

Defining digitization maturity in upstream oil and gas – from purchasing outwards  
Or: from depersonalized systems to business value

Karl Jeffery, editor, Digital Energy Journal  
PIDX European forum, June 5 2018

FIRST IDEA

Business people (not technology business people) should see technology like any other investment they make – what value does it add.

Defining maturity in oil and gas digital technology

= good integration between PEOPLE, SOFTWARE and TASKS

Not about ADVANCED TECHNOLOGY.

In the early days of computers – all you could do was try to get the system working.  
Today we should expect much more.

What happens if we get excited about what technology can do for our businesses  
– rather than the technology itself?

But first we need to understand it

Your special report on artificial intelligence in business (March 31st) mused that “AI will make workplaces more efficient, safer—and much creepier”. The emphasis on industrial engineering on the factory floor in the mid-20th century brought about men with clipboards telling employees exactly how to do their job, even going so far as to tell workers not to think, just perform. But in the 1970s one company that got its quality-control process right was Toyota. The secret to its success was integrating workers with new production-system techniques. Employees were respected for knowing most about the processes they used each day and, after training, were handed more control over their work. More important, they were given the opportunity to solve problems and continuously improve their processes. It was the workers who could connect the dots.

Companies seeking to utilise AI as the next stage in industrial management must incorporate these lessons into their systems, appreciating workers for their knowledge of what really happens in the day-to-day process, their creative potential and their basic humanity. Otherwise, as with industrial engineering, I suspect they may find themselves with bitter employee robots, antagonistic unions and disappointing results.

TIM LEVEQUE

Hilton Head Island, South Carolina

Economist magazine, Apr 26, 2018

Basic psychological flaws with people

Systems feel great for the people who build them

Systems feel terrible for the people who have to work with them!

Engineers often like building systems

It is nearly impossible to plan in advance what systems will actually work for people – trial and error / sharing what works is the only way

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## Commonwealth immigration

### Windrush row: 63 people could have been wrongly removed, says Javid

Home secretary gives first official indication of number of individuals who could have been wrongfully removed or deported

**Jamie Grierson** Home affairs correspondent  
@JamieGrierson  
Tue 15 May 2018 16:49 BST



▲ Sajid Javid told MPs the figure of 63 could be subject to change "because the work is still ongoing". Photograph: Parliament TV

The home secretary, Sajid Javid, has revealed that more than 60 members of the Windrush generation could have been wrongfully deported or removed from the UK in the first official indication of the scale of the problem.

Appearing before the home affairs select committee for the first time since his appointment to the job last month, Javid said the Home Office had identified 63 possible Windrush cases of wrongful removal and warned the number could rise.

Officials identified the cases after trawling through 8,000 removal and deportation records for Caribbean nationals aged 45 or over, who could have benefited from provisions in the 1971 Immigration Act protecting their right to be in the UK.

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People thought a 'system' could provide the answers and ended up deporting people who shouldn't be here – although it would have been obvious through 'common sense' and a little questioning that they belong here.

US Department of Motor Vehicles queue – a non working system (but I'm sure the people who design it would tell you why it is necessary)



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## Facebook Backtracks After Removing Iconic Vietnam War Photo








**Kathleen Chaykowski**, FORBES STAFF ✓  
 FULL BIO ▾

*On Friday, Facebook flipped flopped, admitting that the 1972 Pulitzer Prize winning photograph, 'Napalm Girl,' was an 'image of historical importance' and should be allowed. (Associated Press) [-]*

In recent days, **Facebook** FB -1.28%, arguably the most powerful distributor of media in the world, insisted that one of the most iconic news photographs in the world was not suitable for its social network. On Friday, the company flipped flopped, admitting that the 1972 Pulitzer Prize

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Windows taskbar: Type here to search, 10:12 AM 5/16/2018

Facebook – too much faith in a digitised system and not enough in common sense

# **Oil and gas upstream purchasing: what we think a perfect system looks like**

All the master data is in good condition

All the products are in a catalogue

We can send out quotes to suppliers and pick the best

Purchases are only made with a PO number

Invoice to payment happens perfectly

## **Oil and gas upstream purchasing – what the business wants:**

Right product, right time, right price

If it is needed urgently we receive it urgently

The people with most knowledge of the products make the decision

We understand past performance of different products and suppliers when we make a decision

Anticipate business needs before they happen

When the schedule (eg drilling) changes, the delivery schedule changes

Continually learn how to improve purchasing – learn from past mistakes, experiences of ‘customers’ of the purchased item

## **Common clashes with oil and gas purchasing:**

I can't buy it because I don't have a purchase order number – although I'm the only person in the company who knows what we need

I can't enter this in the form because it isn't in the 'drop down'

The system doesn't capture data about urgency / when we actually need this.

Suppliers get fed up of answering RFQs from buyers who never give them business

The purchasing department always buy the cheapest

I can see what's wrong but no-one is listening or learning

Didn't someone realise we would need that

Why don't these people ever learn

Everybody hates the ERP software or finds it hard to use

BUYERS SAY: suppliers are forcing us to use them with non generic part numbers

SUPPLIER SAYS: I haven't been paid for 60 days – and chasing payments takes a lot of senior management time

## **Attempt to describe 'maturity' in oil and gas purchasing:**

Solid data management – most parts are in a catalogue, good master data.

People can get unusual parts when they need it.

Knowledge about problems with suppliers and parts is captured.

People with the domain expertise get appropriate input into the purchase decision.

Purchases only agreed when funds are available to pay or likely to be within payment term period

Data is accurately captured about all transactions or agreed purchases

Can repeat business with trusted suppliers without getting quotes from others.

Very smooth process through to payment

No dispute over what has been bought

Software is easy to use – it feels like software serves the individuals not the other way around

Get the right control balance – so the right people have the right amount of influence over what is bought, and nothing is bought if funds are not available / CFO does not wish to allocate money to that

System can be easily updated as required

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MY NOTE: BUSINESS VALUE SHOULD EVENTUALLY WIN – IT MAY TAKE A WHILE. BUT WHICH SIDE DO YOU WANT TO BE ON?

## **Maintenance: what we think a good “system” looks like**

We have the right maintenance intervals

We know what spare parts we will need to do the work

The spare parts get ordered and delivered to the worksite on time

The maintenance work gets done according to schedule

If there is a reason to update the maintenance interval, we can do

## **Maintenance – what the business needs**

Understand when maintenance needs to be done – including from plans, past experience, monitoring, understanding changed circumstances

Only do maintenance when it is necessary to do maintenance

Have everything you need at the right time, even if the schedule changes

When emergency maintenance is needed (something breaks) the right people and parts are available reasonably quickly

Improve understanding of what maintenance is needed and the best way to do it

Change quickly when something is wrong in the plan

Get value from all available data to get a better idea when maintenance should be done

## **Logistics – the “perfect system”**

We know what needs to be delivered, we arrange the logistics ‘assets’ (ships, trucks), we use them the most efficiently

### **What actually happens:**

People don’t know what needs to be delivered

Lots of urgent shipments which need expensive means of delivery

Deliver the wrong thing

Something needed urgently isn’t there

People are not proactively informed about delays so they can replan / explore options

Urgency level or “likelihood of schedule change” is not captured

People shy away from human interaction, needed for tasks like sharing vessel space with another operator

Nobody knows what is actually being delivered until it arrives

A lot of wastage of vessel space

## **Mature inventory management:**

We have what we're likely to need before the next delivery arrives

We have spares to keep us going if the next delivery is late

We have items in stock which we might need urgently (if one in operation fails and we have to stop production until it is replaced)

We're minimizing the amount of goods in inventory, taking this into consideration

How much can a computer do this?

Better with a computer doing 90 per cent of it but a person spotting the problems?

## **Safety: the perfect system:**

We understand all our risks and barriers

We have methods to mitigate all our risks

What actually happens:

Nobody knows where the risks are

People who do understand risks are not involved enough in decision making

People are not motivated in the right way

You may have 99 per cent of your 'barriers' but it is the 1 per cent you should worry about

## **Condition monitoring / asset integrity management**

What does maturity look like?

Have sensors

Know what to do with the data from the sensors. MUCH HARDER THAN IT LOOKS.

- Data models for sensor data
- Pass sensor data onto experts

## **Onsite work management**

Use of suitable devices for retrieving information (eg ATEX certified tablet)

Easy onsite access to information which may be important when doing work – with work presented for use by onshore workers

No superfluous information

When an alarm sounds you know exactly why and what to do about it

The right spares + tools immediately available

Access to remote support where needed

Sensible work scheduling to reduce downtime

Problems anticipated in advance

## **My solution: defining MATURITY**

What companies are doing something well and what does it look like? How do we get there?

Where we see digital technology maturity:

Everywhere – banks, transport, retail, media, government

That makes it a very hard subject to define.

## **Mature use of SENSOR DATA**

Sensor data goes into a useful data model

“Logic” to work out if the sensor is saying someone needs to be alerted, and why  
Perhaps sensor data used for analytics or computer modelling of the physical item

It is very hard to do something useful with sensor data other than basic alerts!

## **Data management:**

Seems to have reached a level where the effort is 'good enough' and exhortations to improve it to not go anywhere

Effort is high and business value not always obvious

But motivation should improve as people recognize business value from more mature digitalization – and more mature digitalization probably needs better data

## **Maturity for the engineering data system**

Capturing 'rich data' at the start of the asset's life

Data is well maintained over the asset lifecycle

Use of engineering data standards [CFIHOS](#)

Purchasing system is automatically populated

No supplier-specific part numbers

"Bundled items" are well understood – ie if a compressor is updated, all the associated parts data is updated

Perhaps a 3D 'digital asset'

## **Maturity for production + well management**

Understanding how wells are performing

Understanding how production system might be optimized, and if optimization attempts are working

Understanding different options for well intervention, what they might cost, what the results might be

Good sensor data about flows and other parameters, and means of understanding what sensor data is saying

Automatic systems for ordering need products and services (injection fluids, water collection)

Fast understanding about problems emerging

Purchasing for late life / decommissioning:

Are we just buying this because we always bought it? Do we still need it?

Are we able to adjust our plan based on the remainder of expected life?

A dumb system will continue the purchasing plan like on day 1 – are we doing better than that?

US onshore operations

Use data about past wells to optimize drilling parameters, frac fluid

Monitoring fracs to understand if they are working

Automated systems for managing chemical injection and re-ordering

Automated systems for managing water collection



The Economist explains

## What is the Singularity?

*And will it lead to the extermination of all humans?*



The Economist explains &gt;

May 14th 2018 | by T.C.



THE cover of this week's issue of *The Economist* is about the Vision Fund, a colossal investment fund with \$100bn to spend, which is making a splash in the technology industry. The fund is piloted by Masayoshi Son, the head of SoftBank, which has put up about a quarter of the money. Mr Son has had an interesting career. He founded SoftBank in 1981; it is now reckoned to be the fifth-biggest company in Japan. He also holds the distinction of being the person who has lost the most money in the history of investing, after seeing roughly \$70bn go up in smoke during the dotcom bust at the

Warning: a lot of momentum behind this 'singularity' idea

## Maturity in midstream / tanker shipping purchasing

Best possible choice of vessels

Awareness of which vessels are unsuitable / below company standard, so they are not chartered

Given a choice of vessels, companies are able to choose the right one

Product is never left waiting long for a vessel

Customer has best understanding of quality of management of the company (not just the vessel itself)

Shipowners are not wasting time chasing pedantic demands (fairly insignificant 'observations')

Good sense of priority by all

**THIS IS INCREDIBLY DIFFICULT TO DO WITHIN ANY KIND OF SYSTEM – BUT NECESSARY**



Morning panel discussion from our Tanker Operator Athens conference May 2018

## **Role of machine learning and AI in a mature infrastructure:**

Proven applications are in condition monitoring, perhaps subsurface analytics, perhaps logistics / vessel scheduling, perhaps unconventional drilling

Very different in every circumstance

The perfect conditions for AI are very sterile (like the Go game)

As we move away from perfect conditions the ability of AI to contribute reduces

Capability of AI is increasing

I suggest –

- Understand where and how it works
- Don't see it as magic – its capabilities will not take us by surprise
- in the big picture there are developments but not massive developments. Potential but not much being deployed
- very hard to explain to people who are enthusiastic about something - like taking someone's chocolates away
- but detrimental affect to too much enthusiasm when work isn't being done, people are getting disillusioned and so on.
- don't confuse direction of progress with position

## **Making the 'system' work well:**

Either:

Domain expert (customer or 'user') has a large amount of control over what they do

Or:

The system is very well MODELLED around what people might want to do with it.

The weakness often comes down to NOT ENOUGH CONCEPTUAL MODELLING – not enough thought / design has gone into scenarios which might arise – and ultimately there is too much expectation that workers will fit with what the system wants.

A HYPOTHESIS:

Defining 'maturity' is fairly easy – and we've seen plenty of talks about successful implementations

But some part is always missing – getting the definition deeper down to the more tech-oriented people who build it

Good digital technology is not as exciting as cutting edge digital technology

But good digital technology provides more business value

### **What could PIDX do next?**

- Understand this and improve on it
- Advise on how companies can make implementations more 'mature' – publish blueprints? Develop conceptual models?
- Standards are a key component of it – and follow on directly from discussion about 'maturity' but are not a driver in their own right