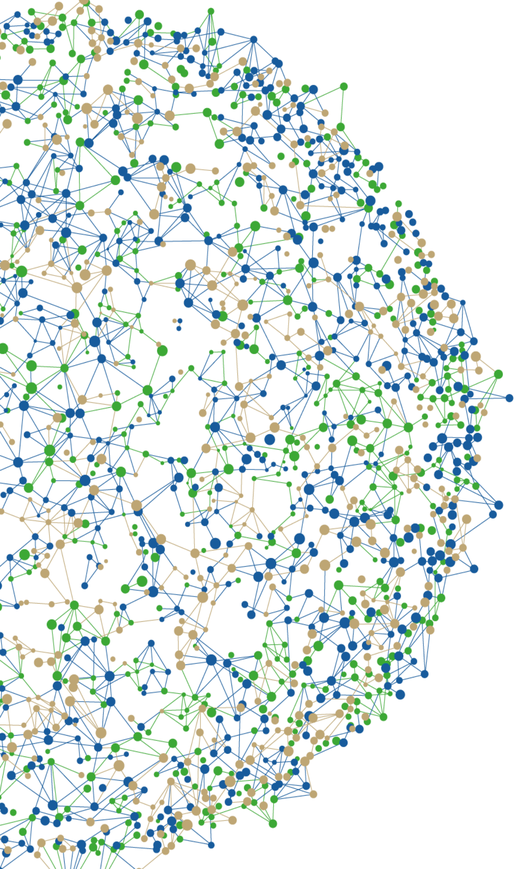


Technology Deployment: How to get it done and maximise outcomes!

Aberdeen, 27 March 2019

technology leadership board

Oil & Gas Authority

The Oil & Gas Technology Centre
Your Innovation Partner

Deployment matters

UKCS Technology Network

Good industry attendance and participation

- **Meetings so far**
  - Facilities Management (Oct 2018)
  - Subsea Technologies (Jan 2018)
  - Technology Deployment (Mar 2019)

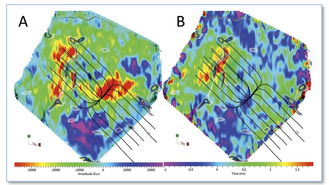
- **Outcomes**
  - Excellent knowledge sharing (documents also posted on web)
  - Accelerating industry networking and collaboration

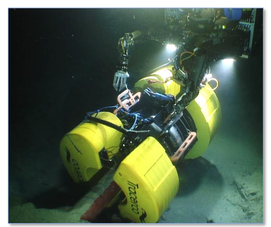
Technology Deployment

Today's workshop

- Facilitated by Deployment Matters (Erik Nijveld)
- Great support from Shell and the OGTC
- Support stewardship expectation for appropriate technology deployment

- **Today's focus**
  - Non-technical technology deployment challenges
  - Input from Dr Ruby Roberts (RGU): barriers to technology deployment
  - Understand the critical success factors for making technology deployments
  - Know how to use the right tools and processes





Next meeting – May 2019

- Proposed focus on digital technologies

- Cuts across the full asset lifecycle
  - help to find resources, derisk projects, reducing capex
  - can transform operations, reduce costs, improve safety
  - increase value and productivity

- Inviting innovative vendors

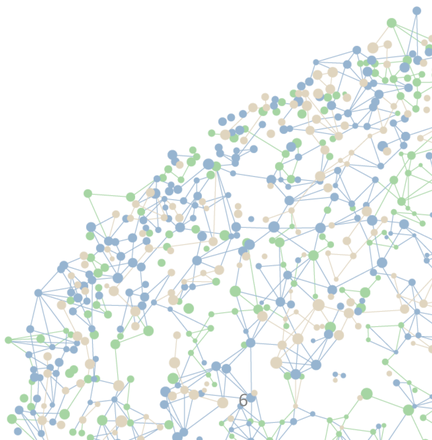
Deployment Matters founders

Vincent van Beusekom

Erik Nijveld

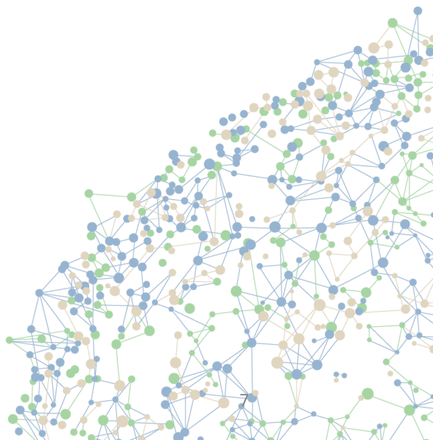
Agenda

9.30 – 9.50	Introduction
9.50 – 10.15	Recognising the problem
10.15 – 10.30	Non-technical barriers to technology deployment (Ruby Roberts)
10.30 – 11.45	Critical Success Factors for Technology Deployment (15 min break at 11.00)
11.45 - 12.30	Small group exercise



Agenda

12.30 – 13.15	Lunch
13.15 – 14.00	Increase the chances of success by using the Technology Stress Test
14.00 – 15.30	Small group exercise – Apply the Stress Test
15.30 – 16.00	Reflection & Evaluation form



Introduction

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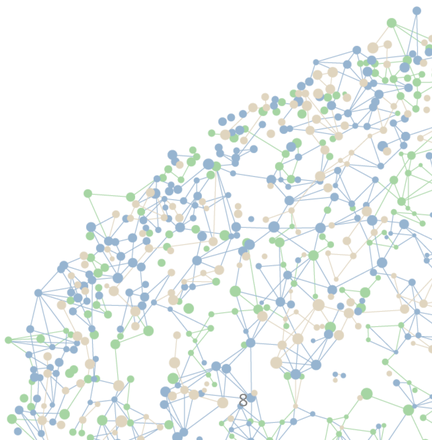
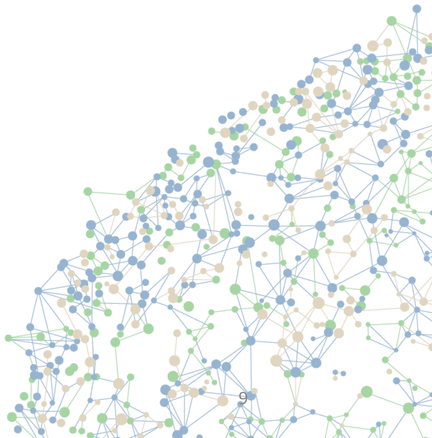
- Safety
- Brief introduction of participants. Roles & expectations.
- Introduction by OGA: The UKCS Operators' Network and why this workshop?

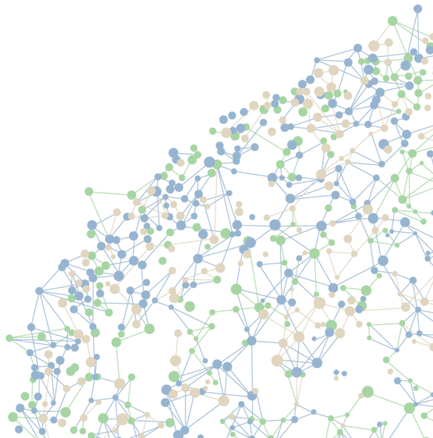


Introduction

- Definition of technology: *a manner of accomplishing a task especially using technical processes, methods, or knowledge* (Merriam-Webster dictionary)
- What may be a standard technology for one company, may be new for another…
- In this workshop, we mainly talk about all the work needed to make the case and get firm approval for technology deployment → typically the most challenging part

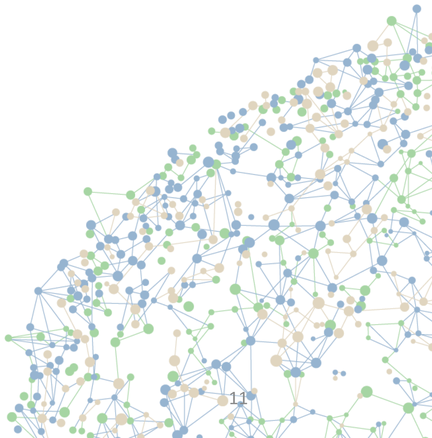


Recognising the problem



Small group discussion

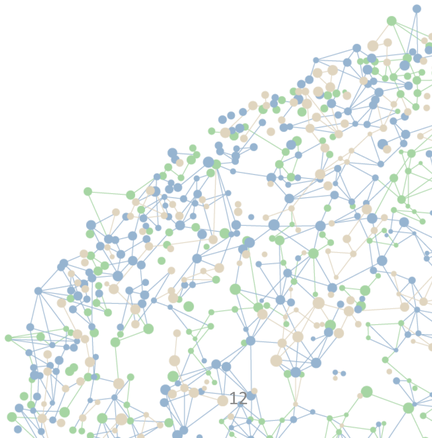
- Small group discussion using Bluescape Canvas. **What are the non-technical challenges that we face and the value lost if we fail to deploy? What can and does go wrong when we try to introduce technology and deploy to scale?**
- Followed by a brief plenary discussion, including how the outcome of the discussion links to the various topics that will be discussed today.



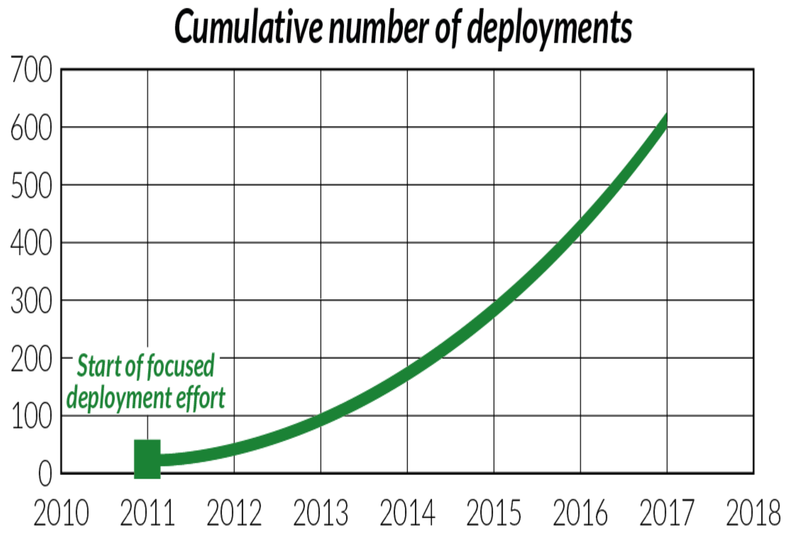
Technology Deployment is challenging…

Challenges that we experienced include:

- Technology competes with many other things that can be done to improve performance.
- End-users are keen, but often don’t know where to start with technology.
- End-users often don’t have the time and/or expertise to assess the available technologies.
- No incentives for contractors to introduce technologies.
- Etc…



But it can be done!



Non-technical barriers to technology deployment

Ruby Roberts

Non-technical barriers to technology deployment

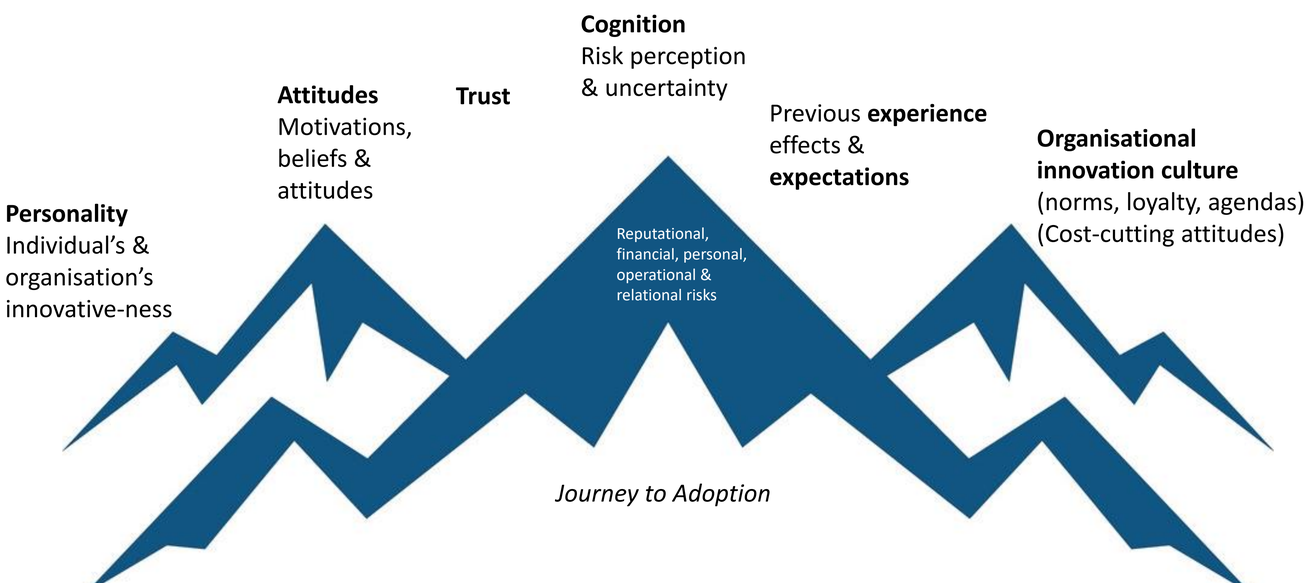
Dr Ruby Roberts

Research Project

Best practices for the deployment of new technologies: Investigating the psychological dimension

Psychological barriers to technology adoption

Tech Co.



How to jump these non-technical hurdles?

- Trust
- Risk perception & uncertainty
  - Technical backbone and expertise
- Attitudes
  - Methods for reducing consumer barriers
  - Mental visualisation, product demonstrations, reducing satisfaction
- Leadership
- Organisational Culture (norms, expectations, attitudes)
- Need to address both Technical & Non-technical factors for successful adoption

Get in touch!

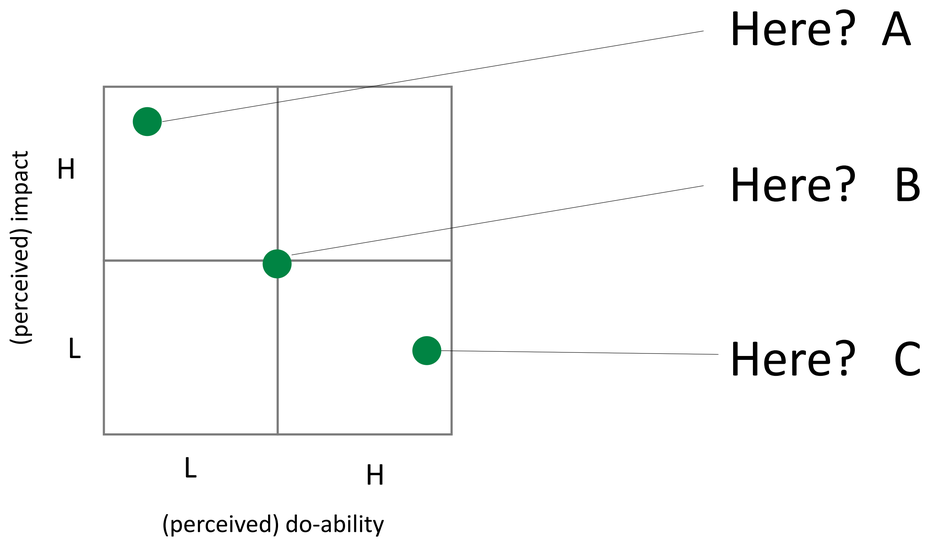
r.roberts2@rgu.ac.uk

@OGTC.com/research/technology-adoption/

Critical Success Factors for Technology Deployment

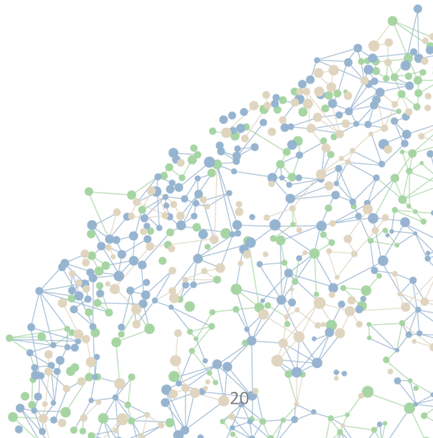
Where would you start?

MENTIMETER



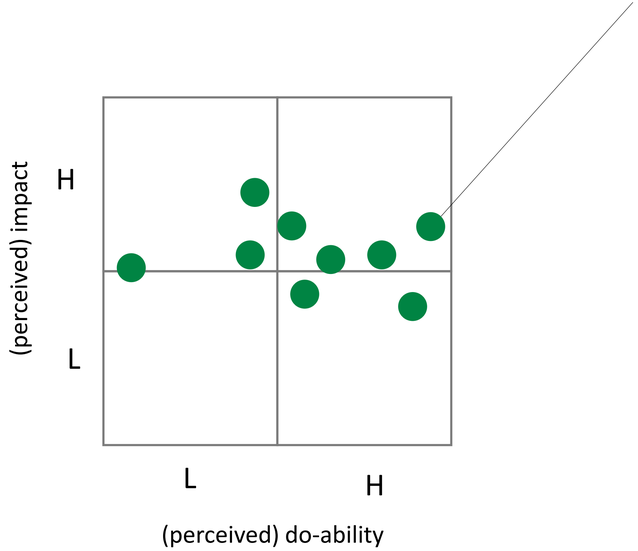
Typical questions

- Is this proven?
- Who else has done it? (preferably someone they know/trust)
- What's the cost? What are the benefits?
- Who can supply?
- Does this require specific expertise?
- Is there a contract in place with the supplier?
- …



Portfolio approach

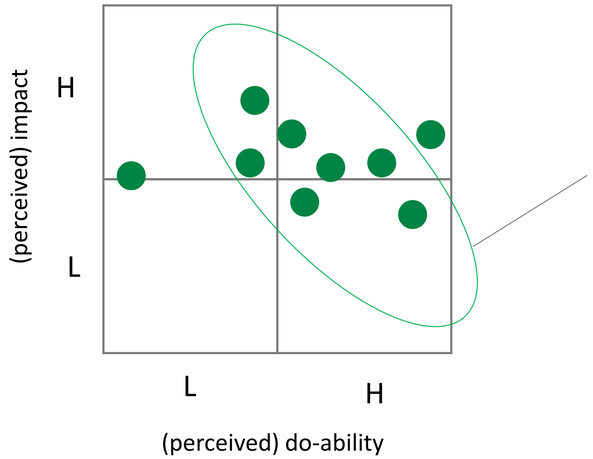
1. Start with quick wins



Quick win example – magnetic anchors for scaffolding

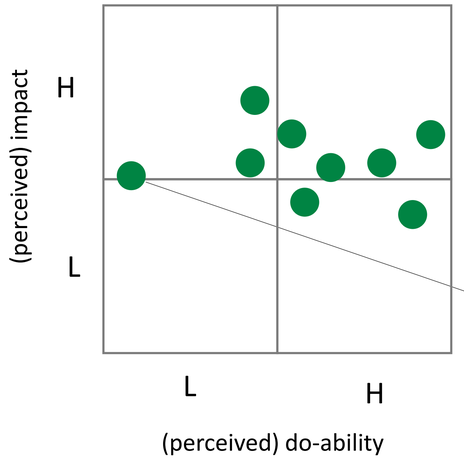
The scaffold volume reduced by ~75%, with manhours & scaffold construction time reducing roughly proportionally

Portfolio approach



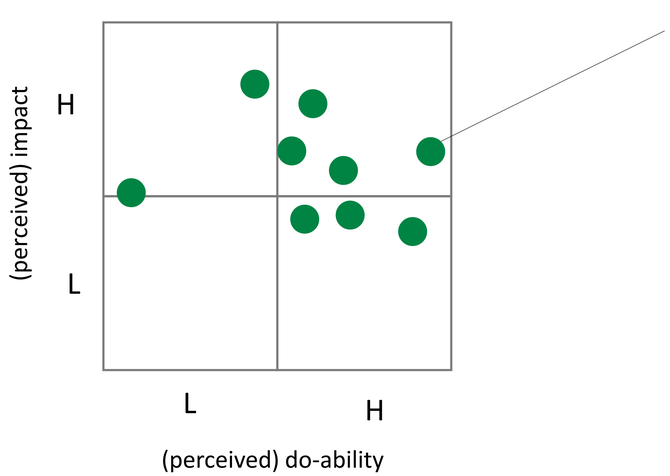
2. Build on the initial success

Portfolio approach



3. Once impact has been made & a strong relationship has been established: bring in new technology

Portfolio approach



Are quick wins easy?

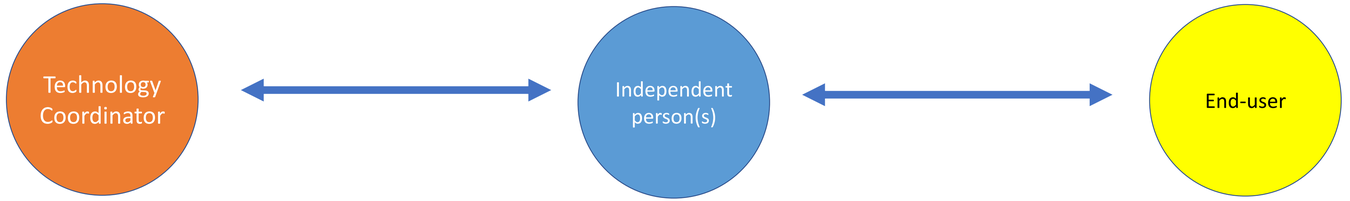
What made this technology challenging?

MENTIMETER

The scaffold volume reduced by ~75%, with manhours & scaffold construction time reducing roughly proportionally

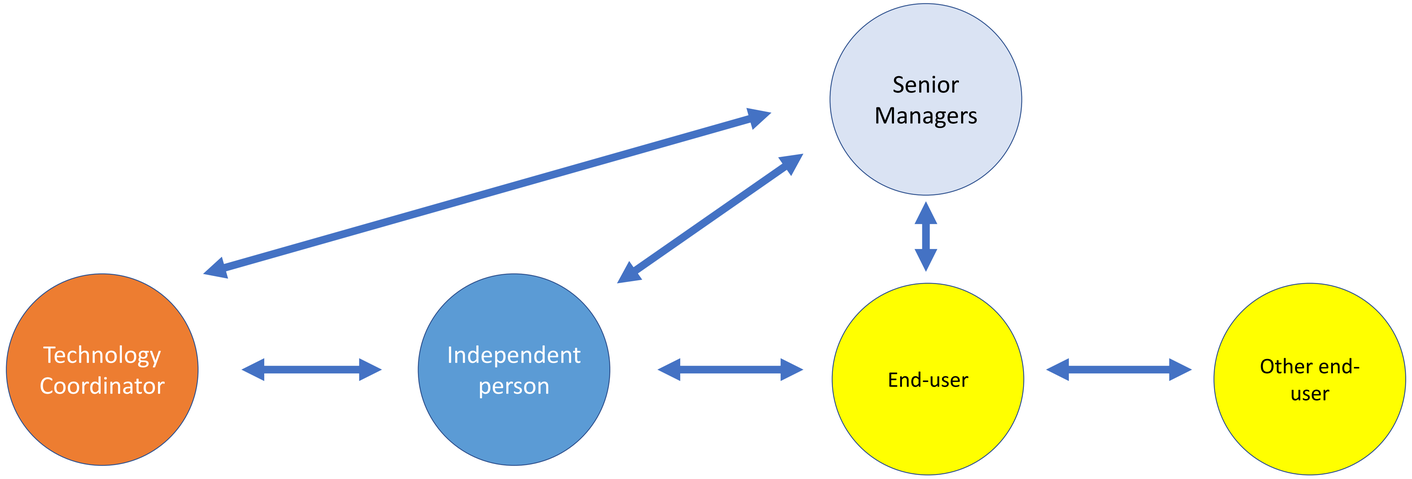
Convincing an end-user

Work through others



Often more effective: instead of building new relationships, work through others

Influencing



It helps if people hear about technologies from different angles

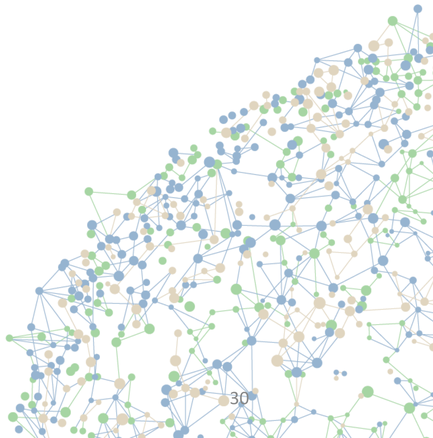
What's more effective for doing technology mapping?

MENTIMETER

Start with the specific business challenges, and select technologies that can address the challenges.

Or:

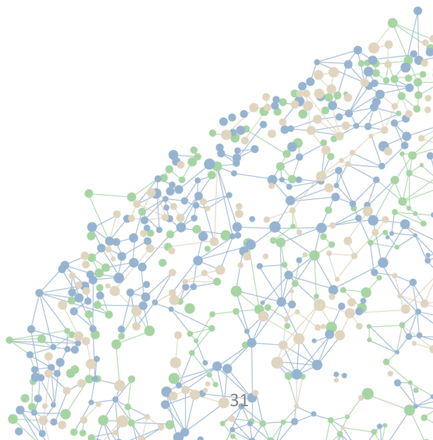
Start with a list of technologies that worked for other (similar) companies, and assess impact for your company.



Essential elements for mapping

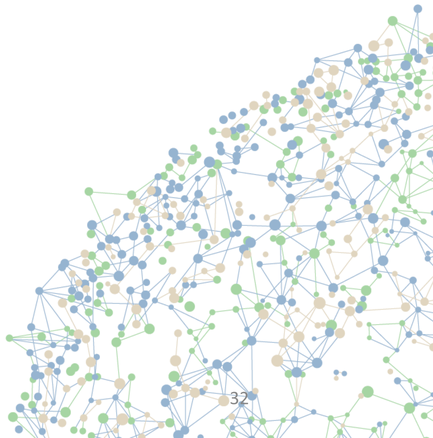
Whatever approach taken, what is essential:

- Strong support from management for the mapping
- A focal point responsible for the mapping exercise & follow-up
- A solid, focused deployment plan
- Report out of the results to management & regular follow-up

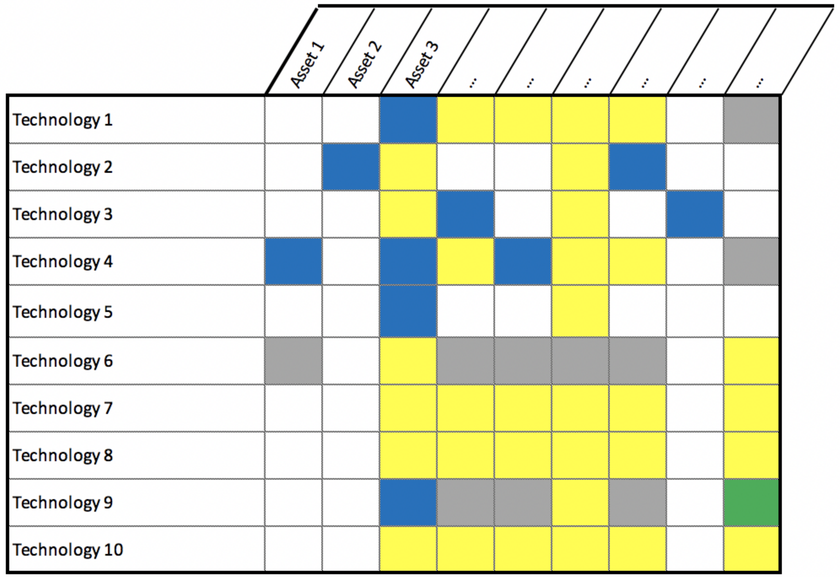


Simple process for technology mapping

1. Articulate the business challenges/opportunities
2. Select technologies that can address the challenges/opportunities



Deployment matrix



: Not yet screened

: Not applicable

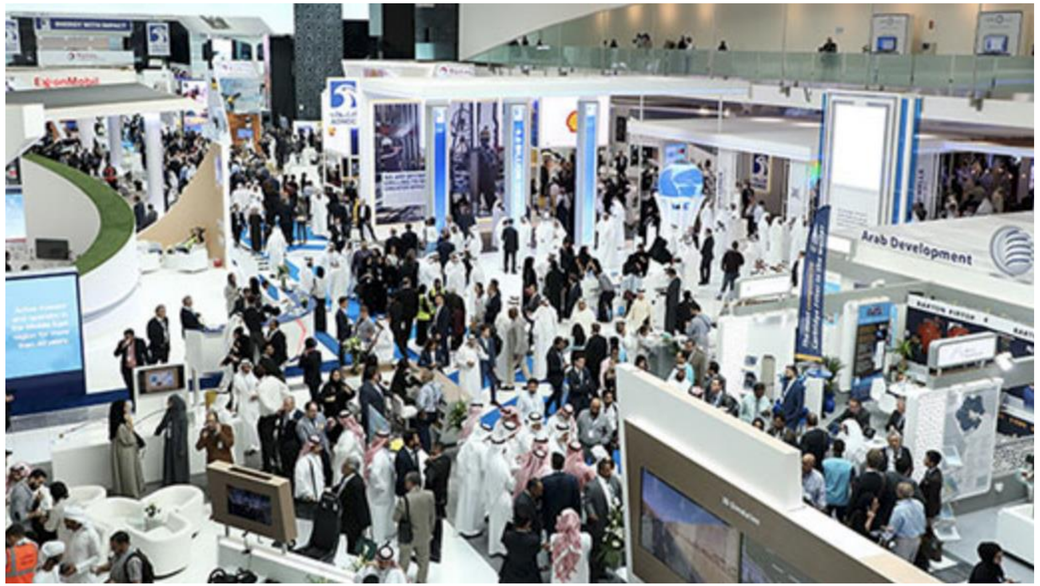
: Opportunity

: In progress

: Deployment done (with potential for more)

A simple yet powerful way to spot deployment opportunities. It also creates healthy competition, and it gives management a tool to ask questions, this way stimulating a replication culture.

ADIPEC



Source: www.adipec.com

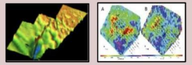
UKCS Technology Insights – Based on OGA's Stewardship Survey

Existing technologies – Shortlist

Oil & Gas Authority

Seismic & exploration

- 3D broadband
- Wide- and multi-azimuth
- Ocean-bottom acquisition
- Latest inversion techniques
- Time-lapse (4D) seismic

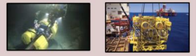


Drilling & completions

- Modelling & simulation for plan optimisation and risk reduction
- Reduced casing string designs and slim-hole
- MWD and geo-steering
- Technologies for efficient operations and NPT reduction

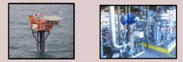
Subsea systems

- Mechanically connected pipes
- Spoolable pipelines
- Subsea boosting
- Multiphase flowmeters
- Smart and remote inspections



Installations & topsides

- Low-cost, reusable NUIs
- Remote monitoring and automation
- Compact and modular process equipment (oil, gas, water)



Reservoir & well management

- Data analytics for reservoir management
- Monitoring, tracers, optical fibre
- Artificial lift (e.g. long life ESPs, and ESP management)
- Flow assurance (e.g. wax and scale treatments)

Facilities management

- Offshore wireless data devices
- Digitisation of asset operations
- Integrated offshore/onshore control rooms
- Non-intrusive inspection
- Predictive maintenance

Well plugging & abandonment

- Well data management and campaign planning
- Cement-bond logging
- Thru-tubing barrier placing
- Efficient section milling

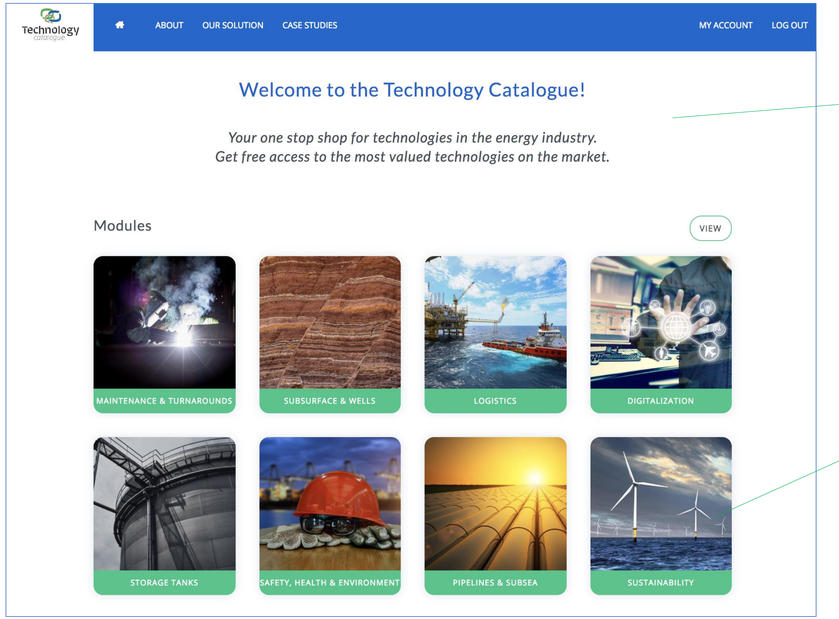
Facilities decommissioning

- Digital and remote surveying
- Technologies for effiicent 'light-house' operations
- Cutting & removal technologies
- Bundle sealing and cutting

Operators are expected to deploy technologies where these can add value 4

Technology Catalogue

www.technologycatalogue.com



Launched in July 2018 with the first batch of technologies.

Similar to TripAdvisor, but then with technologies instead of hotels. It helps users to see the wood for the trees. It helps providers to create visibility for their technologies.

Users can register & access for free. Suppliers pay a fee per technology per year

Technologies are grouped in modules around specific business challenges/ opportunities.

Latest module addition: Sustainability.

Reviews in the Technology Catalogue

Technology catalogue

ABOUT OUR SOLUTION MY ACCOUNT

HOME > RONIK UT DRONE - WALL THICKNESS MEASUREMENTS

RoNik UT drone - wall thickness measurements

No more people in confined spaces

RoNik Inspectioneering executes ultrasonic thickness (UT) measurements using drones. With the RoNik UT drone it is possible to execute steel thickness measurements at hard to reach places at height, such as storage tank walls, roofs and I beams.

The UT drone is RoNik's proprietary development and is based on patented technology that enables the drone to firmly and precisely press the UT probe against a surface. The drone has been specially developed for indoor use in industrial confined spaces and can be controlled in the presence of steel and concrete.

Video Wall thickness measurement using RoNik UT wall drone

Pro/con

- Reduced HSE risk by mitigating work at height and confined space entry
- Reduced (scaffolding) costs
- Easy deployment, faster data gathering
- Reduced downtime of assets
- No weather dependency
- Detailed monitoring of measurements live on screen
- No permits from aviation authority needed for indoor flying
- If tank is heavily corroded, UT measurements are not possible

About RoNik Inspectioneering B.V.

RoNik Inspectioneering

RoNik Inspectioneering performs industrial confined space inspections using drones and robots. Our specialty is the non entry inspection of industrial, hazardous and enclosed space such as storage tanks, chimneys, boilers, furnaces, pipelines, etc. Our focus is on ultrasonic thickness measurements, visu inspections and thermal inspections. We deliver full certified EEMUA159/API653 reports.

Website: http://www.inspectioneering.eu/

Phone: +31-653158321

Email: info@ronik.nl

Expert review:

Martin van den Heuvel

CONTACT EXPERT

“UT Measurements with drones ”

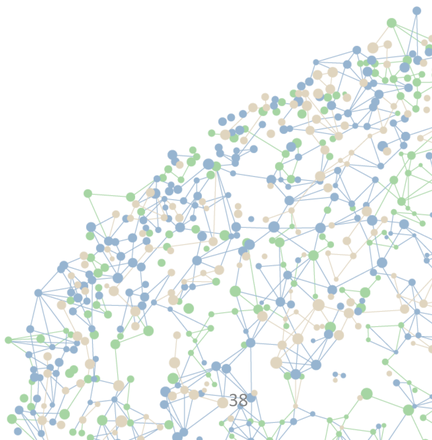
RoNik Inspectioneering is the founder of the Ultrasonic Testing drone and patent holder. The UT measurements are executed by a Level II NDT operator and measurements can be done internally in tanks and vessels above a diameter of 800 mm. Equipment and NDT operator are certified by Mistras. For flying in confined space RoNik has developed an internal "RoNik UT drone operator qualification system" .
RoNik is specialised in developing custom hardware and software solutions fulfilling asset owner specific desires.

Benefits of using this technology

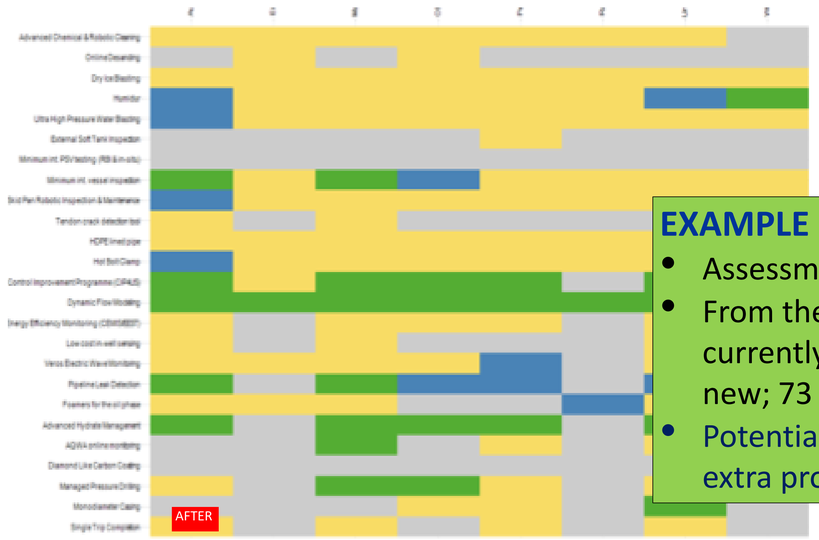
Custom made application of UT measurements with a drone
At client's specification RoNik will develop the procedure and execute the required measurements with the drone.

Simple process for technology mapping

1. Articulate the business challenges/opportunities
2. Select technologies that can address the challenges/opportunities
3. Colour the quilt (in small group working sessions)
4. Assess the potential impact per quilt item (simple database underneath the quilt)
5. Prepare the Technology Deployment Plan – ‘Plan on a page’ for each technology



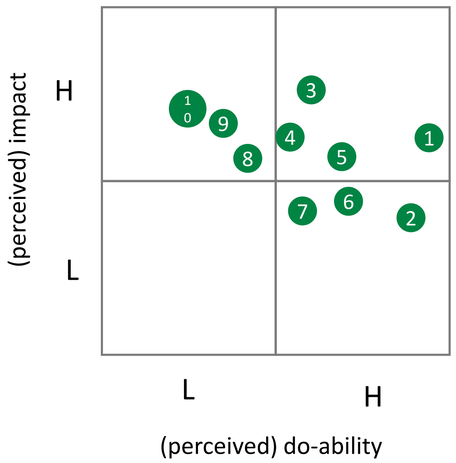
Technology mapping



EXAMPLE

- Assessment of 25 technologies for 8 assets
- From these 25 x 8 = 200 opportunities: 26 already Deployed; 13 currently in Execution; 88 Opportunities – both ongoing and new; 73 N/A or Low Priority
- Potential Business Impact: OPEX reduction of $X million/year; extra production of X boe/d

Technology mapping



	Technology	Cost reduction ($/year)	Extra production (boe/d)	Exposure reduction (hours/year)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Total:				

Plus a simple 'Plan on a page" for each technology

Reverse Integrity Gaskets

Example of a Plan on a Page

Brief technology description

- Special gasket with test port to confirm integrity/tightness of flange connection without having to pressurize the system internally.

Business impact

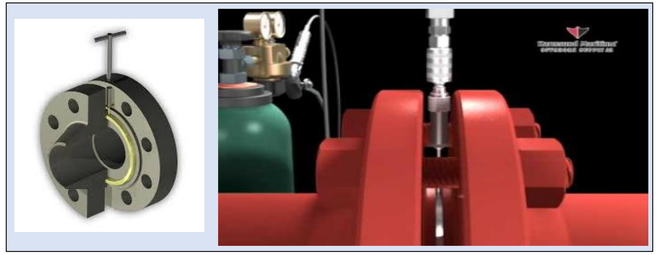
- Reduction of 2 days (TBD) TA time for … + save on N2 costs. Further opportunities possible offshore.

Critical actions (as per Technology Stress Test)

- Confirm scope for … Turnaround
- Include in re-instatement testing procedure
- Raise awareness of advantage and get approval from decision maker through Turnaround steering committee
- Contractual: availability locally directly or via sub contract with e.g. Klinger/ Alba gaskets
- Start ASAP with procurement process

Cost of deployment

- $400-1000/ gasket; (to be included in Turnarounds budget)

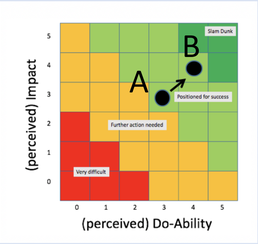


Decision maker:

…

Deployment lead:

…



A: Current Status (dd/mm/yyyy)

B: Status once actions closed (dd/mm/yyyy)

Simple process for technology mapping

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3. Colour the quilt (in small group working sessions)
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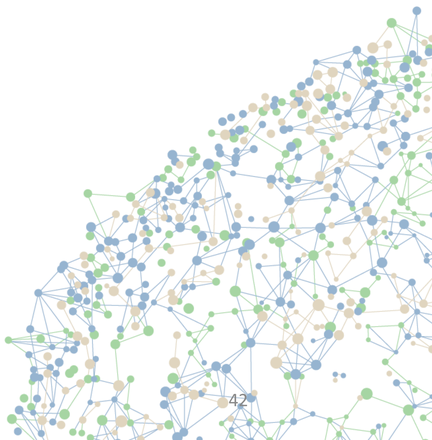
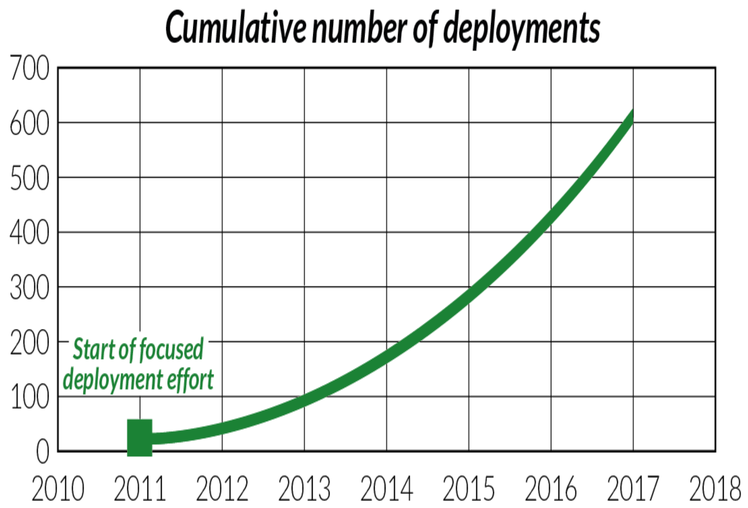
5. Prepare the Technology Deployment Plan – ‘Plan on a page’ for each technology
6. Report out to leadership and seek endorsement



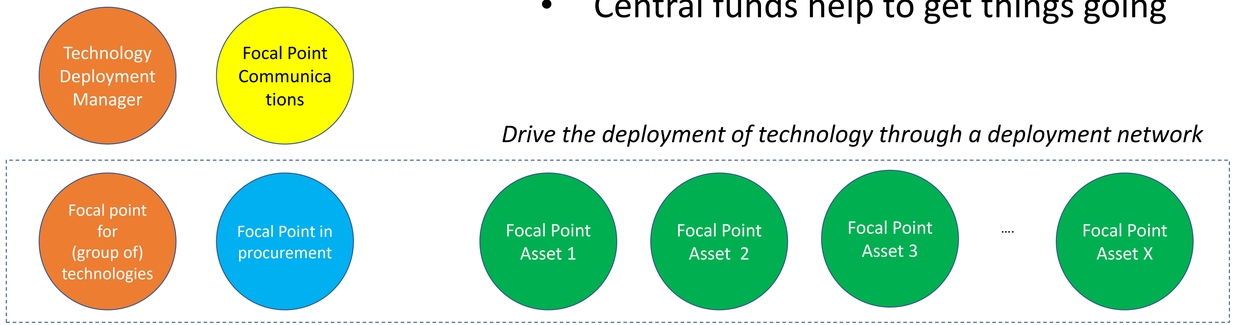
And then… deliver!



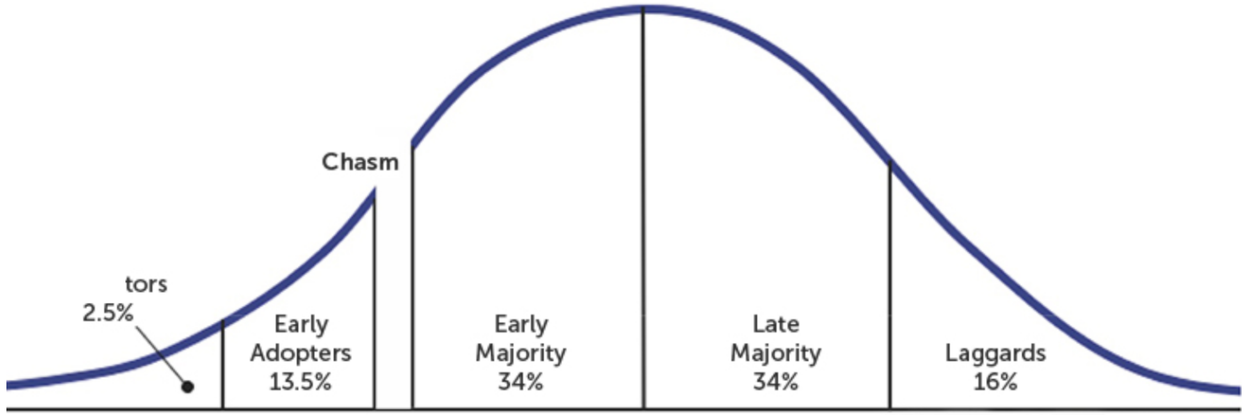
- Treat every deployment like a project
- Embed the capability
- Share knowledge
- Capture in standard guidelines & procedures

Establish a deployment network

- One central focal point per (group of) technologies
- Asset managers to nominate focal points in each asset (end-users; part-time). The end-user needs to have a direct interest in the technology. The technologies should help his/her day-to-day activities.
- Central funds help to get things going



Why is a dedicated deployment effort critical?

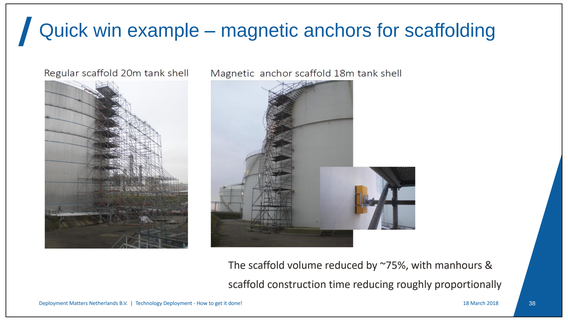


Source: "Crossing the chasm", Geoffrey A. Moore

Technology & Innovation culture

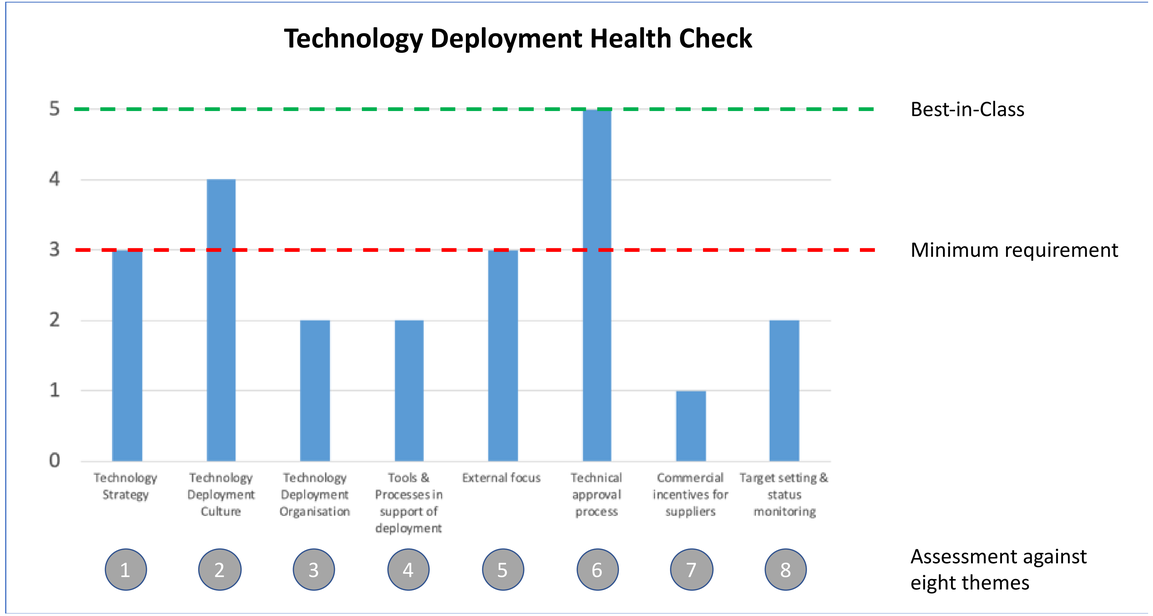
- Include examples in engagements with staff
- Reward staff, not only for first deployments, but also for successfully replicating what others have done
- Make everyone a winner
- Tangible examples in the office
- Etc..

Source: http://smallwinsinnovation.com/9-ways-to-celebrate-a-small-win/



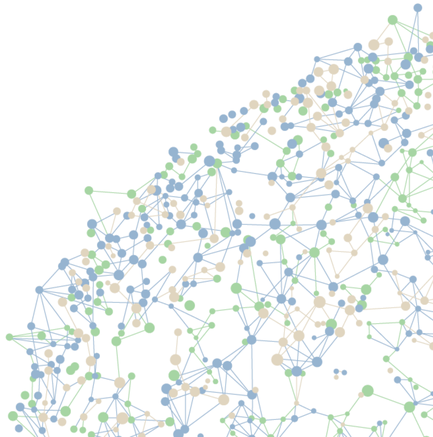
Technology Deployment Health Check

For further background: deploymentmatters.com/consultancy

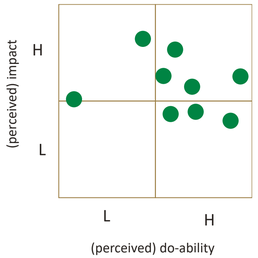


Small group discussion

Apply the learnings & insights

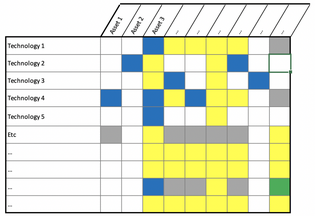


A snapshot of what we discussed so far

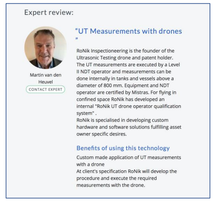


Portfolio approach. Start with the ‘easy’ ones first to create momentum

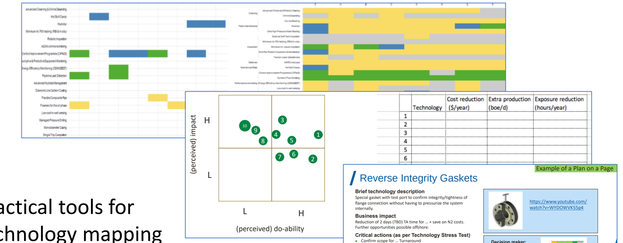
Visual management in support of deployment



Get the confidence to deploy based on experience and expertise from others



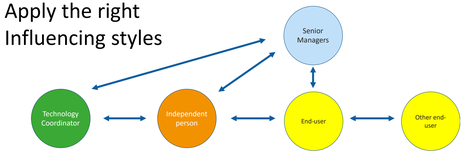
Ways to find out about technologies worth replicating



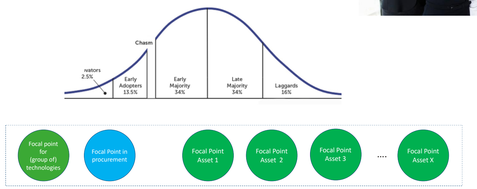
Practical tools for technology mapping & for presenting the case to management

Create a Technology & Innovation culture

Apply the right Influencing styles

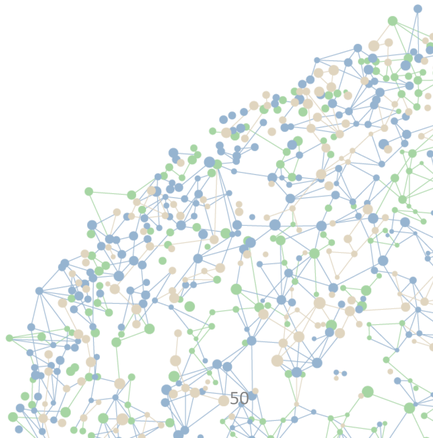


Importance of a dedicated deployment effort



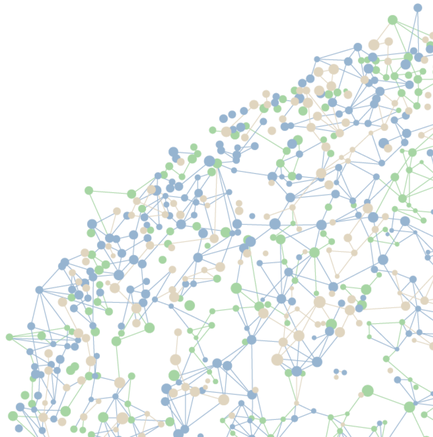
Small group discussion (Bluescape Canvas)

- Discuss key insights and actions that you will take as a result for getting the technology deployed in <u>your</u> company
- Report back the key insights/actions in plenary session.



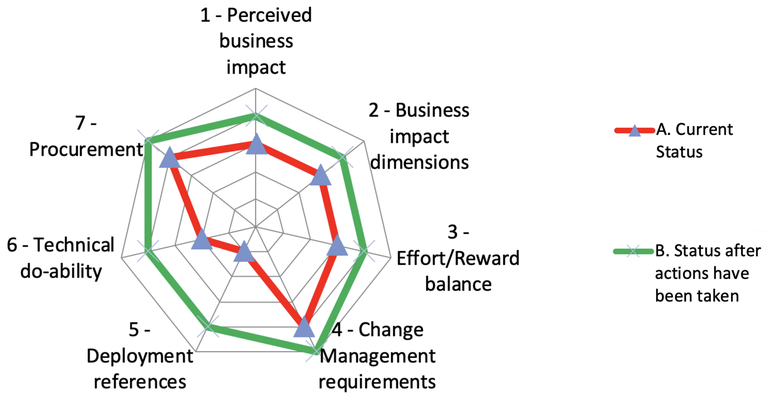
Technology Stress Test

A tool to increase the chances of success for technology deployment

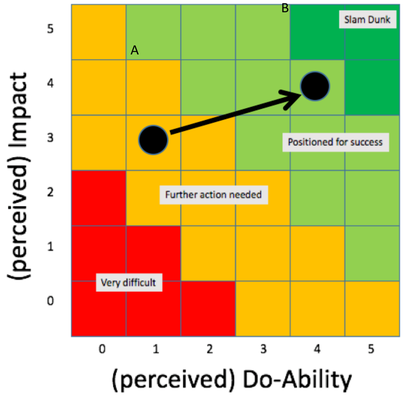


Technology Stress Test

https://www.deploymentmatters.com/technology-stress-test/



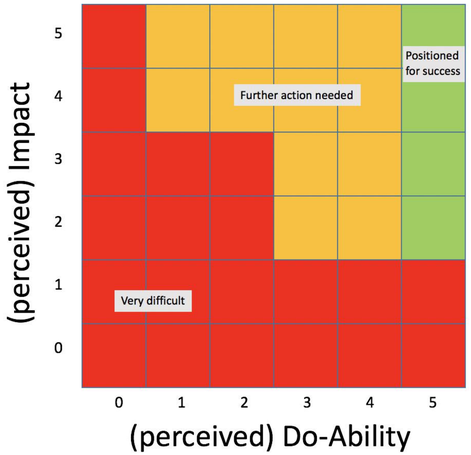
Note: colour coding in matrix may look different for projects close to a milestone



Impact: take the lowest of Themes 1 and 2
Do-ability: take the lowest of Thems 3-7

Technology is assessed against ~30 criteria grouped under 7 themes, through a **structured dialogue** with key stakeholders. Based on the outcome, **specific actions** can be taken to **increase the chances of success** that the technology gets deployed.

Colour coding close to a milestone



The closer you are to a key milestone, the smaller the yellow/green area becomes…

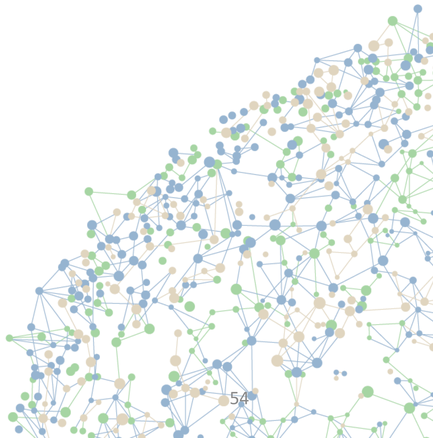
THEME 1: Perceived business impact

Who is the specific person to whom you are ‘selling’ the technology?

Note: it must be the person who benefits from the technology and gets it done (or makes sure that it gets done).

How significant is the impact for this specific person, on a scale of 0-5?

For example: a technology gives GBP 100k OPEX savings per year. The engineering lead you’re targeting has a budget of GBP 1 million per year. In this case, the impact is very significant → 5



Is the data right? Are the assumptions right?

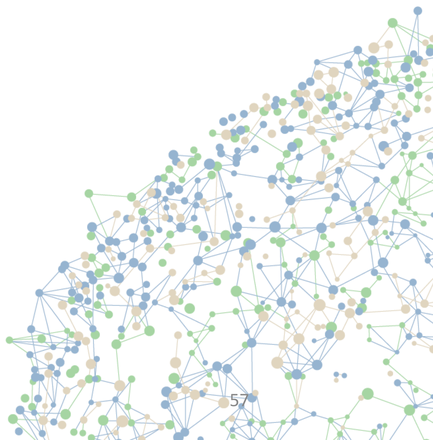
Example: turnaround elimination

Is the data right? Are the assumptions right?

Drilling new wells

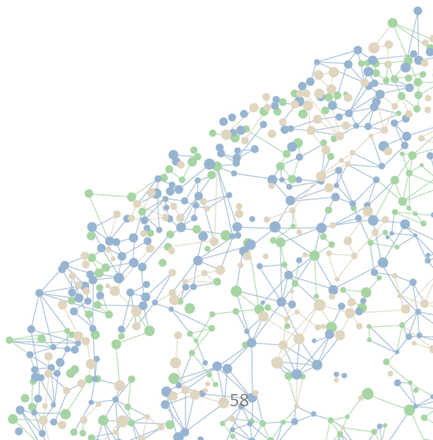
THEME 2: Business Impact Dimensions

0. The technology is not competitive with conventional solutions that can be applied to improve performance.
1. The technology improves performance on one metric [HSE, cost, production]; but has a negative impact on the other two.
2. The technology improves performance on two metrics [HSE, cost, production]; but has a negative impact on the other.
3. The technology improves performance on one metric [HSE, cost, production]; and keeps performance on the other metrics constant.
4. The technology improves performance on two metrics [HSE, cost, production]; and keeps performance on the other metric constant.
5. The technology improves HSE performance AND cost AND production performance.



THEME 3: Risk & Reward balance

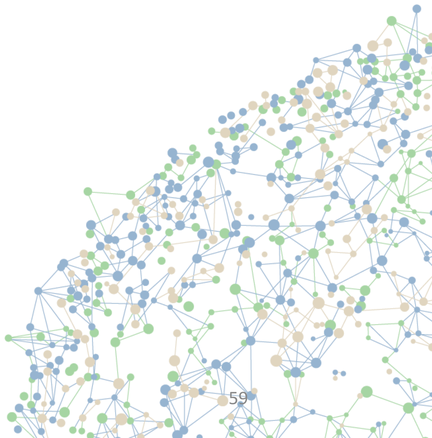
0. One part of the company using the technology gets the benefits; other teams/people involved are negatively impacted; the regular service provider sees a reduction of revenue.
1. One part of the company using the technology gets the benefits; other teams/people involved have no benefits; the regular service sees a reduction of revenue.
2. The company using the technology gets the benefits (all teams/people); the regular service sees a reduction of revenue.
3. The company using the technology gets the benefits; the regular service has no benefits.
4. The company using the technology gets most benefits; the regular service benefits as well to an extent.
5. Balanced rewards across all players.



THEME 4: Change Management requirements

Give 1 point for each item met. Take into account overall complexity/scale.

- Can the technology be deployed without making any changes to the hardware of the facilities? If not, what actions are needed? Are these minor changes, or is it a project in itself?
- Does the technology make use of existing data, IT hardware and integration? If not, what changes are needed?
- Is the technology compatible with current processes/ways of working? If not, articulate what will have to be done differently. Would this e.g. require training of people?
- Can the technology be covered from existing budgets? If not, what is needed to get the budget? Does it e.g. have to follow an annual budget cycle, with impact on timing for the deployment?
- Is the technology in line with local rules & regulations? If not, does this require changes to the technology, or a dialogue with the regulator to change the rules & regulations?



THEME 5 - Deployment references

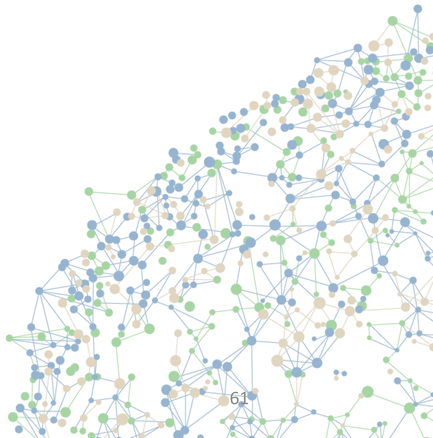
Use the matrix to guide the discussion and determine the score of 0-5.

Has the technology - or esential components of the technology - been deployed?	Have you levaraged the experience of other experts/users?			
	No	Awareness of industry papers about assessment or usage of technology	In direct contact with other experts/users and shared some experiences	In direct contact with other experts/users & full exchange of experience
Never	0			
Yes, in other industry				
Yes, in other industry, within same region				
Yes, by other company in the same industry				
Yes, by other company in the same industry and same region; or e.g. a JV partner				
Within the same company				5

THEME 6: Technical do-ability

Give 1 point for each item met. Take into account overall complexity/scale.

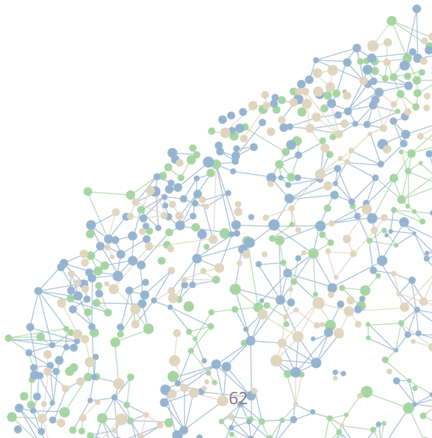
- Are the product specifications supported by evidence?
- Is the technology suitable for the specific application? Do in-depth technical review/studies confirm the applicability?
- Is the technology in line with industry standards?
- Does the technology have the explicit support from the relevant expert? Is his/her opinion (widely) known and do you make use of the review when promoting the technology? Is the view accepted by the end-users?
- Does the user have the capability and know-how to support the technology deployment and to sustainably embed the technology?



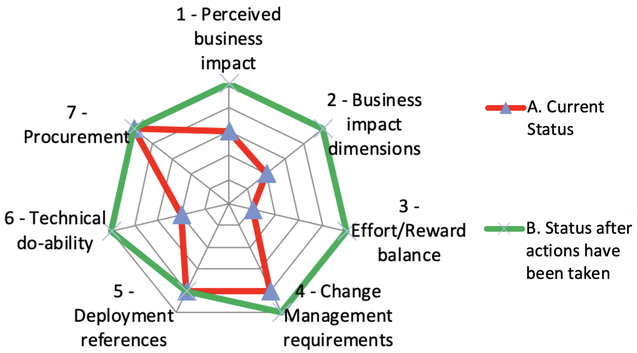
THEME 7: Procurement

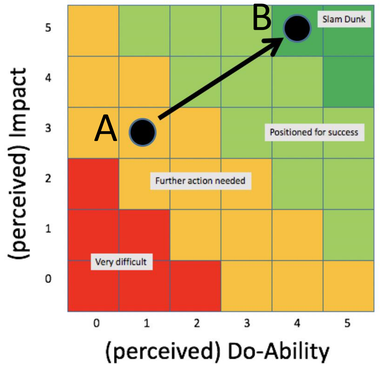
Give 1 point for each item met. Take into account overall complexity/scale.

- Are there multiple suppliers for this technology?
- Are tendering requirements being met?
- Can the technology be obtained through a contract with an existing supplier, either directly or indirectly?
- Does the supplier already have a presence in the relevant country?
- Is usage of the technology in line with the Procurement key performance indicators?



Magnetic anchors for scaffolding – for a large storage tank operator



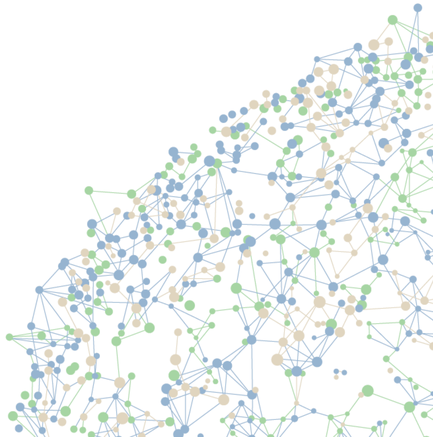


Main actions:

- Clearly articulate all benefits that the technology offers
- Ensure there are clear commercial incentive for the maintenance contractor to introduce novel scaffolding technologies
- Determine the applicable base for the next 18 months such that parties can plan ahead
- Develop an application guide signed off by the relevant technical authority

Small group discussion

Apply the learnings & insights

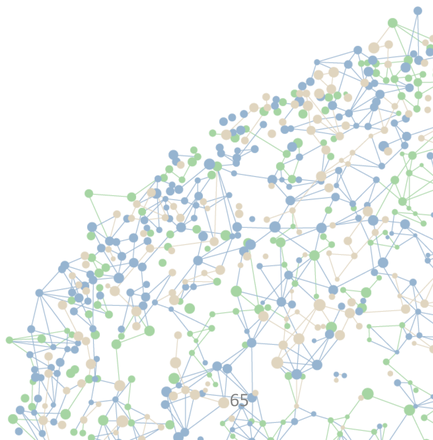


Small group discussion

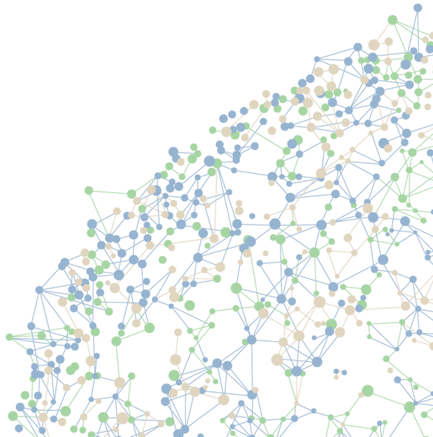
Apply the Technology Stress Test. Decide as a group which technology to focus on. E.g. take an example from the Technology Insights report:

- Non intrusive inspection **(DEFAULT OPTION)**
- Spoolable composite pipelines
- Production monitoring and optimisation (tracers, fibers, data analytics, and intervention)

Combine the learnings with the outcome of this morning's session. Report back the key insights/actions in plenary session.



Reflection



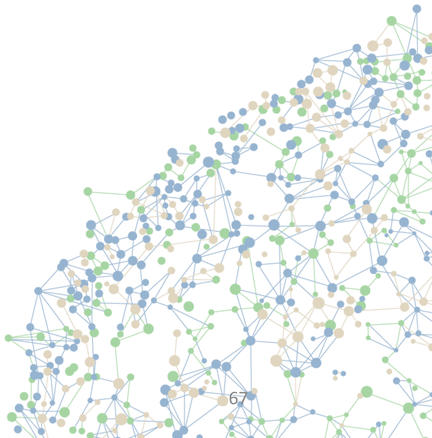
Reflection

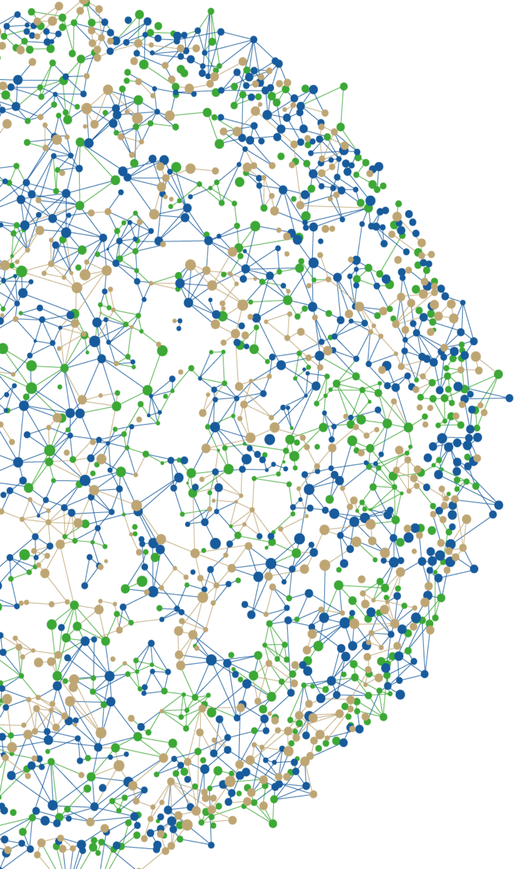
MENTIMETER

Small group discussion using Bluescape Canvas.

What are your key learnings/insights? What are your key actions going forward as a result?

Followed by a brief plenary discussion & mentimeter questions





technology leadership board

Oil & Gas Authority

The Oil & Gas Technology Centre

Your Innovation Partner

Deployment matters