Collaboration for improved decision making in drilling
A Demo 2000 and industry funded project

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Agenda

- IO Background and History in ConocoPhillips
- Challenges in drilling operations, today and in the near future
- How has IO improved the situation, what are the remaining gaps
- The role of information technology in supporting IO processes
- The CODIO solution for collaboration and decision making
**IO Background and History in ConocoPhillips**

**Improved HSE**
- Do more onshore - more time for offshore to do HSE activity
- Improved communication / planning / collaboration fundamental - HSE Excellence

**Reduction of risk**
- Establish onshore barriers
- Onshore monitoring of vital signs - additional eyes
- Quality decision and / reduction in response time

**Reduction in cost**
- Reduced manning - less people offshore by doing activity onshore
- Improved productivity by better planning/preparation onshore

**Improved production**
- Improved coordination of production reduction activity – wells and facility
- Improved regularity – improved monitoring and predictability
- Optimization – online condition monitoring of wells and facility
- Travel less

**Our new Operating Model**
- More proactive and predictable
Challenges
IO drilling operations, today and in the near future

- People and organisations
  - Diverse workforce - Physically and geographically dispersed
  - Demographics and generation gap
  - More people involved in decisions
  - Regulatory and HSE expectations
  - Knowledge sharing
  - Resistance to change

- Process
  - Data, Integration, Standards
  - Communications

- Technology
  - Dependent on robust IT infrastructure
  - Connections – between companies – interfaces
  - Security and Data quality concerns

- Others
  - High NPT
  - High costs on the NCS
  - Drilling complexity
  - Remoteness – example in the Arctic
How has IO improved the situation
What are the remaining gaps?

- Value creation well documented for IO on the NCS
  - Improved use of data and information
  - Improved planning and preparation
  - Improved communication and collaboration
  - Improved decision making
  - Improved contractor involvement
  - Improved regularity and efficiency
  - Improved predictability

- IO value potential still high
  - Collaboration and communication
    - Situational awareness
  - Integration of functions and companies
  - Data quality concerns
  - Documentation/Visualization of decision making process
  - Knowledge sharing
  - Training and education
    - Cross company
    - Use of Simulators
      - Universities and Academia
  - Costs and high NPT still a challenge on the NCS
  - Business models – more work to be done
  - Industry demographics are still here
The role of information technology in supporting IO processes

- IT is already an indispensable part of IO – but has more to offer!

- IT for data integration and visualization

- IT for improved awareness and collaboration

- IT for faster and better decision making

- IT for work process support and compliance
CODIO - The operational context

CODIO focus:
- Problem resolution
- Decision making
CODIO: Collaborative Decision making in IO – Scoping of the solution

- **Applicability area.** Focus on collaboration and decision making needed to resolve “Problems detected” in drilling operations
- **Collaboration support.** Facilitate and support informal and light-weight collaboration between actors in problem resolution
- **Relevant information.** Bring forth and present relevant information for problem resolution, suppress irrelevant information
- **Decision support.** Implement a flexible “Assess-Decide-Act” framework for decision support
- **Knowledge management.** Each problem episode, whether successfully resolved or not, may result in a lesson learned
- **Rich visualization.** Use visualization to maximal effect in the users’ interactions with CODIO
CODIO - Data integration and visualization

- High-level dashboard for monitoring – status “at-a-glance”
- Trend visualization and performance KPIs
- Data streams from multiple sources streamed to role-based portal
- Traffic light indicators and alert messages

Alert: We are behind budget due to low ROP (Rate of Penetration)
CODIO - Improved awareness and collaboration

- Common workspaces for sharing and communicating
- Immediate access to standard communication tools
- Discussion board and micro-blogging
- Drill-down to problem boards

I believe the reason for low ROP is that we hit a layer of stringers. We need to look into this. Let’s create a problem board.
CODIO - Faster and better decision making

- Collaborative analysis of nature of the problem
- Access to specialized analysis tools
- Exploration of decision alternatives
- Formal decision models

Here is what the drill bit looked like after we hit a similar layer in EK-04/8

Let’s run through the decision model to see if we should trip out and change bit, or just drill on
CODIO - Work process support and compliance

- Work processes defined in management system
- Important for regulatory and safety reasons
- “Executable” work processes to ensure compliance
- Active task guidance

Ok, in order to trip out and change the bit we need to follow this work process. Let’s ask for guidance!
CODIO – Embedded in Microsoft SharePoint 2010

- Industry standard platform for collaboration and information sharing
- Integration with “everyday tools” for mail, tasks, calendars, etc.
- “Web parts” for extensions and custom tailoring
- Access to databases and tools
- Standardized browser-based look-and-feel
Where are we headed – Automation and intelligence

**Today**
- Manual

**Next 5-10 years**
- Automation
- Execution support for routine tasks
  - Collaboration tools, check lists, "wizards", on-line procedure manuals, workflow systems
- Decision support for complex tasks
  - Collaborative decision support, diagnostic aids, semantic search, planning and coordination tools
- Autonomous problem solving and optimization
  - Automatic situation assessment, reasoning, action planning and execution, autonomous agents
- Automation of routine pre-planned tasks
  - Event-driven work processes, rule-based systems, Web service integration, process automation
Please come to the Computas stand to learn more about CODIO

Thank you for your attention!
CODIO is an advanced decision support solution for oil & gas drilling operations, based on Integrated Operations (IO) concepts. Its goal is to help resolve operational problems quickly and effectively, and thereby contribute to lower Non-Productive Time (NPT) and improved HSE performance. CODIO assesses drilling teams to effectively filter and exchange information, arrive at a common situation understanding, and agree on a course of action.

**Decision Models**

CODIO tackles both coordination and decision complexity of the drilling process. Its main purpose is to help drilling teams to better tackle problematic situations. To this end, the system has to facilitate common problem awareness and to support collaborative problem solving processes. CODIO relies on a case management approach, i.e. the management of long-lived collaborative processes that coordinate knowledge, content, and resources to advance a case (drilling problem) towards resolution.

**Problem solving - Collaboration and situation awareness**

CODIO supports problem solving in the drilling process by helping the drilling crew to keep an overview of possibly several ongoing drilling operations, to detect and react to undesirable events, and to decide on and implement remedial actions. CODIO includes specific support tools arranged in ‘collaborative boards’ in three successive drill-down levels:

- **Performance board**
  - High-level dashboard for monitoring – status 'at-a-glance'
  - Trend visualization and performance KPIs
  - Data streams from multiple operations streamed to dashboard
  - Traffic light indicators and alert messages

- **Operation boards**
  - Common workspaces for sharing and communicating
  - Discussion boards and micro-blogging
  - Immediate access to standard communication tools
  - Drill-down to problem boards

- **Problem boards**
  - Collaborative analysis of nature of the problem
  - Access to specialized analysis tools
  - Exploration of decision alternatives
  - Formal decision models – decision trees with uncertainty handling

In CODIO, knowledge is captured and shared in real-time using social media technology (micro-blogging) with discussions scoped to specific drilling operations. Users can follow multiple operations and keywords across disciplines and operations, and have aggregated streams of activities on their MySite portal page. They can engage in on-line discussions with colleagues in the team and call upon internal and external experts, if required. CODIO also includes support for effectively documenting, tracking, searching, and following up collaborative activities like virtual meetings.

**Background**

Integrated Operations (IO) have been used successfully in the oil and gas industry for a decade. The goal is to work in a fully integrated manner – offshore and onshore in multi-disciplinary teams – and to improve the efficiency of the operations by having the right people making the right decisions at the right time.

The industry is still primarily in the monitoring, remote working, and surveillance mode, particularly in drilling. Technology has developed at an accelerated pace, however the work processes and organization changes required to take the full advantage of the technology have developed at a slower rate. There is also a lack of integration between technologies, and limited cross discipline understanding of measurement and model uncertainties.

With the increasing amount of data being provided by technology, the industry needs help in turning it into good decisions. This is why decision and collaboration support systems will help the industry close the gap between the technology and the organization. In light of high profile events in the industry the documentation of decision making is also going to be important for the industry.

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**About Computas**

Computas is a Norwegian IT consulting company delivering services and solutions for business processes, collaboration and knowledge management. Our core competencies include analysis, architecture and integration, software development and project management. The company employs more than 200 highly qualified engineers and consultants, was established in 1985, and is 100% owned by the employees.

Computas serves major clients in both public and private sectors. In total, our solutions have more than 125,000 users. Customers include ConocoPhillips, StatOil, DNV, DIF-SUEZ, FMC Technologies, Aker Solutions, Idemitsu Petroleum and Lundin Norway, as well as large public sector organizations.