Purpose and Approach of the Digital Transformation Working Group (DTWG)

Background and Context

Purpose of this Initiative

1. Support digital transformation by **gathering, synthesizing and sharing direct inputs** from the Digital Oil & Gas Ecosystem

2. Demonstrate the benefits of **collaboration** between the two industries
   - The Digital Transformation Working Group (DTWG) is the first collaborative working group between NATI and Noia - launched in May 2018

Our Three Questions

The mandate of the DTWG was distilled down to three key questions:

1. What is the understanding and perception of digital transformation in our industry?

2. What are the major challenges our collective members face?

3. What are the opportunities for digital transformation?

Working Group Approach

Built a team based on the following principles

Balanced. Wanted the team to be agile, yet representative of the ecosystem composition

Transparent. Appropriate handling of data, which would be anonymized and shared with the ecosystem

Volunteer. Dedicated individuals, willing to contribute their time and experience

Team Members

Dave Billard
Aker Solutions

Steven Taylor
Learning Labs

Jessica Wadden
Avalon Controls

Dave Finn
Petroleum Research (PRNL)

Dr. Jennifer Jewer
Memorial, Faculty of Business

Caron Hawco
Hawco Group

Mark Cumby
Hatch

Abdallah 'Al' Al-Qashlan
Memorial (MBA Candidate)

Methodology

Industry Survey   80 responses

↓

Focus Groups   84 participants

↓

Operator Insight   4 Operators

OBJECTIVES

- Gather data across the entire ecosystem

- Deep dive on industry segments
  - Session 1: Projects
  - Session 2: Operations
  - Session 3: Subsea
  - Session 4: Drilling

- Vision for digital transformation
- Transformational challenges
- Digital opportunities

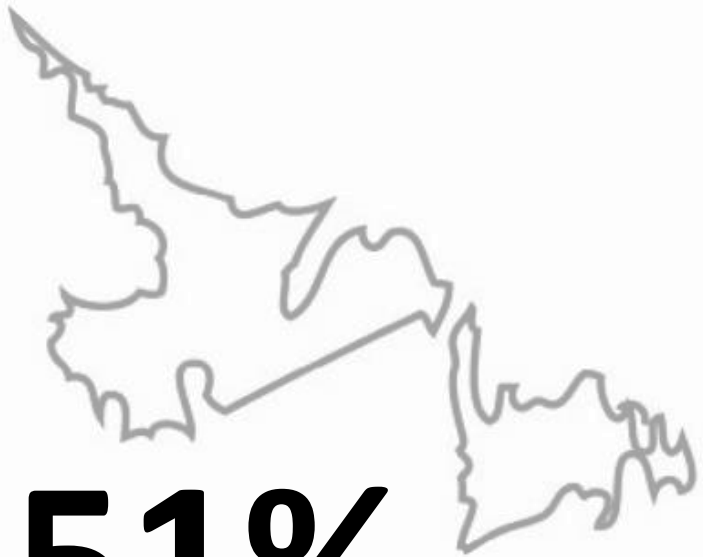# The Pulse of the Ecosystem

Survey Results

Leaders see many ways Digital Transformation can positively impact their business...

In Digital Transformation, people see many challenges to overcome …

INNOVATING ORGANIZATIONAL STRUCTURE

CULTURE BARRIERS

STRATEGY DEVELOPMENT

ALIGNMENT WITH STANDARDS & REGS

QUANTIFYING BENEFITS

STRATEGY IMPLEMENTATION

FINDING TALENT

EDUCATION AND TRAINING

ALIGNING WITH CUSTOMER NEEDS

LACK OF SUPPORTING DATA

There is significant opportunity for NL business to be a part of this transformation

51%

Of local digital advancement will be lead by NL team or NL team directly involved

65%

Will look to **local partners** for support

Diving for Deeper Understanding

Focus Group Sessions

Emerging Ecosystem Themes

- Through the course of the Focus group sessions, 4 key themes relating to digital transformation emerged

  1. Human Resources
  2. Logistics
  3. Personnel on Board – Digital Worker
  4. The Time is Right for Digital Transformation

In Their Own Words …

"Digital transformation is not a project, it's a cultural change"

"Industry needs to work with employees to reduce technology anxiety…"

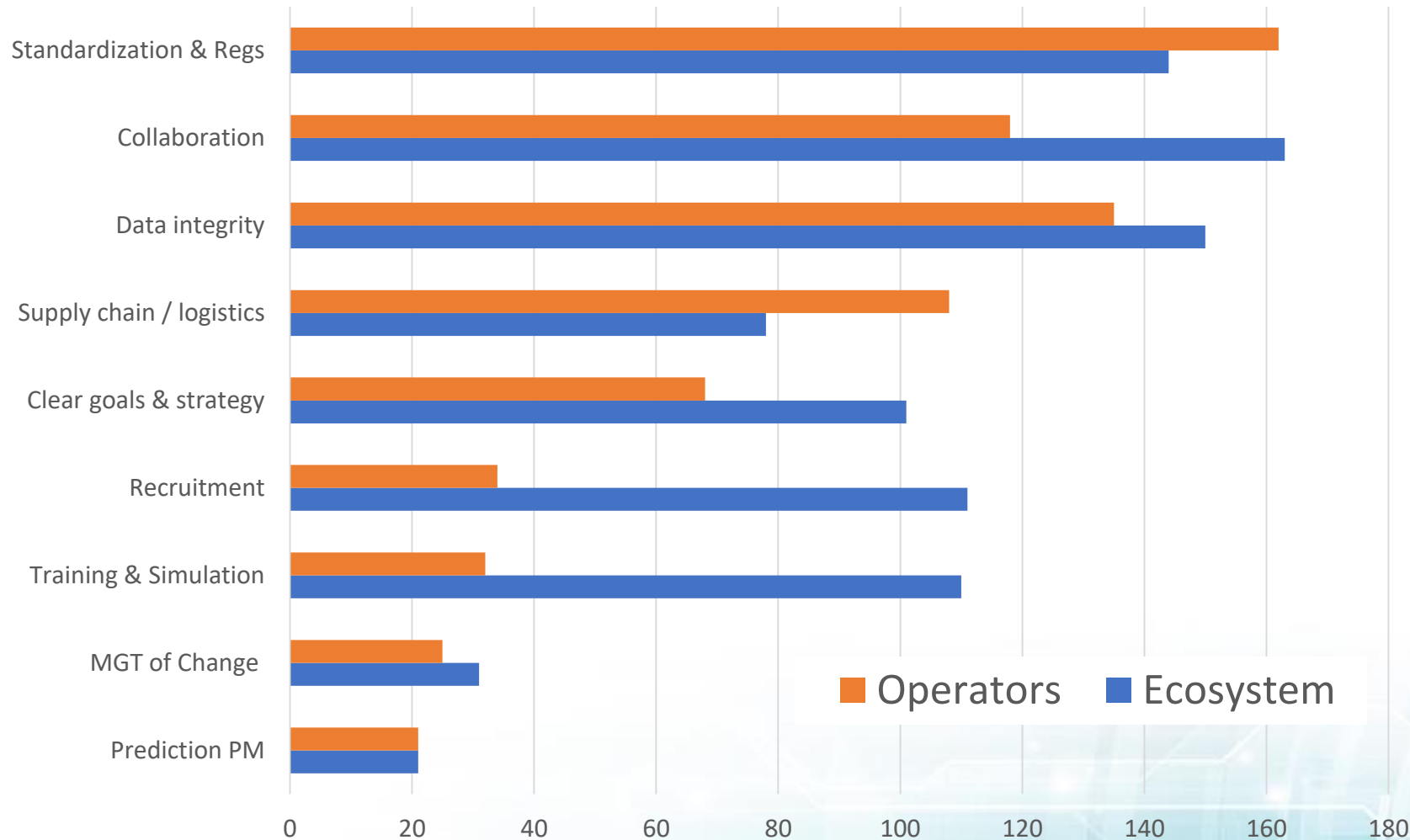"Our staff don't have the technical background to evaluate technology or develop solutions using technology…"

"NL companies may be selling locally, but they're competing globally"

Digital Priorities of Operators & Ecosystem

Top 3 Priorities

Operators
1. Standards
2. Data Integrity
3. Collaboration

Ecosystem
1. Collaboration
2. Data Integrity
3. Standards

Digital Transformation Priorities

The following slides present the specific digital transformation points that were identified in the Operator sessions. They are organized based on 2 factors:

i) What is the approximate timeframe required to develop the technology to address the priority
(0-2 years, 3-5 years and 6+ years)

ii) What part of the O&G industry they impact (i.e Projects, Drilling, Subsea or Operations).

(P) **Projects.** A project is a specific set of operations to achieve a desired goal with defined scope and resources. A project must have a beginning and end date. Examples include Gravity Based structure and Floating Production facility projects and major Subsea tie back projects.

(O) **Operations.** Offshore operations includes all of the processes and procedures required to keep the facilities running; to either drill the wells or produce oil and gas from the reservoir, as well as store, offload and transport the oil to market via oil tanker.

(D) **Drilling.** Drilling is a process to drill a hole through soil and rock to access the geological reservoirs that contain oil and gas. A typical drilling process includes boring, circulation, casing, completion, production and abandonment.

(S) **Subsea.** This refers to activities in the location between sea surface and seabed, close to the oil and gas reservoir. A subsea well is a well in which all the production systems are located on the seabed.

NOIA NXTi

Near Term Digital Opportunities (0-2 years)

Smart contract / smart document technology for bidding, planning, purchase orders, etc.
P O D S

Enhanced sharing & pooling of **data** to help develop business cases for new technology
P O D S

Paperless solutions for timesheets, expenses, PoB, inventory, collaboration, electronic permits (PTW), work orders, drawings, and more
P O D S

Live status of operations, insight and collaboration via **dashboard** technology
P O D S

Machine learning from condition monitoring data, enhancing maintenance prediction & planning
P O D S
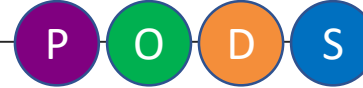
Training programs at University & College that develop digital skills for current and future workers
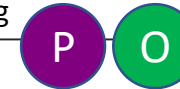P O D S

Unified logistics and warehousing solution, shared by all parties
P O D S

Real-time **PoB tracking** – location, health, status – for wellness and emergency response scenarios
P O D

Real time **Met-ocean data** access to allow for live risk assessment and development of machine learning
P O

Digital reporting for **mechanical completions**
P O

HAZLOC devices to provide interactive connectivity for the digital worker
O

Real-time warehouse and inventory management, connected to offshore operations
O

Subsea sensors to detect temp/pressure/flow/leaks to minimize environmental impact & optimize wells
S

NOIA NATI
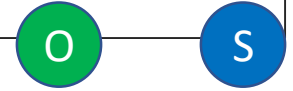
Medium Term Digital Opportunities (3-5 yrs.)

Digital Twin development - integration for remote assistance & training. Managing the entire lifecycle

P **O** **D** **S**

Wireless subsea communications network for sensors & IOT technology

P **O** **D** **S**

Secure, shared **Lessons Learned** data to develop industry wide knowledge & enable collaboration

P **O** **D** **S**

Digital training and skills development using Virtual Reality (VR) & Augmented Reality (AR).

P **O** **D** **S**

Artificial Intelligence & Machine Learning to alert operators of well control & process issues

D

Development of D.E.A.L – Drilling Equipment Automation Layer.

D

Real-time ice tracking, monitoring and simulation to provide realistic T-Time

O **D**

Secure, **high speed offshore** connection to allow live data streaming to rig/facility with full basin coverage

O **D**

Hydrate prediction and management simulation & forecasting

O **S**

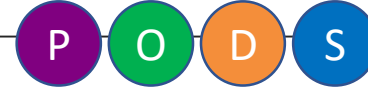ROV housed offshore to permit intervention without dedicated ROV vessel. Sea-floor based ROV

S

Long Term Digital Opportunities (6+ yrs.)

Industry led development of **standard data architecture** for inter-company comms

P **O** **D** **S**
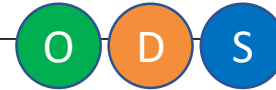
Digital test facility to de-risk new technology adoption

P **O** **D** **S**

Make all offshore facilities subsea with **remote operation**s

P **O** **D** **S**

Digital Twin that is 100% in sync with physical asset

P **O** **D** **S**

Remotely operated offshore facilities

P **O** **D** **S**

Subsea wireless communications for remote ROV control & sensors

O **D** **S**

Robotics for confined space / underdeck inspections

O

Key Insights

Interpretation of Combined Results

There are Big Barriers to Digital Transformation that Impact the Entire Ecosystem

Ecosystem Innovation Framework

- Lacking a defined industry models for I.P creation, sharing and commercialization

- Resources & Training to help companies understand innovation dynamics (Agile, technology, R&D economics, etc.)

- Incubation space inside O&G companies & secondment to start-ups

- "Test harness" that allows new tech to be validated before it enters the field

- Innovation Centre to act as a focal point and hub for innovation

- Enhanced regulator definition of what constitutes R&D

Data Standards Specification

- Lacking a defined industry model for data ownership and sharing

- Industry standards for security, privacy, sovereignty

- Defined API's for data interfaces, including IOT, etc.

- Common Environmental / MetOcean Database

- High speed offshore communications network & infrastructure

Digital Transformation Requires Creation of and Coordination Across the **Digital Ecosystem**

Creators

- Technology companies
- Internal Digital groups (of Operators, Suppliers, Academia, etc.)

ACTIVITIES
- Understand client & industry needs
- Developing new technology & products
- De-risking the adoption of solutions for clients
- Developing scalable commercial models

Facilitators

- Government
- Industry Associations
- Regulators
- Consultants & Industry Experts
- Academia

ACTIVITIES
- Policies & regulations that support Creator/Adopter engagement
- Financial models & incentives for Creators & Adopters
- Creating awareness & evangelism of topics that impact the ecosystem

Adopters

- Operators
- Suppliers
- Service Providers

ACTIVITIES
- Sharing a vision of the industry
- Defining areas for innovation
- Supporting evaluation & validation of technology
- Adoption of new technology

Not all Digital Transformation Activities are the Same...

Digital Adoption

- Adoption of existing technology
- Lower risk (but still risky)
- Outcome can be specified
- Known cost, known ROI (target)
- Multi-quarter initiatives
- Specific to customer

Innovation (R&D)

- Invention of new technology
- Higher risk
- Outcome of the effort unknown
- Higher cost, higher reward
- Multi-year initiatives
- Thematic for industry

… and There is no 'Playbook' to Provide Guidance

- The benefits and risks of digital transformation depend on a number of factors, including the strength of the business case, technology maturity, etc.

- This variability is often overlooked when companies are considering digital transformation initiatives

- This can lead to stalled projects, mixed outcomes, frustration and a lack of ROI for the Adopter

Recommendations

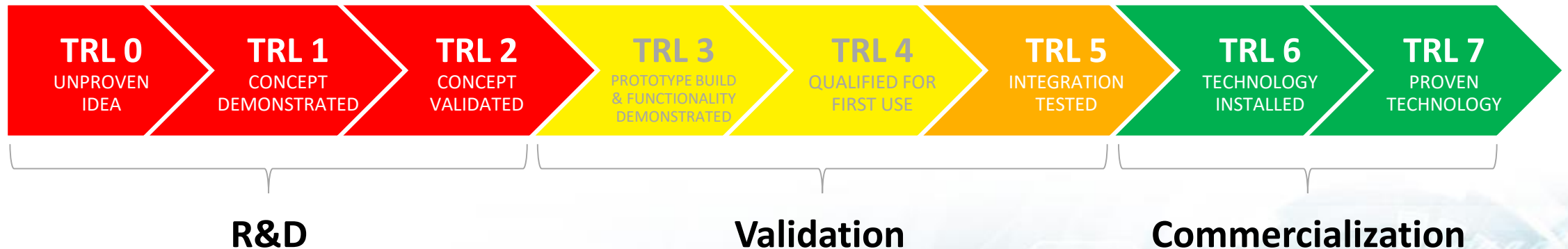Moving Forward with Digital Transformation

Recommendations Approach

- The recommendations are the culmination of the data collected, input from participants and interpretation of the results by the DTWG team

- Accordingly, the following recommendations are not intended to be exhaustive, nor conclusive. Rather, they are directional commentary, whose purpose is to facilitate discussion and further action from the digital ecosystem

Recommendation 1:
Adopt an Ecosystem Innovation Framework based on TRL's...

- Technology Readiness Levels (TRL's) is a model developed by NASA to manage technology maturity.

- The following scale (based on API 17N) can provide a common framework for the industry to plan, manage and evaluate digital transformation activities


| TRL 0 UNPROVEN IDEA | TRL 1 CONCEPT DEMONSTRATED | TRL 2 CONCEPT VALIDATED | TRL 3 PROTOTYPE BUILD & FUNCTIONALITY DEMONSTRATED | TRL 4 QUALIFIED FOR FIRST USE | TRL 5 INTEGRATION TESTED | TRL 6 TECHNOLOGY INSTALLED | TRL 7 PROVEN TECHNOLOGY |

R&D   **Validation**   **Commercialization**

… Combined with the Industry Model for Risk Management

Recommendation 1:
...resulting in the adoption a Hybrid TRL-Risk Matrix Model For Ecosystem Innovation
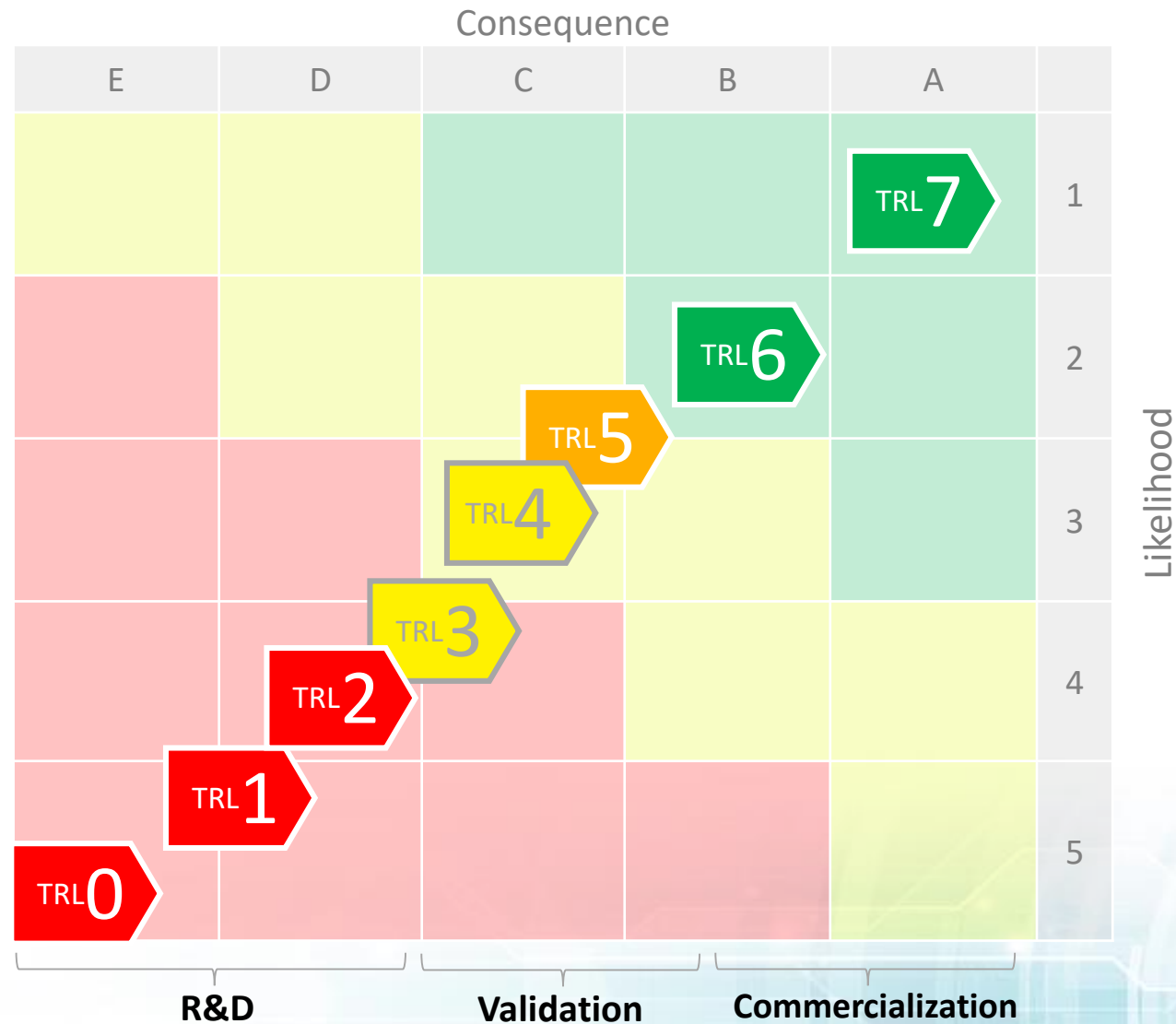
Recommendation 2:
Create a Data Standard to Enable Collaboration

- Data standards group to establish best practices (possibly a standard) for data sharing.
- Proponents in the province would publish a list of areas where they are pursuing digital solutions and make same available to our collective membership via existing utilized communication protocols, based on themes starting at Safety and Operational Efficiency and delving into specific areas of technology covering Exploration, Drilling, Operations and Technology.

Recommendation 3:
Build Ecosystem Innovation Skills Development Program

- Provision of training/seminars to companies on how to plan for digital transformation.
  - Training on how business strategies can be improved through new digital initiatives
  - How to manage/govern a digitally transformed organization
  - The importance of centralized vs decentralized knowledge
  - Education on innovation in other global jurisdictions.

- Collaborative workplace model between technology companies and oil and gas companies.
  - This could include: secondment of an industry expert, investing in third party consultation or establishing cross industry partnership agreements.

Recommendation 4:
Jump start the Transformation Process by Creating Events that Engage the Entire Ecosystem

- Initiate a "Digital KICK – START" program, with coordination amongst various policy and funding organizations

- Hackathon events to foster constructive collaboration and ecosystem understanding

Thank you

Final Report Presentation
Digital Transformation Working Group (DTWG)

June 2019