Beyond the Hype: Digitization of Projects & Lessons Learned

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"Effort is important, but knowing where to make an effort makes all the difference!"

IBM Blockchain

Digital Discovery Co-Create in a Sharing Economy

Agenda



We believe by strengthening our trust, we are empowered to change the world.

What will we solve together?

- Major Capital Projects Framework
- Data to Information Process
- Opportunity Operations Science





About the Digital hype... Artificial Intelligence, blockchain, robotic process auto



Start assembling the puzzle... and now how does this all fit together?



Why Digitization?

Since 2000, 52% of companies in the Fortune 500 have either gone bankrupt, been acquired or ceased to exist. 72% are vulnerable to disruption within three years

54% expect more competitors from outside their industry

SOURCE cited in notes

EXTERNAL THREATS

Born-on-digital companies that steal market share or rewrite customer expectations

New business models that reinvent our industry and change the game altogether

INTERNAL THREATS

Siloed data and systems expand on the wrong platform Gaps in expertise and skills Inability to react quickly

Digital transformation is a balance of process (framework) and product (operations science) innovation that creates



FIGURE 1 An industry evolves over time according to the pattern described in figure 1 (Utterback, 1994). It prospers around a product innovation and, in the first phase, extensive experimentation takes place. As the dominant design emerges, the focus shifts towards process innovation and incremental improvements. Over time, the overall rate of innovation decreases and the firm becomes vulnerable to technological change.

Technology investment by manufacturing companies is widening.

"with the biggest year-over-year increases were oil and energy, up <u>30 percent</u>, manufacturing and industrial, 15.7 percent higher, and aerospace, automotive and transportation, which is up <u>13.7 percent."</u>

And according to a study by Deloitte and the Manufacturing Institute, an estimated 3.4 million manufacturing jobs will become available by 2025. The problem?

It's estimated that two million of those will go unfilled due to a skills gap.

A study by *Deloitte and the Manufacturing Institute* found manufacturing executives rated 70 percent of current manufacturing <u>employees as deficient in technology and</u> <u>computer skills.</u> - Seattle Times February 7, 2018.

Software Selection Grievances: A Cautionary Tale - APICS

- Understand current planning trends and usage. Scenario planning within <u>S&OP is very hot.</u>
- Moreover, <u>early engagement</u> allows vendors access to my mindshare from the outset of the purchasing process.
- Take the time to <u>learn about my specific industry</u> so you can be truly knowledgeable about the issues I am facing.

The top paying gig economy jobs for 2018 are in artificial intelligence/deep learning, blockchain architecture, and robotics. —FitSmallBusiness.com, 2018

A freelance job in the AI/deep learning field on average pays more than four times the country's median household income.

- 1. <u>Artificial intelligence (AI)</u>/Deep learning commands an average salary of \$239,325 a year.
- 2. <u>Blockchain</u> architecture commands an average salary of \$139,280 a year
- 3. <u>Robotics</u> commands an average salary of \$123,936 a year.

What is the most lucrative outcome? Increasing Net Promoter Score with Operational Efficiency is Future Ready.

Eigure 1: A Poodmon to Digital Rusiness Transformation

Customer Experience Increasing NPS	Transformed	 Integrated Experience An integrated (often simulated) customer experience despite complex operations Strong design and UX Rich mobile experience including the purchase process 	 Future Ready Both innovative and lower cost Great customer experience Modular and agile Data as a strategic asset Ecosystems ready 	Sources: MIT CISR 2015 CIO Digital Disruption Survey (N=413) and over fifty conversations with executives in 2016 about their goals for digital business transformation. Quadrants are derived from this data and are splits at 2/3 along each axis. Customer Experience =	
	Traditional	 15% -3.6 Silos and Spaghetti Product driven A complex landscape of processes, systems, and data Performance reliant on heroics 	23% +16.0 Industrialized • Plug and play products/services • Service-enabled "crown jewels" • Standardized processes • Single source of truth for data	combined effectiveness on customer knowledge, omnichannel capability, customer experience projects, and customer experience performance. Oper ational Efficiency = combined effec- tiveness on automation and employee productivity projects, % of core capabil- ities with APIs, and cost of operations performance. Profitability (net margin) is adjusted for industry	
		51% -5.0	11% +4.6		
	Iraditional Iransformed Operational Efficiency Improving cost-to-income ratio			% of firms in this quadrant Percentage points of margin above or below the industry average	

High levels of relevance and conducted pilots across all Digital Manufacturing levers – degree of adoption seems to be consistent across levers



Relevance Pilot phase (or advanced)



Connectivity Connectivity groups Digital Manufacturing 85 solutions that improve and facilitate operational performance, manage-Ś ment, and everyday collaboration of 64 employees (such as augmented reality and digital performance management) Intelligence Intelligence refers to applications 87 around analytics and prediction models as well as digital twins of products and processes (such as 70 predictive maintenance or demand forecasting) Flexible Flexible automation is associated with 77 automation solutions that use new automation digital equipment to increase effi-** ciency through its flexible deploy-61 ment in the production system (such as autonomous guided vehicles or exoskeletons) SOURCE: McKinsey Digital Manufacturing Global Expert Survey 2018 Digital Manufacturing – escaping pilot purgatory

- Blockchain architecture commands an average salary of \$139,280 a year
- Artificial intelligence (AI)/Deep learning commands an average salary of \$239,325 a year. 2.
- Robotics commands an average salary of \$123,936 a year. 3.

1.

2.

Connectivity creates value through network orchestrators.

- Non-digital, nonnetwork business models make up more than 98% of the market
- Network

 Orchestrators grow
 revenue faster and
 generate higher profit
 margins with 8x
 market value
 multiplier Presenter,
 Analysis, Platform,
 Custodian, Producer



An operations science view of that transformation provides quick insight to the foundation of blockchain benefits. The key here is to view information $CT_a \approx V \times U \times t$ requests as work-in-process. Once that perspective is taken the benefits become obvious. For basic operations science insight, we use the VUT equation:

 $\approx \left(\frac{c_a^2 + c_e^2}{2}\right) \left(\frac{u}{1 - u}\right) t_e$

 $\left(\frac{c_a^2+c_e^2}{2}\right)$

Cycle time in queue (CT_q) is affected by variability in the process, utilization of resources in the process and the underlying processing time of information while at resources in the process. For more information on the science behind this relationship, see Factory Physics for Managers, pp 72 - 80.

As shown in the capital projects illustration above, blockchain technology blows up the extended, intertwined networks of information processing that is typical in many supply chains.

Information is all in one place so variability (the "V" term) is reduced 1) through standardization of information.

2) Requests do not have to flow back and forth up and down a supply chain which reduces overall information request WIP and thereby reduces overall



utilization (the "U" term) of resources, e.g. planners, accountants, engineers and operations managers, in supply chain operations. This has a huge impact on reducing queue time.

3) With information for a part all in one place and easily accessible, the time to complete a request (t_e, the "t" term) is greatly reduced.

By Little's Law, WIP is visible cycle time. All of these benefits accumulate to massively reduce the information request WIP in a supply chain. So, the tasks and products associated with the information requests get completed much more quickly. This is basic operations science and it quite often leads to higher revenue and lower costs.

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This led IBM to descriptive, predictive to prescriptive or cognitive recommendations.

Emerging Technology is becoming Existing Technology: And companies changed their entry into the technology. <u>Artificial intelligence (AI)/Deep learning</u> commands an average salary of \$239,325 a year. <u>Blockchain architecture</u> commands an average salary of \$139,280 a year.

<u>Robotics</u> commands an average salary of \$123,936 a year.



Data Monetization and Analytics

Collects, aggregates, and derives actionable insights from data to create and capture new value



Internet of Things

Embeds sophisticated sensors and chips in physical objects, enabling real-time monitoring and understanding



Artificial Intelligence

Develops the ability of a computer or robot to perform tasks commonly associated with intelligent beings



Blockchain

Establishes an immutable shared ledger, allowing any participant in the network to see all records of transactions



Other emerging tech (e.g., RPA)

Robotics Process Automation leverages algorithms to automate routine tasks, accelerating time to value and reducing human error Blockchain was easy to enter.... Then to data sciences and Artificial

Intelligence



Key Elements of **Blockchain**.



Append-only distributed system of record shared across business network



Privacy

Ensuring appropriate visibility, transactions are secure, authenticated and verifiable

Smart Contract Business terms embedded in transaction database & executed with transactions



Consensus

All parties agree to network verified transaction

- Blockchain establishes a shared, secure record of information flows; a 'shared version of events' across networks for supply chain transactions, processes and partners.
- Blockchain will be used to provide a synthesized record of information flows. This level of shared visibility will offer organizations an opportunity to optimize multi-party processes across their business ecosystems.

Blockchain: A distributed, shared, ledger.

Saves Time



Transaction time from days to near instantaneous

Removes Cost



Overheads and cost intermediaries



Increases Trust



Through shared processes and recordkeeping

- Blockchain holds records of digital transactions in such a way that makes them accessible and visible to multiple participants in a network, while keeping them secure.
- The digital shared ledger is updated and validated with each transaction, resulting in a secure, permanently recorded exchange.
- The result? Faster, permissioned, and auditable B2B interactions between parties such as passengers, buyers, sellers and logistics providers

Today: Global trade is hugely inefficient and burdened by paper-based processes

- Inconsistent information across organizational boundaries and "blind spots" throughout the supply chain hinder the efficient flow of goods
- · Complex, cumbersome, and costly peer-to-peer messaging
- Manual, time-consuming, paper-based processes
- Risk assessments often lack sufficient information; clearance processes subject to fraud

A single shipment of avocados from Mombasa to Rotterdam involves 30 actors, 100+ people, and 200 information exchanges







99 %

Decrease

TIME TO TRACK FOOD FROM STORE TO SOURCE

Saving

\$700B

IN US ALONE WITH A 1% REDUCTION IN FOOD BORNE ILLNESS

Walmart ><

PROBLEM | FOOD AUTHENTICATION

Transparency in supply chain

Digitally tracing food products from an ecosystem of suppliers to consumers

Provides permanent record of food supply chain transaction, digital product information such as farm origination details, processing data +shipping details that are digitally connected to food items.

Tracing Improved from 7 days to 2.2 seconds using the IBM Blockchain Platform. **That's "food traceability at the speed of thought", Frank Yannis, Walmart**

...and that's Blockchain changing everyday life.

Blockchain 101 Assets and Education

Complete Your <u>Blockchain</u> Essentials Badge to understand:





Material, papers and research will be made available

2) IBM Blockchain: Develop platform - access to sand box environment

https://ibm-blockchain.github.io/develop

At the bottom of this page they will find a link to the actual development environment (a.k.a. Online Playground),

3) YouTube Videos on Blockchain

https://www.youtube.com/watch?v=ID9KA nkZUjU >>>> Blockchain explained simply 3:34 min **

https://www.youtube.com/watch?v=tdhpY QCWnCw&pbjreload=10 >>> Maersk global Trade Use case - 3:20 min ** Across functions, respondents report that the most **significant benefits** come from adopting AI in manufacturing and in risk.



¹Respondents who answered "some value," "no value," or "don't know" are not shown. This question was asked only about the business functions where respondents say their organizations have deployed AI, and only includes responses from respondents who say their organizations have piloted or embedded AI in 1 or more functions or business units. For manufacturing, n = 272; for risk, n = 285; for supply-chain management, n = 299; for product and/or service development, n = 536; for strategy and corporate finance, n = 155; for service operations, n = 669; for marketing and sales, n = 482; and for human resources, n = 198.

McKinsey Global Institute on Artificial Intelligence

McKinsey&Company

Few organizations have adopted the core practices that would enable them to realize AI's potential value at scale.

Core AI practices in place at organizations,¹ % of respondents

Organization uses data (both internal and external) effectively to support goals of AI work	33
Organization has access to internal and external talent with right skill sets to support AI work	27
Senior leaders demonstrate true ownership of and commitment to AI initiatives	26
For business processes where AI has been adopted, it is integrated into day-to-day operations	26
Organization has clear strategy in place for accessing and acquiring data that enable AI work	18
Organization runs effective, continual process for developing portfolio of most valuable AI opportunities	18
Organization has mapped where all potential Al opportunities lie ²	17
Employees trust AI-generated insights	16
Organization has right technological infrastructure and architecture in place to support AI systems	15
All relevant data are accessible by Al systems across organization	8
Frontline workers embed AI into formal decision- making and execution processes	6
None of the above	24

¹This question was asked only of respondents who said their organizations have piloted or embedded Al in 1 or more functions or business units, and they were asked to select all practices that are in place. Respondents who said "don't know" are not shown; n = 1,646.

²Including required level of investment, difficulty of implementation, and potential value at stake.

McKinsey&Company

Data is still hard to govern. Better Connectivity Respondents at the most digitized organizations report greater adoption of AI capabilities than their peers at other companies.

Organizations' adoption of AI capabilities,1 % of respondents

- Embedded in business processes in multiple functions/business units
- Embedded in business processes in at least 1 function/business unit
- Piloted in at least
 1 function/business unit

	At the most digitized companies ²			Ata	At all other companies	
Machine learning	18	21	3	1 5	11	24
Virtual agents or conversational interfaces	12	25	28	3	12	26
Natural-language text understanding	9	21	28	3	10	26
Robotic process automation	15	20	19	7	15	23
Natural-language speech understanding	7	17	27	2 –	9 21	
Computer vision	11	21	19	6	14	22
Natural-language generation	7 1	6 2	22	2-6	19	
Physical robotics	6 7	14		7	10 12	
Autonomous vehicles 2	- 4 9			3 4	8	

That is, AI products and/or services, including software. Respondents who answered "not at all" or "don't know" are not shown. At the most digitized companies, n = 330; at all other companies, n = 1,798.

²Respondents who say their companies have an average level of digitization of 51% or more. Level of digitization is based on the average percentage of the following measures: percentage of the share of sales that come from products and/or services sold through digital channels; of core products and/or services that are digital in nature; of core operations that are automated and/or digitized; and of supply-chain volume that is digitized or moves through digital interactions with suppliers.

McKinsey&Company

The Al applications are going from pilot to multiple business units What was slowing down the adoption? "Business professionals spend more than

40%

of their time fixing and validating data before they use it."

-Forrester

"80%

of the time doing analytics isn't spent doing analytics but doing data preparation."

-information-management.com

"59%

of business and technology decision makers say it takes months or years to meet new complex requests to turn data into business intelligence insight."

-Forrester



Real Work Happening Today.....

IBM **Blockchain**



Lenovo goes from data sciences to artificial intelligence

Challenge:

Establish greater visibility across systems and data sources to improve customer order management, minimize disruptions

Solution:

Supply Chain Insights platform leveraging AI to deliver greater visibility and insights on top customers, order visibility and disruptions

Technology roadmap for blockchain, IoT to support vision for future

"IBM Supply Chain Insights helps organizations leverage the power of Artificial Intelligence to gain greater visibility and predictive insights across the supply chain. Ultimately, that visibility and insight can help drive action, efficiency and incremental revenue"

 Bobby Bernard, Global Procurement and Supply Chain Executive

Watson Supply Chain



More than just data analysis: Artificial Intelligence (AI) for the Supply Chain

Al empowers an organization and supply chain professional to make **faster** and **more accurate** decisions to mitigate disruptions and optimize supply chain operations



Watson APIs

Speech to text | Text to speech | Conversation | Discovery | Knowledge Studio | Natural Language Understanding | Natural Language Query

IBM Supply Chain Insights

Operations Center

with Smart Alerts

Configurable alerts cut through data overload

Visibility across the supply chain, illuminating risks and disruptions, their details and impact

Slash informational retrieval time by 90%

30

		0		
Ξ	Watson Customer Engagement Supply Chain Insights			🗊 🗘 🌒 Sam 🕐 Help 🛛 IBM
80	+++ More > Late Shipment Expected (Supply) > ShipMart			\$
98 81	Brad, 28 ShipMart shipments are predicted to ship late this week. This will strongly impact 06 March 12:56M (PST)	ct 6 customers.		
₽⁄	All 70 shipments • Carrier • Destination location • Origin location • Part/item ▲ Supplier			4
	18%	Late Shipment Exp	pected (Supply)	
	ShipMart 28 shipments	28	6	\$468,515
	12%	Shipments predicted late	Customers impacted	Total customer revenue
	20%	17d	14	2 Recent actions
		Median delay	KPIs affected by shipments	JB SC >
	ShipMart Hana Transport LecaTran Other			
	ACQ Shipping			Ö
		-		
				==

IBM Supply Chain Insights

Resolution Rooms

with Ask Watson

Online collaboration aided by cognitive insights to resolve disruptions and mitigate risks

Ask Watson to recommend experts, source key information and access knowledge from prior event resolution

Enable quick, informed business decisions

31



IBM Supply Chain Cognitive Journey Early Outcomes

Disruption Mitigation

- Disruptions management down from 18+ days to just hours
- 52% reduction in expedite costs

Inventory

- 18% reduction in inventory levels
- 2.5% reduction in structural costs

•

Maintained consistently high serviceability targets

Procurement

- 90% faster data retrieval times
- Late orders reduced by 75%

Cost Savings

IBM

- Reduced working capital
- Saved millions \$\$\$ on inventory and reduced freight costs alone
- As an example, avoiding one supply disruption saved \$60 million in revenue

FLUOR.

Fluor Uses IBM Watson to Deliver Predictive Analytics Capability for Megaprojects

Fluor drives digital transformation with artificial intelligence solution to monitor status of global projects and drive significant project cost savings

September 13, 2018 07:15 AM Eastern Daylight Time

IRVING, Texas & ARMONK, New York--(BUSINESS WIRE)--Fluor Corporation (NYSE: FLR) and IBM (NYSE: IBM)

Woodside

integrates Artificial

Intelligence

Business benefits

USD 7.5 million

reduction

in employee expenses due to faster access to and more intuitive analysis of engineering records

75%

reduction

in the time spent by the geoscience team reading and searching through data sources

Increases

overall productivity

by empowering a larger range of employees to interrogate the cognitive system

Before Watson, Woodside's engineers spent up to 80% of their time trying to uncover possible solutions or hazards – and only 20% of their time on the actual engineering work. With Watson, time spent on researching has been reduced by 75%, because Watson enables easy access to decides of wisdom and learnings built up by Woodside's own employees.



Neil Maxfield Woodside Energy, General Manager Project Capability



Caitlin Bushell Woodside Energy, Graduate Process Engineer

"Watson helps me find expert knowledge straightaway."

With Watson, not only has Woodside saved US\$10 million-worth of time and kept employees safe, but they've also created a bridge for knowledge transfer from the past and for the future. "Watson has given us the flexibility and capability to move quickly, helping us solve new and exciting problems faster, simply because we're not spending as much time searching for



How did they do that?

> https://www.youtube.com/watch? v=GFZ2IaTVkY8

> https://www.youtube.com/watch? v=KuqvQr7DiTQ

Is your company a producer, custodian, platform, analysis, and/or presenter?



Customer Care

Provides the foundation for a new omni-channel engagement experience that allows clients to meet their customers in their channel of choice, while avoiding call center traffic



Expert Assist

Helps customer-facing stakeholders when they need more information to help solve a problem, answer a question or cross-sell a customer



Voice of the Customer

Allows clients to understand their customer's sentiment and trends beyond what's gathered from traditional surveys

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Compliance Assist

Extracts document elements and compares legal clauses to help professionals review and analyze contracts



Visual Assist

Quickly fix issues with visual diagnosis, make recommendations or trigger workflows based on visual analysis online or offline with IBM Watson and Apple CoreML

Common Services

IBM^(R) AI OpenScale enables businesses to infuse artificial intelligence (AI) into applications. Benefits include:

- AI OpenScale can detect biases in runtime as models are scoring data and automatically mitigate those biases to deliver fairer outcomes in enterprises applications.
- Data scientists can improve the fairness of models free from bias by using toolkits for bias detection in training data sets and models.
- Enterprises can develop trust in AI applications through the ability to explain individual transactions, including factors that are used to make the prediction and confidence levels.
- AI OpenScale can be used to bring transparency and fairness to models that are developed in any third-party tools or integrated development environment (IDE), and deployed on any model-serving engine.
- Business users can measure the outcome of applications by accessing an open data mart that contains fine grained metrics of AI models scoring transactions.











LESSONS LEARNED....



No matter where you start, determine your path and execute. Fail forward, fail fast and fail safely.



For more information: http://www.research.ibm.com/university/



No-Charge Access: https://onthehub.com/ibm/

Get easy no-charge and low cost access to the tools and education you need to develop the next great thing.

Enjoy powerful technical and strategic resources from IBM.

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THANK YOU!

https://cognitiveclass.ai/

Dr. Ben Amaba, Professional Engineer, CPIM[®], LEED[®]AP BD+C Chief Innovation Officer (CINO) for Industrial Sector, Watson & Cloud Platform "Effort is important, but knowing where to make an effort

makes all the difference!"

