. However, attention is turning to those decision makers and the tools, methods and work processes that will support their activities. Of particular relevance to this debate is the role of collaboration and the ways in which integrated multi-functional teams can work together to make better and faster decisions.

In an effort to gain better insight into the potential benefits from working in such new collaboration environments, Chevron, Hydro and Shell decided to sponsor a Joint Industry Project with Epsis and SAIC. This project has been set up to analyse and test central topics related to operation centres for Production Optimisation, using the facilities of the Epsis Operating Centre Environment.

This paper defines what is meant by collaboration in the context of Production Optimisation and discusses the various forms of collaboration, physical and virtual, that are possible. It also sets out a framework in which to evaluate the extent to which collaboration can be used in work processes and decision scenarios. This framework is the starting point for the analysis and re-design of work processes and the paper presents an approach to how work processes might be tested within an operation centre.

It is recognised that operation centres will be significant developments within the organisation and will affect both people's work habits as well as have an effect on organisation design. The paper presents some of the challenges associated with implementing these facilities and associated working practices and some of the solutions that organisations may adopt to help manage these changes.

Introduction

The concepts of the operation centre and the electronically enabled work environment that connects distributed parties are becoming more prevalent in the industry, with some examples already in operation. This paper looks at the human elements of the operation centre – for instance, the behavioural and organisational issues and the decision-making processes that underpin its successful operation. Specifically the paper will look at the role of collaboration within the operation centre as it is the collaborative nature of these environments that is commonly identified as their most important feature.

The paper begins by describing the main elements of the operation centre and defining the terms and concepts of the inquiry. This seeks to explain what is meant by collaboration, where it happens and who it includes.

The main part of the paper sets out a framework with which to estimate the extent to which collaboration can be used in work processes and decision scenarios. The framework helps to judge where collaboration might most valuably be applied and at what point in a decision making process. The tools and methodologies that promote collaborative behaviour are presented and located within this framework.

Lastly, the paper looks at the organisational impact and the risks of implementing operation centres and associated work practices.

Elements of the Collaborative Environment

At its most simple, collaboration is termed the activity of multiple parties working together towards a common aim. The context of decision making can also be added to the definition, so that collaborative decision making occurs when multiple parties work together to come to discuss, and execute, a decision.

As described later in this paper, the concept of decision making can be broken down into four main parts:

- Gathering data about the problem or situation under consideration
- Generating ideas and alternative solutions to the problem situation
- Making the decision
- Communicating and executing the decision.

And this four-stage process can help distinguish when collaboration can occur. Depending on the nature of the problem under consideration, collaboration can occur at any combination of different stages.

Forms of Collaboration

Collaboration is here defined as essentially any situation in which multiple parties can work together. The term ‘collaborative environment’ that will be used throughout this paper refers to any of these different forums in which collaboration can happen, therefore the environment does not refer to any one place. The exact nature of the location for collaboration, and the people it may include, are dealt with below, however it should be noted that this working definition includes collaboration that is part of a business process. This allows for collaboration that can be spaced over time, for instance, the production of a document that is then worked on by others, or a number of interpretations of a dataset that are produced non-simultaneously. Thus collaboration is here not limited to only simultaneous participation.

The scope of collaborative ‘decision making’ also includes all the actions and decision points across a work process so that the process itself becomes collaborative. This takes into account the fact that many decision points and actions taken within an asset are not be ‘one-off’ events but are located within a linked series.

It should also be noted that collaboration can be both ‘formal’ and ‘informal’ in nature. Whilst ‘formal’ collaboration can be designed into the work situation, ‘informal’ collaboration, by which we mean the ability to consult one’s peer groups and get a second opinion, is equally important. This is especially true in problem scenarios that are particularly unusual, and therefore have not designed collaboration into their resolution. Informal collaboration however, by its nature, is more difficult to design and instead tends to be a product of the working environment(s) that are created across the asset and its operations.

Participants in the Collaborative Environment

Who can participate in a collaborative environment such as an operation centre? It is envisaged that whilst the primary users of such work spaces may be within the organisation entity (asset or BU) itself (a definition that would also have to include any vendors that are involved in the normal operation of the asset), the logical progression would be to include participants from outside this organisational unit, for instance operator experts that are based in other geographies; asset partners; government agencies. However, in the near-term it is likely that operation centres are going to be based on specific processes and functions and, as is discussed below, will be structured for different types of collaborative event.

The scope of the Collaborative Environment

As previously described, a collaborative environment is any forum, physical or virtual, formal or informal, in which parties can come together to discuss problems and scenarios and come to decisions. A number of different terms are used within the industry and it is the intention in this section to clarify the terms so that distinctions, and attendant characteristics, can be recognised.

The figure A-1 in Appendix A encapsulates the scope of both of the operation centre and collaborative environment and shows how the interactions between the participants, within the physical and virtual environments, are envisaged to work. To deal with the two main elements:

Operation Centre

The definition of an operation centre here is a physical space, such as a meeting room or equivalent, in which participants can work together and interact with the various technologies within the space. The technologies, such as video-conferencing or teleconferencing, can mean that the centre can interact with other participants who are not physically located within it, thus forming a ‘collaborative environment’ (below).

It is envisaged that the primary operation centre will be located onshore (in an offshore field) or, in an onshore field, at a head office or equivalent. However, a ‘primary’ operation centre will require some video- or teleconferencing capabilities at the field itself so that it can communicate with personnel there.

For this phase of the project it is envisaged that the operation centre is distinct from a control room, both by its physical location and its role. The control room is responsible for control, actuation, frontline safety and real-time monitoring of all aspects of the operation; the operation centre is in our definition responsible for production optimisation and so at this stage is not taking over any control systems. However, it should be noted that the centre could, at some stage in the future, take over some responsibilities usually associated with a control room, particularly where closed loop control systems are installed and the emphasis shifts to surveillance of these systems.

Collaborative Environment

A collaborative environment is a virtual space, enabled by technology, in which participants can work together to solve problems and make decisions. A collaborative environment may include the operations centre and another party using some collaboration technology but does not necessarily need to include an operation centre. The collaborative environment could be linking an operator onsite with an office-based engineer at the asset’s primary office, with operator experts further afield. It also has the ability to allow for non-simultaneous communication in that documents/drawings etc can be shared and commented upon over a number of parties and locations.

Framework for Collaborative Decision Making

As has been discussed, collaboration can take different forms and be suited to different types of scenario or work process. What follows in this section is a framework to decide what level of collaboration is needed and at what point in the decision making cycle.

As previously discussed, the decision lifecycle could be considered to have four parts:

- **Problem Definition and Gathering Data:** At this stage of the process the participants are deciding the nature and possible causes of the problem or situation under consideration, this in itself may prove a difficult proposition. At this stage, data is also collected to help support the decision process.
- **Generating Ideas:** At this stage, ideas and alternative solutions are generated for consideration at the next stage.

- **Making the Decision:** Selecting the chosen solution from the list generated in the previous stage.
- **Communicating and Executing the Decision:** Managing the process of communicating the decision and ensuring its proper execution.

This four-part process is a systematic way of looking at the decision making process and as such it would be natural to see some of the stages being collapsed into each other in real-world situations. However, the framework still allows identification of those critical elements without which a decision is unlikely to be made or executed.

Judging where collaboration is appropriate

The four stages of decision making can be used to understand where collaboration might be most valuable and appropriate. And in order to judge where collaboration might be more appropriate a number of criteria can be applied to the situation or work process; these criteria can be grouped into four main themes which represent the opportunities that exist for collaboration to optimise the decision making process:

- **Complexity:** the difficulty of the problem; how many variables it has; the ability to describe it.
- **Number of participants/stakeholders:** the number of participants both within the main decision making process and the number of involved parties to whom the decision may need to be communicated.
- **Speed:** How quickly is an answer needed; is there an opportunity to speed the process up?
- **Importance/Criticality:** The decision affects a main business driver or one of the critical areas such as HSE.

The criteria are more relevant to some stages of the decision lifecycle rather than others and Table B-1 (Appendix B) below gives the specific questions that relate to each stage and which can determine where collaboration is best applied. A scoring system of 1-3 is used to indicate a low, medium or high score in each of the questions, and this enables an overall result to be calculated across each of the four stages.

The resulting score (the total as a proportion of total score possible) can give an indication of where in the decision making process collaboration has most impact. However, the results can be further refined with an understanding of the different forms of collaboration, as described below.

Collaboration Types

Table B-1 above can be used to judge at what point in the decision lifecycle a collaborative approach has the most impact. To further refine the result, the score can be placed within a collaboration ‘hierarchy’ that describes differing levels of collaboration.

The range of collaboration below is adapted from some observations made by Vroom and Yetton¹ and it helps to distinguish between different types of collaboration.

Types of collaboration:

- **Autocratic:** minimal collaboration is used here as the leader or ‘decision owner’ operates on their own. The autocratic approach may include some

approach to other participants in the process but their input is minimal.

- **Consultative:** a more collaborative approach, where the decision owner or leader may elicit views, information and ideas either individually with other participants or as a group.
- **Group Participative:** Full collaboration with a group engaged; the final decision is arrived at by consensus.

These collaboration types can be used to refine the scoring system used above, so that an overall low score in a decision stage equates to an autocratic style in that one stage. Other stages in the same work process might score more highly leading to a variety of styles throughout the problem or work process.

The table below illustrates how the scores relate to each of the three types:

	Problem Definition & Data Gathering	Idea Generation	Making the Decision	Communication & Execution
Autocratic	3-4	4-6	3-4	4-6
Consultative	5-6	7-9	5-6	7-9
Group Participative	7-9	10-12	7-9	10-12

Table 1: CDM Framework Scoring

Therefore the framework can identify both the stage within the decision making process at which collaboration is going to have greatest impact and also what that collaboration will look like.

Example work process evaluated by framework

The best way of illustrating the framework is by way of an example. The work process chosen is the daily production optimisation process and this is a good candidate as it is a high value process that obviously has some collaboration opportunities as it involves office and onsite resources and more than one discipline.

The JIP team evaluated the process according to their understanding of its activities and actions and it should be noted that we expect the scores to vary between assets teams and also within asset teams. However, the scores here are for the purpose of illustrating the process of applying the framework and interpreting the results. (See Table B-2, Appendix B).

The resulting score presented in Table B-2 shows that overall this is a fairly collaborative process across the whole decision lifecycle. Consultation of different participants will happen towards the latter part of the decision with the highest collaboration required at the beginning of the process. This seems to equate with the dynamic of the work process as the office-based production expert and the offshore team will both be working to understand what has happened within the asset over the previous hours with the data sources available to them. What the framework is recommending is that this process of data gathering and agreeing the nature of the challenges ahead is where collaboration might be most effective. From that point on, the production expert will take

the lead but taking a consultative approach with colleagues both offshore and onshore. Finally, communicating and executing the decision will demand some collaboration to ensure proper communication of the priorities as the number of participants is relatively high and the timing relatively sensitive.

Collaborative Tools and Methodologies

There are a wide range of both tools and methods that enable and improve collaborative working. Within the tools category, there are the technologies that allow collaboration to happen over distances, such as audio- and video-conferencing, and shared electronic workspaces that allow for real-time sharing and visualisation of data. Collaborative methodologies are concerned with the processes that ensure that collaboration occurs and these range from tactics for consensus building, gathering a range of input within a meeting (avoiding groupthink), brain-storming techniques and proper meeting organisation. Last, there are 'domain-specific' tools (such as for Production Optimisation) that will need certain characteristics for them to function within a collaborative environment. For example, the ability for these tools to be set up such that two locations can see exactly the same visual output and for each location to have the ability to take control of the application.

Collaborative tools and methodologies can be located within the preceding collaborative framework as different methods and tools will be appropriate at the different stages. For instance, a methodology like brainstorming will be more appropriate at the solution generation stage, whilst consensus building will be of more relevance during the decision-making phase. The framework can therefore be used to identify the point at which collaboration is most valuable and what tools and methods might support that collaboration.

Designing and Testing Collaborative Processes

The overall purpose of the JIP has been to test collaborative decision making in action within a prototypical operations centre. In order to do this, the JIP team chose common yet important business processes, such as the Daily Production Optimisation process, to understand how collaborative decision making within the operations centre environment can help to increase the efficiency of the process.

The starting point is to come to a representative description of the work process. This occurs in two parts, first a textual description of the process that is ordered under a number of categories (activities, roles, data and tools). From this description a workflow diagram is constructed that shows the linkages between the various roles and the sequence of activities.

The collaborative framework, as described in the preceding section, is also used as way of understanding where the opportunities for collaboration might be and also, if used with a cross-section of asset personnel, to draw out some of the differences of opinion between the team. These observations can be useful input into achieving a consensus within the team on the most valuable point within the process for collaboration and as precursor to the design of the new work process.

The aim of the project is then to run a comparison between the 'as is' process and the redesigned process. This can be done by running each process in as typical and operational way as is possible, including the provision of data to simulate the conditions that the participants will have to consider. By running both the 'as is' and new processes one after the other, the aim would be to allow the team to experience the differences and advantages of working within the operation centre, and also to allow participants to observe the effects of different approaches to collaboration, using different collaborative methodologies.

Collaborative Opportunities and Requirements

Experience from several operation centre deployment projects has shown that such environments offer many opportunities for better decision making through increased collaboration. This supports the underlying theory of operation centre environments, which is to facilitate greater integration between the individuals within an organisation, the tools and technologies they use and the processes and procedures that underpin their day to day tasks.

At the same time these projects also show the need for attendant organisational requirements for its benefits to be fully realised. In the following some of these opportunities and requirements are discussed along with proposed measures to help mitigating the associated risks. The covered issues have been found through observations and interviews related to projects run by the JIP participating companies, as well as from information on similar projects run by other companies.

People & Organisational Structure

Formal organisation structures have an influence both on how people collaborate and on their areas of focus, and are therefore an important mechanism for ensuring proper collaboration. Since a main objective of implementing operation centres is to promote collaboration, it should be considered how organisational units are best structured to support the use of such environments. This creates a need to take a close look at existing organisation structures and consider how they may be changed to fully utilise the benefits of these new working environments. For instance, it may be that organisations are better structured in units that support the horizontal flow of tasks that produce the results rather than the traditional vertical structures that only accommodate command lines. Also it should be carefully considered how people are placed next to each other as well as to the operation centres and collaboration facilities themselves. Both research² and experience has shown that only minor distances influence the degree of contact between colleagues, as well as how frequently facilities are utilised. Therefore operation centre environments must be placed in immediate proximity to all those who are supposed to use them on a regular basis. Furthermore it has also been found that careful grouping of individuals improves both the frequency and quality with which these facilities are used. For instance, by placing well behaviour and process capacity experts next to each other, the likelihood that they will collaborate to optimise the overall production increases significantly.

Another attribute of operation centre environments is that they allow several tasks to be performed over large distances.

Consequently it should be considered to what extent office based discipline experts can perform tasks that currently require onsite presence through remote collaboration, as well as to what extent onsite work can be moved to office environments. Such initiatives have been taken in several projects, and are seen to both improve access to scarce resources and reduce the exposure of people to onsite risks³. These initiatives are even reported to be a major business objective through their contribution to reduce operating costs, especially in offshore operations. Also consideration should be given to what extent discipline experts can work across several assets, allowing both company and/or vendor experts to regularly participate in asset work processes. While access to remote company experts is mostly reported as a positive contribution, the experience from use of external experts seems mixed. The latter is to some extent related to external access to confidential information, and may be improved with the development of less rigid network security solutions.

Collaborative decision making implies that many people must perform most of their work in new environments and participate in a wider range of workflow areas than before. The collaborative nature of the operation centre environment is therefore seen to change the skill requirements from its participants on several areas. Many participants are now required to possess more cross-discipline or generalist skills in combination with operational field experience to fully contribute in collaborative decision making processes. Expert discipline skills can be made available when needed through ad-hoc participation by domain experts in the collaborative environment. This may change the mix of generalists and experts through the entire asset teams. It may even help counteract some of the negative effects of the age demographics of the E&P industry, in that increasingly scarce expert resources may be partly replaced by more generalist resources. Some have also experienced that participants have developed cross-disciplinary skills as a direct result of working in these new environments.

The new environments also require participants to possess strong teamwork skills, including the capability to collaborate actively and constructively, assist getting the job done through the team, see other people's ideas as a positive contribution, seek for help and advice oneself and be someone others can turn to for help and advice. These are general team-work skills that are seen to be more important when working in collaborative environments than in ordinary meetings and face to face situations. An associated management skill requirement is the capability to properly facilitate meetings and other collaborative sessions, so that all participants are given ample time to understand, reflect, comment and present their views. Although there is a tendency to assume that these are skills that most highly educated employees already possess, experience has shown that proper training may be a good investment when moving to these new working environments.

As well as new skills, the move to collaborative working in these new environments can also demand certain changes in behaviours from the participants. The success of collaboration is as much the intentions and actions of the participants, as it is the character of the re-designed workflow. In the operation centre environment, trust and mutual respect between all

participants is a critical success factor. Trust in someone is a belief that others can be depended on, and in all team-work members need to trust that each will do what is expected of them in a timely and professional manner. When we build trust in each other we largely rely on social communication and interactions. However, collaborative environments often include remote participants that lack the physical presence that is so important in the development of trust. Building trust in distributed teams⁴ is therefore known to be much more difficult and time consuming than in teams working face to face. Factors that help building trust in distributed teams include positive leadership, individual integrity, achieved results and empathy. Showing mutual respect include listening to each other with an open mind, give direct feedback to the relevant person and respond to all communication in a timely manner. This is another area which is seen to be more difficult to master in distributed teams than in ordinary working environments. Both are areas that have shown the importance of proper training programs and teambuilding sessions. It has also seen to be advantageous to implement training programs that reduce the experience and knowledge difference between onsite and office personnel. Appropriate working norms regarding conduct in meetings should also be considered, especially when meetings involve the use of audiovisual conferencing equipment.

Process & Workflows

Some of the major benefits that can be gained from collaborative decision making are improved understanding of the problems at hand, access to all discipline expertise required to make better decisions and better buy-in into and execution of the decisions. However, to utilise these benefits, it is necessary to evaluate existing workflows and modify them to support the new working environments. If operation centres are just used to support as-is workflows, it is seen that only minor performance gains are acquired. To help frame the workflow analysis, the following questions has been found useful:

- What activities are performed by the team, what decisions are made and when?
- What information is needed to perform the activities and make the decisions?
- Where is this information found and how is it accessed?
- How are decisions made, who makes them and by who are they executed?
- What are the current problems and how can the workflow be improved?

In evaluating workflows for use in operation centre environments, it should in particular be considered to what extent the decision making process can benefit from moving tasks and decisions between the onsite and the office organisations. Operation centres also provide the possibility of moving to a 24/7 working pattern across the asset as a whole. They allow the asset office to be in continuous contact with the field site, and it should therefore be considered to what extent the office organisation should extend its working hours to match that of the onsite organisation to achieve continuous collaborative decision making workflows. However, there is

an assumption that moving to a 24-hour shift pattern will involve a very significant shift in the industry as it is currently structured, and for global operating companies the utilisation of resources distributed around the world may therefore be used to achieve similar results.

The improved access to domain expertise required to make decisions is seen to support the long standing industry efforts of discipline integration, and greatly advancing the use of multi disciplinary teamwork. But the resulting diversity of the decision making groups can also cloud the decision making process itself. It is therefore important to remain conscious of these possible risks, including unclear responsibilities and ownership, as well as fuzzy decision making processes. Collaborative decision making is especially vulnerable to the risk of ambiguity due to participation by higher ranking officers who do not make the decision, or from company experts who normally represent the authority on technical solutions within their area of expertise. To mitigate these process risks, it is recommended to have properly documented and easy accessible decision making policies and procedures that are supported by clearly defined roles and responsibilities. Some organisations report to have found that a regular review and documentation of roles and responsibilities have shown rewarding results.

Technology & tools

Designing and constructing an operation centre is more than implementing an advanced technology solution. A successful solution must fit its purpose, and it is therefore important to understand what the users are actually going to do in this environment. Consequently a detailed understanding of the associated work processes is fundamental to specifying its functional requirements which in turn will result in the technical specification for the solution.

One of the main requirements of the operation centre solution is that of improved collaboration between different locations as well as different disciplines. Therefore the collaborative requirements must also be covered by the functional requirements in order to design an environment that will stimulate greater collaboration. This must in particular address the following issues:

- Do resources have to collaborate continuously or only in certain situations?
- Does collaboration have to happen within a physical space or can it be achieved through technology?
- What will be the form of the collaboration; status reviews in large groups, interactive information exchange in smaller groups, application sharing, etc?

Operation centres represent challenging high-technology working environments, and to make them as user-friendly and effective as possible it has been found that the end-users need to be involved in their design and development. The risk is otherwise to implement what simply turns into very expensive meeting rooms. When evaluating the required technology solutions, the following is of particular importance:

- Whatever technology is selected it must be of the right quality (e.g. web cams are not suitable).
- All shared information must be available to all participants concurrently on identical format.

- Integration between real-time data streams and software applications must be established.
- Collaboration through software applications requires high-end infrastructure solutions.
- Multiple users require solutions that handle concurrent access and manipulation of shared data.

Operation centres are also seen to require extensive user support. The demands they make on their users often make them appear to be overwhelming. Fear of failure and of damage to the equipment are common hindrances for use. The most obvious way to reduce the associated risks is proper training and active user assistance to help all users overcome the initial threshold. Some organisations have also found that user support can be improved by the education of “super users” that can combine user support with regular use of the facilities.

Operation centres are operational environments that should be designed for 24/7 uptime to function properly. They therefore require extended service levels with acceptable response times both by external vendors as well as internal IT organisations.

It should also be noted that many previous attempts to deploy these facilities have considered implementation to stop when the facility is opened for operational use. However, some have experienced that this is really when the actual implementation begins. Coaching, mentoring, feedback and continuous change management is seen to be critical through the initial phase of an operation centre implementation. This will then be phased out gradually as users become more familiar with the new way of working, although regular reviews are also required.

The Physical Design of Operation Centres

The physical set up and design of the operation centre and related issues such as the number of occupants, ownership and position within the larger ‘office’ are practical yet important factors that influence the focus and efficacy of these spaces.

For instance, the question of who occupies the operation centre and for what period is fundamental to its design. Some rooms are designed as permanently staffed spaces, where personnel have their own workstation, others as meeting spaces (albeit with advanced visualisation and audio-visual equipment) that are occupied as and when the need arises. Both solutions have their own advantages and disadvantages. The first solution, the permanently manned room, has the advantage of embedding collaborative working into the organisation and ensures that personnel do not migrate back to their ‘normal’ workstations and ways of working; this solution comes with the disadvantage that the space is practicably only usable when those who are permanently positioned there are involved in the meeting. If others want to use the facilities they risk interrupting the work of those permanently positioned there. The ‘occasional’ meeting room is the obverse of the first solution; it risks being left unused and yet is better for different combinations of personnel. In practice, the core business processes that are being run within the collaborative environment will decide their design, this results in solutions where multiple collaborative environments are built within one asset, where both an operations and a collaboration room

are being built with the ability to reconfigure the two space such that they can be made into one larger room if the need to include the permanently positioned personnel in the operations room arises.

Risks

Regardless of the considerations mentioned above, there are a number of potential risks that collaborative decision making in particular will bring to the organisation and its way of working, as well as the more standard risks that come with business change projects. Some of these are discussed below.

Collaborative decision making should provide increased awareness and confidence to management of the decisions being made, but it could also result in the wrong individuals or disciplines to collaborate and therefore misdirected management attention. While collaborative decision making should create a new integrated way of working by encouraging multidisciplinary teams to access and consider all relative viewpoints when making decisions, it could also encourage individuals to revert back to their existing silos. Domain experts may become detached or isolated from natural peer groups and individuals may gravitate to generalize and sacrifice development of domain expertise in these new working environments. By encouraging, facilitating and rewarding those involved in collaborative decision making, institutional barriers should be eradicated over time. However, a new generation of organisational silos may be created by new divisions perceived to be created by those inside and outside operation centres, and less confident and vocal members of the decision making process may become isolated. To mitigate these organisational risks it should be ensured that management members are committed advocates of collaboration, that management support and reward early adopters of collaborative decision making and communicate the successes and benefits, and it should be supported by comprehensive training.

Although collaborative decision making should enable organisations to make better decisions faster and more often, it is not always appropriate and could therefore potentially have a negative impact on the decisions being made. The decision making process could become slower or it could lead to a process of “decision by committee” that results in worse decisions or even lack of so. Also the creative thinkers may lack the confidence to speak up resulting in suffocation of innovative decisions.

Utilization of industry standard collaborative tools and technologies are valuable enablers for collaborative decision making in organisations. But the technologies themselves could also have a negative impact in its implementation by making the decision making too reliant on the available technology, increase its vulnerability to viruses, hackers, technological break-downs, and downtime. To mitigate these technological risks it should be considered to invest in alignment between people, skills and technology capability through training and mentoring, and ensure that collaborative decision making is cultural and not purely technological.

Conclusion

Collaboration is an oft-cited feature of the operation centre and yet its precise nature, and the question as to when it is most valuably employed, is often left unexamined. Collaboration is more appropriate for some scenarios than others and using a framework to understand where the opportunities for collaboration are greatest can help refine an asset's organisation and focus. For collaboration will not always be the appropriate response to a situation, even after the implementation of an operation centre, and can potentially reduce the efficiency of the asset.

The implementation of collaborative working within operation centre environments is going to have a profound affect on all aspect of the organisation: these innovations have the potential to transform working habits, the way teams are structured and the location of personnel. Truly collaborative working will be challenging, and the risk is that it is seen as another technology project, however, properly implemented, it will affect people, processes and technology.

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Appendix A – Participants in the Operation Centre and Collaborative Environment

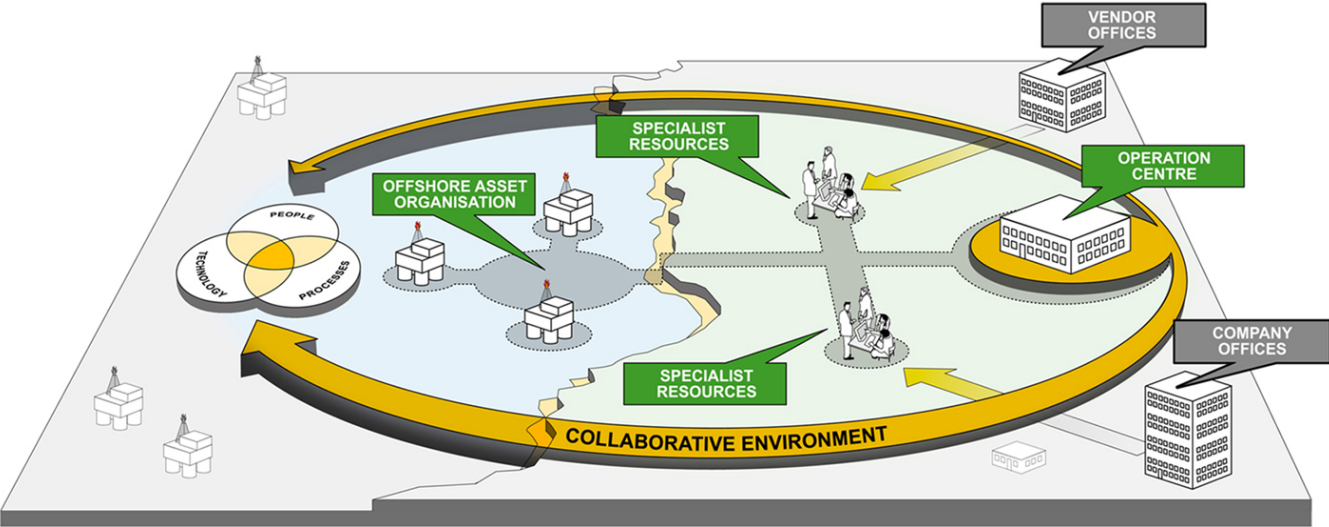


Figure A-1

Appendix B – The Collaborative Framework

Problem Definition & Data Gathering	Idea Generation	Decision	Communication & Execution
1. COMPLEXITY			
How difficult is it to define the problem?	How difficult is it to generate alternative solutions?	How difficult is it to choose a solution?	How difficult is it to understand the consequences of the action?
Score:			
How unfamiliar is the problem?			
Score:	Score:	Score:	Score:
2. NUMBER OF PARTICIPANTS/STAKEHOLDERS			
How many data sources and how difficult are to understand?	How many disciplines can contribute suggestions?	How many stakeholders are there in the decision?	How many stakeholders have to be informed of the decision?
Score:	Score:	Score:	Score:
3. SPEED			
	Is there an opportunity for collaboration to speed up idea generation?		How quickly does decision have to be executed and how many people are involved?
	Score:		Score:
4. IMPORTANCE/CRITICALITY			
	To what extent does the decision impact critical business drivers?	To what extent does the decision impact critical business drivers?	How important is it that the decision is executed?
	Score:	Score:	Score:
Total:	Total:	Total:	Total:

Table B-1: Criteria to assess when collaboration is most appropriate

Problem Definition & Data Gathering	Idea Generation	Decision	Communication & Execution
1. COMPLEXITY			
How difficult is it to define the problem?	How difficult is it to generate alternative solutions?	How difficult is it to choose a solution?	How difficult is it to understand the consequences of the action?
Score: 2			
How unfamiliar is the problem?			
Score: 2	Score: 2	Score: 1	Score: 2
2. NUMBER OF PARTICIPANTS/STAKEHOLDERS			
How many data sources and how difficult to understand?	How many disciplines can contribute suggestions?	How many stakeholders are there in the decision?	How many stakeholders have to be informed of the decision?
Score: 3	Score: 1	Score: 2	Score: 2.5
3. SPEED			
	Is there an opportunity for collaboration to speed up idea generation?		How quickly does decision have to be executed and how many people are involved?
	Score: 2		Score: 2
4. IMPORTANCE/CRITICALITY			
	To what extent does idea generation impact critical business drivers?	To what extent does the decision impact critical business drivers?	How important is it that the decision is executed?
	Score: 3	Score: 3	Score: 2
Total: 7/9	Total: 8/12	Total: 6/9	Total: 8.5/12
Autocratic	Autocratic	Autocratic	Autocratic
Consultative	Consultative <input checked="" type="checkbox"/>	Consultative <input checked="" type="checkbox"/>	Consultative <input checked="" type="checkbox"/>
Participative <input checked="" type="checkbox"/>	Participative	Participative	Participative

Table B-2 – Example ‘Daily Production Optimisation’ Outcomes