

Making knowledge flow through knowledge connections

Tim Stouffer and Reid Smith

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Brochure Entry

Integrating knowledge management into the enterprise: Making knowledge flow through knowledge connections

- Facilitating knowledge flow obtain the most value from KM programs: why the upstream oil and gas industry needs this more than any other
- Managing an information governance framework on a global scale: maximizing business benefit, minimizing risk
- Identifying the IT tools that permit companies to “learn” what they already know and promote knowledge flow
- Identifying opportunities to improve productivity, enable high-quality decisions and mitigate risk
- Attacking on multiple fronts: policies, roles & responsibilities, processes, technology

Tim Stouffer, Technical Excellence Knowledge Manager, Marathon Oil

Reid G Smith, Enterprise Content Management Director, Marathon Oil

Knowledge is often gained only through experience and resides only in individual heads. For knowledge to have power it must *flow* through knowledge connections. Knowledge flow must be facilitated for companies to obtain the most value, especially in industries that must rely on individuals to rapidly assess and solve problems. Upstream Oil and Gas is just such an industry. Fortunately solutions exist, enabled by IT tools, which permit companies to “learn” what they already know and promote knowledge flow. This presentation covers some of the solutions, in varying stages of maturity, being used by Upstream Oil and Gas companies.

Marathon statistics at a glance



- Recently announced split effective July 1, 2011
 - Pre-split (Upstream + Downstream)
 - Fortune 50 company
 - Established in 1887
 - 4th largest US integrated oil & gas company
 - 5th largest US refiner
 - Current Market Cap: ~ \$37 billion
 - 2010 Revenues: \$73 billion
 - 2010 Net income: \$1.46 billion
 - Employees: > 30,000
 - Upstream Figures
 - 2010 Net Oil & Gas Production Sold: 391,000 BOE/D
 - 2010 Net Synthetic (Oil Sands) Oil Sold: 29,000 BPD
 - 2010 Net Proved Reserves: 1.638 billion barrels
 - Headquartered in Houston, Texas
 - Employees: ~3,000
 - Operations in 10 countries
 - BIG changes for Marathon!

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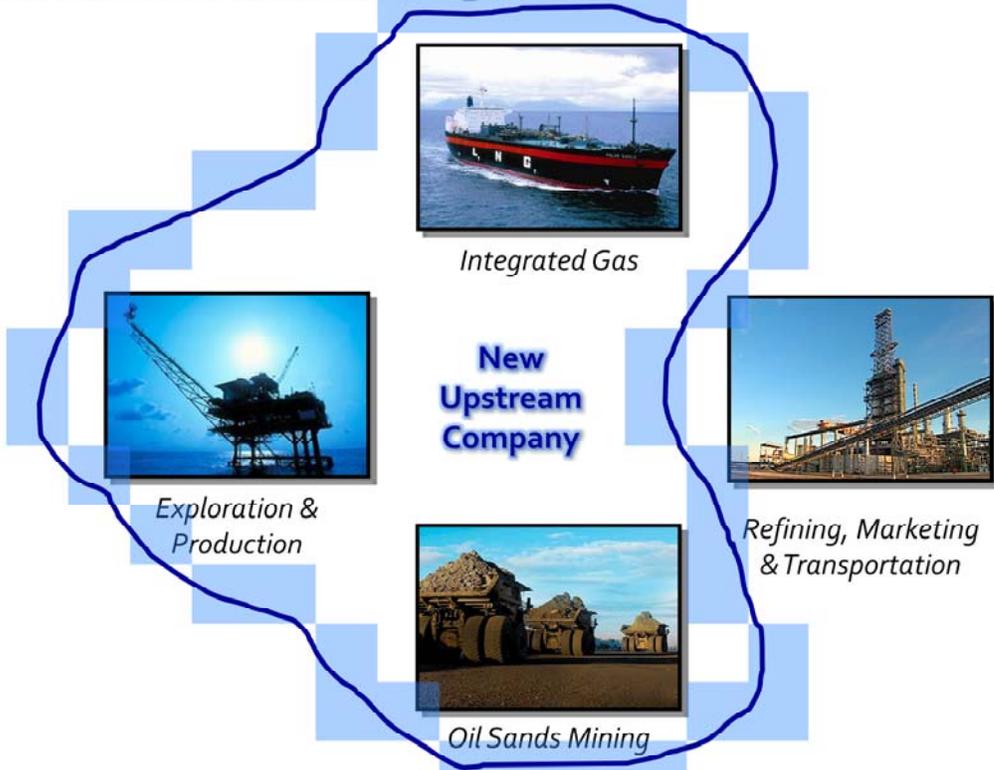
I think that some information about Marathon will help to put the work we have been doing in context.

Marathon was established in 1887.

For comparison,

- 2008 Proved Oil & Gas Reserves: 1.2 billion barrels
- 2008 Proved Bitumen Reserves: 388 million barrels

Marathon's business segments



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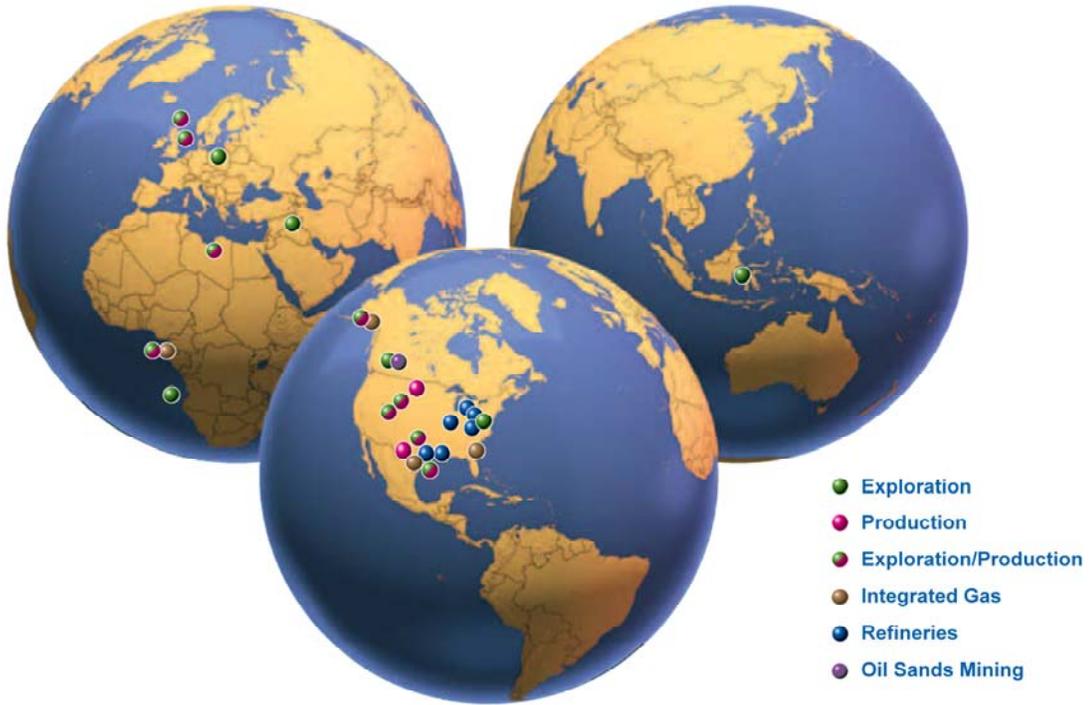
Exploration & Production

Oil Sands Mining: 20% interest in the Athabasca Oil Sands Project

Integrated Gas: Transform gas into products like LNG, methanol, ...

RMT: US – Midwest, Upper Great Plains, Gulf Coast & Southeast. Refining, Terminals & Transportation, Pipe line and retail.

Global operations



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Operations in 10 countries

$$v = -\frac{k \partial p}{\mu \partial x}$$

v – flow velocity
 k – permeability
 μ – viscosity
 p – pressure
 x – distance

— Henry Darcy

**Knowledge is sticky.
Without a systematic process and
enablers, it won't flow.**

— Carla O'Dell

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Fluid Flow

Fluid flow in porous media (e.g., petroleum reservoirs) is governed by Darcy's Law.

- Fluid flows faster through a permeable structure
- Viscous fluid does not flow easily
- Fluid flow is improved by applying pressure (e.g., increasing inlet pressure or decreasing outlet pressure)

Knowledge Flow

The keys to knowledge flow are captured in this 2002 quote from Carla O'Dell of APQC.

- Knowledge flows faster through a permeable organization
- Tacit knowledge does not flow as easily as explicit knowledge
- Knowledge flow is improved by applying pressure (e.g., competitive pressure, compliance requirements, managerial leadership, peer pressure)

Our working hypothesis is that knowledge flow and fluid flow obey analogous laws. The analogy suggests a way of thinking for the knowledge manager. To increase knowledge flow, take actions to increase organizational permeability, reduce knowledge viscosity, increase business pressure gradient.

Context for the presentation

- **Goals**

- Construct the work platform for the next generation – a new foundation for collaboration and knowledge sharing
- Enable easy-to-use and consistent access to the *relevant, up-to-date and trusted* information needed to monitor performance, to pre-empt potential problems and to take decisions
- Implement consistent records management to ensure we preserve the information required for legal and regulatory compliance
- Make a step change in knowledge sharing

- **Foci**

- Organizational plumbing
- Communities of practice

Our knowledge flow work is embedded in an enterprise program to make a step change in the way information is managed across the company. From these goals you can identify the different types of pressure our company is sensing around information governance, sharing and protection.

Organizational plumbing

■ Dimensions

- Policies
- Roles & Responsibilities
- Processes
- Technology
- Ongoing Support

■ Stakeholders

- Business
- Law
- HR
- Internal Audit
- Finance
- Public Affairs
- IT, ...

The Power of



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Success demands a multi-dimensional campaign: updating policies; defining roles & responsibilities; streamlining processes; installing up-to-date, commercial technology; and providing ongoing support.

Business (i.e., **Operations** in this context): Relevant, up-to-date and trusted information

Law: Consistent information management processes

HR: Management of personal information

Internal Audit: Following policies & standards

Public Affairs: Responsible for the front page news

IT: performance, reliability, scalability ... and speed

...

More detail on Law concerns: Compliance: Consistent Records Management, Policy Framework, Hold Order Management, eDiscovery, Cleanup & Migration: Legal & operational concerns. Law and HR concerns overlap when it comes to country laws for managing personal information

[http://download.microsoft.com/download/E/2/3/E23BF598-6486-40A6-8FF7-](http://download.microsoft.com/download/E/2/3/E23BF598-6486-40A6-8FF7-C9837AE91CAA/Data_Governance_Managing_and_Protecting_Personal_Information.docx)

[C9837AE91CAA/Data_Governance_Managing_and_Protecting_Personal_Information.docx](http://download.microsoft.com/download/E/2/3/E23BF598-6486-40A6-8FF7-C9837AE91CAA/Data_Governance_Managing_and_Protecting_Personal_Information.docx)

http://en.wikipedia.org/wiki/Information_privacy

http://en.wikipedia.org/wiki/Records_management

http://en.wikipedia.org/wiki/Information_lifecycle_management

http://en.wikipedia.org/wiki/Enterprise_content_management

http://en.wikipedia.org/wiki/Personally_identifiable_information

http://en.wikipedia.org/wiki/Sensitive_personal_information

Standards: ISO 15489, DoD 5015, MoReq, ...

Optional: Show the video.

Technology

- Electronic & Physical Information
- Email
- Instant Message
- Web (Intranet & Internet)
 - *Collaboration & Social Media: blogs, wikis, discussion boards, ...*
 - *Videos, webcasts, podcasts, RSS feeds, ...*
 - *People Profiles*
- File Shares / PCs ... "unstructured"
- Applications ... "structured"
- Microsoft
 - Office 2007, SharePoint 2007, Exchange
- Open Text Livelink



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Just to give the idea of the variety of information we are concerned with.

On the left you see the variety of channels via which information is shared.

On the right you see a sampling of information types ... many of which have been stored traditionally on shared drives.

MaraView front page is Marathon's intranet home page. It includes corporate and industry news and information, as well as real-time stock, crude oil and crack spread feeds. What every Marathoner needs to know today.

TeamView is where individual organizations, project teams and communities of practice share information – with the company and with each other. This slide shows how ECM team members share information with each other.

MyView is a customizable view for each individual. We can subscribe to news feeds, add "favorites" and manage personal information. Here you can see mine.

MyView also includes a personal profile – projects the individual has worked on, expertise, education, and so on. Here you can see what others can find on me.

Consistent search is available on every page. There are a number of Advanced Search options – for narrowing search results. There are also several options for viewing search results, including map integration.

We have also begun to implement enterprise search across technical applications. As a result, one can go to MaraView or to other applications and find the data, documents and people needed to do the job. This example shows how **ViewPoint** reports can be surfaced via MaraView search. **ViewPoint** brings together real-time and historical upstream data from sensors and applications in a series of easy-to-understand dashboards. Examples include production data and key performance indicators.

MConnect is the landing page for Marathon's communities of practice. We are largely using OOTB MOSS functionality to support the CoPs.

The organizational plumbing is in ...
On to getting knowledge to flow



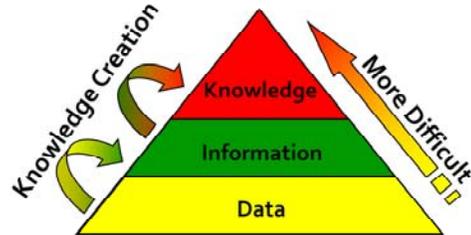
The Power of 

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Knowledge Premise

- Can we all agree?
 - Knowledge contained in your company adds value to your business
 - Specific knowledge often gives you a competitive edge
- But knowledge is worthless unless it *flows*
 - Flow → re-use
 - No flow → useless
- So how do we get knowledge to flow?
 - It's contained in someone's head – Tacit
 - It's contained in a file (paper, digital) – Explicit



"If We Only Knew What We Know"

– Carla O'Dell, APOC

Back to Darcy's Law...

$$v = -\frac{k}{\mu} \frac{\partial p}{\partial x}$$

v – flow velocity
 k – permeability
 μ – viscosity
 p – pressure
 x – distance

{ Mechanics: $F = ma$
Electricity: $V = iR$ }

— Henry Darcy

Knowledge is ~~sticky~~. *viscous*.
Without a systematic process and
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Getting Knowledge Flowing

- Must have the “plumbing” in place to facilitate knowledge flow
- Tools are important, but are *not* the solution
 - If you build it, they won’t necessarily come
 - Good tools help, bad tools hinder
- Focus on the people (customers)
 - What do they want?
 - Spread tacit knowledge (P2P and P2K)
 - Help tacit knowledge become explicit
 - Convince people of the value of sharing knowledge
 - To the company
 - To *themselves*

Cultural Legacy

- Upstream was a more decentralized organization prior to 2002
 - More employees of all professions located in regional offices: more F2F
 - Virtually all non-operational professions now in Houston: good and bad
- Very open and collaborative culture – but one-to-one
 - Historically this is how everyone was mentored and how knowledge was shared
 - Decentralized structure worked OK for each region
 - What extra value may have been achieved with cross-region collaboration?
 - Some knowledge sharing occurred simply by moving people
- *Visible* knowledge sharing and collaboration needed – one-to-many, many-to-many
 - Learning this new trick...

Some KM History

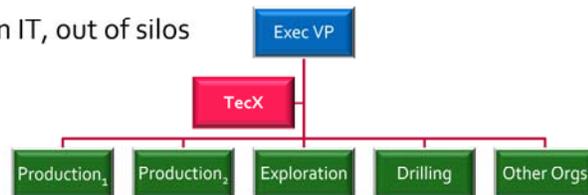
- A few local communities formed in the mid '90s, focused needs
- Formal efforts began in the late 1990s
 - IT initiative
 - Highly structured, multiple locations, highly governed
 - Established numerous Technical Peer Groups (TPGs)
 - Governance and support waned as people moved
- Remnants of the TPG effort persevered through time by
 - Enthusiastic petrotechs with credibility who wanted to lead and/or
 - One IT Business Analyst who provided continuity and support
- New IT tools gradually adopted to enhance collaboration

	BU1	BU2	BU3	BU4	BU..
Job A	Rep	Rep	Rep	Rep	Rep
Job B	Rep	Rep	Rep	Rep	Rep
Job C	Rep	Rep	Rep	Rep	Rep
Job D	Rep	Rep	Rep	Rep	Rep
Job ...	Rep	Rep	Rep	Rep	Rep

Recent Developments

- Addressing Marathon's *Upstream* business only
 - Fortuitous since company is splitting in two July 1!
- Focus is on petrotechnical professions - ~715 people
- Created a new organization in 2008: Technical Excellence (TecX)
 - Career Development
 - Process Improvement
 - **Knowledge Management**
- TecX reports to Executive VP
 - Independent of business units, not in IT, out of silos

Operate in:
10 States
10 Countries



TecX KM Activities – 1

- Knowledge Management group given goals, funding and support
 - Manager selected for knowing corporate culture first
 - Having KM awareness second (not vice versa)
- Aware of existence of 6 Communities of Practice (CoP)
 - One in the morgue
 - One in intensive care
 - Four in varying degrees of health
- Went to “school” on knowledge sharing
 - KM conferences (especially APOC’s)
 - Industry practices suited to Marathon
 - Met with other companies for BPs and LLs



TecX KM Activities – 2

- Began to implement knowledge sharing “no-brainers”
 - Saw value in CoPs as the main KM platform
 - Got CoPs to a healthier state by “pushing” and publicizing activity
 - Identified credible CoP Leaders and got their supervisors’ buy-in (for time)
 - Developed simple CoP “portal” *k* – permeability (increased)
 - Aligned CoP goals with business needs *p* – pressure (increased)
- Working with Marathon’s “plumbing” group (ECM), created a CoP portal
- KM Concepts and language new for most
 - CoP leaders and members
 - Management
- Obtained management support, got some trickle down, ... *p* – pressure (increased)

TecX KM Activities – 3

- Learned of 6 “Advisory Groups” set up in business units
 - Convinced them they were essentially CoPs
 - Provided resources to help them collaborate better
- Had several groups come forward suggesting CoP formation
 - Stress tested whether they should be CoPs
 - Facilitated new CoP formation and existing CoP health
- Introduced “MConnect”
 - Intranet portal for CoPs
 - Share news, **Success Stories**, all things KS
 - Repository for wiki
 - In one year MConnect generally recognized as *the* place to go for KS



k – permeability (increased)

MConnect View

TeamView

Home | News Blog | Communities | Wiki

Quick Links

- All Discussions
- All Events
- All Images
- Membership Request

My Dashboards

- My Summary
- Resources
- My Action Items

Default Lists

- Task Items

Lists

- Announcements
- External Contacts
- Links

Discussions facilitate KS and sense of community

Latest Discussions

The MConnect Discussion Board is a single repository serving all communities of practice. With the goal of sharing knowledge, the discussions allow members to interact with like minded people within their CoP and others. Below are the most recently added/updated threads.

Thread Title	Replies	Last Updated	Modified By
Aerlian reservoir experience new	3	4/27/2011 10:57 AM	Scott, Erik O.
OPEX expectations for rod pump vs. plunger lift new	0	4/27/2011 7:59 AM	Corbett, Michael T.
Looking at installing a Coalescing Separator. Anyone have experience with them?	2	4/27/2011 7:42 AM	Schling, John A.
Findeff's GOM reconstructions new	1	4/27/2011 5:26 AM	Blenchard, Robert H.
Instrumentation CoP (ICoP) Logo	6	4/26/2011 2:43 PM	Hall, Chris
Do you want to be alerted to Shale Resources CoP Discussions? new	0	4/26/2011 10:47 AM	Stauffer, Tim

Community of Practice and Reference Sites

- Equipment**
 - Chemsafe (CHCP)
 - Electrical (ECP)
 - Fixed Equipment (FECP)
 - Instrumentation (ICP)
 - NAPO SCADA (SCP)
 - Pipeline (PLCP)
 - Rotating Equipment (RECP)
- Subsurface**
 - Geoscience (GCP)
 - Petrophysics Corner (PCP)
 - Play Fairway (PFCP)
 - Reservoir Management (RMCP)
 - Shale Resources (SRCP)
 - Technician (TCP)
- Wells**
 - Completions (CCP)
 - Drilling (DCP)
 - Production Optimization (POCP)
- General**
 - Library Information Center
 - Petrotechnical Computing
 - Technical Excellence (TeCX)
 - Young Professionals (YPCP)
 - JIP and Consortia
 - APQC Link
- IT (Info for all)**

Easy navigation in two places

Topical CoP news and Success Stories

Easy to Join

Not a Member?

While all Marathon employees are able to view content on MConnect, participating in community discussions and contributing to mwiki requires membership in a Community of Practice. Request membership by clicking below.

Latest News

MConnect news articles and case studies. Contact [Tim Stauffer](#) for article submissions.

One Question Demonstrates the Power of We!

If you're running economics on how best to produce from a new asset, who better than to ask than those who have experience doing something similar?

Drew Domalakes is a reservoir engineer for Marathon's Eagle Ford Asset Team, with some previous experience in production and completions, and wanted to evaluate artificial lifting options for economic benefit. Specifically, he had a question about how hydraulic jet pumps might be a solution for the pad-style, high-deviation wells planned for development. He posted a question on the Production Optimization and Completion Communities of Practice (CoPs) discussion boards via the "cross talk" feature. Little did he know what he was tapping into by simply making his question visible to those

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Sample Success Story

A Reservoir Engineer in Aberdeen posts a question on the Reservoir Site...



...Most Reservoir Engineers are in Houston. No expertise found among Reservoir Engineers...



The Power of We

k - permeability (increased)

..... BUT one re-posts the question on the Production Site...



The engineer found company expertise around the world AND just down the hall, via the network!

Success!!!

...A Chemist in Aberdeen sees the post and has answers too!

...A Chemist in Equatorial Guinea monitoring the Production site has answers, AND re-posts on the Chemical Site...



Continued Progress

- Performed APOC's self-assessment of KM maturity
 - Some surprises, but mostly confirmed focus areas
 - Get tacit to explicit μ – viscosity (reduced)
- Preaching *obsessively* about sharing knowledge *visibly*
 - At CoP meetings
 - Fledgling performance metrics for individuals p – pressure (increased)
 - Keeping fresh news content on MConnect
- Contracted writing of initial wiki content μ – viscosity (reduced)
 - When wiki goes live it will contain magnet content
 - Content based on previous work by internal SMEs
 - Gave wiki a recognizable identity: MWiki



Marathon > MConnect

Welcome Tarcusnet1 | Marathon | MyView | MyLinks | Help

TeamView

MConnect | News Blog | Communities | MWiki

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MWiki

The Power of Knowing

MWiki is the destination for contributing and sharing content for communities of practice. Included are best practices, lessons learned, definitions & terminology, technical articles and more. All wiki entries can be edited by CoP members.

Recent Activity
Recently added or updated MWiki articles. All categories.

Name	Modified By	MWiki Section	MWiki Subject	Modified
Gas Lift New	Stouffer, Tim	Wells	Best Practice	4/26/2011 4:28 PM
Punger lift	Melendez, Tony	Equipment	Best Practice	3/23/2011 3:18 PM
Creating a new MWiki article	Stouffer, Tim	Subsurface	Definition/Terminology	3/23/2011 9:47 AM
How to update to Knowledge Library	Melendez, Tony	General	Process/Procedure	3/21/2011 11:50 AM
Creating GEOLOG color-maps	Melendez, Tony	General	Process/Procedure	3/21/2011 11:26 AM
Artificial lift	Day, Peter I.	Subsurface	Technical Article	3/17/2011 12:02 PM
Zoelites near Salt Structures in the Gulf of Mexico	Stouffer, Tim	Subsurface	Definition/Terminology	3/10/2011 2:16 PM
Pressure Transient Analysis - Characteristic Plots	Stouffer, Tim	Subsurface	Technical Article	3/10/2011 11:03 AM
Abandonment Pressure	Broome, Casey B.	Subsurface	Technical Article	2/23/2011 12:22 PM
Gravity and Magnetics	Stouffer, Tim	Subsurface	Definition/Terminology	2/17/2011 2:18 PM
Seismic	Bundalo, Neda	Subsurface; Technology	Definition/Terminology	2/16/2011 3:17 PM
4-D Elastic Modeling	Blanchard, Robert H.	General	Definition/Terminology	1/20/2011 2:53 PM
Anisotropic correction of sonic logs in wells with large dips	Blanchard, Robert H.	Subsurface	Technical Article	1/20/2011 2:07 PM
Shale Distribution and net-gross from Thomas-Stieber X-plots in Geolog	Stouffer, Tim	Subsurface	Technical Article	1/5/2011 2:01 PM
Use of "verticalized" Stading Velocities to Constran Shale Properties	Stouffer, Tim	Subsurface	Technical Article	1/5/2011 1:36 PM
Statistical Method for deriving permeabilities from Core Porosity and Permeability	Stouffer, Tim	Subsurface	Technical Article	1/5/2011 1:35 PM
New Model for Absolute and End-Point Effective Permeability Estimation	Stouffer, Tim	Subsurface	Technical Article	1/5/2011 1:33 PM
Excel Sheet for Plotting Formation Pressure, Pressure Gradients and Contacts	Stouffer, Tim	Subsurface	Technical Article	1/5/2011 1:29 PM
Gas Saturation Estimation Method Using NMR Data with Uncertainty	Stouffer, Tim	Subsurface	Technical Article	1/5/2011 1:24 PM

Page Contact:
Melendez, Tony
Knowledge Management Specialist
713-299-2622

Guidelines
Guidelines for adding and editing MWiki content and frequently asked questions.

Create a new MWiki article
Add a MWiki Alert

Who to contact for support:

- Tony Melendez
- Tim Stouffer

Subjects
There are six subject areas of wiki pages. Each subject can contain content from any section.

- Best Practices
- Definitions
- Lesson Learned
- Process/Procedure
- Software
- Technical Article

Done

Local Intranet 100%

Current Status

p – pressure (increased)

■ Developed CoP award program

- Rewarding behaviors
- Coveted year-end awards



- Community of the Year
- Success Story of the Year
- Executive Champion of the Year
- Discussion Post of the Year
- KS Event of the Year
- New Community of the Year
- Leader of the Year



■ Capturing and publishing success stories

- Quantifying value whenever possible (time saved, \$ earned, \$ saved, ...)
- Demonstrates individual and company benefits

Current Status

- Loading and linking initial wiki content
- All CoPs migrated from old sites, facilitating new CoP startups
- Promoting more KS events and activities



Knowledge Sharing
Event of the Year
Organizers

- Taking advantage of new features of the plumbing (e.g., cross talk)



Going Forward

- More management interaction
 - Meaningful metrics
- } p – pressure (increased)
- Add CoPs to new tool as needed
 - Encourage use of Mwiki
 - Continue to improve plumbing
- } k – permeability (increased)
- Support more KS events (F2F still needed)
 - Support more KS *between* events
 - Investigate additional rewards
- } p – pressure (increased)

Conclusions: Get Knowledge to FLOW!

- Getting Knowledge to flow is much like the physics contained in Darcy's Law
- Increase "Permeability"
 - Improve access to knowledge
 - Build knowledge connections: P2P and P2K
- Increase "Pressure"
 - Management leadership
 - Metrics
- Decrease "Viscosity"
 - Turn tacit knowledge into explicit, actionable knowledge
- Decrease "Distance" (make things easy)
 - Bring people, knowledge and communities closer together

$$v = -\frac{k}{\mu} \frac{\partial p}{\partial x}$$

v – flow velocity
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Increase organizational permeability. First, remind ourselves that porosity is people, knowledge bases and workflows. Focus on connecting them: p2p, p2i, ...

How do you reduce viscosity in oilfield applications: raise temperature (big effect); raise pressure (small effect); gel breakers (used in fracturing ... normally done with enzymes at the lower temperatures and oxidizers at elevated temperatures. The challenge has been adding sufficient breaker to provide a complete break while being able to place the proppant before breaking begins);

Note that in the oilfield, sometimes we want to increase viscosity and sometimes to reduce it.

Remember that in changing the pressure gradient in an organization, you have two variables to work with: pressure and distance. You can reduce organizational distance (e.g., via reorganization).

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