

Use of collaborative agents and autonomous systems within Oil and Gas

Saturn 2012 – Einar Landre, Harald Wesenberg

Framing the Challenge

Failed Safety Critical Operations

A large offshore oil platform is engulfed in a massive fire, with thick black smoke billowing into the sky. Several fireboats are positioned around the platform, spraying high-pressure water jets to combat the blaze. The scene is set in the open ocean under a clear sky.

We believe more supply information systems and
efficient man-machine interaction is the key

Evolution of drilling control



Analogue

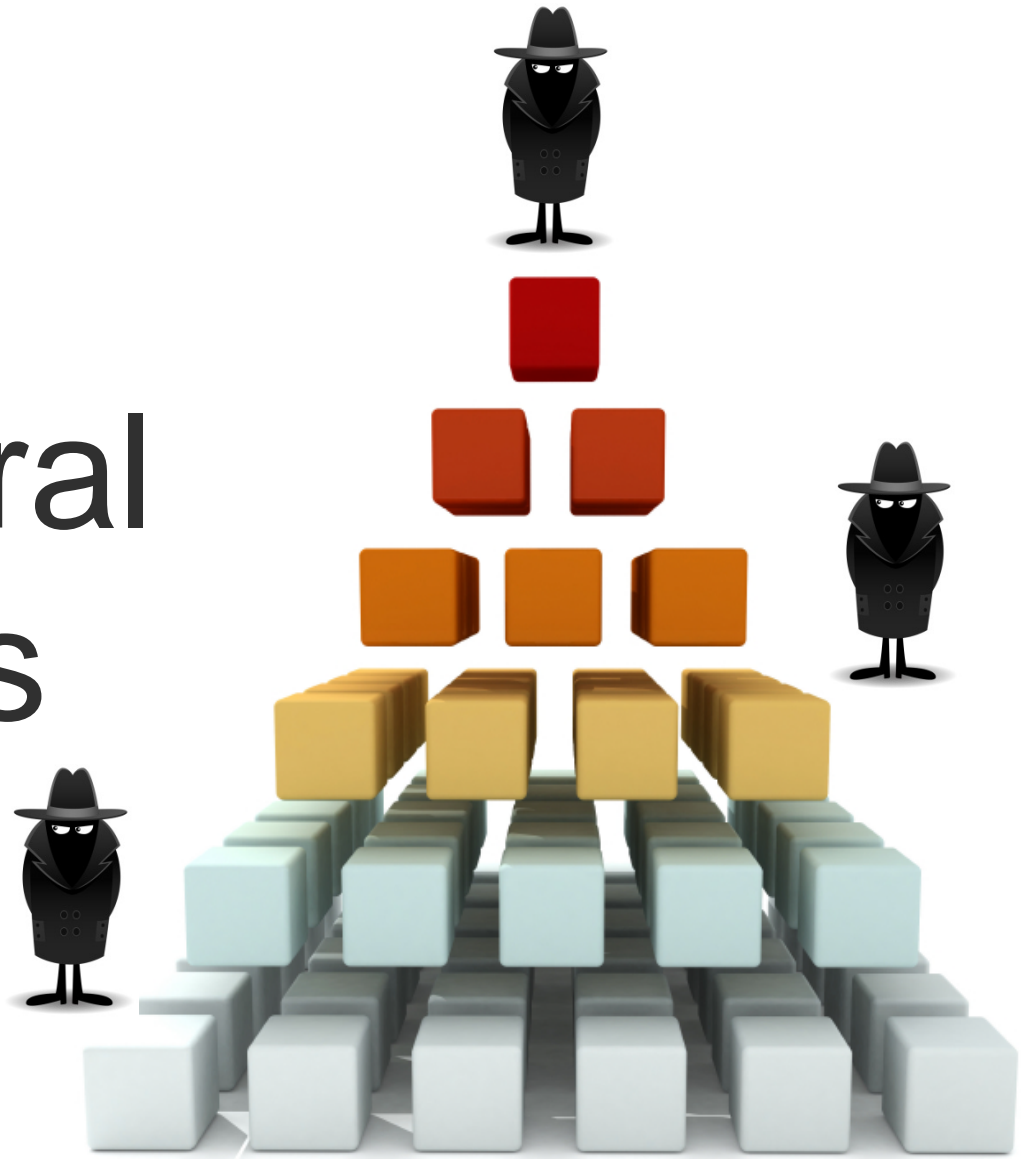


Digital

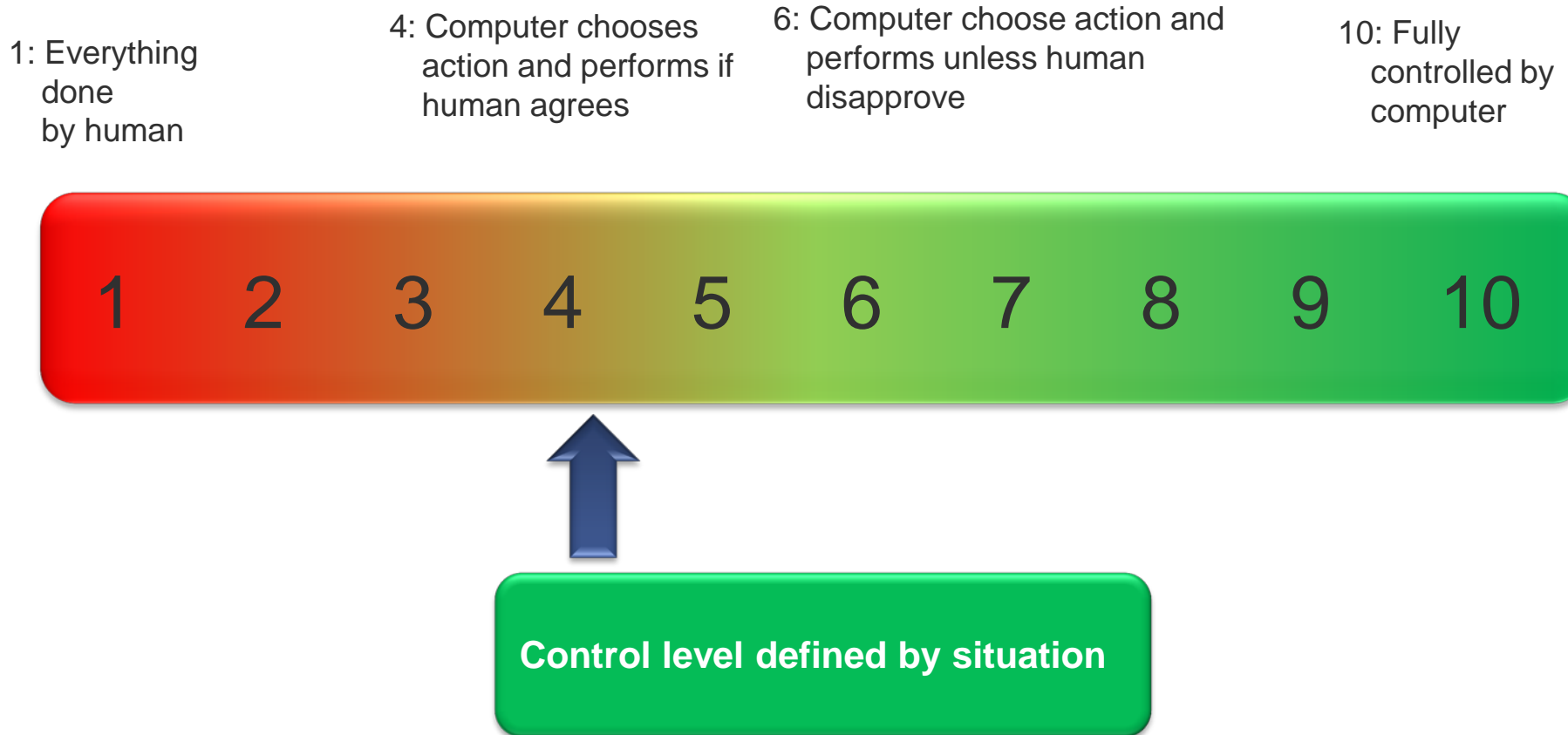


Remote

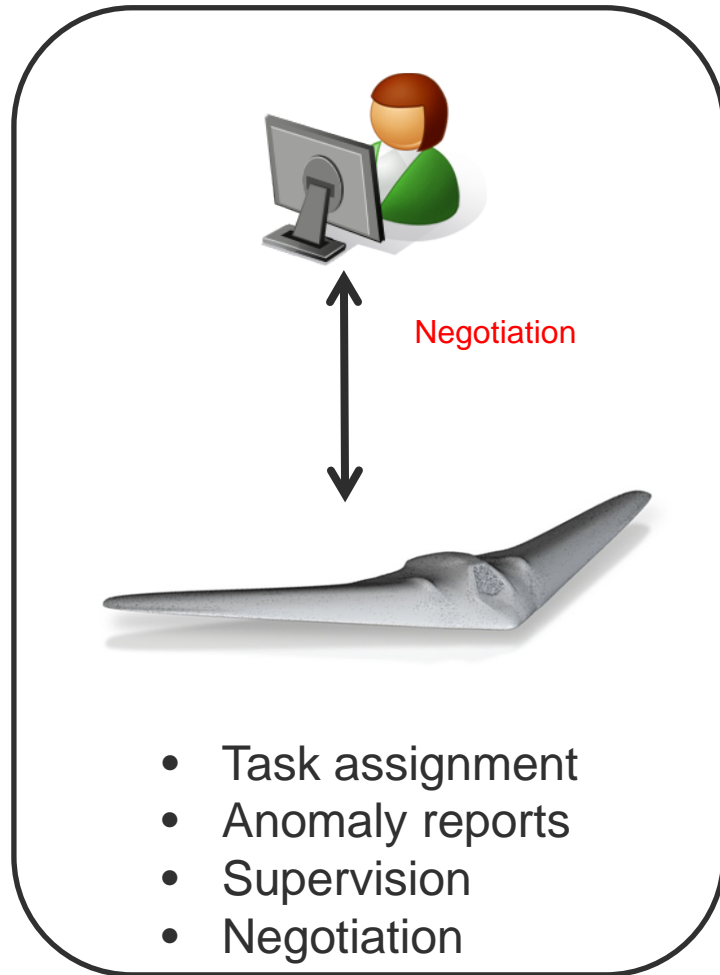
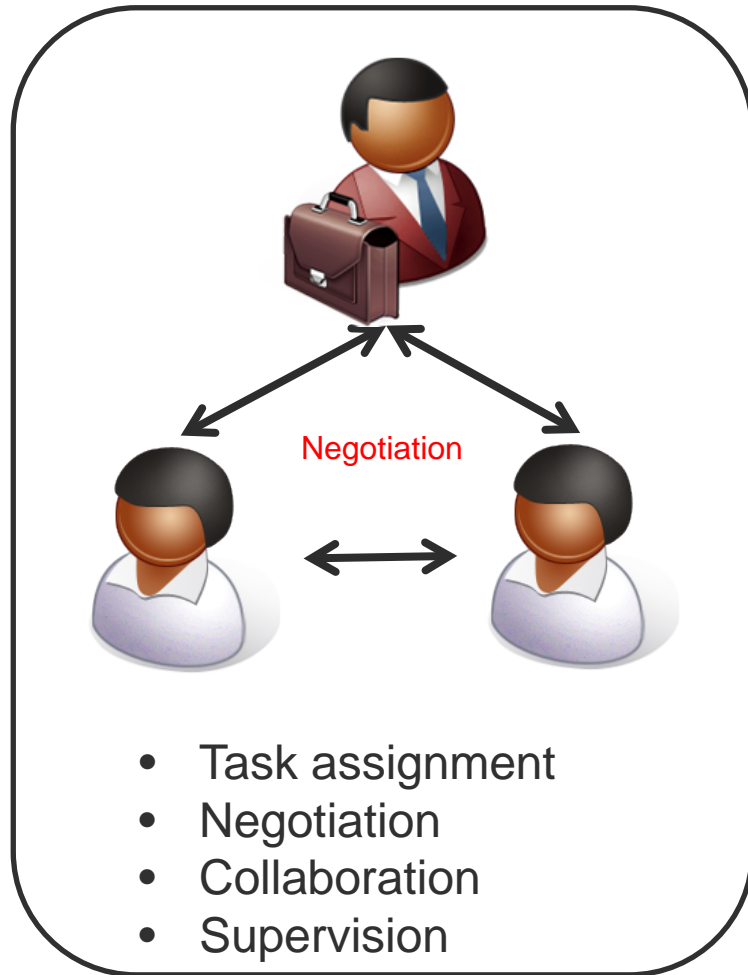
Architectural Concepts



Levels of computer control



Delegation & Negotiation



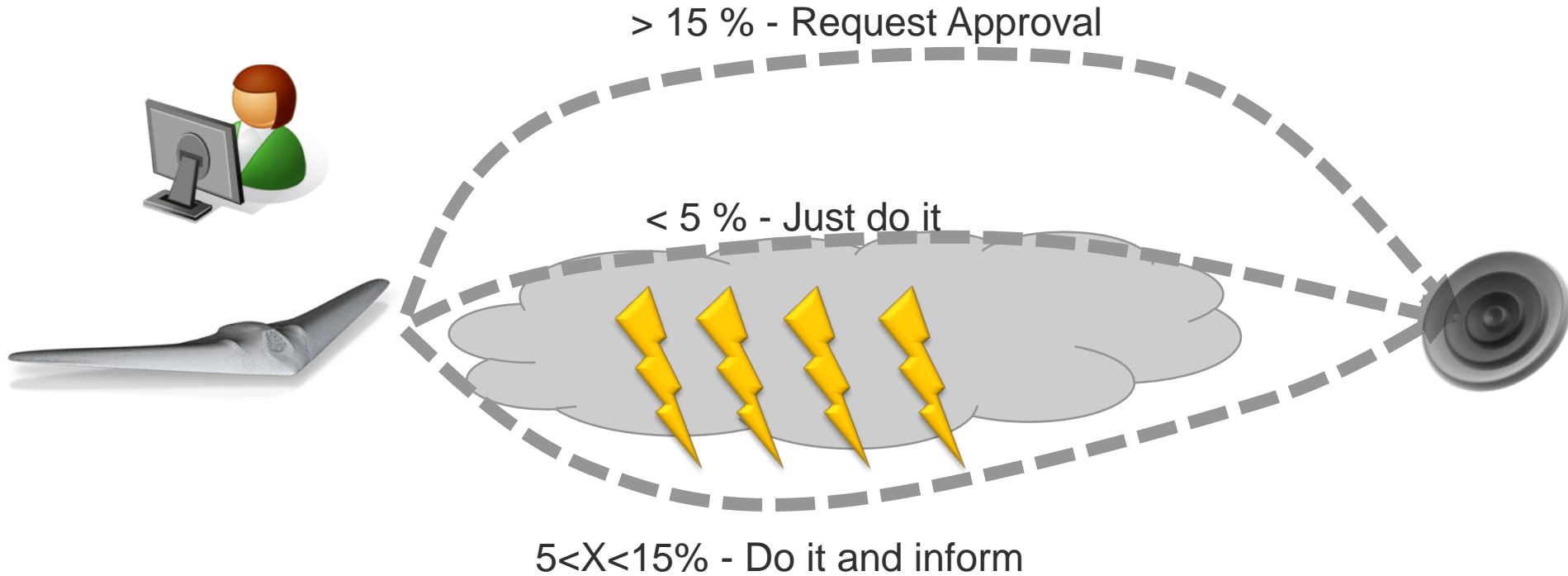
Delegation & Negotiation

**Make the
machine more
human**

- Supervision

- Negotiation

Variable Autonomy



Variable Autonomy



**Human operator is
responsible and
always in control
!!!!!!**

Agents

Can learn

Can be tasked

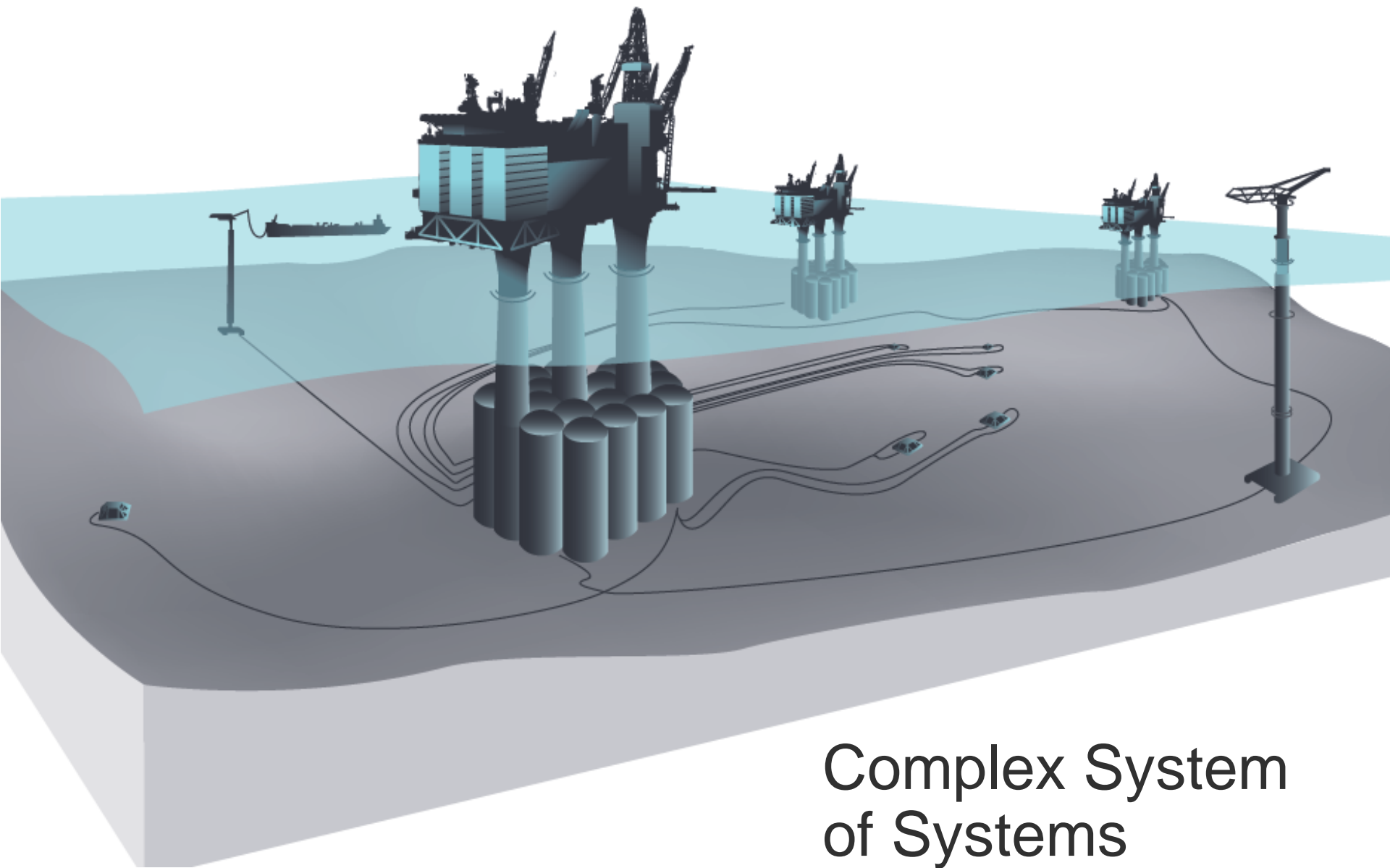
Can sense

Can delegate

Can report

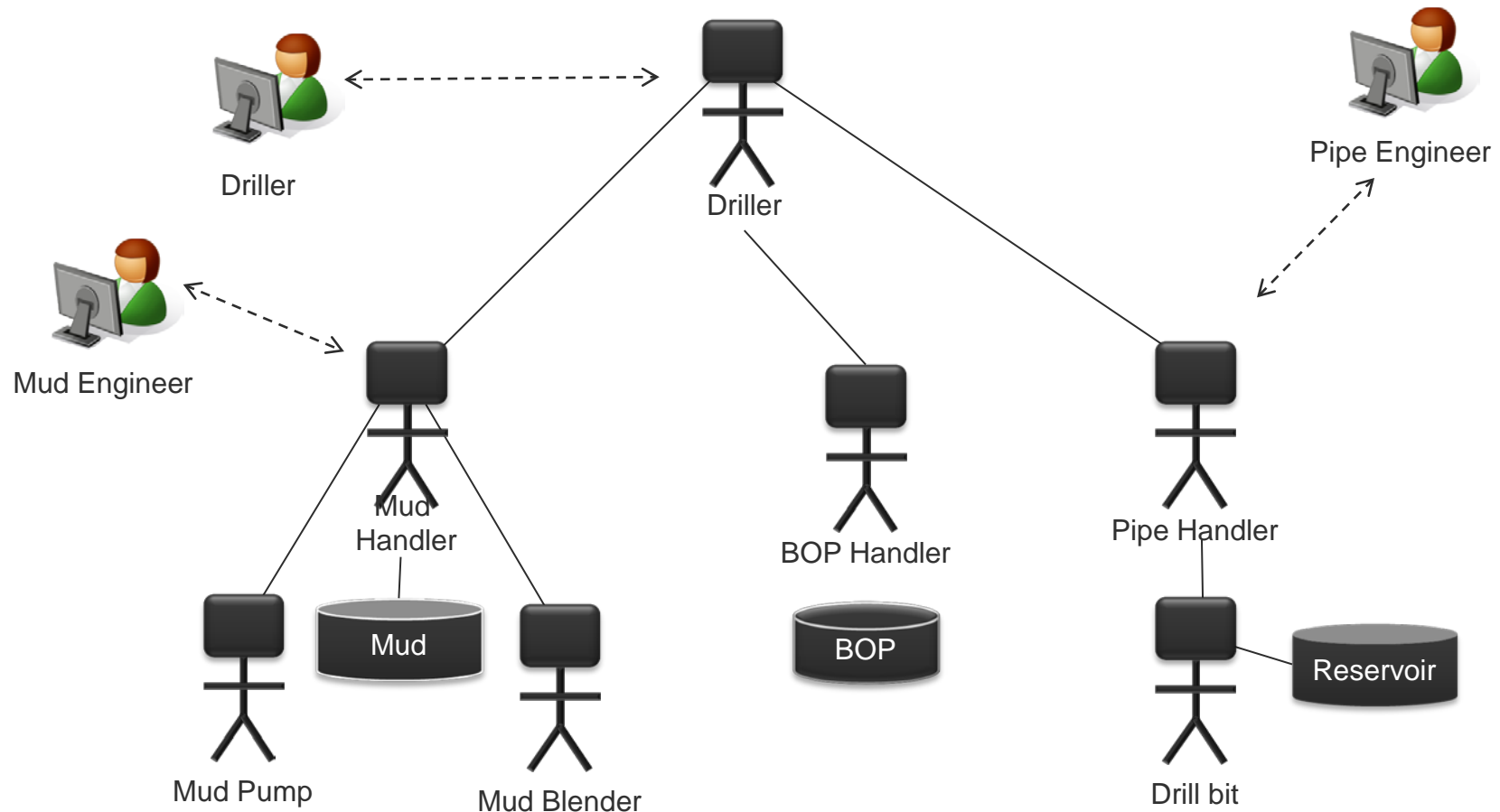
Can form teams





Complex System of Systems

Software mirrors system hierarchy



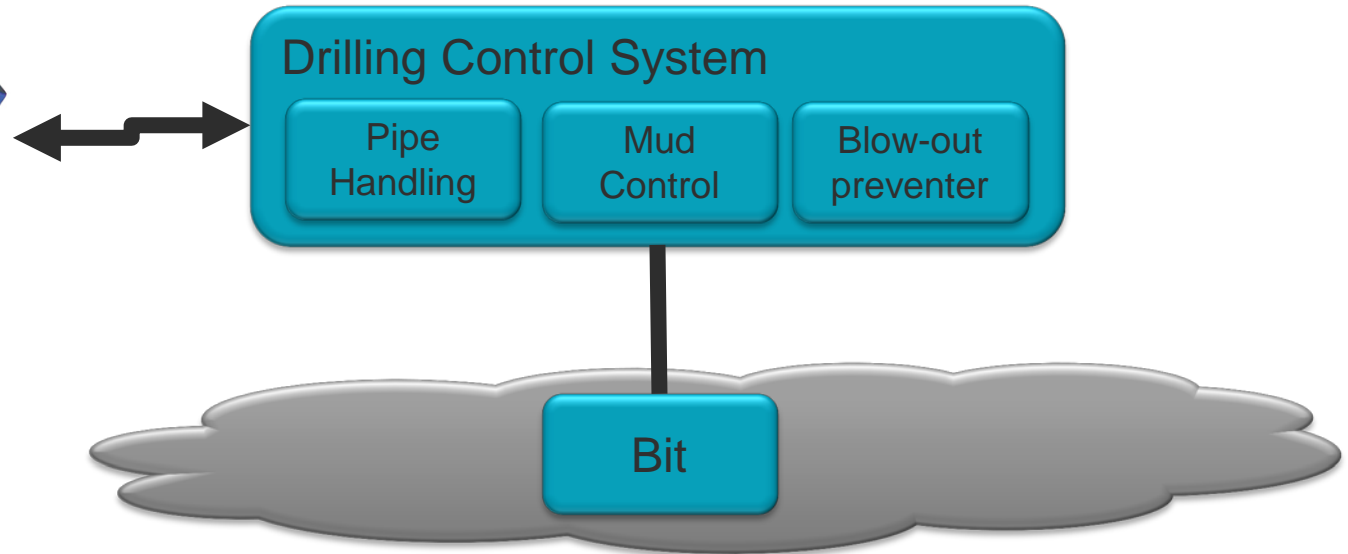
Application

Manual Digital Drilling



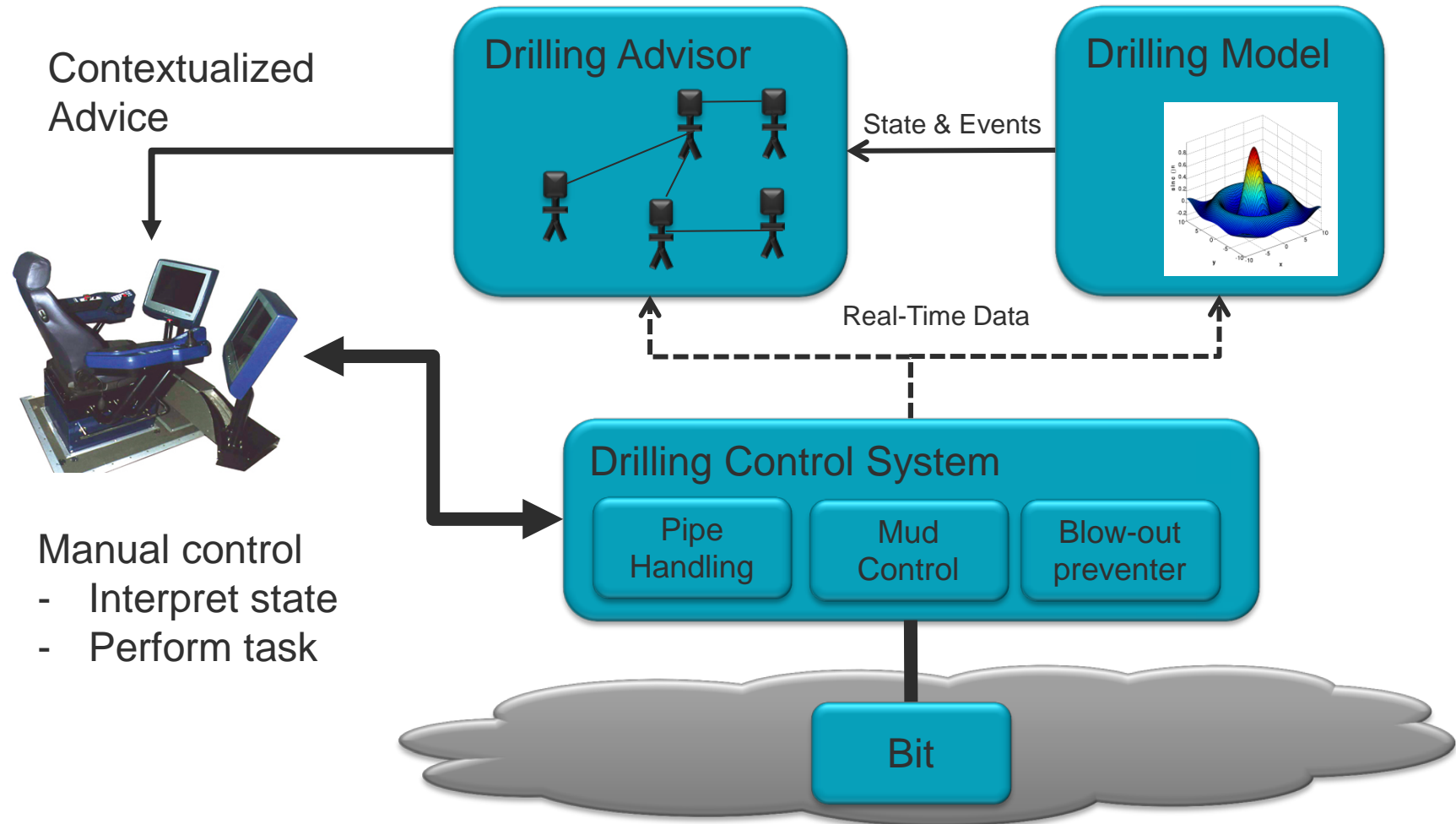
Manual control

- Interpret state
- Perform task

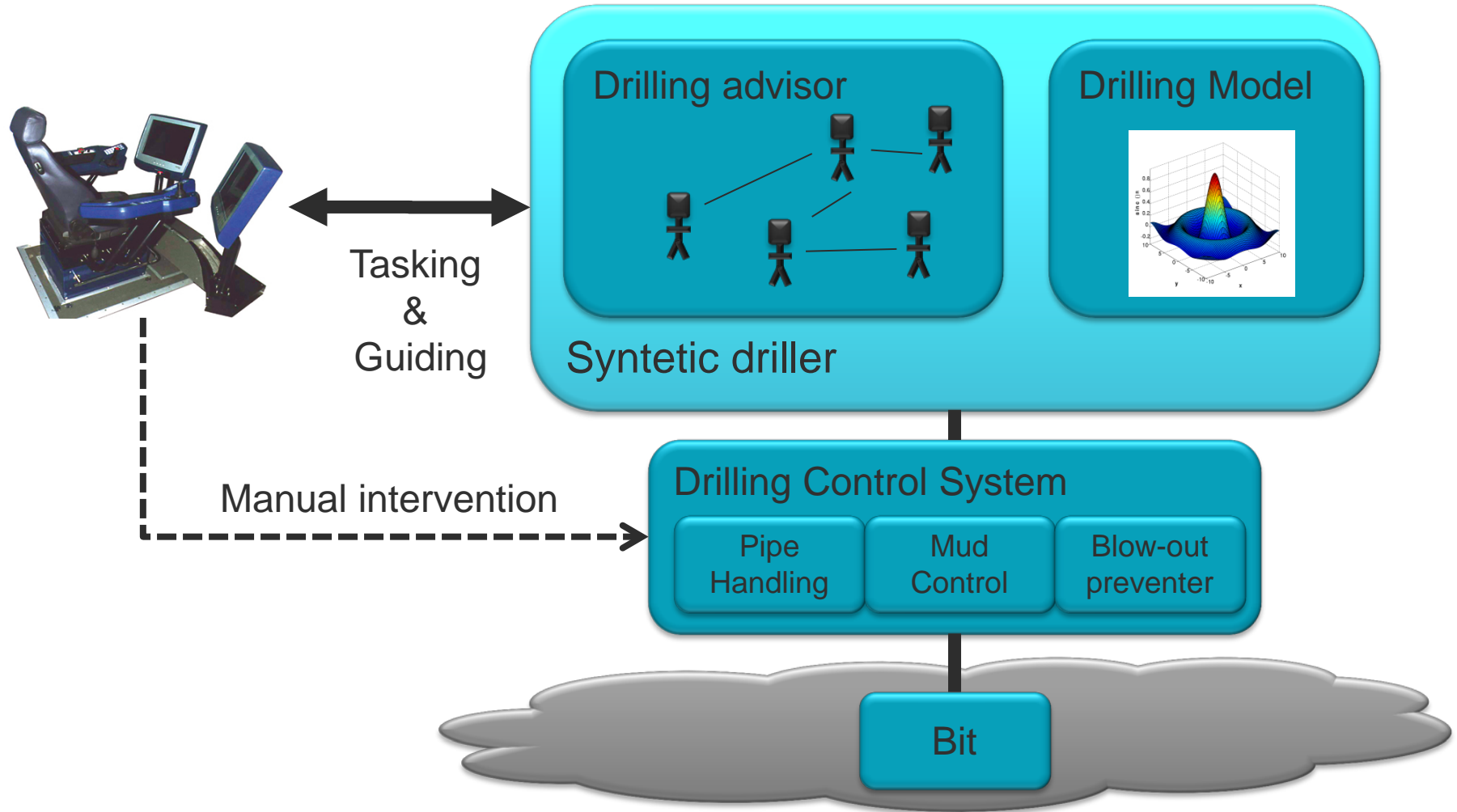


Partly automated machine controls

Computer guided drilling



Autonomous drilling





Increased situational awareness





Increased compliance



Improved decision quality

Increased trust

```
Owner.AIDemulator = Owner.GetAgentByName(name);  
a.start();  
a = Owner.getContainerController().createNewAgent(name, classname, args);  
  
\\start emulator  
String name = "Emu" + Owner.getLocalName();  
args[1] = Owner.getAID();  
args[0] = Owner.getLocalName();  
Object[] args = new Object[2];  
  
\\create arguments  
classname += parentclass.substring(dot+1);  
classname = parentclass.substring(0, dot+1) + classname;  
  
if(dot>0)  
String classname = "Emu-";  
int dot = parentclass.indexOf('.');  
String parentclass = Owner.getClassName().parentName();  
\\package.class->package.Emu.class  
\\get emulator class  
try  
{  
m_parent = Owner;  
jade.wrapper.AgentController.as = null;  
}
```

Reduced operational risk



There's never been a better
time for **good ideas**

Use of collaborative agents and
autonomous systems within oil and gas

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