SPE Intelligent Energy International 2012

Utrecht, The Netherlands
27-29 March 2012

Volume 1 of 2

ISBN: 978-1-61839-931-1

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2012) by the Society of Petroleum Engineers
All rights reserved.

Printed by Curran Associates, Inc. (2012)

For permission requests, please contact the Society of Petroleum Engineers
at the address below.

Society of Petroleum Engineers
P. O. Box 833836
Richardson, Texas 75083-3836

Phone: (800) 456-6863
Fax: (972) 952-9435

books@spe.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Volume 1

SPE 148650 Are We Poor at Explaining Things? 1
Karl Jeffery

SPE 148817 Optimisation of Beam Pump Wells Utilising Variable Speed Drives and Remote Monitoring Software 6
Tom Radzevicius, Fred Clarke

SPE 148861 Decision Support in Long Term Planning of Petroleum Production Fields 27
Espen Erlingsen, Torgeir Strat, Vidar Gunnerud, Bjørn Nygreen, Marta Dueñas Díes

SPE 149015 Protection of Petroleum Industry from Hackers by Monitoring and Controlling SCADA System 36
Anne Vijay, Vaisakh S. Unni

SPE 149197 Upstream Situational Awareness - Comprehensive Events Based Surveillance Solution 48
M. Leblanc, D. Rees

SPE 149345 Improved Performance in Real-Time Operational Support Processes through Application Process Work Flow Optimization in Russia 59
Sheldon Rawlins, Todd Giasson, Zim Okafor, Anton Bokarev

SPE 149579 Optimizing the ROI of Digital Technologies in Production Operations 72
Amit Prakash, Aashish Bansal

SPE 149594 Production Monitoring Using Artificial Intelligence, APLT Asset 80
G. Olivares, C. Escalona, E. Gimenez

SPE 149602 Distributed Acoustic Sensing - A New Way of Listening to Your Well/Reservoir 95
Kjetil Johannessen, Brian Drakeley, Mahmoud Farhadiroushan

SPE 149619 Saudi Aramco Intelligent Field Data Exchange Experience Using PRODML: Case Study 104
Abbas Beshri, David Nixon, Nasser Nasser, Raed Suhaibani, Hamad Muhawes

SPE 149641 Enhancing Production, Reservoir Monitoring, and Joint Venture Development Decisions with a Production Data Center Solution 115
Mark Allen, David M. Smith

SPE 149668 Chevron's Digital Oilfields Solutions and Base Business Processes Maximize Value at McElroy Field, West Texas 120
William C. Taylor

SPE 149736 A Two-Level Strategy to Realize Life-Cycle Production Optimization in an Operational Setting 127
G. M. Van Essen, P. M. J. Van Den Hof, J. D. Jansen

SPE 149758 Digital Oil Field Implementation in High-Pressure, High-Temperature Sour Environments: Kuwait Oil Company Challenges and Guidelines 138
Q. Dashti, A. Al Jasmi, B. Al Qaoud, Zaki Ali, J. C. G. Bonilla

SPE 149766 Automation in Wellbore Stability Workflows 152
Stefan Wessling, Anne Bartetzko, Jianyong Pei, Thomas Dahl

SPE 149780 Integrating Mathematical Optimization and Decision Making in Intelligent Fields 164
David Echeverría Ciaurri, Andrew R. Conn, Ulisses T. Mello, Jerome E. Onwunalu

SPE 149785 Oilfield Data Mining Workflows for Robust Reservoir Characterization 181
Keith R. Holdaway

SPE 149801 Artificial Neural Network Drilling Parameter Optimization System Improves ROP by Predicting/Managing Bit Wear 195
Yashodhan Gidh, Arifin Purwanto, Hani Ibrahim

SPE 149851 The Full-Automatic Real-Time Display, Testing and Adjustable System in Separated Layers Water Injection Well 208
Feng Shan Wang, De Kui Xu, Lei Yu, Feng Hui Zhang, Chong Jiang Liu, Zhen Kun Zhu

SPE 149908 Smart Metering: An Online Application of Data Validation and Reconciliation Approach 215
M. Haouche, A. Tessier, Y. Deffous, J-F. Authier, J-P Couput, R. Caulier, B. Vrielynck

SPE 149940 The Missing Pieces of the Intelligent Energy Puzzle – The People Effect 225
Mark Dickson

SPE 149957 A Measure of The Digital Oil Field Status – Is It The End of The Beginning? 232
R. Cramer, D. Göbel , K. Mueller, R. Tulalian

SPE 149959 Establishing a Digital Oil Field Data Architecture Suitable for Current and Foreseeable Business Requirements 246
R. Cramer, J. Krebbers, Eric Van Oort, Tony Lanson, Bob Palermo, Ajith Murthy, Peter Duncan, Tim Sowell

SPE 149998 The Psychology of Adopting Intelligent Energy: Lessons and Insights from Unexpected Places 267
John W. Davidson, Mark J. Lochmann
SPE 149999 Sustaining a Dynamic Revolution: How BP Is Growing the Value Delivered From Transient Flow Modelling and Control 278
Patrick Calvert, Peter Griffiths
SPE 150008 Improving Oil & Gas Installation Safety through Visualization of Risk Factors 284
A. O. Braseth, S. Sarshar
SPE 150011 Moving Toward Intelligent Field Applications: MPFM for Production Rate Testing and Beyond 292
Karam S. Al Yateem, Nami Al Amri
SPE 150013 Optimization of Cableless Technologies to Obtain Reservoir Pressure and Temperature for Real-time Monitoring 303
Karam S. Al Yateem, Khalid I. Al Omaireen
SPE 150014 Testing Methodology for Smart Wells Completion toward Attaining Optimal Production Rate Setting for Maximum Hydrocarbon Recovery 314
Samih Alsyed, Karam Yateem
SPE 150016 Collaboration as a Cornerstone of Intelligent Energy: How Collaboration is Fundamental to Accelerate and Support IE Success 322
Helen Gilman, Michael Kuhn
SPE 150029 Energy Company Perspective on Virtual Worlds / 3-D Immersive Environments 329
Richard A. Morneau, Williams G. Van Herreweghe, Joe W. H. Little, Dominique B. Lefebvre
SPE 150054 Integrated Environmental Monitoring in Daily Operations 341
Vidar Hepsø, Mona Låte, Geir Gramvik, Ståle Johnsen, Ingunn Nilssen, Harald Wesenberg
SPE 150057 Integrating WITSML, PRODML, and RESQML Standards for Cross-Domain Workflows 350
William McKenzie, Francis Morandini, Philippe Verney, Laurent Deny, Jean-Francois Rainaud, Rob Eastick, Gary Masters, David Mack Endres
SPE 150061 Pre-Salt Production Surveillance – The First Journey Across Processes in Santos Basin 361
T. Z. D'Andrea, T. Sanomya, C. B. C. Lima, M. D. M. Bastos
SPE 150064 Real World Remote Operations: A Spectrum 373
James C. Brannigan, J. C. (Chris) Luppens
SPE 150066 Intelligent Field Infrastructure Adoption: Approach and Best Practices 383
Soloman Almadi, Tofig Al-Dhubaib
SPE 150069 Real-Time Drilling Engineering: Hydraulics and T&D Modeling for Predictive Interpretation While Drilling 395
Ricardo Borjas, Leopoldo Martinez, Carlos Perez, Reginaldo Rodriguez
SPE 150070 Transformation and Change in Oil and Gas Production 403
Sergio Sama Rubio, Mark J. Lochmann, Larry Denver, Dave Rees
SPE 150071 The Future of Surveillance 419
Mark J. Lochmann
SPE 150079 Managing Fields Using Intelligent Surveillance, Production Optimisation and Collaboration 437
Frans G. Van Den Berg, Andrew Mabian, Ronald Knoppe, Edwin Van Donkelaar, Frans Terlaan, Valentin Koldunov, Rufina Lameda
SPE 150095 Transforming IT to Innovate and Support Real-Time Operations Globally 449
Joel Patterson, Sebastien Lehnherr, Terry Mead, Kevin Goy, Brad Schmid, Robin Harris
SPE 150096 Closed-loop Feedback Control for Production Optimization of Intelligent Wells under Uncertainty 460
F. A. Dilib, M. D. Jackson
SPE 150099 Evolution and Adoption of a Corporate Strategy For Digital Oil Field Products and Services Within a Service Company 479
Tommy Denney, Brian Haapanen
SPE 150108 Using Digital Oilfield Principles to Enhance Safety 486
Steve Heckbert, Melissa Quick
SPE 150109 Successful Real-Time Optimization of a Highly Complex, Integrated Gas System: Intelligent Energy in the Real World 492
Derek Göbel, Jan Briers, Frank De Boer, Ron Cramer, Kok-Lam Lai, Martijn Hooimeijer
SPE 150112 4 Years of Eye-to-Eye Connectivity – The Success of Azerbaijan's Advanced Collaboration 508
Orhan Ibrahim-Zade, Kerry Moore-Cernoch, David Overton

SPE 150114 Implementing New Technology Securing Availability And Quality Real-time Drilling Data Onshore 515
Thomas Halland, Stian Steinsbø Lie, Lene Hoff, Dag Solnørdal
SPE 150116 Maximizing the Value of the Intelligent Field: Experience and Prospective 522
Ahmed H. Alhuthali, Fahad A. Al-Ajmi, Sultan S. Shamrani, Abdel N. Abitrabi Ballan
SPE 150131 Innovative Intelligent Technologies used for Production Optimization and Infrastructure Integrity Surveillance 532
Ian Roberts, Alexander Albert, Layla El Hares, Marcus Rossi
SPE 150138 Temperature Transient Analysis in a Horizontal, Multi-zone, Intelligent Well 545
K. M. Muradov, D. R. Davies

Volume 2

SPE 150142 Innovative Work Scheme: Real Time Analysis During Well Test Operations 559
A. Ferreira, J. Vidal, R. Abi-Ramia, I. Jouti, S. Flores, D. Essenfeld, J. Cañas, F. Rey, G. Landinez, P. Maizeret, G. Villanueva, J. Cabanilla, R. Alves
SPE 150150 Automation of Safety Valve Travel Timing Delivers Business Value in the Caspian 572
Luca Marinai, Ajay Khetarpal, Brett Grange, George Mackinnon, Christopher Houghton
SPE 150152 Intelligent Energy and Other Industries - Lessons Learned 584
Michael Strathman, Mark J. Lochmann
SPE 150153 ISIS Rate & Phase: Delivering Virtual Flow Metering for 300 Wells in 20 Fields 605
Richard Heddle, John Foot, Hugh Rees
SPE 150155 From Standard Operations via Re-manning and Remote Support to Automated Advisory Systems; a Stepwise Development Program for Remote Operations Over a Decade 613
Erland Sæverhagen, Arve K. Thorsen, Jan Ove Dagestad, Inge Svensson, Lars Olav Grøvik
SPE 150160 Skarv and Valhall Re-development a Journey to the Second Generation of Digital Oilfields 625
Eldar Larsen, Paul Hocking
SPE 150165 Connecting a Global Digital Oilfield Community Through a Collaboration Platform 639
Susie Coppock, Ana Simonato
SPE 150171 Accelerating Regional Transformation Using a Centralised Business Process Repository 647
Mark Newman, David R. Feineman
SPE 150173 Choices, Changes and Challenges: Lessons for the Future Development of the Digital Oilfield 652
Jeff Dickens, David Feineman, Steve Roberts
SPE 150185 Methodology For Overcoming Bottlenecks Leading To Successful Implementation of Collaborative Working Environment 663
Bahir Al Azawi, Mohamed Hafez, Simon Jakeman, Ibrahim Al Bishr, Ahmed Bin Amro, Peter Malvey
SPE 150192 Seria North Flank: Development and Management of a Smart Field 668
Ivan Yong
SPE 150195 Review, Analysis and Comparison of Intelligent Well Monitoring Systems 674
M. F. Silva Jr., K. M. Muradov, D. R. Davies
SPE 150197 Permanent Distributed Temperature Sensing (DTS) Technology Applied In Mature Fields: A Forties Field Case Study 694
Craig Costello, Peter Sordyl, Cledwyn Hughes, Martin Figueroa, Emmanuel Balster, George Brown
SPE 150201 Improving Management and Control of Drilling Operations with Artificial Intelligence 707
Giulio Gola, Roar Nybø, Dan Sui, Davide Roverso
SPE 150203 Optical Fibers: The Neurons For Future Intelligent Wells 714
Johannes M. V. A. Koelman, Jorge L. Lopez, Johannes H. H. M. Potters
SPE 150208 The Critical Role of Digital Data in a Drilling Performance Workflow 722
F. E. Dupriest, P. E. Pastusek, M. T. Prim
SPE 150214 Efficient Use Of High-Frequency Data Through Production Data Management System Implementation 730
A. Creemer, R. W. Holy, F. Fuehrer, M. Mohajer
SPE 150215 Continuous Monitoring of Thermal EOR at Schoonebeek for Intelligent Reservoir Management 742
J. C. Hornman, J. Van Popta, C. Didraga, H. Dijkerman
SPE 150219 A Perspective for a National Oil Company to Transition from Traditional Organizational Management to a Digital Culture 748
Iraj Ershaghi, Adel Al-Abbassi

SPE 150220 Leveraging Technology and Support Infrastructure and Experience in Upstream Digital Technology Application 758
Keith E. Killian, Chris G. Jones, Johan B. Nye, Suzan Wiemers
SPE 150225 Using Semantic Technology to Auto-generate Reports: Case Study of Daily Drilling Reports 765
Martin Giese, Jens I. Ornæs, Lars Overå, Inge Svensson, Arild Waaler
SPE 150233 Challenges in Managing People to Implement an Integrated Operations Systems: A Petrobras Case Study in An Operational Unit of Exploration and Production 776
Cézar Augusto Monteiro Siqueira, Vaney Nascimento Da Cunha, Regina Buzetti Meneghelli, Francisco Antônio Padilha Barreto, Ericsson Jussim Sesma, Roberto Carlos Dos Santos Simões
SPE 150234 Predictive Asset Maintenance 783
Eliot Kingsley
SPE 150235 Smart Oil and the Extended Enterprise 790
Peter Forbes
SPE 150241 Modular Procedural Automation Innovation for Upstream Processes 797
Maurice J. Wilkins, Steve Lazok
SPE 150245 Cross-Industry Perspectives On Remote Collaboration, Optimization And Operations 804
Christophe Romatier
SPE 150249 Wireless Instrumentation in the Oil & Gas Industry - From Monitoring to Control and Safety Applications 811
Stig Petersen, Simon Carlsen
SPE 150253 A Framework to Assess Value of Intelligent Petroleum Fields and Integrated Operations 825
D. Strasunskas, A. Tomasgard, A. N. Nystad
SPE 150262 The Time Has Come For Truly Integrated Workflows: A Different Approach To Cross Functional CWE's 836
Brian Crockett, Khamis Busaidi
SPE 150278 WITSML: Laying the Foundation for Increasing Efficiency of Intelligent Wellsite Communications 845
J. G. Pickering, J. A. Shields, Y. K. Gidh, D. C. Johnson, M. A. Alshehry, M. M. Al-Khudiri, M. P. Farnan, J. E. Schey
SPE 150284 Transforming Remote Mountain Well Sites into Starbucks or Bridging (Layer 2) versus Routing (Layer 3) for Wireless Data Transmission 858
David A. Barker, Mark A. Miller
SPE 150285 Decision Support and Workflow Automation for the Development and Management of Hydrocarbon Assets Using Multi-Agent Systems 863
Amr S. El-Bakry, Michael C. Romer, Peng Xu, Anantha Sundaram, Adam K. Usadi, H. Lane Morehead, Mark L. Crawford, Bryce A. Holloway, Charles A. Knight
SPE 150306 The Overlooked Drilling Hazard: Decision Making From Bad Data 873
Roar Nybø, Johnny Frøyen, Anders D. Lauvsnes, Torbjørn Korsvold, Mei Choate
SPE 150314 State of the Art of Artificial Intelligence and Predictive Analytics in the E&P Industry: A Technology Survey 881
César Bravo, Luigi Saputelli, Francklin Rivas, Anna Gabriela Pérez, Michael Nikolaou, Georg Zangl, Neil De Guzman, Shahab Mohaghegh, Gustavo Nunez
SPE 150369 Production Gain and Optimization through the Implementation of Smart Well Completion Technology in Saudi Aramco, Case Study 900
Faisal M. Dossary, Saud A. Dawsari, Rayid S. Anazi
SPE 150370 Getting the Most Out of Networked Drillstrings 909
Roar Nybø, Dan Sui, Johnny Petersen, Johnny Frøyen, Thomas Jackson, Daan Veeningen
SPE 150371 Moving Towards Sustainability: A 5 Year Production Engineering Experience with Intelligent Fields 923
Rashad M. Al-Zahrani, Alaa A. Dashash
SPE 150380 Virtual Worlds-based Immersive Training Simulators for Improved Safety in Operation Start-up and Emergency Response Planning 932
Hans Van Den Wijngaert, François Lagae
SPE 150382 A WITSML Enabled Workflow for Integrating Offset Well Drilling Risks and Events Into Well Planning and Execution 935
N. R. Deeks, Y. I. Arevalo, A. J. Fernandes
SPE 150396 Achieving Excellence in Offshore Logistics 943
Jose R. Favilla, Dirk A. Claessens, Ulisses Mello, Bruno Flach
SPE 150407 Smart Fields - Sustaining and Accelerating Benefits from Intelligent Fields 954
Leo De Best, Frans Van Den Berg
SPE 150408 Evaluating the Performance of Intelligent Completions 959
Varun Yadav, Neha Surya

SPE 150418 Integrated Operations in Statoil – from Ambition to Action 970
Trond Lilleng, Mette Øyen, Unn Farestvedt, Harald Engelsen, Hilde Nordbø, Berit Vennes, Aleksander Revheim, Ole Seim, Teresa Halvorsen

SPE 150422 Early Symptom Detection Based on Real-Time Evaluation of Downhole Conditions: Principles and Results from several North Sea Drilling Operations 981
Eric Cayeux, Benoît Daireaux, Erik Wolden Dvergsnes, Gunnstein Sælevik

SPE 150424 Intelligent Field Management: Real Time Monitoring and Proactive Optimization of Greater Ekofisk Area 998
Amit Madahar, Alannah McIntosh, Ilnur Mustafin, Nick McAlonan

SPE 150426 Interoperability, a Paradigm Change 1011
Ronald L. Montgomery, Jose R. Favilla Jr.

SPE 150428 Managing Operation Events in Real-time: From Smart to Smarter 1028
Furqan Khan, Benjamin Testard, Jean-Gregoire Boero-Rollo, Eric Verbrugge

SPE 150431 A Stack Model and Capabilities Approach to Investigate Integrated Operations Across Different Industrial Sectors - O&G Industry versus Aviation, Military and Medicine 1043
Sjur Larsen, Knut Steinar Bjørkevoll, Andrew K. Gibson, Vidar Gunnerud, Dag Ola Lien, Ketil Thorvik, Arild N. Nystad

SPE 150439 The Development and Successful Application of an Automated Real-Time Drilling Fluids Measurement System 1055
Tore Stock, Egil Ronaes, Truls Fossdal, Johnny Bjerkaas

SPE 150450 Advances in Production Allocation: Bonga Field Experience 1068
Emmanuel Udofia, Mamoke Akporuno, Frans Vandenberg, Vincent Beijer, Gbenro Oguntimehen, Olatunbosun Oni

SPE 150453 Building Capacity for Innovation - A Drilling Contractors Approach to Continuous Change Management 1076
Martin Eike

SPE 150455 Enabling Agile and Responsive Workflow Automation: A Hydraulic Fracture Design Case Study 1082
Marshal Strobel, Gustavo Carvajal, Michael Szatny, Chaminda Peries

SPE 150457 Self-Help and Leveraging Scale via the Wells Advanced Collaborative Environment's Global Community of Practice 1093
S. J. Sawaryn, A. Deady, S. Lennox, K. Moore-Cernoch, J. M. Morrison, M. Saunders

SPE 150470 Real-Time Factory Drilling in Mexico: A New Approach to Well Construction in Mature Fields 1105
Pablo A. Codesal, Luis Salgado

SPE 150477 SAGD Field Trial for a New Intelligent-Well Completions Strategy to Increase Thermal EOR Recoveries 1116
Joel Shaw, Mark Bedry

SPE 151977 Design and Implementation of a Global Solution for the Management of Real-time Drilling Data 1126
Glenn Warner, Sergio Hernandez, Jesus Lopez, Jake Booth

Author Index