Drilling Systems Automation Roadmap Industry Initiative

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The Program
Purpose: develop an industry roadmap for common understanding of how drilling systems automation will develop
Phase I: volunteers established process (based on Sandi National Labs program), expectations, scope and foundation for Phase II
Phase II: funded joint industry project (JIP) to develop industry report

The Team
Program Manager: John de Wardt, DE WARDT AND CO
Deputy Program Manager: Ed Tovar, InTechSys

Steering Committee:
- Mark Andersen, Shell
- Eric Cayeux, IRS
- Amanda DiFlore, AMD Consulting
- Blaine Dow, M-I Swaco
- Clay Flannigan, SWRI
- Slim Hbiaieb, Schlumberger
- Calvin Hafner, Independent
- Moray Laing, SAS / SPE DSATS
- Terry Lofts, Transocean / IADC ART
- Robin MacMillan, NOV / IADC ART / SPE DSATS
- John Macpherson, Baker Hughes / SPE DSATS
- Bob Moran, Halliburton
- Randy Mutch, Ensign
- Lindsay Voss, AUVSI
- Mario Zamora, Retired – M-I Swaco
- Lindsay Voss, AUVSI
- John Berra, Formerly Emerson
- Eric Nettleton, Formerly Rio Tinto
- Tom Sheridan, MIT Professor Emeritus

Expert Advisors:
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- Eric Nettleton, Formerly Rio Tinto
- Tom Sheridan, MIT Professor Emeritus
- Lindsay Voss, AUVSI
- Mario Zamora, Retired – M-I Swaco

Phase II Stage I Report Content
A. Executive Summary
B. Purpose, scope and boundaries
C. Needs for automation and roadmap
D. Vision, product definition - onshore multiple wells & offshore exploration
E. Current State / Future State 2025
F. Description of 9 challenges
G. Graphical map
H. Value proposition - integrated development of Drilling Systems Automation

Affiliations
SPE / IADC
AUVSI

The 9 Key Challenges
Coordinated teams of industry experts commenced mapping these parallel independent tracts forming the foundation for the JIP
1. Systems Architecture: physical interoperability of drilling systems, workflow hierarchy, state definition, system functionality
2. Communications: addresses links among the downhole, surface, remote operating centers, and distributed experts, in addition to standards for common protocols and interoperability, deterministic systems for hardware control, and secure data transport at all levels
3. Sensors / Instrumentation and Measurements: requirements for timely, comprehensive, reliable, quality measurements downhole and surface operations
4. Drilling Machines and Equipment: surface and downhole drilling equipment, robotics, highly mechanized and semi-autonomous
5. Control Systems: downhole, surface, and remote monitoring through advisory control to autonomous systems
6. Simulation Systems and Modeling: planning, real-time, offline, remote and post-well
7. Human Systems Integration: interaction of automation systems with humans including displays, human machine interfaces, role competencies, training, adaptive control
8. Industry Standards and Certification: available and required standards and regulations
9. Contingency Management System: critical for safe, deterministic, trustable, deployable autonomy – system ability to "get out of trouble" (added Dec 2015)

Continuing the Work
- Challenge teams directed by committee members developing their forward views – around 50 industry individuals involved
- Updates of progress published in one overall and two challenge specific SPE / IADC papers
- Pace of progress requires dedicated leadership resource – need for a Joint Industry Project funded by sponsors

Status
- Initiative set the foundation so industry can work together for a common solution on which to apply proprietary techniques.
- Requires funding to deliver business value from the future work listed below.

Workload from current state to Stage I report state

Publications
SPE / IADC-173010-MS
Drilling Systems Automation Roadmap – The Means to Accelerate Adoption
Drilling Conference, Ft. Worth, March 2016

IADC / SPE-178814-MS
Drilling Conference, Ft. Worth, March 2016

IADC / SPE-178841-MS
Human Systems Integration: Key Enabler for Improved Driller Performance and Successful Automation Application
Drilling Conference, Ft. Worth, March 2016

Available at: www.onepetro.org