



*Creating Extraordinary Value From  
What Your Company Already Knows*

# **Future of Knowledge Work: Developing Your Next Generation Experts**

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**KMWorld 2014**

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# Topics

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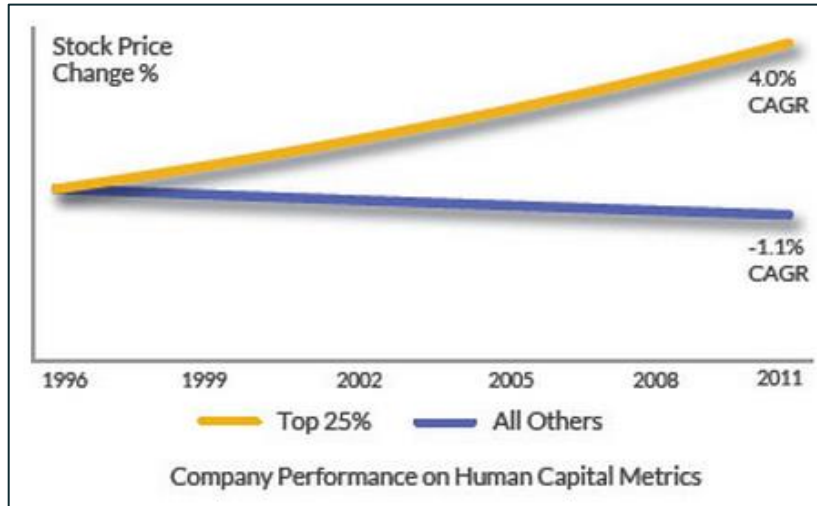
- Future of Knowledge Work
- Trends in Human Capital (“Corporate IQ”)
- Mental Models: How to Think Like Your Best Experts
- Smarter Network Success Stories
- Business Value

# Thoughts on the Future of Knowledge Work

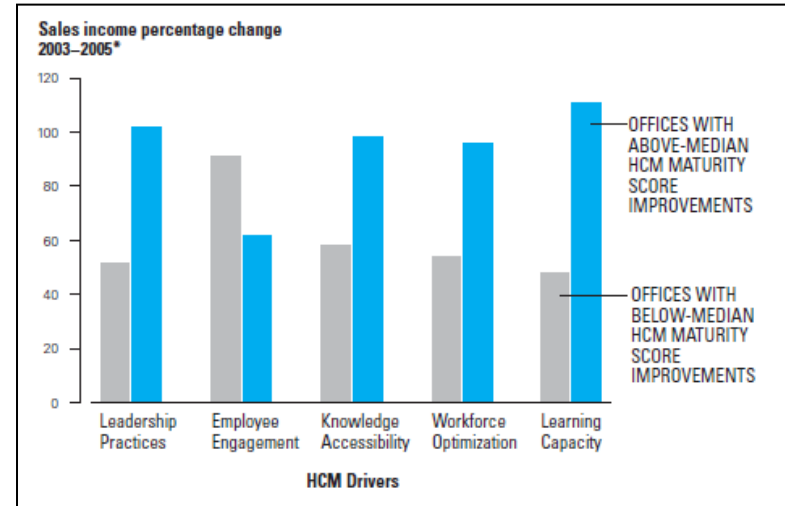
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- Competitive advantage continues to rely on highly skilled people for decision-making, problem-solving and service delivery
- Shortage of skilled Gen Y knowledge workers (~40 MM by 2020)
  - GAPS: critical thinking, problem-solving, team behaviors, listening, communicating
- Focus on best use of human capital
  - Identify tasks that can be off-loaded or automated/smart systems
  - Better ways to accelerate skill development (strategic differentiator)
  - New definition of “Employee” (contract skills as needed)
  - Dynamic and agile teams become the norm
  - Improve KM processes to better retain internal / external expertise
  - Crowdsourcing, Open Innovation more prevalent for creative work

# Human Capital and Business Performance



Human Capital Management Institute, 2013

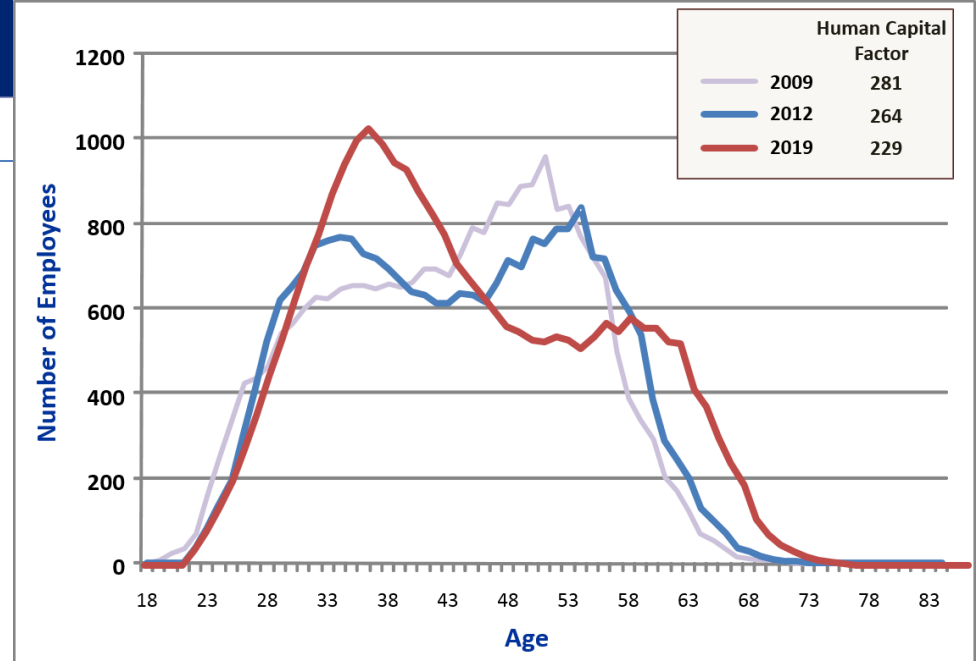
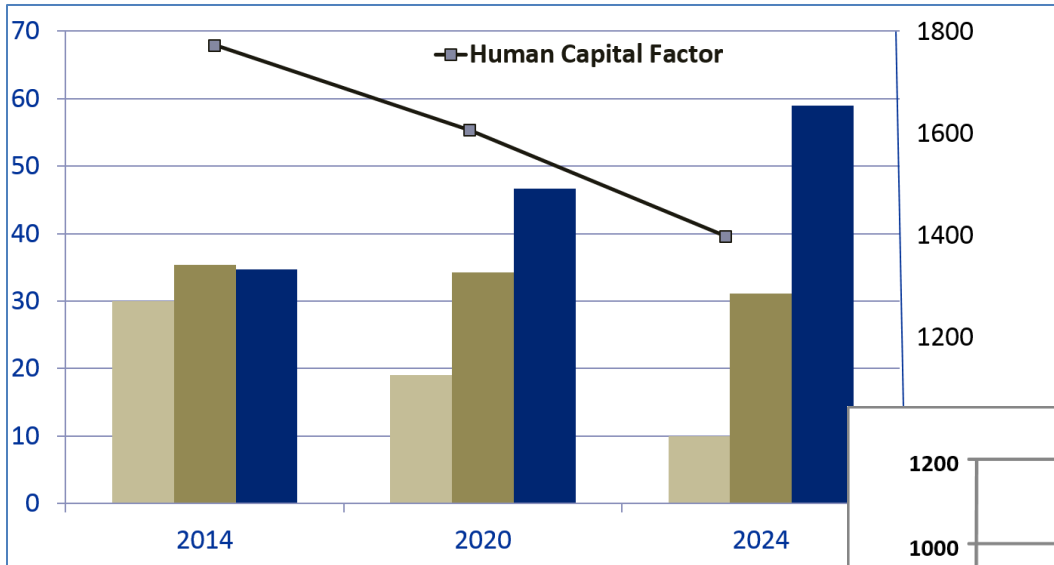


Harvard Business Review, 2007

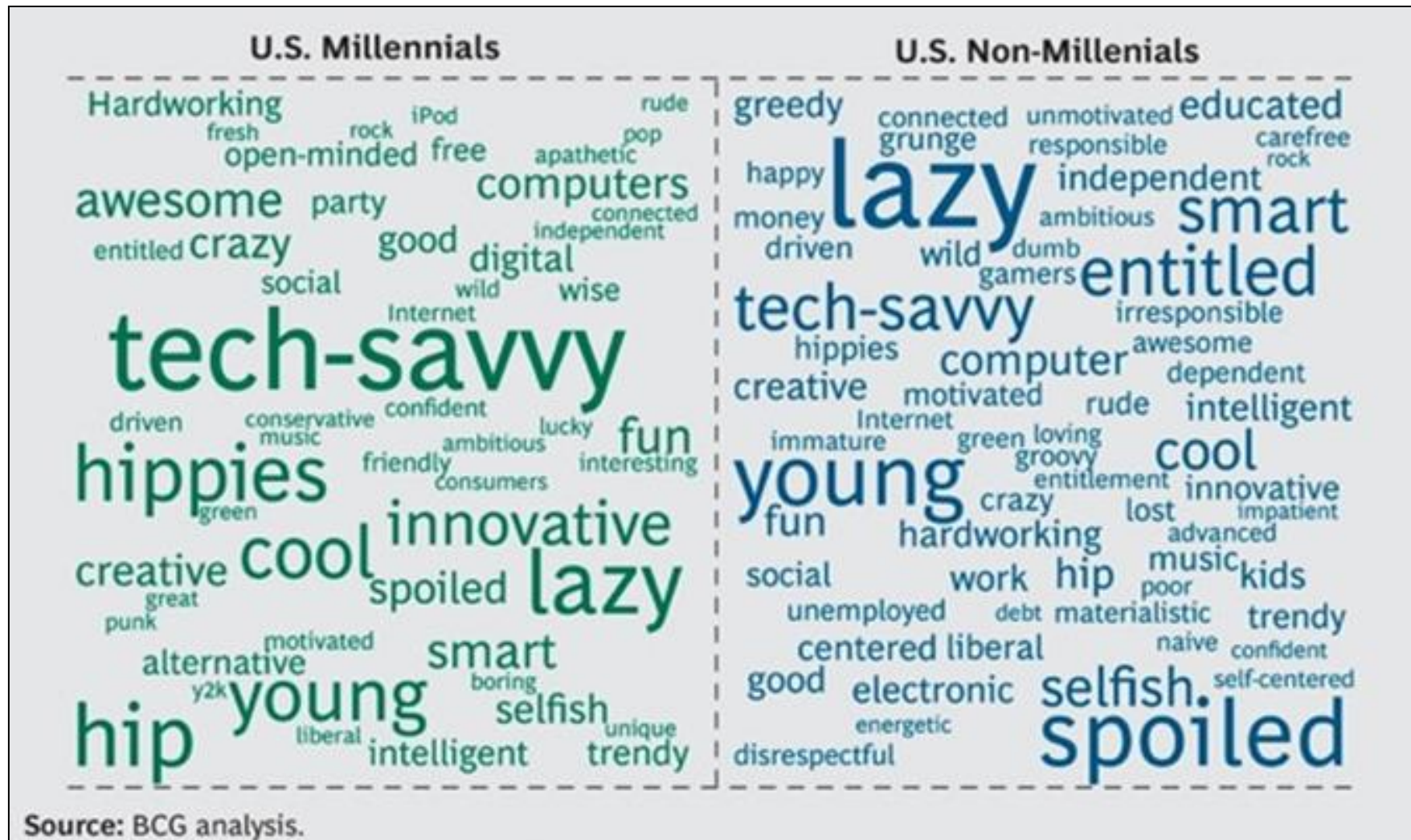
## Factors Correlating with Human Capital

- |                           |                                    |
|---------------------------|------------------------------------|
| • Work experience (years) | • Job tenure (company or position) |
| • Education (degrees)     | • Leadership positions and rank    |
| • Salary                  | • Employee engagement              |
| • Seniority               | • Network effects (collaboration)  |

# Knowledge Loss – Millennial Crew Change

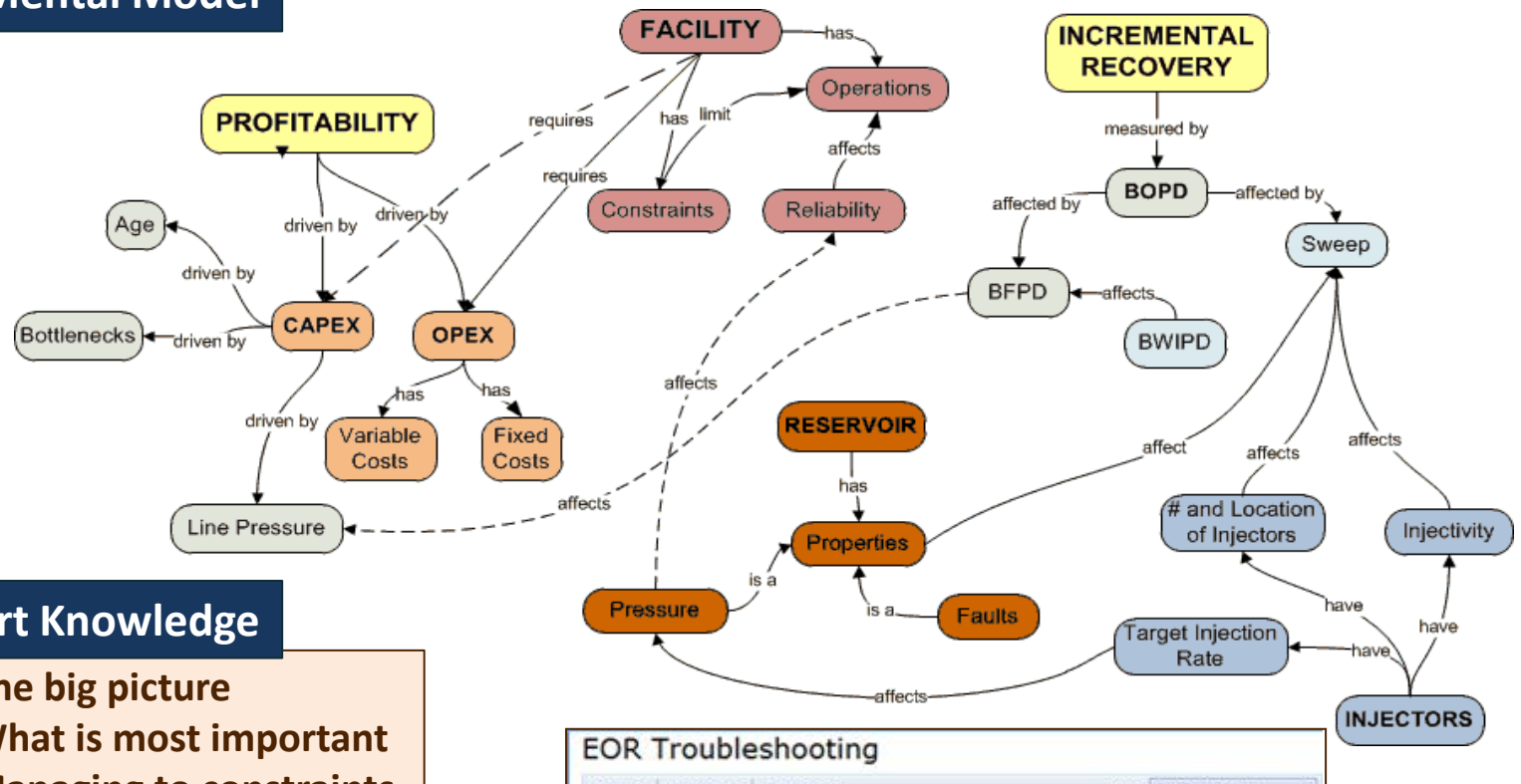


# Generational Mindsets



# How to Think Like an Expert

## Mental Model



## Expert Knowledge

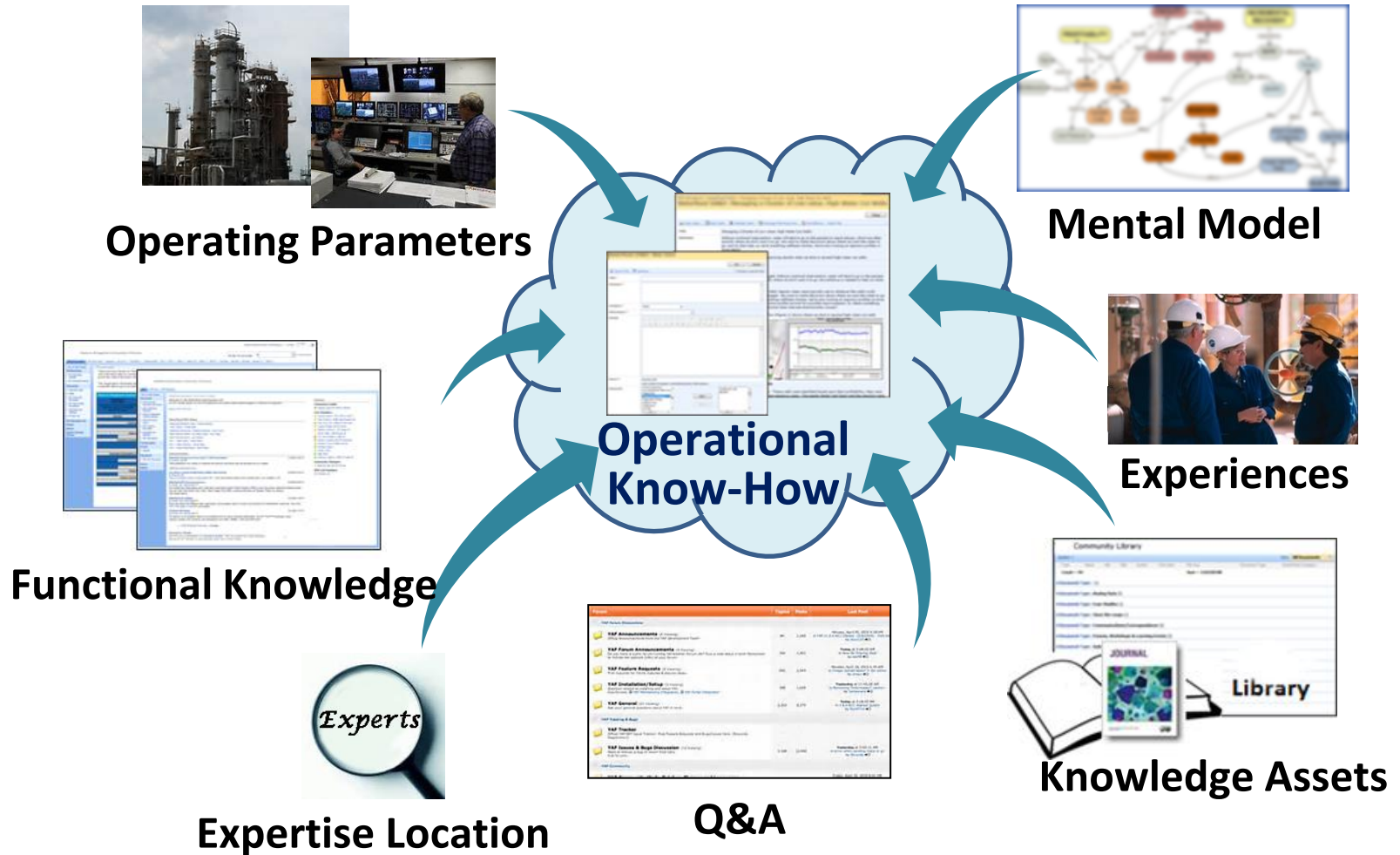
- The big picture
- What is most important
- Managing to constraints
- Common situations
- Achieving quality results
- What can go wrong
- Handling problems
- Who to contact for help

EOR Troubleshooting		
Cause	Remediation	Type
Symptom : Erratic ESP ammeter chart (2)		
Symptom : ESP ammeter chart shows low amps		
Injector problem	Look at the line pressure on a screen plug contractors to go out and clean screens.	
	If injector suffered a pressure drop in plugging	
	If the pressure is back to a desirable range	
Injector problem	Check to see if aging	
Injector problem	Check if there is an orralling for well head	



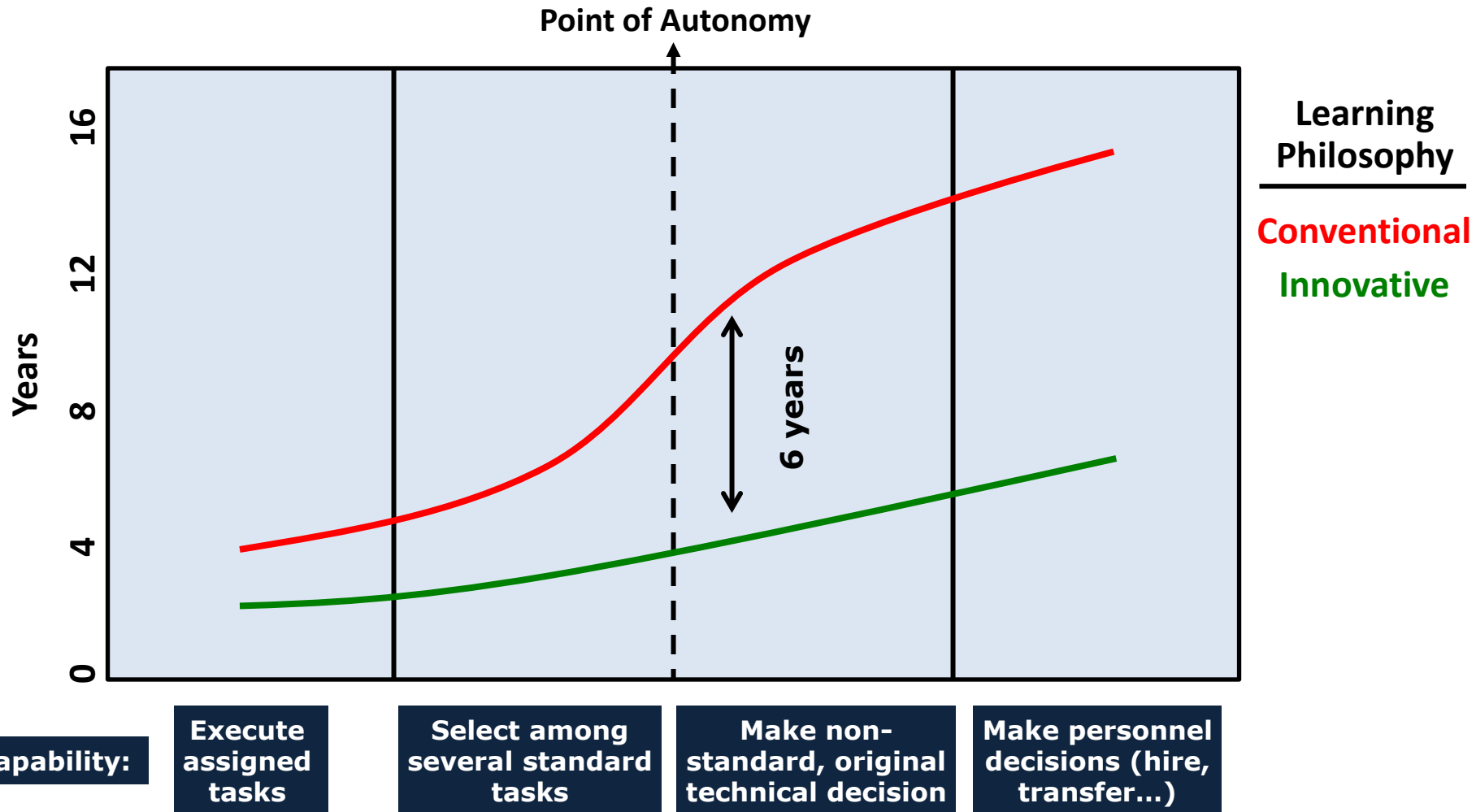
# Smarter Network Assets

## Learning and Performance Support






# Impact of Accelerated Competency



# Smarter Network – Chemical R&D



**KNOWLEDGE  
RECOVERY**

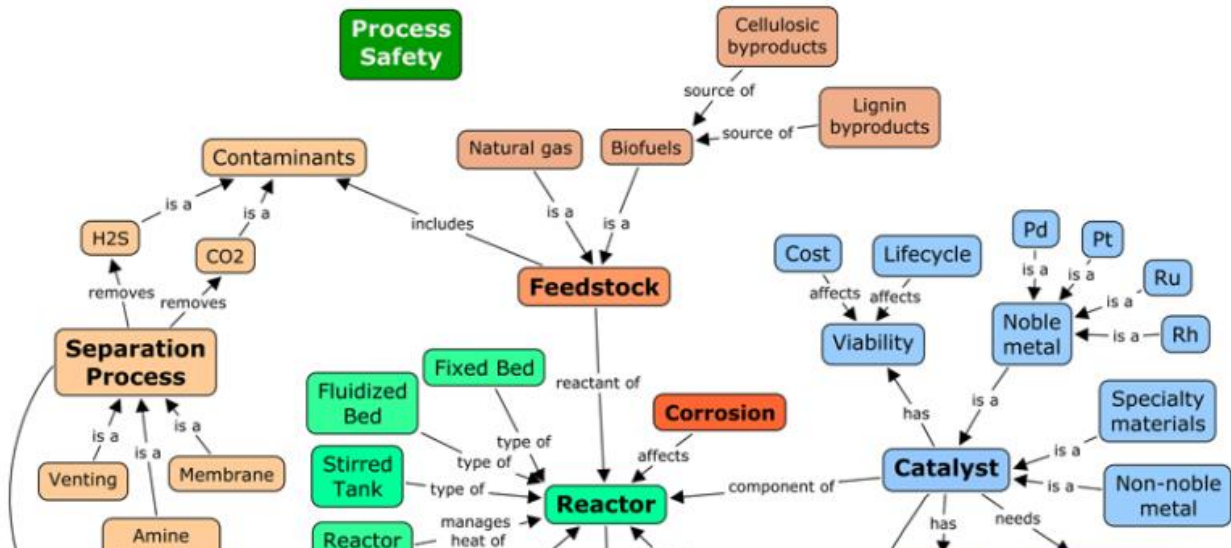
[KR Demo Home](#)   
 [RE Home](#)   
 [Chemical Manufacturing R&D](#)

## GTL Process

GTL Process Model

- [R&D Expertise](#)
- [R&D Library](#)
- [Process Info](#)
- [Members](#)
- [Discussions](#)
- [Lessons Learned](#)
- [Manage Q&A](#)
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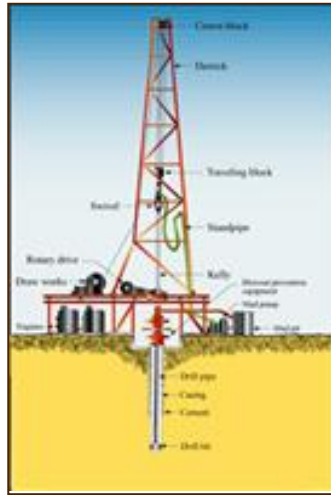
The diagram is a knowledge graph with nodes and relationships. Key nodes include:
 

- Process Safety** (green box) includes **Contaminants** (orange box).
- Contaminants** includes **H2S** and **CO2** (orange boxes).
- Separation Process** (orange box) removes **H2S** and **CO2**.
- Separation Process** includes **Venting** and **Membrane** (orange boxes).
- Amine Absorption** (orange box) is a type of **Membrane**.
- Feedstock** (orange box) includes **Natural gas** and **Biofuels** (orange boxes).
- Cellulosic byproducts** and **Lignin byproducts** (orange boxes) are sources of **Biofuels**.
- Feedstock** is a reactant of **Reactor** (green box).
- Reactor** includes **Fluidized Bed**, **Fixed Bed**, **Stirred Tank**, and **Reactor System** (green boxes).
- Reactor** manages heat of **Process Control** (red box).
- Process Control** includes **Pressure** and **Temperature** (red boxes).
- Reactor** is affected by **Corrosion** (red box).
- Reactor** is a component of **Catalyst** (blue box).
- Catalyst** includes **Noble metal** and **Non-noble metal** (blue boxes).
- Noble metal** includes **Pd**, **Pt**, **Ru**, and **Rh** (blue boxes).
- Catalyst** has **Viability** (blue box).
- Viability** is affected by **Cost** and **Lifecycle** (blue boxes).
- Catalyst** has **Specialty materials** and **Non-noble metal**.
- Process Control** affects **Process Safety**.
- Process Control** delivers **Product** (yellow box).

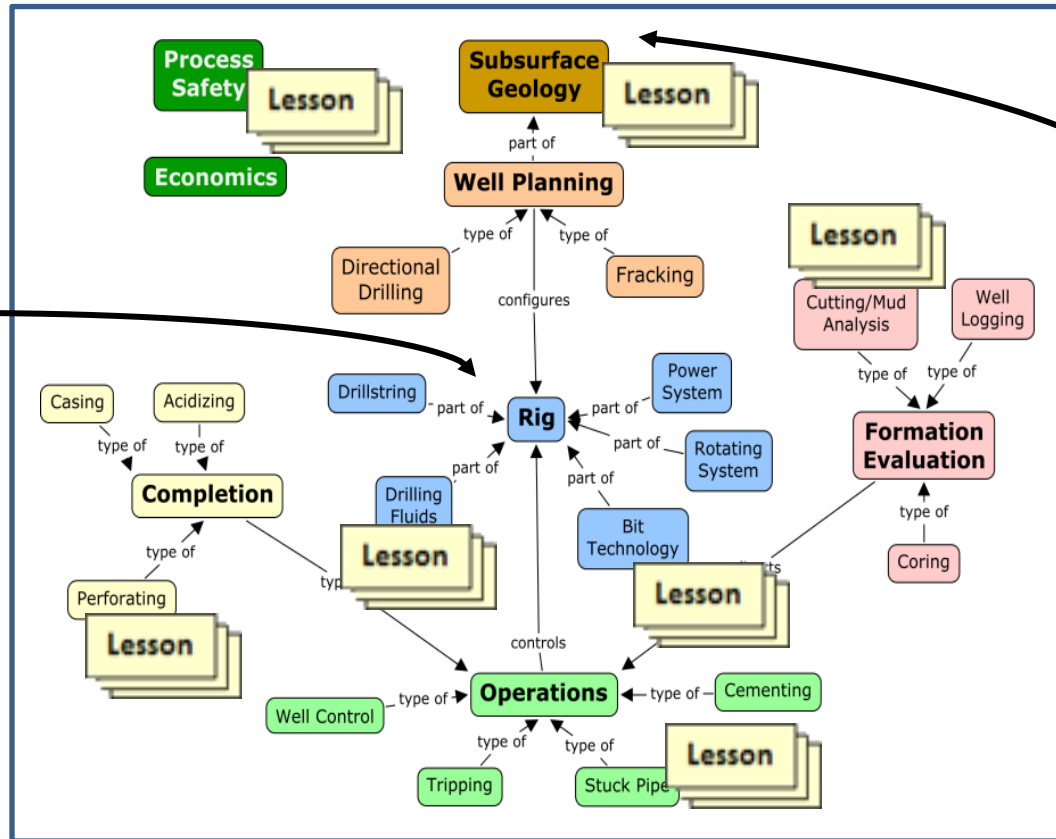
Title	Main Category	Sub Category
<a href="#">Runaway reaction causing pressure issues</a>	Process Control	Pressure
<a href="#">Line start plugging causing pressure issues</a>	Process Control	Pressure
<a href="#">Handling runaway reactions - resorcinol process</a>	Process Control	Pressure
<a href="#">Handling plugging in a polymerization process</a>	Process Control	Pressure
<a href="#">Underperforming heat transfer equipment</a>	Process Control	Temperature
<a href="#">Runaway reaction in resorcinol process</a>	Process Control	Temperature
<a href="#">Domain Characterization.CE Domain.pdf</a>	Pilot Projects	General

# Smarter Network - Drilling

## Drilling Mental Model



Rig Components



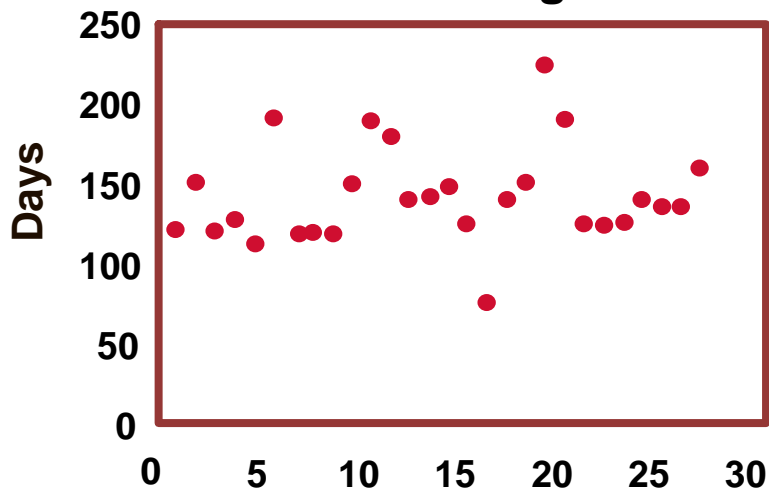
Formation	Depth (ft)	Formation	Depth (ft)
Miocene/Recent	0-8,000	Deep-water Clastics	0-8,000
Oligocene	8,000-10,000	Fine Wilkesburg Deep-water Shales	8,000-10,000
Eocene	10,000-12,000	U. Wilkes Turbidites	10,000-12,000
Paleocene	12,000-14,000	L. Wilkes Turbidites	12,000-14,000
	14,000-16,000	Wilkesburg Sand	14,000-16,000
Cretaceous	16,000-18,000	Wilkesburg Deep-water Chalks/ls	16,000-18,000
	18,000-20,000	Eschscholtz Clastics	18,000-20,000
Jurassic	20,000-22,000	Deep-water Carbonates	20,000-22,000
	22,000-24,000	Shallow Marine Clastics	22,000-24,000
Triassic	24,000-26,000	Louisa Shale	24,000-26,000

Geology

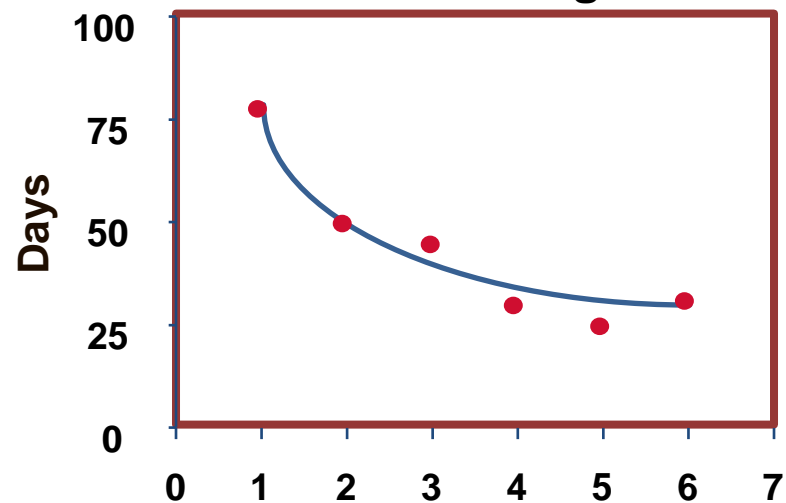
# Learning from Team to Team Knowledge Transfer

## Oil Well Drilling

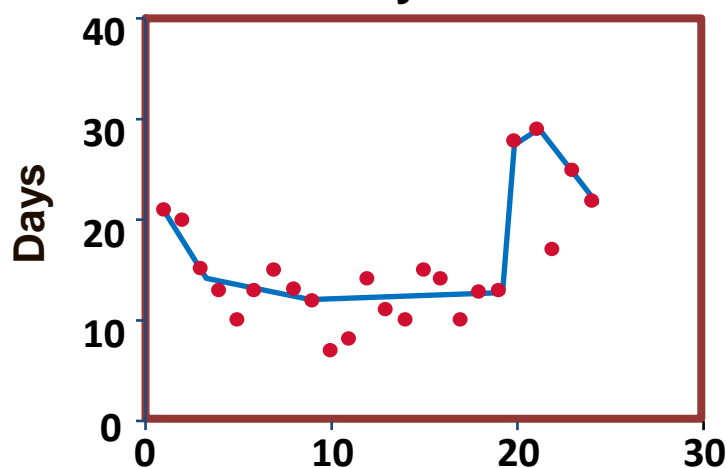
### No Learning



### Fast Learning



### Loss of Key Personnel



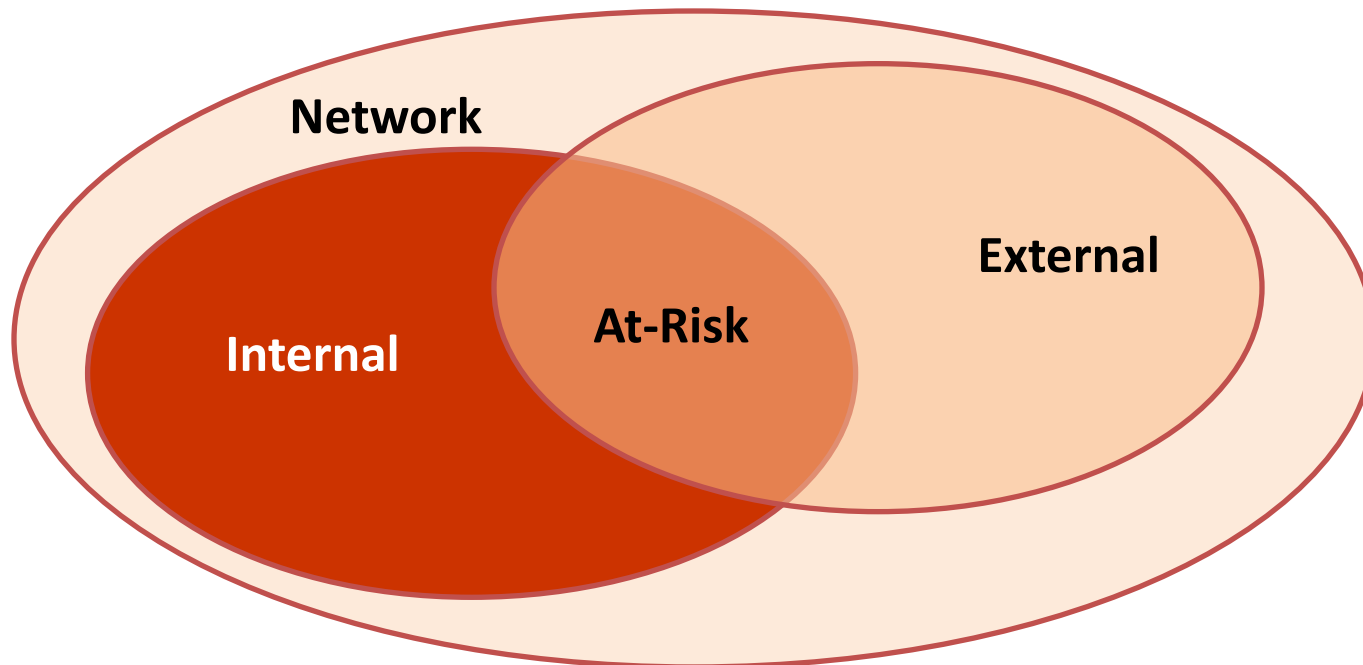
Drilling operations are expensive with rig costs of \$100-500K/day.

Reducing days per well provides high value.

# Smarter Networks - Extending Boundaries

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Internal Expertise	At-Risk Expertise	External Expertise
SMEs/Workforce	Near Retirement	Retirees
Smart Systems	Changing Jobs	Qualified Vendors
Knowledge Bases	Leaving	Consultants



# Smarter Networks - Example Value

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- **Cost Reduction**

- Operating Cost (\$2 billion/year)
- Energy Savings (>\$1 billion)
- Global Refining Operations (\$100 million)

- **Oil & Gas Exploration and Production**

- E&P Knowledge Networks (\$50-250 million/year)
- Drilling Process (cut time by 50%)

- **Safety**

- World-class safety performance

- **Expertise Development**

- Reduce time to competency (by 50%)

# Conclusions

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- Human capital trends indicate needs to quickly develop next generation experts and connect external expertise
- Engage and retain Millennials: understand generational mindsets
- Knowledge networks tap the collective expertise of your organization, sharing ideas, practices and lessons that:
  - Reduce costs
  - Solve tough problems
  - Stimulate innovation
  - Accelerate competency (Expert mental model)
- Networks can reach beyond departmental and organizational boundaries, to include retired experts and trusted vendors
- Visualizing knowledge is a proven method for enabling better cognitive processing of complex work domains



# Questions? Key Takeaways?

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