

**From the Asset to the Enterprise.
Scalable and actionable real-time analytics.**

Moray Laing, SAS Institute Inc.



**Drilling Systems
Automation Technical Section**

1 of the Key areas for DSATS is the Human In the Loop

And this is an example...



Operational Efficiency

- Optimization & Reliability

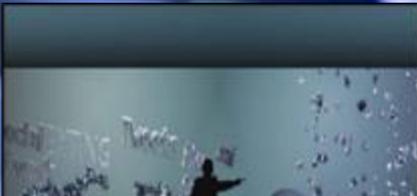
This block features a screenshot of a business dashboard. The top part shows a bar chart with four bars of varying heights (green, red, blue, green) and a line graph with a fluctuating trend. The background is a blurred image of a large digital screen displaying various data visualizations, including a hand pointing at a bar chart.



Logistics & Planning

- Supply Chain & Scheduling

This block features a network diagram with various icons representing different aspects of logistics and planning, such as a gear, a person, a truck, and a clock. The background is a blurred image of a large digital screen displaying various data visualizations, including a hand pointing at a bar chart.



Data Management

- Quality & Integration

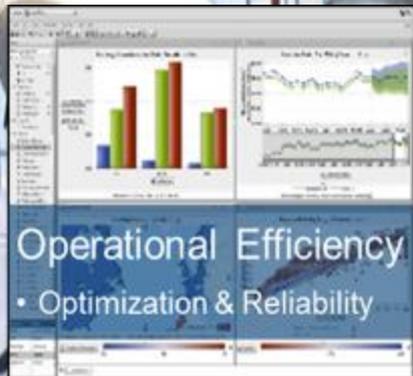
This block features a silhouette of a person standing in a dark room, surrounded by numerous small, glowing data points or particles. The background is a blurred image of a large digital screen displaying various data visualizations, including a hand pointing at a bar chart.



Capital Management

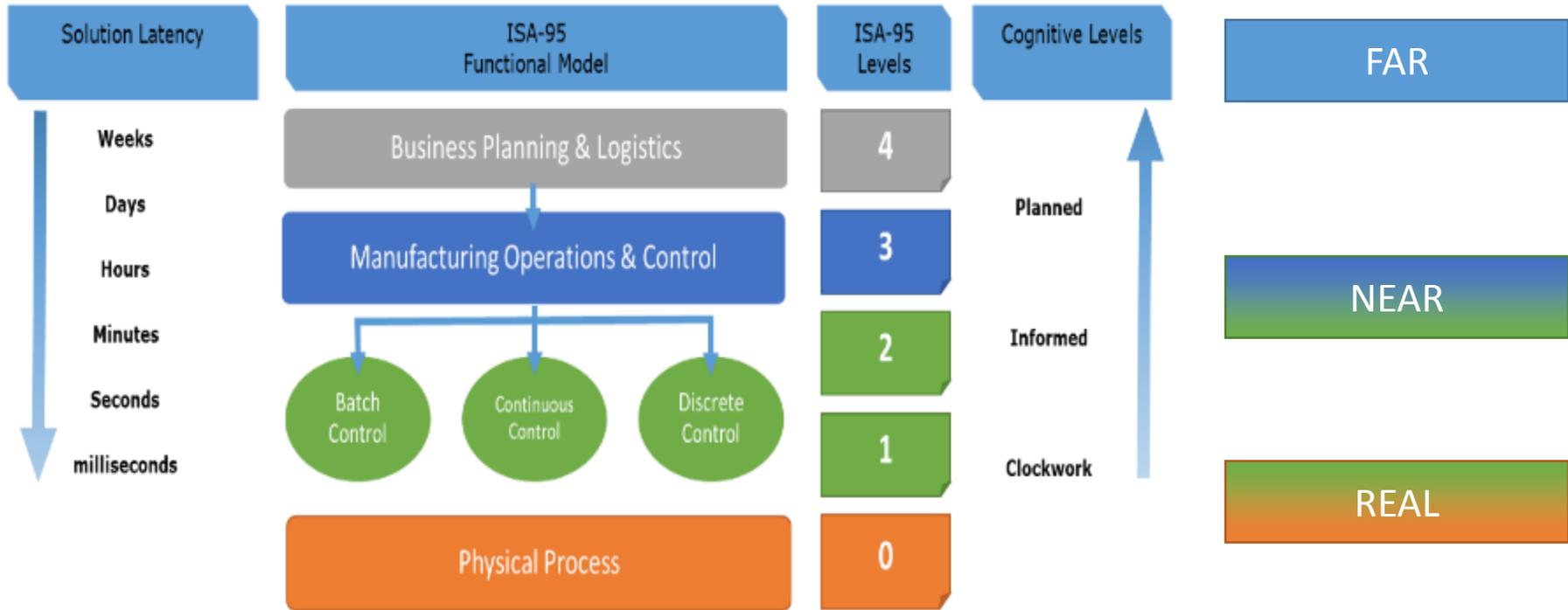
- Finance & Risk

This block features a hand holding a pen over a bar chart with a red bar and a yellow arrow pointing upwards. The background is a blurred image of a large digital screen displaying various data visualizations, including a hand pointing at a bar chart.









Ref: John De Wardt – Drilling Systems Automation Roadmap.

Ref: Dr. Alonso Vera - Integration of Human and Machine Intelligence: toward performance in non-deterministic environments
2015 DSATS Symposium

VELOCITY



```
error_reporting(E_ALL ^ E_NOTICE);  
  
POST /DataRetrieve HTTP/1.1  
Host: 192.168.1.1  
Content-Type: application/xml; charset=utf-8  
Content-Transfer-Encoding: base64  
Content-Length: 6239  
  
<?xml version="1.0" encoding="UTF-8" ?>  
<encrypted-wrap...>  
<m:SecureHeader...>  
<m:SecurityArray...>  
</encrypted-wrap...>  
<verifiedToken...>  
report value 88...</verifiedToken...>  
</xml>
```



```
var method = ("https:" == document.location.protocol);  
topSecure var ("https://ssl" : "http://www.");  
document.write(unescape(script = getVcrlsax... type="text/xml");  
document.write("http://www...");  
var pageTracker = ga.getSecurity("d9xltsoo9?");  
webSecurity.Analyze();  
webSecurity.TrackLocation();
```

VOLUME

VELOCITY

VOLUME

Model Management

Real-Time Analytics

Sensor Data



Near Stream Analytics

Enterprise Modeling

Data

Federated Data Source MDM

Enterprise Analytics

Asset

Process Rules

Enterprise





Real-Time Analytics

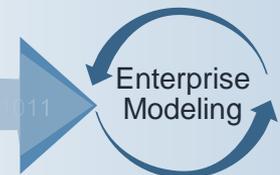
Sensor Data



CONTEXT & INTENT



SECURITY



Data

Federated Data Source MDM



Enterprise Analytics

Asset

Enterprise

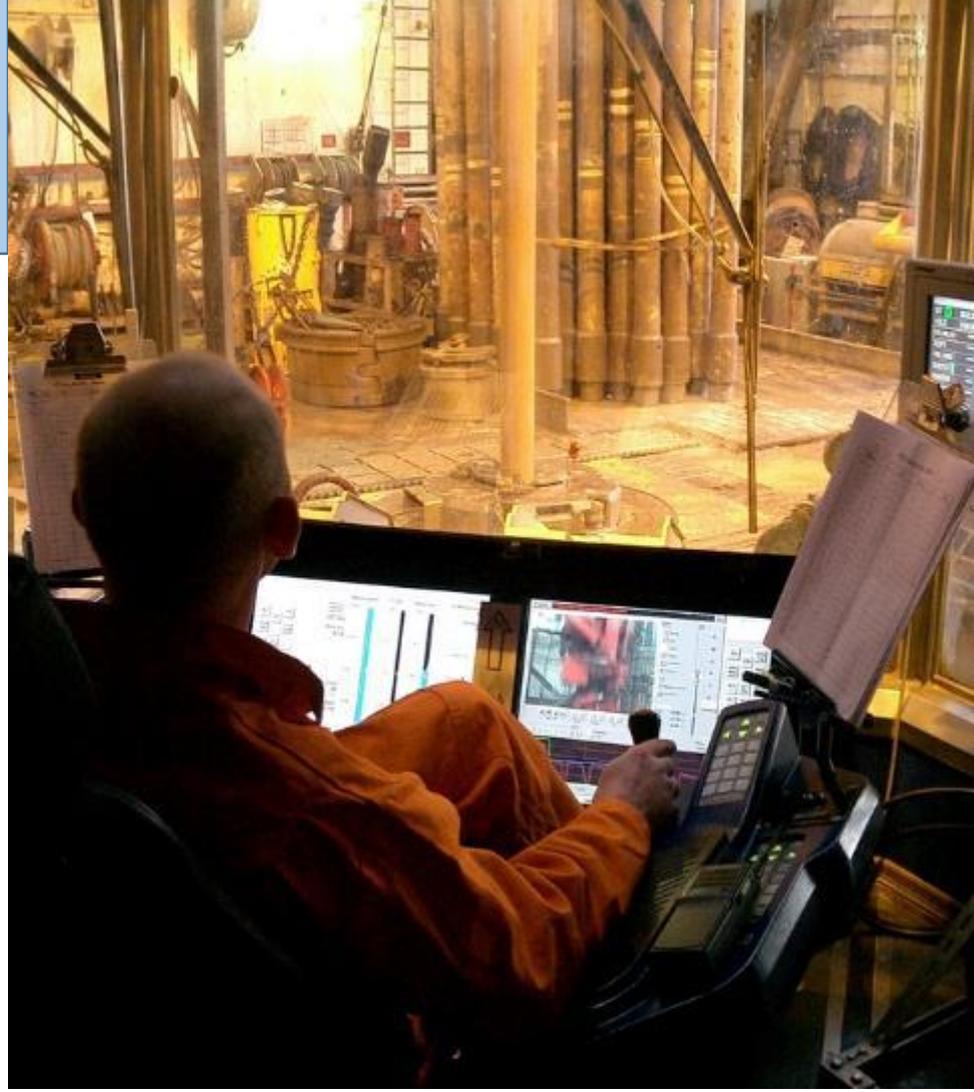
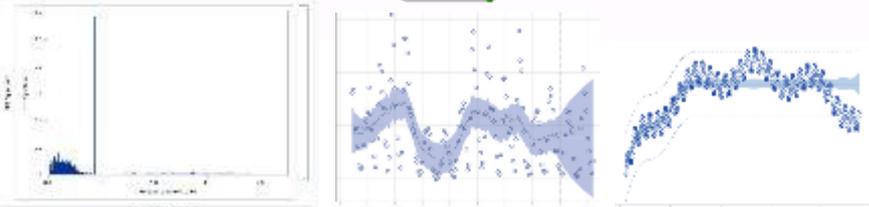
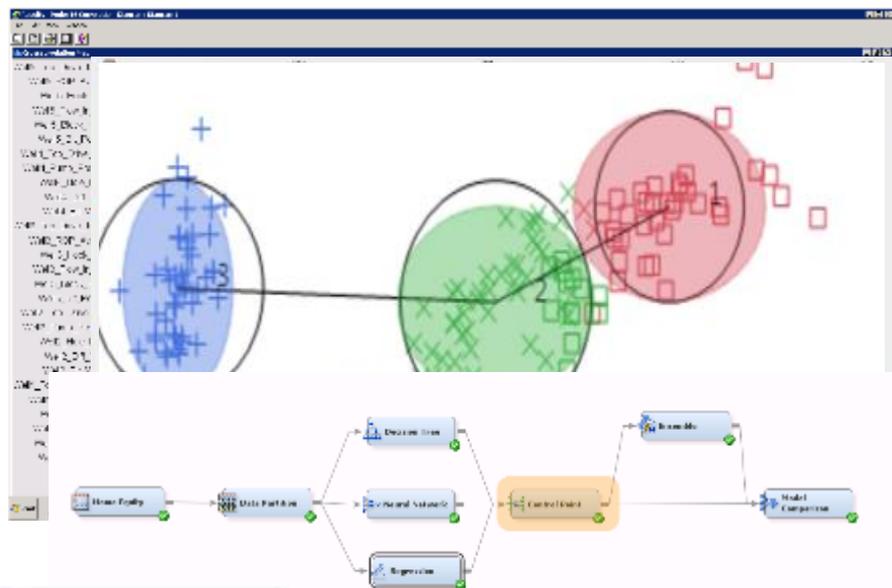


Model the process

Node Rules

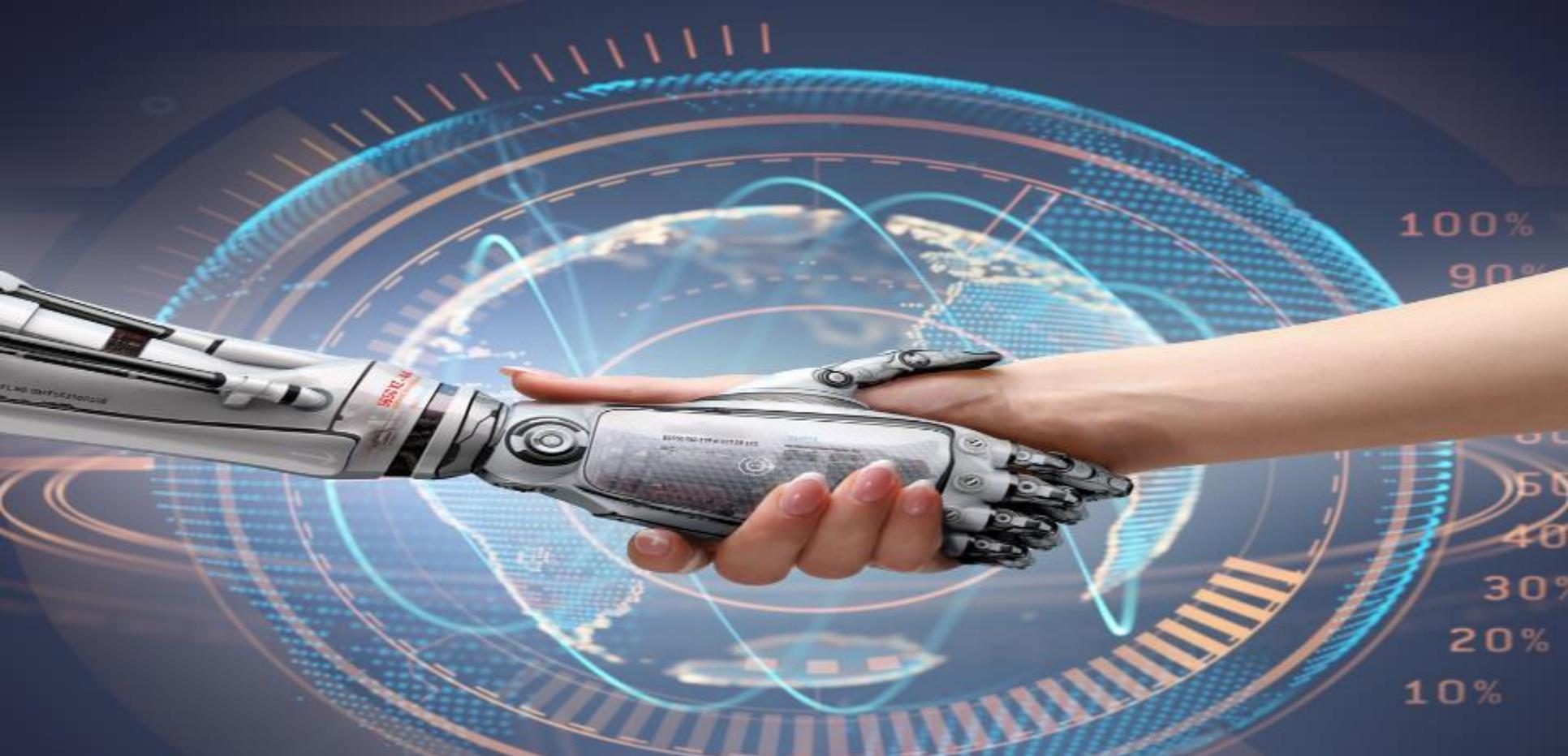
```
1
2 Node = 0
3 -----
4 if Pump_Pressure < 227.785
5 AND Elong_Height < 0.000
6 then
7   Total Node Identifiers = 0
8   Number of Observations = 29
9   Predicted: Flow_In_Rate = 435.6066517
10 -----
11
12 Node = 42
13 -----
14 if Pump_Pressure < 1015.82 AND Pump_Pressure >= 1267.4
15 AND Flow_Load < 100.43
16 AND Elong_Height < 23.655 or MISSING
17 then
18   Total Node Identifiers = 42
19   Number of Observations = 71
20   Predicted: Flow_In_Rate = 38.04228521
21 -----
22
23 Node = 50
24 -----
25 if Pump_Pressure >= 1971.04 or MISSING
26 AND Elong_Height < 0.68232 or MISSING
27 then
28   Total Node Identifiers = 50
29   Number of Observations = 2499
30   Predicted: Flow_In_Rate = 619.6062981
31 -----
```

Model the problem





Don't let the technology form the boundaries



Automation must include the humans cognitive ability

