Intelligent Plant™

Inform, Enhance, Grow. Intelligently.

An industrial app store approach for production technologists

North Sea Production Efficiency

FPAL empowered by Achilles Registered

Microsoft BizSpark Startup

OSIsoft. partner

Microsoft Azure

Software Business Models for the Future

- Review the Opportunities
  - What is available to you by improving North Sea production efficiency and the prize we can all win
- New Software Model
  - Assess the opportunities of changing your software model for a new paradigm and how that can help to improve efficiencies within your business
- Systems for Experts
  - See how a system for experts which brings together disparate vendors in an App Store for industry can provide real-world savings for the oil and gas sector

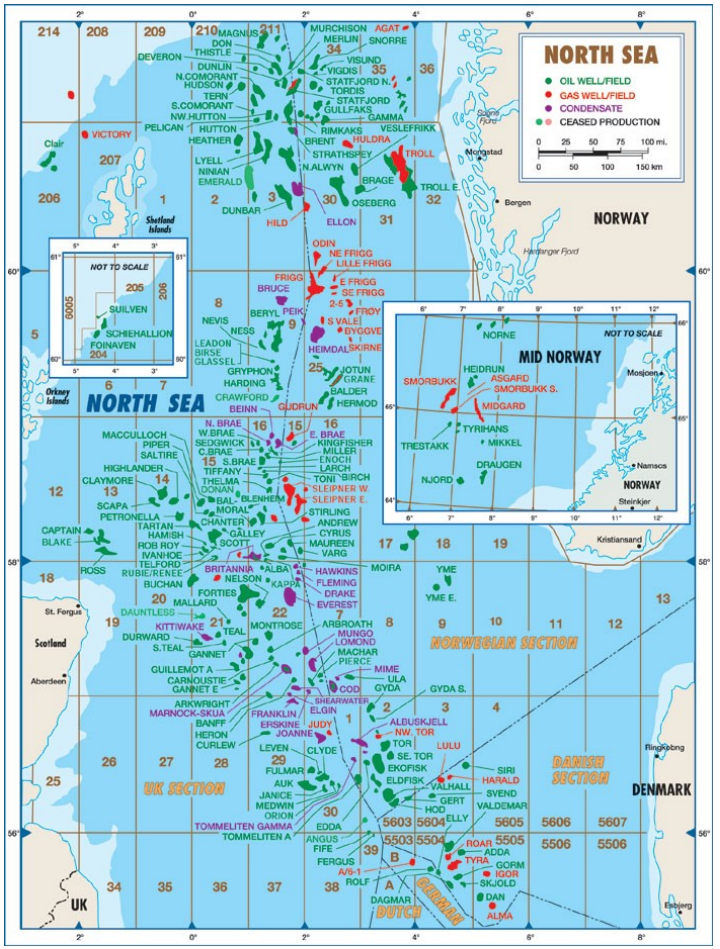
What is the Size of the Prize

North Sea Alone –

- Production efficiency varies from <50% - to 70%

Current production:

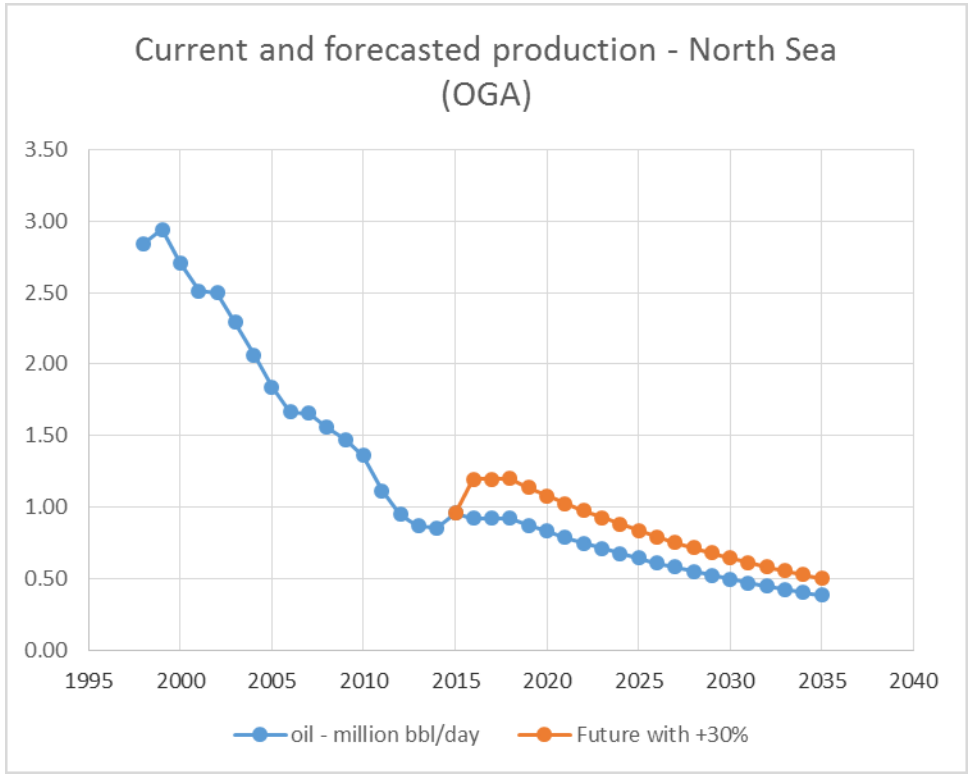
- Oil: 920,000 bbl/day
- Gas: 3,336mm scf/day



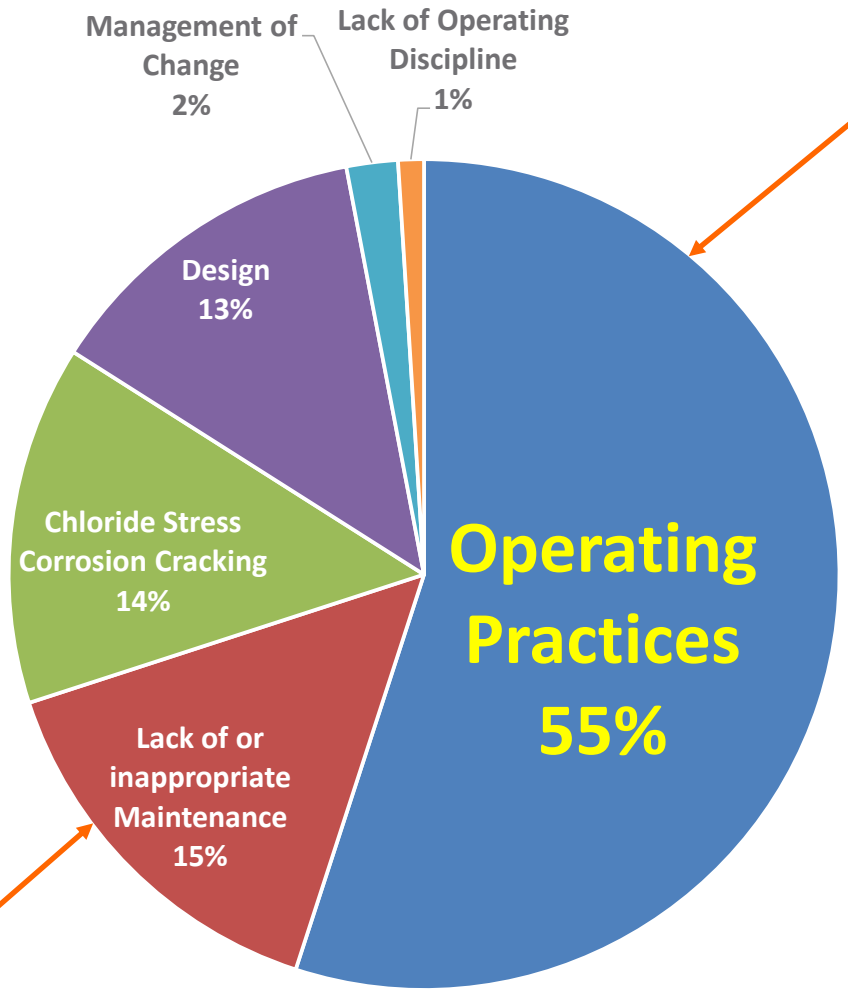
What is the Size of the Prize

What can we do for Oil and Gas –

- Optimise, and reduce downtime
  - We already appear to have improved production efficiency but there is still plenty room for improvement
- With a 30% improvement
  - The increase in production up to 2035 is 1.4 billion barrels of oil
  - That's $56.7 billion at $40 per barrel



What should we be Concentrating on?



What we need to concentrate on

What people normally concentrate on

Causes of lost Production excluding "one offs"

Ref: document: OGU-CSS-ADL-OA-SY-0001

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Software Business Models for the Future

		Initial Cost	Support Cost	Internal Cost	Ease of Trial	Chance of Success	Encourages Innovation
OLD	Application Developer Driven	↑	↑	↑	✗	✗	✗
	Operator Driven	↑	↑	↑	✓	✓	✗
NEW	App Store	↓	↓	↓	✓	✓	✓

The Old Business Model – Developer Driven

Application Developer has an idea

Application Developer builds a proof of concept

Application Developer shows this to the operator, with little idea of the savings that their application may make

Application Developer offers to install application on operators network at significant cost

Operator considers the fact that they will have to spend of the same order internally to enable the capability to be installed

The Old Business Model – Developer Driven

Operator either:

£££££'s

Justifies cost and goes ahead, project is a success and operator realises gains or savings and developer is paid

£££'s

OR

Justifies cost and goes ahead, then finds issues with software that has not been tested on real data and the project fails. Operator is less willing in future to risk similar projects

The Old Business Model – Developer Driven

In the **Worst Case Scenario**:

££'s

The operator does neither of these and does not go ahead due to high cost of installation resulting in:

- Operator does not realise benefits
- Developer is out of pocket

££'s

The Old Business Model – Operator Driven

Operator has an idea

Operator builds a proof of concept

££'s

Operator shows this to an application developer, and pays for this to be developed

Operator installs technology on their own network at significant cost

££'s

Operator bears the burden of cost of support paying application developer year on year

£'s

££££'s

The Old Business Model – Operator Driven

…But this success is temporary as new technology is required and a project is kicked off to do the same thing again

Operator shows this to an application developer, and pays for this to be developed

Operator installs technology on their own network at significant cost

Operator bears the burden of cost of support paying application developer year on year

The App Store Business Model

£0

Operators are charged nothing to connect (encourages connections and use)

£0

Application Developers are charged nothing for access to data (encourages development)

Note: Access was difficult to achieve alone in the past

£ Low Cost

£££££

Operators can "try" and verify an app at very little cost and then gain value only paying for apps that they know work

90% of the cost is transferred to the developer

£

10% is taken by the App Store (Intelligent Plant)**£**

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Challenges we are Attempting to Address

Data Exists that has the capability to improve production in the North-Sea and elsewhere, but the applications that are developed to monitor this data have classically struggled to be deployed

Typically this data access is limited to a single monolithic vendor stifling innovation

- The App Store requires a single deployment of App Store Connect to allow the operator to utilise any application from any developer in the App Store

Challenges we are Attempting to Address

Monitoring applications usually have to store calculated and modelled results, but operators do not like to give write access to existing data historians

- App Store Connect includes a free Edge Historian with write access to allow calculation results to be stored on the operators own network without affecting existing infrastructure

Application developers struggle to access real data to test and build new capabilities

- App Store provides standard example datasets that allow them to start working with pseudo-real data before they are able to get an operator on board which can take some time

The App Store Business Model

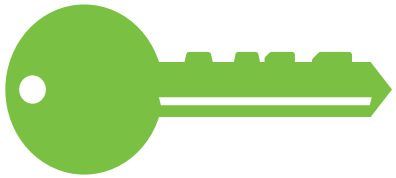
£’s

This enables developers with small outlays to create new technologies and quickly have them running on real data with no app store costs until they are making money

It also creates a stream of revenue to allow the developer to maintain and improve the tool

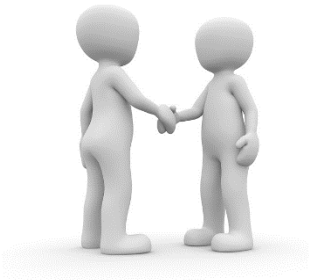
£’s

Cyber Security



All Data is Encrypted
Access to Data is Secured
No App has Access to Data until you allow it
Operators Data is securely stored on their own Network

Why are we doing this?



We believe that enabling the operator to switch from one vendor to another within a platform will create an ecosystem that allows best in class applications to rise to the top

We have seen far too many people redevelop the same old tools – and we need to move the paradigm forwards by opening things up and allowing people to see what can be possible

Why are we doing this?

We believe the industry needs a new model of delivery for technology to allow the take-up of new capabilities with lower initial cost in order to stay cost effective

£ Low Cost

The burden of development to

- Access data
- Understand the types of data that is available
- Support many different types of historian

Can kill individual developers

By doing this at SCALE – for everyone, everyone can win;

- App Developer gets paid relative to the use of their app
- App Store gets paid relative to the use of the store
- Operator only spends money on what is worth their investment

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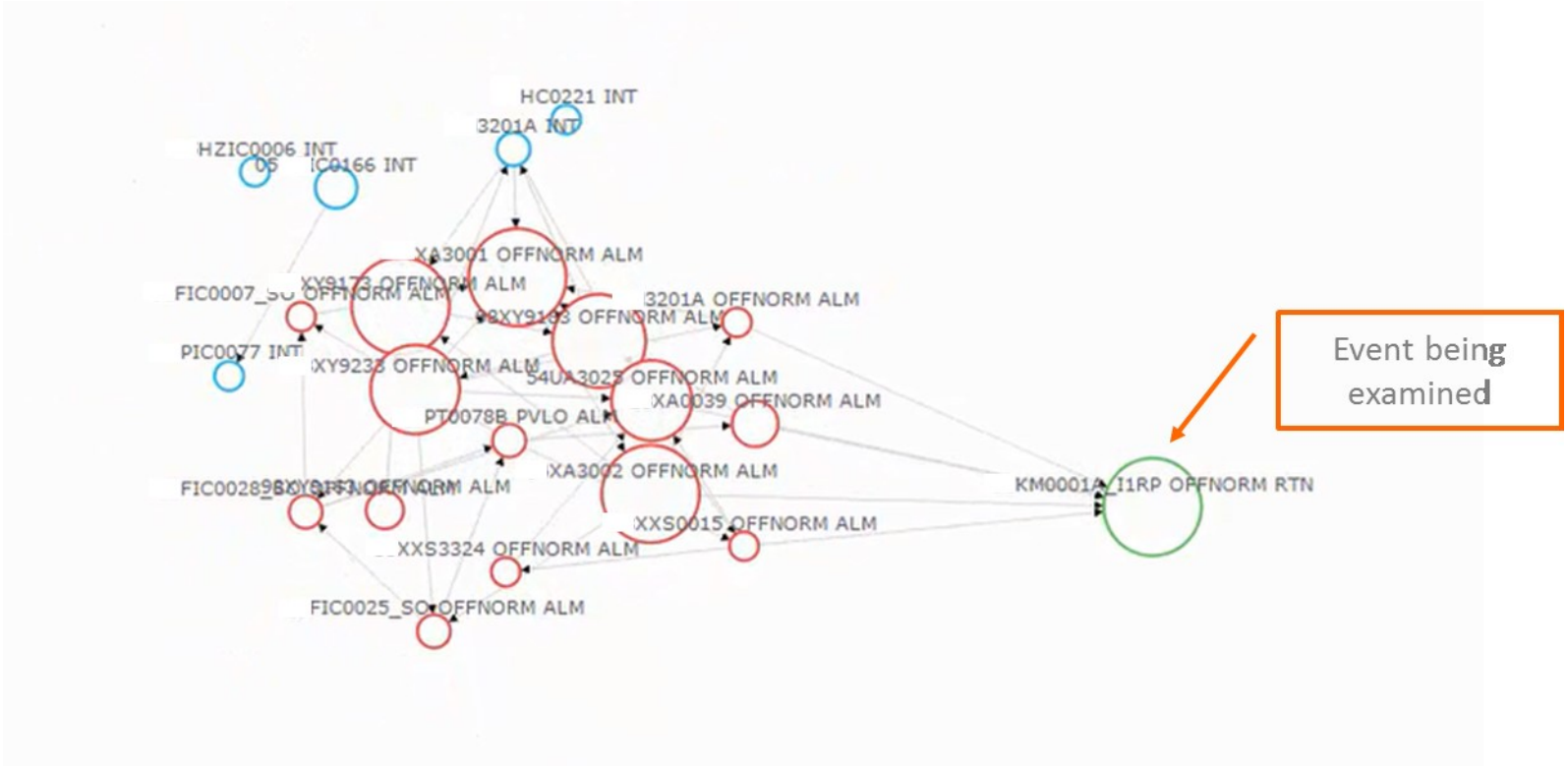
Uptime

- The image shows the aggregation of 21 compressor stops over a six month period:



Uptime

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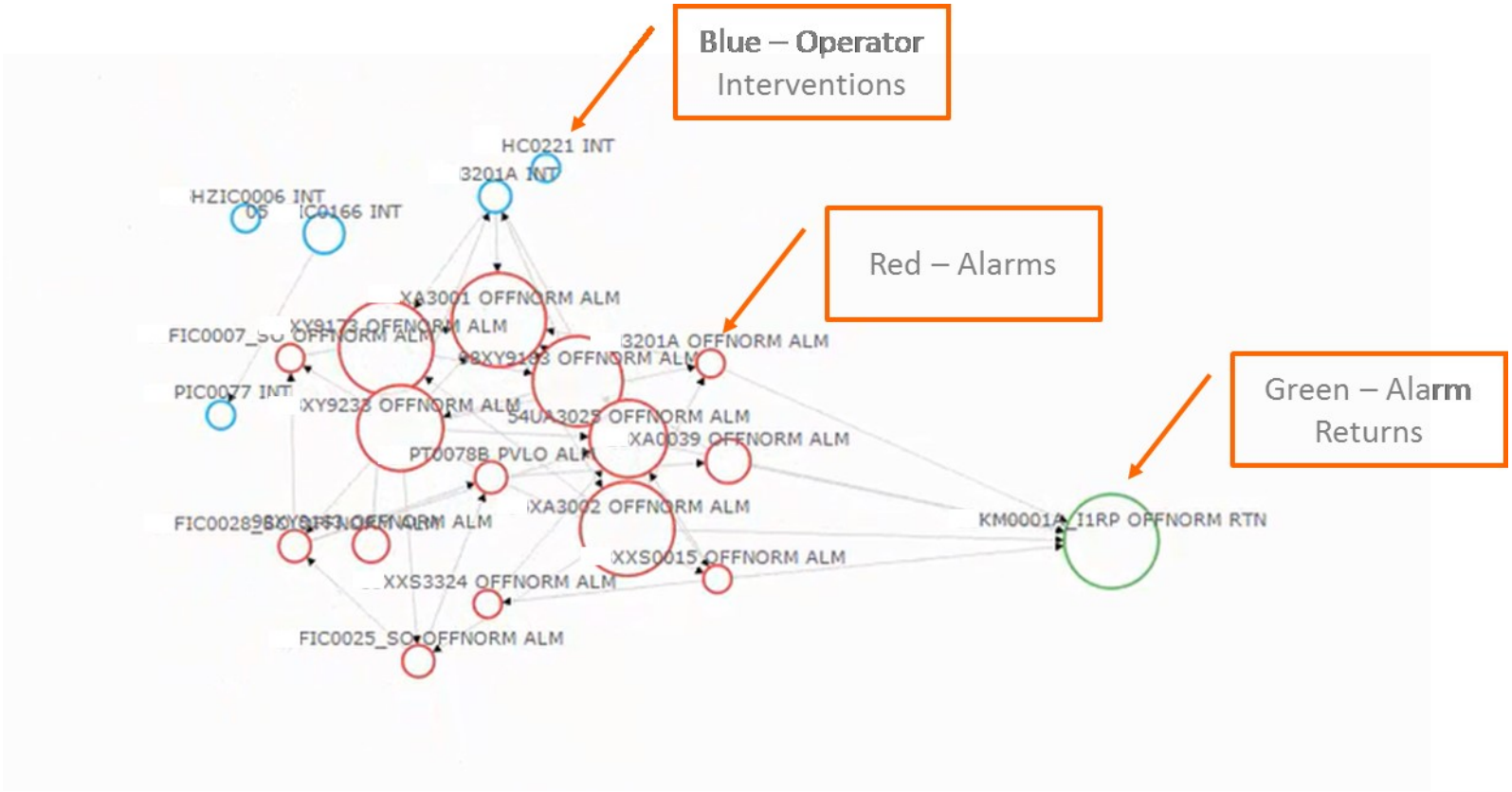
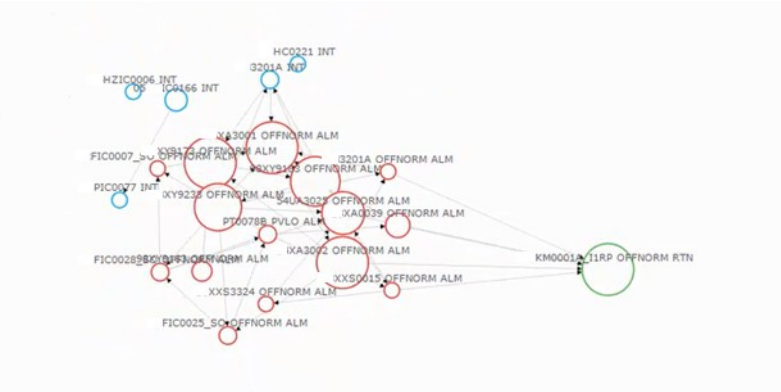


Uptime

- In the example shown, 6 out of 21 were normal stops, therefore 15 were trips, i.e. 71%
- We estimate that at least 40% of the equipment trips will be down to actions that can be eliminated through training and/or procedural changes, i.e. 28% of all trips
- Potential per machine saving per year
  - = No of trips * Value of trip * 0.28
  - = 20 Trips * (0.5days * 20kbpd * $40) * 28%
  - = $2,240,000
- This can apply to:
  - Compressors
  - Generators
  - Oil Pumps
  - Water Injection pumps



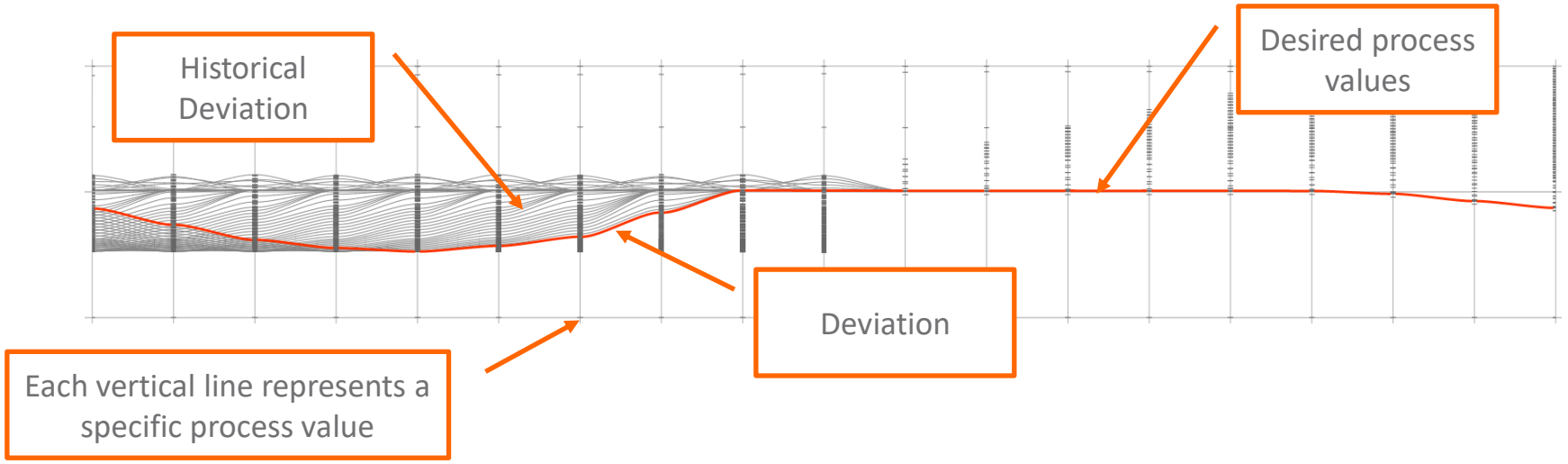
- This requires conversations with the operator, trips offshore, and buy-in from all levels but it represents a massive opportunity to make North Sea Assets more viable in the current environment

Gestalt Trend - Summary

- Gestalt Trend is a data analytic application that examines historian data over a defined period (which may be several years) looking for relationships between variables and how that effects production and efficiency

- We will discuss 2 uses of Trend:
  - Operating Envelopes
  - Optimisation

Gestalt Trend - Operating Envelopes

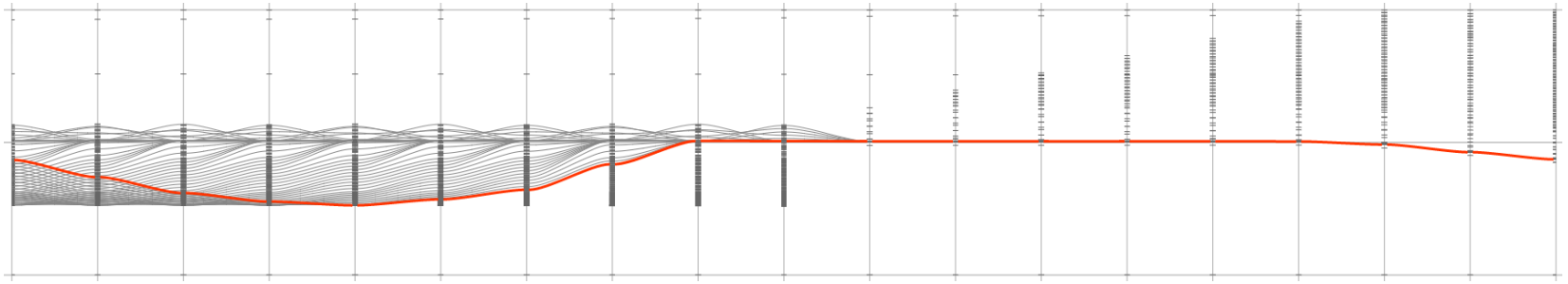


- Monitor plant performance by observing deviation from normal
- All the important tags can be viewed at the same time
- This can be set up so deviations are shown well before alarm values are triggered
- Maps well to your mental model as position is related to place in process, rather than just colour

- Detect Early
- Diagnose
- Prevent

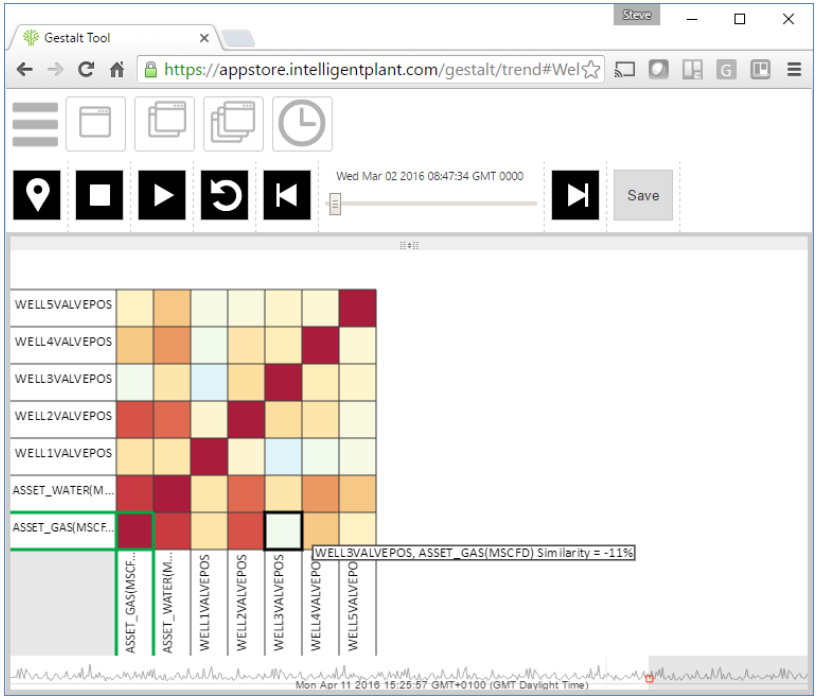
Gestalt Trend - Operating Envelopes

- We estimate that 75% (at least) of uncaught excursions which led to trips can be eliminated through the enhanced monitoring ability
- Potential per site saving per year
  = No of trips * Value of that trip * 75%
  = 10 Trips * (0.5days * 20kbpd * $40) * 75%
  = $3,000,000



Gestalt Trend - Optimisation

What are these wells doing?

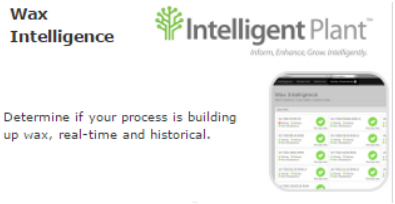


- The tool to the right immediately advises on what is preventing and contributing to production
- In this case Well 3 is preventing the asset reaching maximum production – this may be through reverse flow, large water cut, or other interactions
- The problem is that many wells have no individual flow meter, so are tested individually even though when they are producing they are connected together to the production separator and so may produce differently when co-mingled

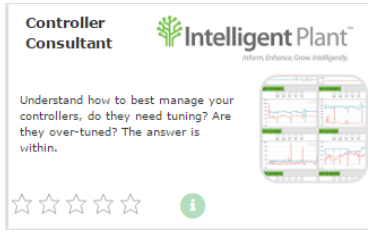
Gestalt Trend - Optimisation

- We estimate production may be increased by 1%
- Potential per site gain per year
  = Gain * Production
  = 1% * (365 days * 20 kbpd * $40)
  = $2,920,000

Example Apps



Wax intelligence - Alerting engineers to the possible build-up of wax in pipelines, saving a potential cost of over $10,000,000.



Controller Consultant - Improve control and reduce maintenance
Reduced cost/ less lost production,
Trial with Maersk UK at present.

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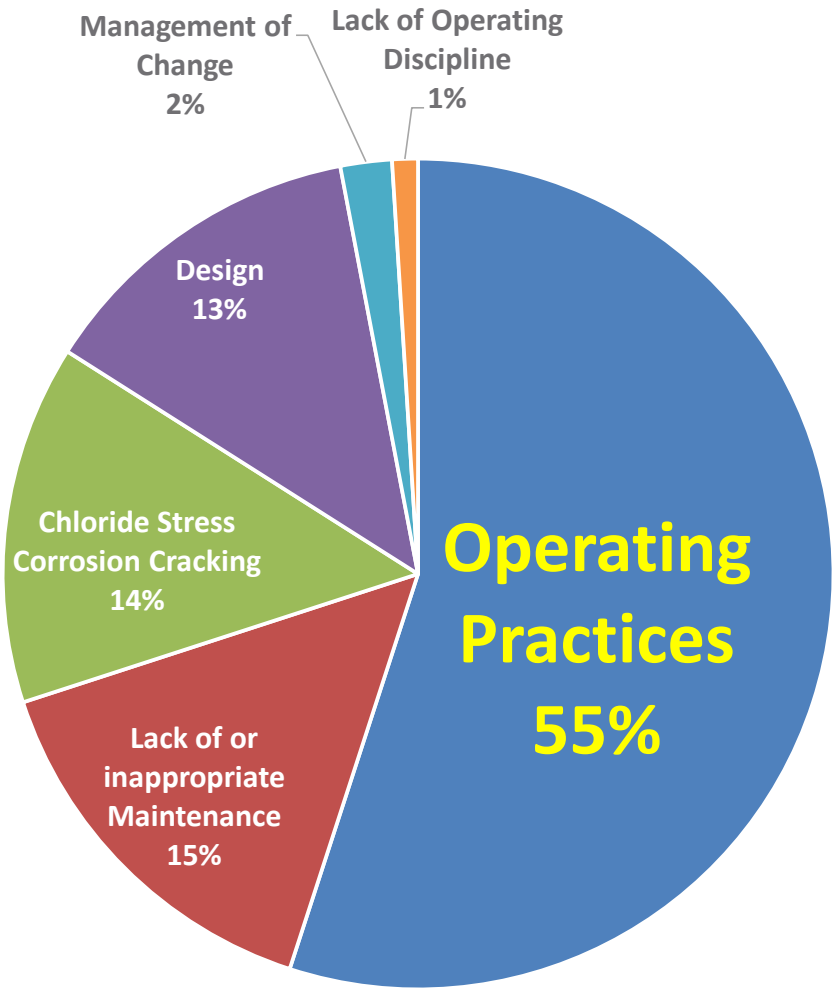

Causes of lost Production excluding "one offs"

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Thank You!

http://appstore.intelligentplant.com

- Anyone can log in to see what is available and try it.