Integrated Operations Centers

An Agile Approach to processes and ways of working

By Kevin Stewart and Ådne Tveit, Epsis
Synopsis

The potential of Integrated Operation Centers is widely recognized across most industries. However, many centers don’t live up to the initial expectations. Despite being delivered on-time and on-budget, many centers struggle to integrate the operation and deliver their intended value. Common indicators that this has happened often include users and teams working as they did before moving in to the center, information screens with no content or simple corporate digital signage and the emergence of subcultures/groups that actively work to get around the limitations or objectives of the IOC.

Many of these issues are described in the article by Clark & Nordtvedt, "How to get the most out of an Integrated Operations Center Initiative".

This paper focuses on a practical approach for developing a successful and value-generating IOC, by describing how to establish best practice for Ways of Working within the center, and how to adhere to them over time.

The approach is based on an agile methodology, where value is delivered early and often. The results are lower project costs, higher quality deliverables, better engaged users and results that will validate management’s decision to invest in improving their IOC.

Finally, modern business environments are constantly changing, so the IOC needs to be designed with a capability to grow and adapt to these changes. Continuous improvement and a focus on delivering value are key to sustaining the impact of any IOC.
About the authors

Ådne Tveit, Vice President

Ådne has since 2011 been VP for Epsis. He is promoting concepts and technology in Europa, Asia and Australia, evangelizing operational excellence and digitalization within finance, oil & gas, construction and hospitals. “Today there is plenty of Big Data, but most organizations still don’t have access to the Big Picture” is something he is frequently quoted for, and the Big Picture is what he wants the customers to keep after doing business with Ådne.

Prior to working at Epsis, Ådne has held senior sales and management positions in IBM and Oracle and had his own consultancy company for 10 years. Ådne graduated from Ohio State University in 1984 with a major in Computer and Information Science.

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Kevin Stewart joined Epsis in 2012 from Matrikon, where he was the UK Operations Manager. He holds an MBA from Edinburgh University. Kevin has 25 years’ experience managing the development and delivery of software systems across several industries; the last 17 years of which have been predominantly in the Oil and Gas industry.

Initially delivering systems to achieve business objectives, his main area of interest these days is how businesses can achieve more value from their investment by taking an integrated approach to their operations. Key to this is orchestrating Ways of Working, where information, people, business processes and technology come together into an integrated solution that provides greater value than its constituent parts.

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Introduction

Digitalization in the oil and gas industry is giving operators access to new opportunities for improving their businesses. For operational environments, these opportunities often result in an Integrated Operations Center (IOC) as the focus of new, digitally-enabled Integrated Ways of Working.

Several companies have published articles on the value that such centers can bring. Chevron, for example, has a world-wide program for delivering IOCs, and the value attributed to a few of the asset implementations has been quoted at SPE conferences. In the UK, the successful implementation of an IOC for production, operations and maintenance, led to improved production efficiency of 4%, a reduction in equipment failure of 9 MUSD and an NPV of 51 MUSD over a period of 18 months (Alba asset manager in key note at SPE Intelligent Energy 2016, see also Reed, 2015 and Gilman et. al, 2016).

We discussed how to shape a project to get the most value out of an IOC-type initiative in a recent Epsis paper – see Clark and Nordtvedt, 2019. In this paper, we will dive a little deeper into aspects of Epsis’ experience within process deployment.

IOCs are typically used to implement business processes into practical Ways of Working. To help with such implementations, we will review the value of taking an approach that is commonly used for deploying software, namely Agile Project Delivery. In Epsis, we have used elements from this methodology to develop a new approach for rapid deployment of improved Ways of Working.
**Waterfall vs. Agile approach**

The term 'Agile' has been used in software development since 2001, although similar development practices were in use quite a bit earlier than that. The agile development principles were based on real-life experience from the challenges and limitations of traditional development. The Agile approach offered a lightweight framework for helping teams maintain focus on the rapid delivery of business value; given a constantly evolving functional and technical landscape. See Agile Alliance, 2015.

Agile development particularly addresses four key attributes of software development – visibility, adaptability, business value and risk. These are all key challenges with traditional approaches such as the Waterfall model. There, progress largely flows in one direction ("downwards" like a waterfall) through the phases of conception, initiation, analysis, design, construction, testing, deployment and maintenance (Bebington and Herbert, 1983).

In our experience, delivery using the Waterfall model can fall short when it comes to the visibility of progress and the opportunity to adapt to changing circumstances on the business side. Also, most of the business value is realized after the project has been completed and risk remains high throughout most of the project. The Agile framework was developed to improve visibility of progress throughout the project and to enable change of direction and functionality based on changes to the environment the solution would live in. Additionally, the framework allowed business value to be delivered incrementally. Finally, on the risk side, it becomes possible to constantly reduce risk from early in the project lifecycle.

The Agile framework gave rise to 12 principles for agile software development (Beck et al., 2010). We cite five of these principles here, as they are of relevance for our later discussion:

| Principle #1: | Customer satisfaction by early and continuous delivery of valuable software. |
| Principle #2: | Welcome changing requirements, even in late development. |
| Principle #3: | Deliver working software frequently (weeks rather than months) |
| Principle #4: | Close, daily cooperation between business users and developers |
| Principle #5: | Working software is the primary measure of progress |

Projects deploying new business processes and integrated Ways of Working in Operations Centers have many similarities to the Waterfall vs. Agile discussion for software development above.

The identification of business processes – or business process mapping, has historically followed what could be regarded as a Waterfall type of delivery. We discuss the disadvantages of this in the next section. Similarly, once business functions or areas have been selected for deployment in an Integrated Operations Center, the same approach is frequently followed for project delivery – decide on high-level focus areas; decide who will sit in the center; build the center and move people in; and, finally, start evolving Ways of Working in the center. This again suggests a Waterfall approach to deployment of centers and the development of new Ways of Working in the centers. We suggest an alternative method later in this paper.
Business Process Identification

Business Processes are often described in the context of a layered model, from a high-level overview at the top, to the details at the lowest levels – see illustration in the figure below.

Of course, high-level business processes are needed for several reasons, including visibly meeting regulatory requirements. However, the requirements set out in a high-level operating model are not at the right level of detail to be practical in operations. They are either too high level, fulfilling needs for management to operate the company, or at too low a level, ensuring safe operations (e.g., in Standard Operating Procedures). In between, where the bulk of the work is being done, is frequently left out in such exercises, as it is the domain of the knowledge worker and something that can’t be documented. The expectation is that these mid-level processes they will vary somewhat from worker to worker (based on experience), from department to department (based on management style) and from one company to the another.

The classical approach to reviewing or introducing new processes is to finish the upper level before moving down to the next level, i.e. start at Process Level 0 (PL0), continue with PL1, then PL2 and so forth. The aspiration is to ensure consistency, that all aspects are considered and that the ideal operation is created. Like the Waterfall method for software development, progress to the next phase is only made once the current phase is completed and higher levels in the model are rarely revisited.

This is illustrated in the figure with the horizontal arrows below.
Epsis’ experience has shown that this method is difficult to successfully deliver. It takes too much time before it realizes any tangible value; it becomes too theoretical, complex and unwieldy; and the interest and patience of stakeholders is easily lost along the way.

Also, the lower levels improve constantly based on changing ways of working, while the upper levels fall behind and are not updated accordingly. Therefore, the model has a short lifespan, until it is out of synch with the current way of working.

Realizing this from the onset gives the business the opportunity to approach the delivery of the business processes and their implementation into operational Ways of Working by alternative means. This is illustrated by the vertical arrows in the figure below. This is an Agile approach, in contrast to the Waterfall-method.

The results from this agile method of delivering process improvements have been successful compared to classical approaches, this is also supported by Epsis’ experience.

Although illustrated as a top-down-approach, we frequently see variations where bottom-up is appropriate. Then we start with deploying the activities, which later find their role in the overall process.

With this methodology, we see that:

- the project delivers real, operational value after a few months or even weeks,
- stakeholders understand early on the process of developing fully formed and executable Ways of Working.
- As a result, they are usually more motivated to support the change process,
- as everybody gets involved, it’s easier to adjust course of the project to match business needs,
- you prioritize the areas where the cost/benefit-ratio is low,
- there are manageable project phases, with distinct, frequent deliverables, and
- there are continuous reviews and (potential) exit points, if project does not deliver the expected value.
- the documentation is in the workflows, thus always updated. No need to maintain a process-model decoupled from the actual Way of Working.

These observations match well with the agile principles for software development described on page 2 and 3. Flexible development cycles create more user involvement, better match between need and solution and earlier value harvesting. Along with a more attractive cost-profile than the classical waterfall-projects, these benefits are very welcomed.
Ways of working in integrated operations centers

The above approach for developing new Ways of Working may well be applied in a variety of operational settings, from classical organizations to more innovative collaborative work environments. One example where the method is particularly effective, is the Integrated Operation Center (IOC), often a key enabler for better and more efficient operations. There, we distinguish between what people in the center are doing and how they do it. What they do we call Activities, and how they coordinate them the Ways of Working.

Examples of activities are preparation for morning meetings, well-test analysis and surveillance of specific pieces of equipment.

How and when they perform these activities, constitute the Ways of Working. Together these include the information and applications are used, who are consulted, who collaborates, and so on.

Whereas governing documents often tells an engineer or operator, at a high-level, what the objectives should be, we find that how it should be conducted and how it inter-relates with other work is frequently not specified. The consequence is that two engineers may work the exact same task in very different ways. It may lead to similar results, but there is no guarantee. Thus, the consistency in the operation is lacking, which in worst case scenarios can lead to diverging recommendations or conclusions.

Data is another challenge when activities are performed differently. Do people get data from the same source? Do they store local copies? And where can the latest version be found? Our experience is that this challenge is often over-looked and that searching for data is a time-consuming part of a knowledge workers’ daily activities.

Properly defined Ways of Working typically lead to activities being performed in a more efficient way, with increased consistency as well as quality. If there is a best practice, everybody should have easy access to that as a well-defined Way of Working. The organization loses a key opportunity for improvement if no best practice is recognized.

Bringing it all together - agile delivery of Ways of Working

An IOC is a good arena for implementing Ways of Working. By engaging the users in the implementation project, you ensure that their knowledge is included, and that they will more easily adapt the new Ways of Working. The key question is, of course, how do we do this in practice? And, can the above discussion on an agile approach guide us to a sound way for deployment of Ways of Working in IOCs?

The Basic Agile Process

As has been discussed, the goal of the agile methodology is to produce shorter development cycles and more frequent product releases than traditional waterfall project management. There are a few different agile project management frameworks — Scrum and Kanban are two of the most common — but each follows the same basic process, which includes:
**Project Planning**

As with any project, before beginning it is important to understand the end goal, the value to the organization or client, and how it will be achieved. A project scope can be developed here but remember that the purpose of using agile is to be able to address changes and additions to the project easily, so the project scope shouldn’t be immutable.

A roadmap is created identifying the likely breakdown of features that will make up the final solution. This is a crucial component of the planning stage, because the project team will be delivering these individual features during each sprint. At this point, a product backlog can be created. This is a list of all the features and deliverables that will make up the final solution. The team will pull tasks from this backlog when planning sprints.

**Sprint Planning**

Before each sprint begins, the team and other appropriate stakeholders need to plan what will be accomplished by each person during the sprint, how it will be achieved, and assess the task load. It’s important to share the load evenly among team members so they can accomplish their assigned tasks during the sprint.

**Daily Meetings**

Short daily meetings are held to help the team accomplish their tasks during the sprint and assess whether any changes need to be made. During these meetings, each team member briefly talks about what they accomplished the day before and what they will be working on that day. These daily meetings should be only 15 minutes long. They aren’t meant to be extended problem-solving sessions or a chance to talk about general news items. Some teams hold these meetings standing up to keep it brief.

**Sprint Review and Retrospective**

Finally, there is a review at the end of each sprint. This review has two purposes:

- Show the finished work products to the project stakeholders. This is an important communication and change management tool for engaging with stakeholders.
- Review what went well during the sprint, what could have gone better, whether the task load was too heavy or too light, and what else was accomplished during the sprint.
Epsis has developed a unique approach, based on the basic Agile process, to develop and deploy new Ways of Working in IOCs:

The ‘Improvement Opportunity’ is the key unit of planning, delivery and progress
Whereas a software development backlog will be full of features and deliverables, the Ways of Working backlog is filled with Improvement Opportunities such as “better data in morning meeting”, “improved preparation for morning meeting”, “Engineer’s Daily Optimization Review”, “Situational Awareness Screens for Logistics team” or “Product Test Review”.
The engineers and operators that will be seated in the IOC are key to all activities associated with developing Ways of Working. They know the activities and they know what works and what does not work. Engaging with these individuals is a key resource for identifying improvement opportunities, prioritizing activities and deploying Ways of Working is essential.

The Lifecycle of Improvement Opportunities
Each Improvement Opportunity or Focus Area is developed through standard phases or a lifecycle. However, it is important to note that, depending on the sprint duration, it is not likely that all opportunities will move from identified all the way through to complete in one sprint. As part of the sprint planning process, the team will commit to which opportunities are in the sprint and how far each one will be progressed. The phases of the lifecycle are as follows:

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<th>Identify - Usually from discussions and interviews with users or stakeholders – these are the basic opportunities for improvement that feed the project ‘backlog’ with new focus areas.</th>
<th>Review – review the configured activities and Ways of Working with the users – do this in the Design Lab, and iterate – re-configure, test and review – until the users are satisfied</th>
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<tr>
<td>Assess – the delivery team’s judgement on how the opportunity can be implemented, and the practicalities associated with the delivery</td>
<td>Test – Conduct a test of the configured opportunity in actual use but in a test environment</td>
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<td>Prioritize – the Governance Board’s view of what opportunities need to be prioritized for next sprints</td>
<td>Deploy – once testing is complete; the opportunity is now ready to be deployed in the IOC</td>
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<td>Define – the delivery team works the opportunity to get an appropriate level of detail for implementation</td>
<td>Complete – tick the box, the opportunity has now been deployed. However, it should not be seen as immutable as these types of business processes rarely stay static. At any time, these focus areas can be evolved by their users, often with a streamlined version of the above process to fast track changes and maintain business relevance and continued use.</td>
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The ‘Improvement Opportunity’ is the key unit of planning, delivery and progress
Establish a design lab
Experience has shown that it is far better to show rather than tell users how they will work after an opportunity has been implemented through the full lifecycle. Key to this is a test facility – or what we often refer to as a Design Lab - for Ways of Working. This is where implemented activities and Ways of Working are prototyped and demonstrated.

The Design Lab does not need to be big, or even similar to the IOC-setups, it only has to have access to the same applications that will be used in operations. In the early days of an IOC development, the Design Lab will bring useful insights into the activities and Ways of Working in the IOC when finished. After the IOC facility is established, the Design Lab can turn into a test and staging environment before Ways of Working will go “live” in the IOC itself (i.e., before going to the production environment represented by the IOC).

Establish a proactive governance process
When deploying activities and Ways of Working in an IOC, it is important to balance what can be done within a certain amount of time to show new Ways of Working being implemented and value realized, with the need for rigor in the deployment.

To achieve this, it is key to establish a sound Governance Process with proactive management involvement from the beginning. This process should allow for user engagement and ideas to be generated, vetted and eventually find their way to implementation, but at the same time maintain focus on the overall objective and deliverables.

The Governance team should be part of the backlog review during sprint planning, as they have the experience and business awareness to which opportunities are achievable during a sprint due to business constraints and which opportunities will provide the greatest value. The Governance team is also there to ensure that the backlog is being constantly fed with new opportunities. If the backlog is drying up, are enough stakeholders being engaged, should a new focus area be started or is the project coming to a natural pause as the new Ways of Working bed-in and the teams start to look for new opportunities for improvement.

Sprint 17-18, end of sprint

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<th>Info Screen</th>
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Key Project Components for Success
To wrap up with some advice on how to approach development of Integrated Operations Centers in an agile manner, below are a few distinct steps that we have learnt to be both effective and practical:
1. Assessment
Start with assessing the status of your operation. Identify major issues and bottlenecks in the operations and prioritize these as the first focus area. Make a high-level project plan at this stage, to set expectations about what will be tackled, in what order and when it might be delivered. Plan so that you have documented value no later than three months after startup. Set some ambitions when it comes to effects of the project at this stage. The assessment phase should take no longer than 1 month.

2. Design Lab
Next, establish a design lab. This is not a sophisticated environment, just a PC connected to 2-6 screens with the appropriate software. The PC should have access to all systems and data that the users need in their daily operation, and it must have a workflow engine, like Epsis TeamBox, to orchestrate the Ways of Working, making them consistent and quick to execute. It should not take more than a few days to set up the lab – if you have ready access to the equipment, access to systems and data or other necessary resources.

3. Agile approach in practice
In an iterative way, users now come in to develop their new Ways of Working, as described previously. Facilitated by the project team, the new Ways of Working are refined until they are sufficiently robust and value-creating for deployment. Depending on the size of the project team, user groups might have four sessions each in the Design Lab, with one week between each session. The project would normally expect to handle two to four user groups in parallel.

4. Early Value
Users should be able to harvest value from the investment immediately after deployment. However, on a regular basis, the new Way of Working should be evaluated. Initially, best practice is to have the project team visit the user groups, to assist in the evaluation. The users should be challenged to identify improvement opportunities, as ‘100% right first time’ is rarely true or even an aspiration for this method. Most ways of working can always become better. This is the core of implementing a culture of change and continuous improvement, an important attribute of a dynamic and effective organization.

5. End up with a Capability, more than a Facility
The key to success is to focus on what the teams in the IOC are doing, and how they do it. They should do the right activities and do the activities right. It should be effective, and well-integrated with the activities in operations and the supporting asset organization. The organization should be able to change the Ways of Working; adopting to new requirements and work patterns and pushing Best Practice to new heights.

A common pitfall is that when the project is “finished”, the new Ways of Working is set and frozen. This is not optimal, over time it will be outdated, and the operators will explore new ways of working, without adopting it into the current model. Thus, every organization should strive towards continuous improvement, and let change be constant.

Contact us
There are several ways to implement IOCs, some better than others. Epsis has been part of many of these projects over the years and have experienced what distinguishes a successful project from those that end up with a center full of expensive screens that are switched off most of the time. If you like Epsis’ agile approach, don’t hesitate to contact us.
References


6. Kent Beck; James Grenning; Robert C. Martin; Mike Beedle; Jim Highsmith; Steve Mellor; Arie van Bennekum; Andrew Hunt; Ken Schwaber; Alistair Cockburn; Ron Jeffries; Jeff Sutherland; Ward Cunningham; Jon Kern; Dave Thomas; Martin Fowler; Brian Marick (2001). "Principles behind the Agile Manifesto”. Agile Alliance, 2010.
We have worked in the oil and gas industry for the last 15 years, focused on a market niche that has at various times been known as Digital Oilfield / Integrated Operations / Smart Fields / i-field, and now is often referred to as Digital Transformation.

During this time, we have worked with many clients worldwide on numerous projects of this nature and have gathered considerable expertise in how to implement these programs in a practical and sustainable way. We have visited oil and gas fields in all regions of the world to help our clients increase value from their digitalization projects and transformational change initiatives.

If your company is considering embarking on this type of activity, we hope that you will find our thoughts useful. We would be happy to schedule a follow-up discussion if you would like to have additional input to your endeavors.

Please contact us with your comments or questions.