



Digital Oilfield In Business
SPE Webinar Series – 07/12/2017

Dr Tony Edwards – CEO
 Stepchange Global





SPE Webinars are Sponsored by:

SPE
 SPE Foundation



Tony has extensive experience in the oil and gas exploration and production industry worldwide. Tony has a BA degree from Keele University in Geology and Chemistry, and a Doctorate in Petrology from the University of Manchester. He had a 17 year career with BP that spanned R&D through to front line operations and project management. He was a founder member of BP's Integrated Operations Program, Field of the Future, and was subsequently the global director for the Advanced Collaborative Environment Program. In 2006 he moved to BG-Group to launch its digital oilfield program. In January 2009 he founded Stepchange Global, a dedicated digital oilfield advisory company, and has since advised Statoil, BP, PETRONAS, ConocoPhillips, Total, Santos, Origin Energy, BHP Billiton, GAZPROM and ExxonMobil on their Integrated Operations strategies.



Tony Edwards, PhD
CEO, Stepchange Global

Over the last four years Tony has combined to his operational experience in running unmanned platforms with Digital Oilfield to advise on radically minimum manned operational and project concepts that are lower in CAPEX and OPEX whilst delivering improved safety and reliability.




Topics to be covered



In this third of a series, the following topics will be covered:

1. Developing a business case: Quantitative and Qualitative Business Cases
2. Getting started: Piloting IO and DOF; Building a Programme; Scaling and Sustaining
3. Applications to: Oil and Gas; onshore and offshore, un-conventionals; LNG, drilling, mining, others
4. IO and DOF for major projects
5. What is next for IO and DOF (big data / analytics, IT/OT, etc.)



Digital Oilfield – is seen as the Future and the Way to Optimise the Oil and Gas Business



What is Digital Oilfield (DOF)?



'The vision for the Digital Oil Field is one where operators, partners, and service companies seek to take advantage of improved data and knowledge management, enhanced analytical tools, real-time systems, and more efficient business processes'

IHS CERA: Digital Oil Field of the Future

What is enabled by DOF?

- Moving to a real time or near real time way of working
- Connection of one or more remote sites or teams to work together
- Moving to more multidiscipline way or working
- Value chain integration and optimisation



'How we run our companies in the future'

Changes enabled by Digital Oilfield

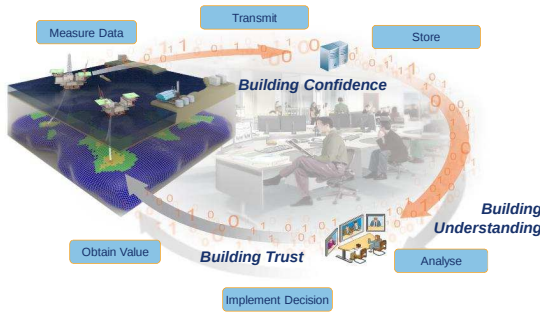


Before	With DOF
Serial	Parallel
Single discipline	Multidiscipline teams
Dependent of physical location	Independent of location
Decisions based on experience	Decisions based on Real-time Data
Reactive	Proactive



 **'This is a big change in the way we work'**

Collaboration is key to delivering the Measurement to Decision Lifecycle

 Improving Operational Excellence

DOF Elements for Success – Stack Model

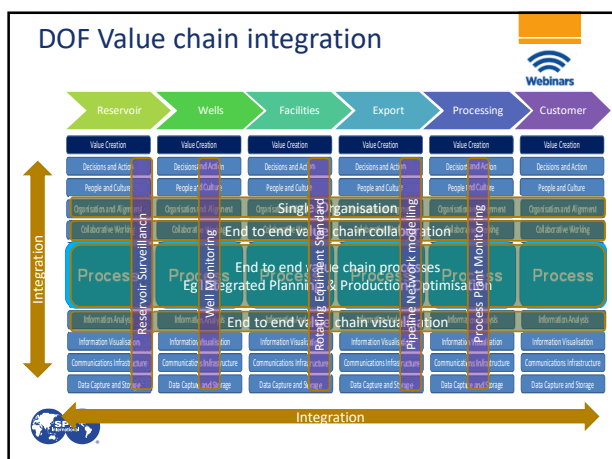


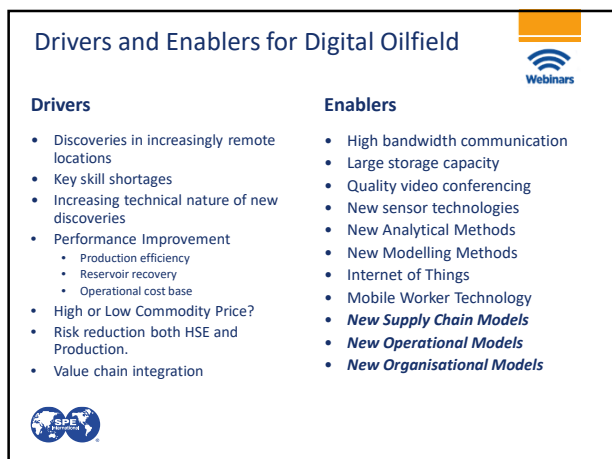

 Business Value

Technical data Processes KPI Dashboards - OPS

Application 1 Application 2 Application 3 Technical applications

Reservoir Production Drilling Geology Other DBs







Industry View of Value Realization from DOF



Smart Fields ®



Field of The Future ®



Digital Field



Integrated Operations (IO)



Integrated Operations (IO)



I-Field ®

DOF Benefits – Industry View

- Accelerate Production (2-8%)
- Improve Recoverable Rate (0.5-5%)
- Reduce Operation Cost (5-25%)
- Reduce Drilling Cost (5-15%)
- Improve HSE

Oil majors have used their own brand names, industry generic term is Integrated Operations (IO) and Digital Oilfield (DO).

- Shell has reported \$5 billion of benefits attributed to Smartfield Program
- BP has gained 85 mboed of excess production due to FoTf
- Statoil has moved to a new operational model - 20-25% less offshore staff



"IO is a quiet revolution reshaping our industry" – Helge Lund, CEO Statoil

Business and Value Cases

- **Quantitative**
 - Easily measurable
 - Agreed by all parties delivering the DOF project
 - Be preferably based on KPI's that are already in place
 - Be rigorously tracked and reported
- **Qualitative**
 - Capture the stories behind successful DOF implementations
 - Human side of the value case
 - Important to sustain a global programme of DOF delivery
- **Enabling**
 - What it is that needs to be done to do that cannot be done now
 - Successful DOF implementations always have an enabling factor
 - Asset, Regional and Company wide



The copyright for this work vests in Stepphange Global Ltd. All rights reserved. The information contained in this document is proprietary to Stepphange Global Ltd and is made available for the recipient on the express understanding that it may not be copied, used or disclosed in whole or in part for any purpose except as authorized in writing by Stepphange Global Ltd.

Quantitative Benefits

- The quantitative benefits case uses key performance (KPI's) indicators that are:
 - Quantitative and easily measurable
 - Agreed by all parties delivering the Intelligent Field project
 - Be preferably based on KPI's that are already in place
 - Be rigorously tracked and reported
- The quantitative benefits are typically those that are used as performance metrics within an operational oil and gas asset and typically include:
 - Daily, Monthly and Yearly production
 - Ultimate Reservoir recovery
 - OPEX Cost reduction
 - CAPEX cost reduction at the Project phase or for modification projects.
 - Although the cost reduction is significant in real terms, it is dwarfed by the value attained by improved performance in production and reserves recovery.



The copyright for this work vests in Stepphange Global Ltd. All rights reserved. The information contained in this document is proprietary to Stepphange Global Ltd and is made available for the recipient on the express understanding that it may not be copied, used or disclosed in whole or in part for any purpose except as authorized in writing by Stepphange Global Ltd.

Qualitative Benefits



- There are often less tangible benefits to be had from implementing of collaborative work environments. They include:
 - Reduction in number and time taken to recover from unplanned events
 - Maximised use of scarce resources
 - Carry out remote operations and remove people from harm's way
 - Improved quality of decision making and shortened decision making timescales
 - Knowledge sharing and transfer, supporting nationalisation and localisation
 - Increased trust in decisions
 - Shared sense of responsibility and achievement
 - Continuous improvement of the skills and learning
- There is also the human side of the value case that captures stories about the way in which the work lives of those working with DOF in a collaborative environment have changed compared to their previous way of working
- Articulating 'What is in it for me?'



The copyright for this work vests in Shellchange Global Ltd. All rights reserved. The information contained in this document is proprietary to Shellchange Global Ltd and is made available for the recipient on the express understanding that it may not be copied, used or disclosed to others in whole or in part for any purpose except as authorised in writing by Shellchange Global Ltd.

Enabling Benefits



- Enabling benefit drivers examples are:
- Moving to a minimum manned, remotely supported operational model
- Drilling and commissioning 400 wells a year effectively and efficiently when resources are scarce
- Managing geographically spread assets and resources is over hundreds of kilometres
- Scaling your organisation
- Offsetting a lack of competency in your organisation
- Enabling a multi-site remote operations support model

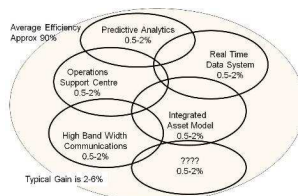


The copyright for this work vests in Shellchange Global Ltd. All rights reserved. The information contained in this document is proprietary to Shellchange Global Ltd and is made available for the recipient on the express understanding that it may not be copied, used or disclosed to others in whole or in part for any purpose except as authorised in writing by Shellchange Global Ltd.

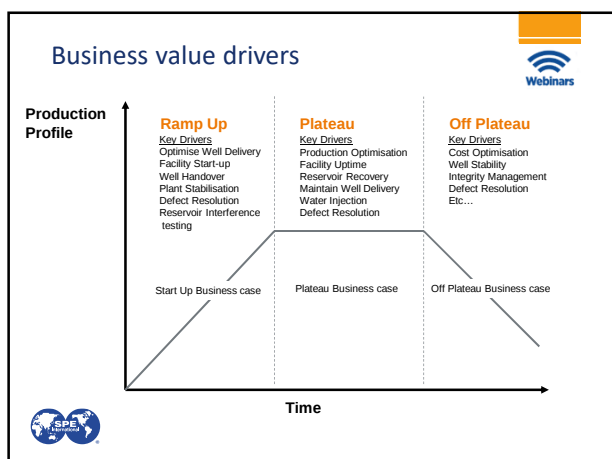
Business Case



- The Value is derived from the Integration of the technologies with changes to the People, Process, Organisation and the Physical environment
- For the North Sea this is typically a production efficiency improvement of 2-6%
- Many Qualitative Benefits to the way of working, eg Use of scarce resources and collaboration between remote locations
- Typical pay back time is 6 – 18 months but can be much less!



The copyright for this work vests in Shellchange Global Ltd. All rights reserved. The information contained in this document is proprietary to Shellchange Global Ltd and is made available for the recipient on the express understanding that it may not be copied, used or disclosed to others in whole or in part for any purpose except as authorised in writing by Shellchange Global Ltd.



What has changed at \$50 oil

- Focus is:
 - Make the most of what you have got
 - People, Process and Organisational change to maximise value from current data and information in operating assets
 - Short term payback for new implementations in brownfields, < 1 year
 - Shift in focus to OPEX reduction
 - Application of IO for Major Project Concepts and Project Process
 - New minimum manned concepts that are lower CAPEX, OPEX with improved safety
 - Efficient use of scarce and expert resources

What has prevented the rapid uptake of DOF?

- A Lack of leadership and vision
- Not understanding that People are key to the success
- Not influencing all levels in the organisation
- Not understanding the value of DOF from an asset perspective
 - There can be a perceived risk to the assets from DOF
 - This needs to be mitigated
- Not taking an integrated or platform approach across people, process, organisation, technology and the physical environments
- It's been labelled as technology or a process change rather than a organisational transformation
- An attempt to fix the solution and programmatically role out the concept
- DOF is by nature a changing and evolving platform
 - The value will often come from unexpected directions
- Standardise the ability to change and innovate

This copyright for the work exists in Steinhilber Global Ltd. All rights reserved. The information contained in this document is proprietary to Steinhilber Global Ltd and is made available for the audience for the purpose of understanding the IO may not be copied, used or disclosed in whole or in part for any purpose except as authorized in writing by Steinhilber Global Ltd.

Early Experiences introducing DOF to Assets



- Assets don't think they have any problems – they are either 100% efficient or they won't admit to problems
- They believe they have all the expertise they need
- Delivery timeframe driven by asset priorities rather than Programme
 - Need to align with asset priorities and schedules
- Short term performance and cost focus
 - Too busy to meet
 - Don't see value in some of the solutions, thereby missing opportunities e.g. Remote Equipment Monitoring
- Only want technology solutions – people / change management is seen as optional. Hence, full value is often not delivered
- By contrast, feedback is that too many initiatives are placed on assets by Centre – confusion and lack of co-ordination across initiatives (no Programme of work)



The copyright for this work vests in Shipchange Global Ltd. All rights reserved. The information contained in this document is proprietary to Shipchange Global Ltd and is made available for the recipient on the express understanding that it may not be copied, used or disclosed to others in whole or in part for any purpose except as authorised in writing by Shipchange Global Ltd.

Challenges - DOF an Integration Project



- How do we Integrate across:
 - Technologies – Data and information
 - People, Process, Technology, Organisation & Physical Environment
 - Geographically remote Locations
 - Disciplines and Functions
 - Within and without the company
 - Value Chain, reservoir to customer
- This needs to be broken down in to manageable chunks
- An Organisation needs to understand where it's primary value opportunities are from above
- Needs to be business facing
- This is a Transformation



Implementation of Capabilities



Phase 1 – Discovery or Piloting

- establish proof of concept
- define options and architectural control

Phase 2 – Adoption

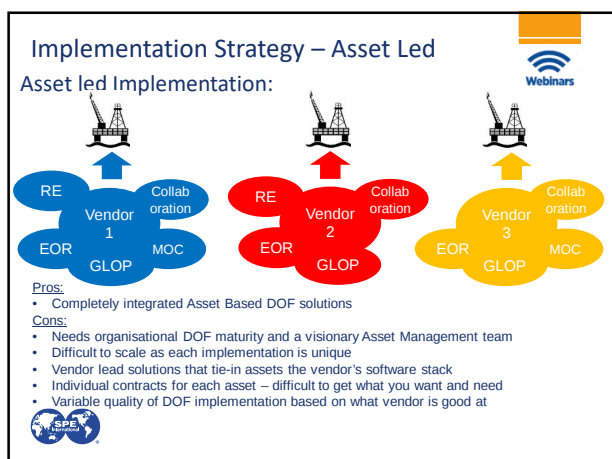
- initial performance capture
- peer to peer and fast cycle learning – Sharing
- build confidence in the capability platform
- encourage the right behaviours

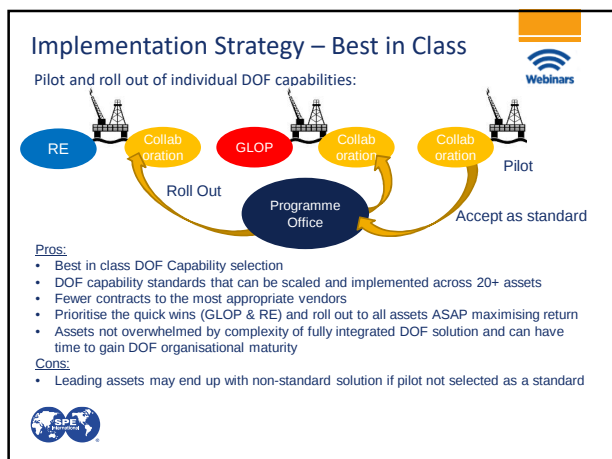
Phase 3 – Scaling

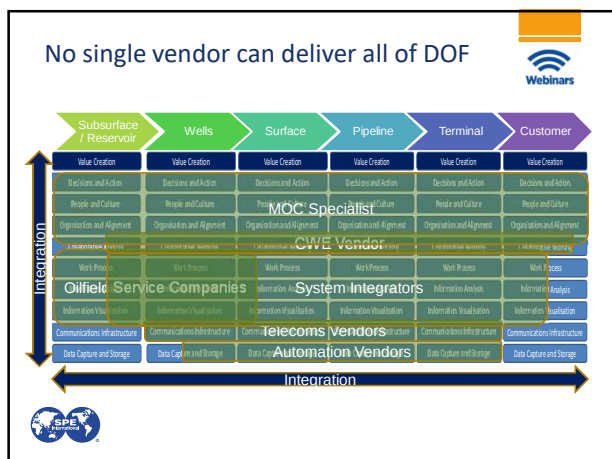
- scaling strategy and implementation – Company Wide
- behaviour becomes predictable and repeatable
- contractual performance scheme e.g. reliability goals

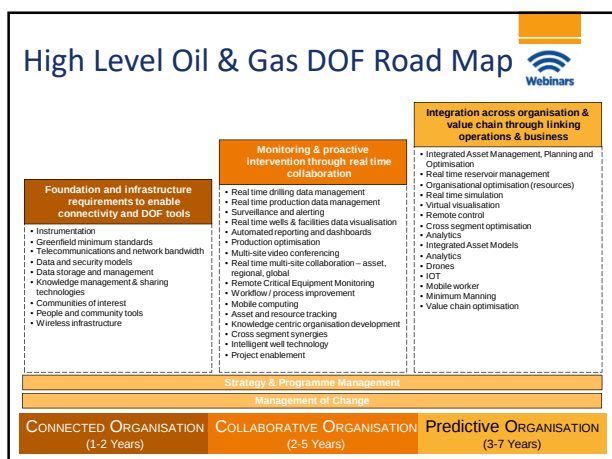


The copyright for this work vests in Shipchange Global Ltd. All rights reserved. The information contained in this document is proprietary to Shipchange Global Ltd and is made available for the recipient on the express understanding that it may not be copied, used or disclosed to others in whole or in part for any purpose except as authorised in writing by Shipchange Global Ltd.









Characteristics of a successful DOF Project or Programme

- It is not viewed as a technology project but a technology enabled change programme
- It is a continuous improvement programme and not a project with a start and a stop
- It has active senior management support
- It is lead by the Asset/Operations Teams
- A willingness to try and fail, it will not be right first time
- 'do it your way', one size does not fit all
- A recognition that the implementation is organisationally and culturally dependent

 *'New Technology + Old Organisation = Expensive Old Organisation'*

Summary: DOF Delivery

- The use of multiple frameworks allows the identification of Opportunities and Gaps
- Maximise the value from your DOF investments, current and future
- Deliver a Capability, Add Value and Not a Technology or Process
- Challenge your current assumptions and ways of working
- How is a Real-Time organisation going to work?
- Adoption and Scaling is the Challenge
- A programme approach aligns all your DOF Projects
- What is your Scope? What is your Vision?
- This needs to be for your company and way of working!



Application of DOF



- Applicable to all types of Assets
 - Onshore, Offshore, Gas, Oil, LNG, Un-conventionals
- Most value where there is high complexity
 - Large and complex Facilities
 - Large well counts
 - Geographically remote
- Value Chain integration
- All Regions
- Not just for the large players
 - Emergence of Low cost Smart Hybrid Model



What is next for DOF?



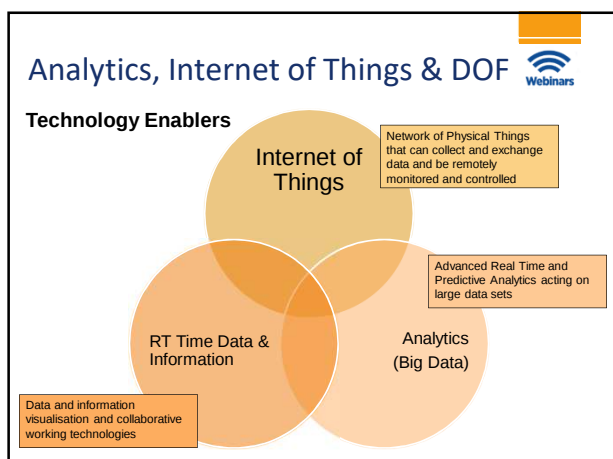
- New technologies enabling predictive organisations
- Radical Minimum Manning for Greenfield projects
- New Network based Collaborative Operating and organisational Models

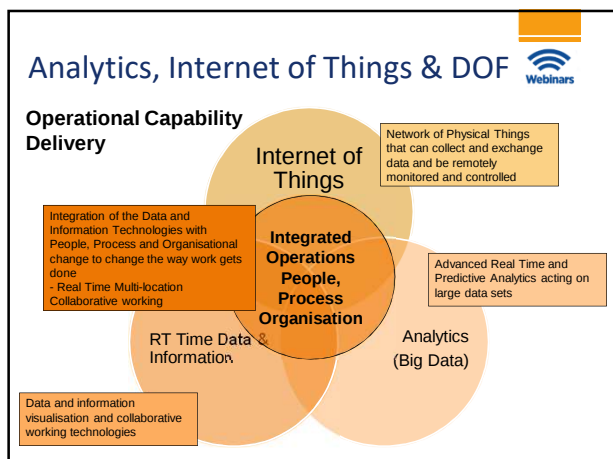


New DOF Technology Trends



- | | |
|--|---|
| Mobile Worker <ul style="list-style-type: none"> • People Tracking • Tablet Devices • Helmet Camera Technology | Closed Loop Optimization <ul style="list-style-type: none"> • Artificial lift optimisation • Advanced Control • Integrated Asset Model |
| Equipment and Logistics Tracking | Major Projects <ul style="list-style-type: none"> • Collaboration for the project process • Radical Minimum Manning • Remote Commissioning |
| Data Driven Analytics <ul style="list-style-type: none"> • Machinery data • Well Performance data • Cross discipline data • Video Analytics | New Operational Models <ul style="list-style-type: none"> • Remote Operations and Remote control • Cross Asset support centres • Expert and Regional Support centres • Value Chain integration |
| Drones and AUV's <ul style="list-style-type: none"> • Fixed wing • Rotor Wing | Internet of Things |
| Robotics | 3D Virtual environments |
| Automated report writing | |







Brownfield Applications

- Remote Operations and Engineering support is now common
 - Few examples where the full benefit of the reduction in manning or site visits have been achieved. This is a change challenge
- Remote control
 - Transfer of control from the asset to a remote location is rare but has been done as an end of field life strategy
 - Barrier to change is high
- De-Manning of brownfields to unmanned status
 - Very few examples of this






The copyright for this work is in the property of the International Association of Oil & Gas Engineers (IIOGE). All rights reserved. The information contained in this document is proprietary to IIOGE and is made available for the recipient on the express understanding that it is not to be used for any other purpose without the prior written permission of IIOGE.

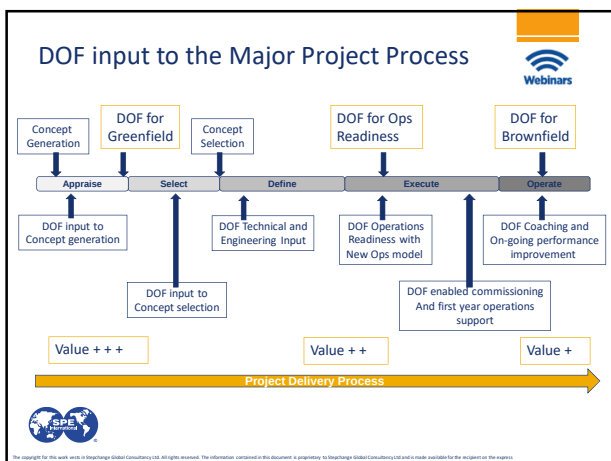
Greenfield Applications

- Remote Operations and Engineering support is now the normal operating model
 - This applies to both onshore and offshore developments
- Remote control
 - Is increasingly being considered for all types of Operation
- Unmanned or Minimum Manning of Project Concepts
 - Few examples for complex production facilities
 - Designed to a radically minimum manned operations model
 - Now possible to unman and minimum man increasingly complex facilities
 - Significantly drop both CAPEX and OPEX






The copyright for this work is in the property of the International Association of Oil & Gas Engineers (IIOGE). All rights reserved. The information contained in this document is proprietary to IIOGE and is made available for the recipient on the express understanding that it is not to be used for any other purpose without the prior written permission of IIOGE.



Minimum Manned Project Concepts

- Minimum or unmanned by design
- Common vision between Operations and Projects
- Remote control
- Design it the way you want to run it
- A new way to run Projects
- Alternate Project KPI's
- Improved Safety and Risk
- Lower OPEX - >50%
- Lower CAPEX - 10-30%
- Improved Availability >97%
- Can be applied to all types of Operation




The copyright for this work rests in Stepchange Global Consultancy Ltd. All rights reserved. The information contained in this document is proprietary to Stepchange Global Consultancy Ltd and is made available for the recipient on the express understanding that it is not to be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage or retrieval system, without the prior written permission of Stepchange Global Consultancy Ltd.

Collaboration is at the heart of DOF



A network of Collaborative Environments build a vision of a new way of working

The sharing of real time data and information to improve operational decision making




DOF in Oil & Gas Summary



- DOF - a major change in the way we run Oil & Gas operations
- The leaders in DOF regard it as a 'transformation programme' and not a technology or IT project
- People, Process and Organisational change is key to success – Enabled by Technology (PPTO)
- The Value is there and payback can be very short
- DOF is very organisationally and culturally dependent
- New technologies will enhance and transform the approach
- Minimum manning is already technically possible but we have to change the way we run projects
- Collaborative working will be the normal way of working
- This is how we will run our companies in the future





Questions & Reflections

Tony Edwards
Stepchange Global

Contact:
Email: tony.edwards@stepchangeglobal.com
Mobile: +44 7777 681207
Office: +44 2083989000
Web: <http://www.stepchangeglobal.com>
