

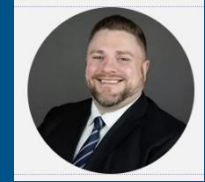
Operational Analytics: Perspectives and Foundations

MODERATED BY



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Adjunct Prof, Va Tech
Global Perf Excellence Webinars
Team Lead, IISE

Jared Frederici, Sr. Consultant
The Poirier Group



Ben Amaba, Ph.D., P.E.
CTO
IBM

Mattheus Scuta
Product Mgr, Analytics
Ford



William Hathaway, President
Moresteam

James Swisher, Dir, Cont Ed,
IISE



Webinars that Matter in Times of Turbulence

16 Feb 2021

Agenda & Panel Questions

11:00 Scott Tee up

11:12 Jared Foundations

11:24 Ben Perspectives on AI and ML

11:36 Matheus on How it's Playing out—Case Example

11:48 Scott and Bill and James to close out

All Organizations, Large and Small, and Cross-Industry can Leverage Techniques with Data & Information to Better Position Themselves.



Scott Sink—ISE at Virginia Tech (and TPG) 12 min on the Program

- Program Architecture
- Certificate and Certification Design
- Foundations and Curriculum Concept Development
- Platform Delivery and Support



Jared Frederici, The Poirier Group – 12 Min on Foundations

- Simplify path and framework
- Story Outline – Converge ORMS and Data Analytics
- Management Systems Framework



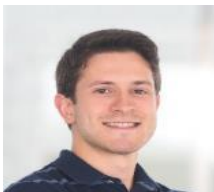
Ben Amaba, IBM – 12 Min on the role of AI and ML to reduce latencies

- AI/ML relationship - Decision Based versus Data Driven Converge
- We achieved Moore's Law on Capacity and now we need to achieve Metcalf's Law of network and speed.
- Conclusion - the Convergence of Industrial, Systems and Software Engineering to remove Latency for ISE professional



Matheus Scuta, Ford – 12 Min on Case Study of how it is Playing Out

- Ford Industry 4.0 - 5 G communications for autonomous vehicle where ML/AI/ORMS converge using the Management Systems Framework



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Our Sponsor for
Today



IIESE Professional Affinity Groups (Partners)



Our Global Personal and Professional Development Series for IISE Members and Customers.....



THEMES:

- Enterprise Transformation and OpEx
- Operational Analytics
- Cultures to support Perf Excellence
- Integration of People, Strategy, Process and Technology
- Integrated LeanSigma
- Industry, Service, Healthcare 4.0
- Personal and Professional Learning and Development
- Change Leadership and Management
- Navigating through Turbulent (VUCA) times
- Supply Chain and Logistics Optionality

Welcome to IIESE TV and our Operational Analytics Channel

- IIESE Members will have total access to this OA Channel post today's webinar.
- IIESE Non-Members who attend today will have limited access but will receive a discount on full access.
- We're launching an Operational Analytics Certificate and Certification Program this Quarter—stay tuned for more details.

IIESE TELEVISION
IIESE BETA CHANNEL – 5016 OPERATION ANALYTICS STUDENT PORTAL: PERSPECTIVES

▶ Fundamentals of OA - Perspectives

Evolution of OA

Student Rationale

Defining OA - Perspectives

Latency and OA

The Nuance of OA

Art and Science: Solutions

Art and Science of OA

Art and Science: Ford Motor Co.

Data Storage and OA

Data Collection and OA

	DIV	CLOS	NAV	%	OFF
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FSR	50	73218	103333	46	52.17
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▶ 2:11

◀ PREVIOUS SEGMENT
▶ NEXT SEGMENT

EXPLORE

Learning Modules	Documents	Videos
<p>IIESE Beta Channel – 5016 Operation Analytics Student Portal: Creating Culture I</p> <p>Thought leaders and subject matter experts share how leading organizations are working to create Cultures that Support Full Potential Performance/Operational Excellence. Practical</p>	<ul style="list-style-type: none"> Operation Analytics Webinar Operation Analytics - Sustaining Visible Measurement Systems Operation Analytics Session II - Jared & Scott Operation Analytics Webinar - Ben & Scott IIESE Body of Knowledge Intel Analytics Overview 	<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; font-size: small;">Fundamentals of OA - Perspectives</p> </div> <div style="border: 1px solid #ccc; padding: 5px;"> </div>
<p>IIESE Beta Channel – 5016 Operation Analytics Student Portal: Creating Culture II</p>		

Performance Excellence

Operational Analytics Related Modules in our OA Channel

- Op Analytics Perspectives
- Today's Webinar
- OA—The Data Management Role
- OA—The Data Analyst and Decision Support Role
- OA—Decision Sciences: The New Industrial and Systems Engineering
- OA—Reducing Latencies in Capture, Analysis, Decision-Action taking, and Benefits Realization
- OA—Driving Benefits Realization

- OA—Building and Sustaining Visible Measurement Systems
- OA—Case Studies
- OA—Process Analytics
- OA—Creating Cultures that Support Operational Excellence

The Channel Offerings Will continue to grow with the intent of becoming a major productivity tool for you and your organization



INSTITUTE OF
**INDUSTRIAL
& SYSTEMS**
ENGINEERS

<https://www.iise.org/details.aspx?id=46729&>



A webinar recording will be provided tomorrow



The Presentation will be located in IISE Channel.



Questions? Scott will review them as they come in and integrate into the dialogue as appropriate and time permits



Follow up questions are welcomed and contact information is provided at the end of the presentation.



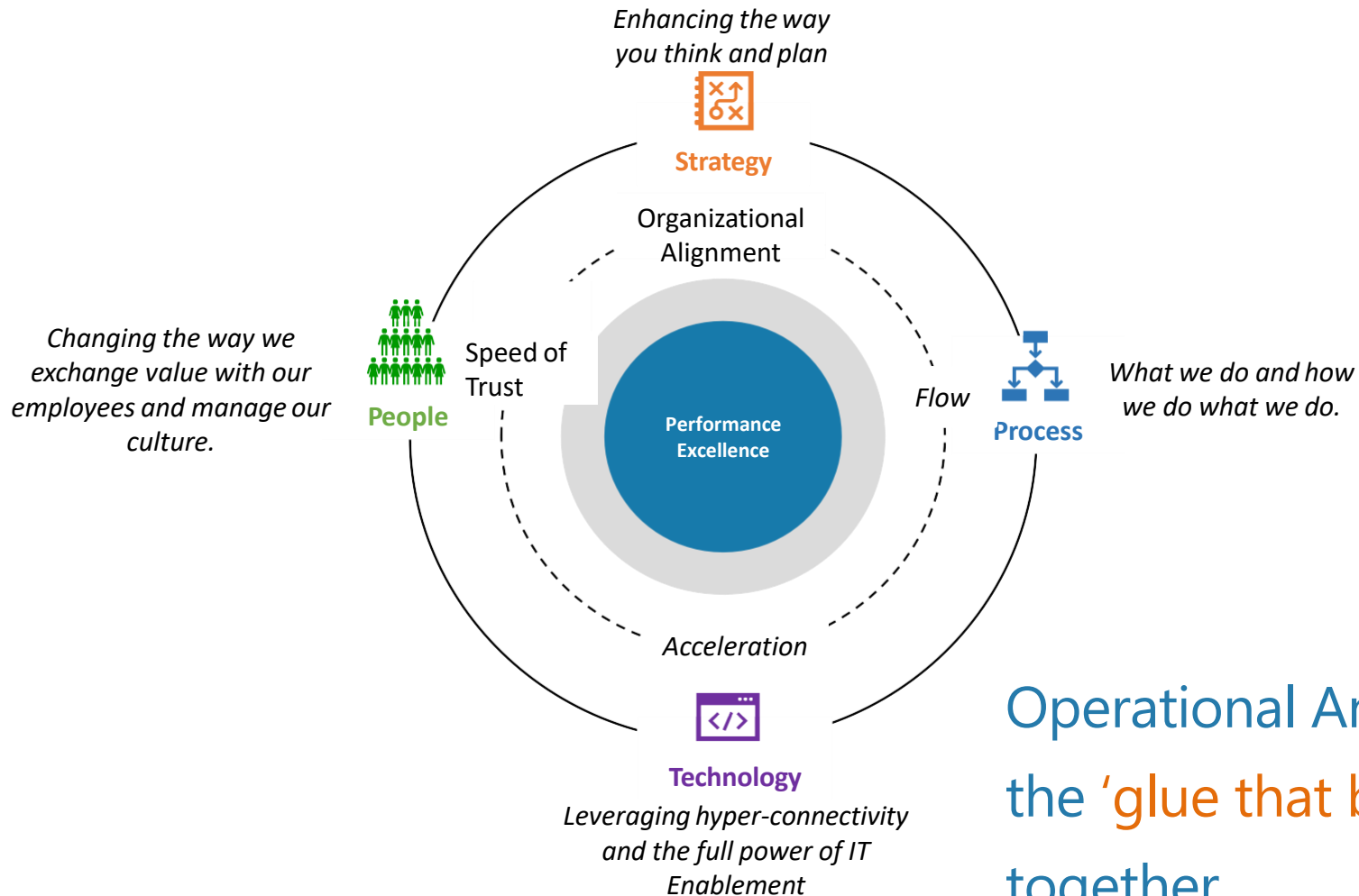
<https://www.iise.org/details.aspx?id=46729>



Certificates of attendance are mailed 1 day after the webinar is completed

Membership Has Privileges!!

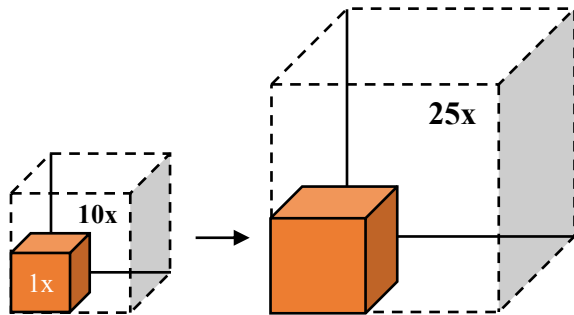
ISE's Create Value by Integrating People, Strategy, Process and Technology



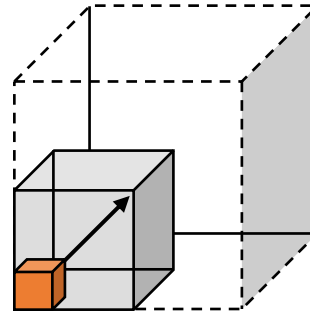
Operational Analytics is the 'glue that binds' this all together

END GAME: Grow Enterprise Value

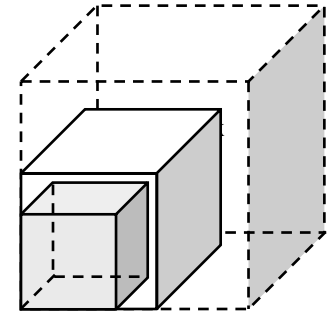
POSITIONING STRATEGY



VALUE EXCHANGE OPTIMIZATION



OPERATIONAL EXCELLENCE



Improve Positioning via..



Geographic Coverage /
Offerings Provided /
Served Segments /
Branding/ Imaging, etc.

Managing the Exchange of Value
With Stakeholders



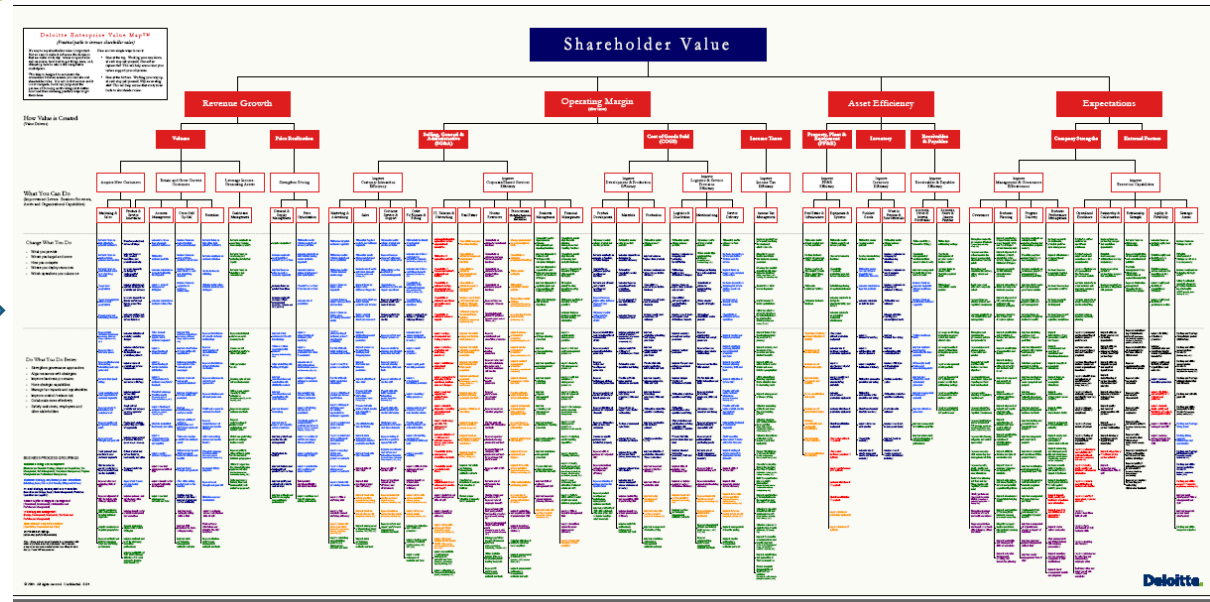
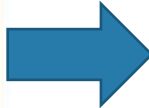
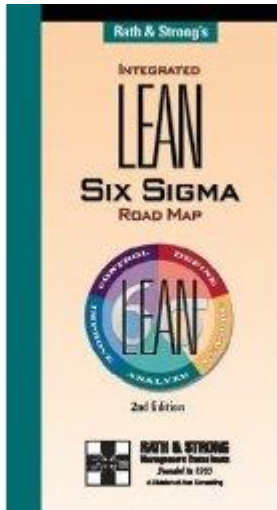
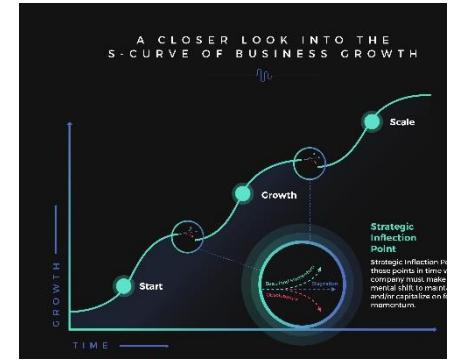
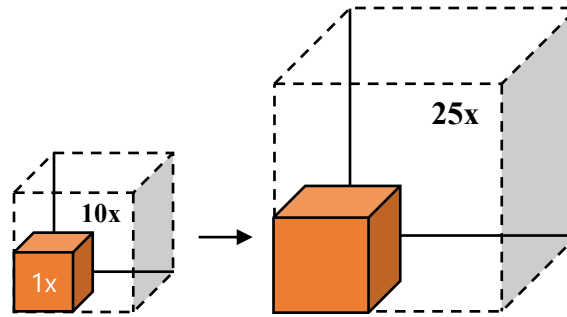
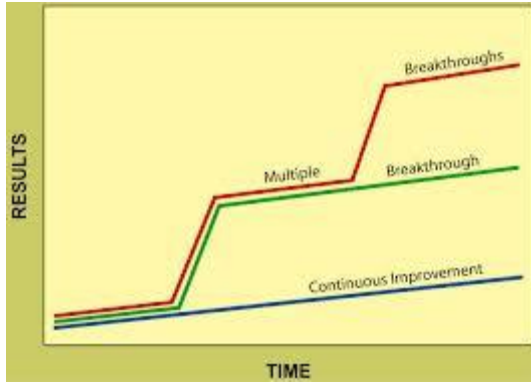
Altering the Give/Get,
Responding to unmet and
unfulfilled needs, QFD,
Innovation, Rebalancing
Segment
Investment

Improve Quality, Efficiency,
Productivity, Innovation,
Engagement, Quality of Work
life, Sustainability



Apply principles and methods of
ISE and ILSS

How the Pieces fit together



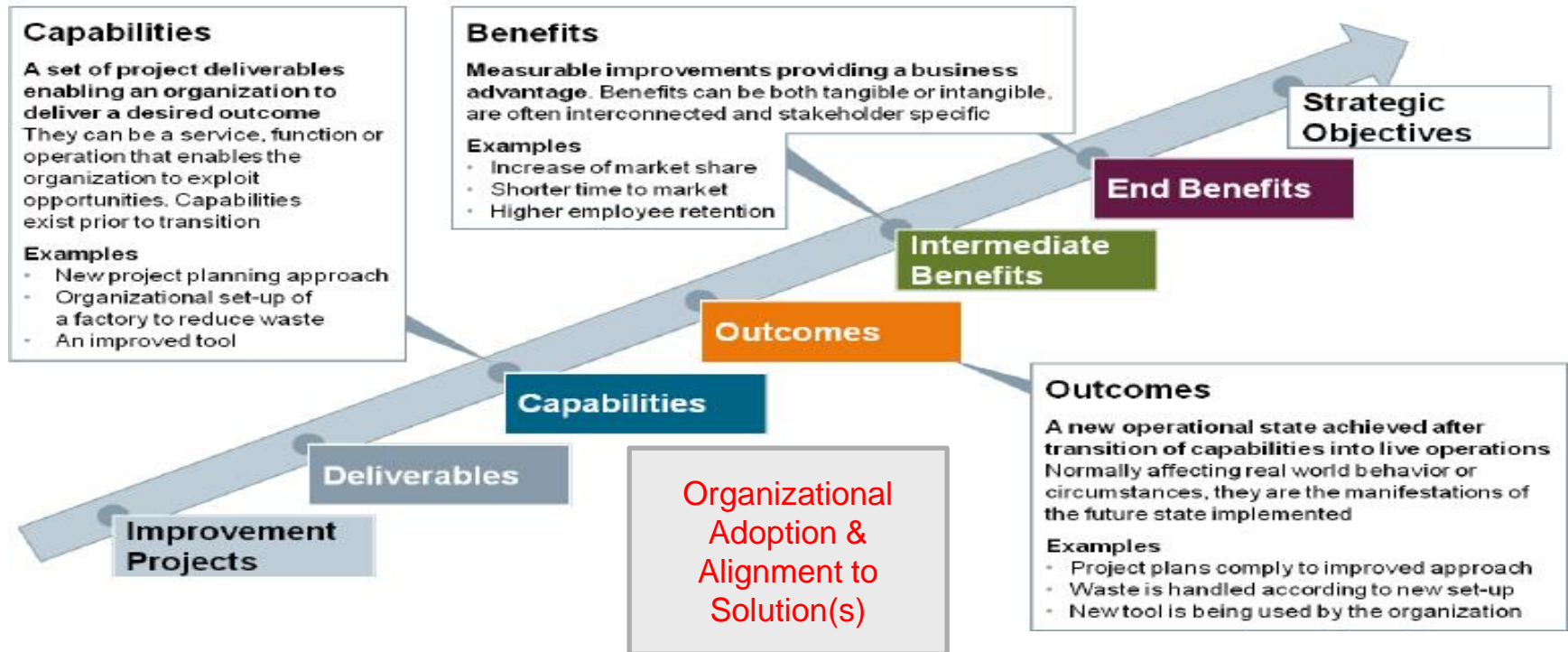
ISE
Integrated Systems Engineering



Enterprise Value Map
Practical paths to increase enterprise value

Operational Analytics enables us to understand this causal linkage to Benefits Realization

Path between improvement projects and strategic objectives



By What Method and How will We Know?

Op Analytics represents huge opportunity for ISE's

IISE Body of Knowledge



IISE's Operational Analytics Certificate and Certification Program

In Partnership with:

The Poirier Group
Moresteam University



Delivered Uniquely:

IISE Analytics Channel

- **10 Video Modules with 'youtube' sized segments for easy consumption/learning**
 - **Certificate requires an on-line final exam**
 - **Certification requires the Certificate plus a reduction to practice, proof of skill project**
- Module 1: OA Thought Leader Perspectives
 - Module 2: Operational Analytics Perspectives, Points of View and Foundational Principles and Methods and Models
 - Module : Operational Analytics: The Foundational Data Management Role
 - Module : Operational Analytics: The Analyst, Decision/Action Support Role
 - Module : Data Sciences and The New Industrial and Systems Engineering
 - Module : Operational Analytics: The Evaluation Role & Process Analytics
 - Module : Operational Analytics—Visual Measurement/Management Systems (Parts I, II, III)
 - Module : Operational Analytics: Putting it All Together: Case Studies
 - Module : The Role of Data and Information (Engineered Management Systems) in Periods of Major Disruption, Reducing the Latencies
 - Module 1: Creating Cultures that Support Full Potential Performance/Operational Excellence



Operations Analysis

The abundance and growth of machine data, which can include anything from IT machines to sensors and meters and GPS devices, is another major driver of big data solutions. In its raw format, many organizations are unable to leverage machine data. Yet disregarding this data means that organizations are making business decisions based only on a subset of available information. Leveraging machine data and combining it with existing enterprise data enables a new generation of applications that are able to analyze and gain insight from large volumes of multi-structured machine data—which in turn improves business results.



Raw Logs & Machine Data

Enterprise Data

Capture a Complete View

Access large volumes of machine, operational and transactional data and combine with other enterprise data.

Get the Context

Overcome complexities to perform advanced analysis and provide context across different data sets.

Get Insights From Analytics

Release intelligence trapped in your data, allowing agile interpretation and action.

WHAT DO YOU NEED TO SUCCEED?

THE RESULTS

Empower the C-Suite

Reassure decision makers that they are acting with full knowledge & understanding of *all* available data.

Improve Reliability

Perform root cause analysis on data to more easily identify and preempt system failures, keeping customers happy.

Speed Operations

Help departments proactively minimize the problems and bottlenecks that stymie the flow of operations.

Monitor & React

Visualize streaming data to monitor the end-to-end infrastructure and deliver real-time alerts.

The Role of Data and Information in Periods of Major Disruption



Jared Frederici, North American Program Lead, The Poirier Group

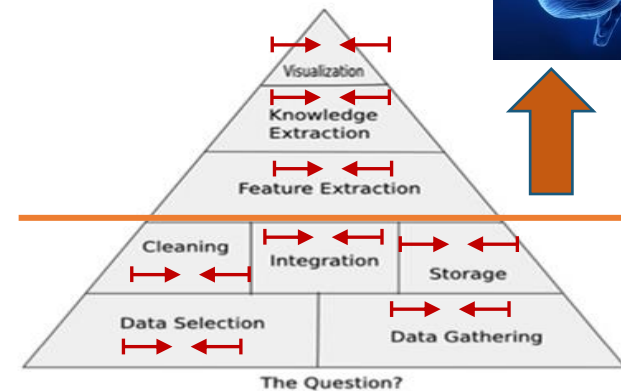
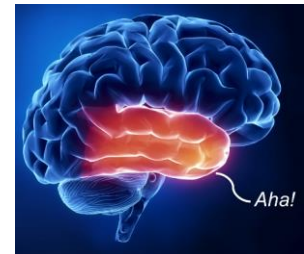
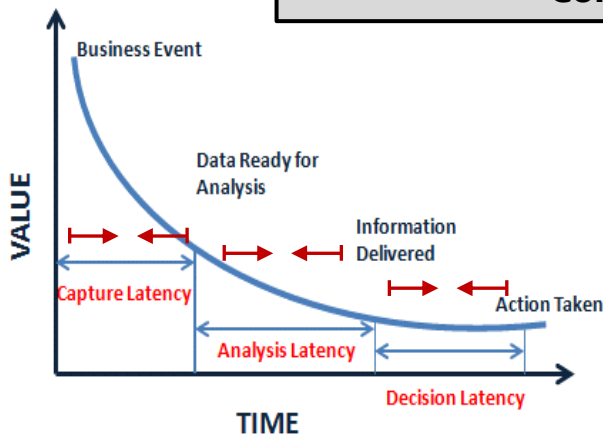
Jared has devoted much of his career to leveraging data and information to make crucial, and rapid interventions for organizations. At The Poirier Group, he leads and supports teams in creating and executing operational strategies, business transformation and process improvements that positively impact a variety of cross-industry clients.



Regardless of your business situation in the context of COVID-19, here's how you can develop rapid, appropriate effective responses that are scalable and sustainable.

Covid-19 is Amplifying the Need for Data & Information-Based Decisions Rapidly, w/ Minimal Latency, and Maximum "Ah-Ha".

Traditional Strategies Need Modified to Position Organizations Correctly to Stay Ahead of the Curve



Must do #1, Reduce Latency to Decision to

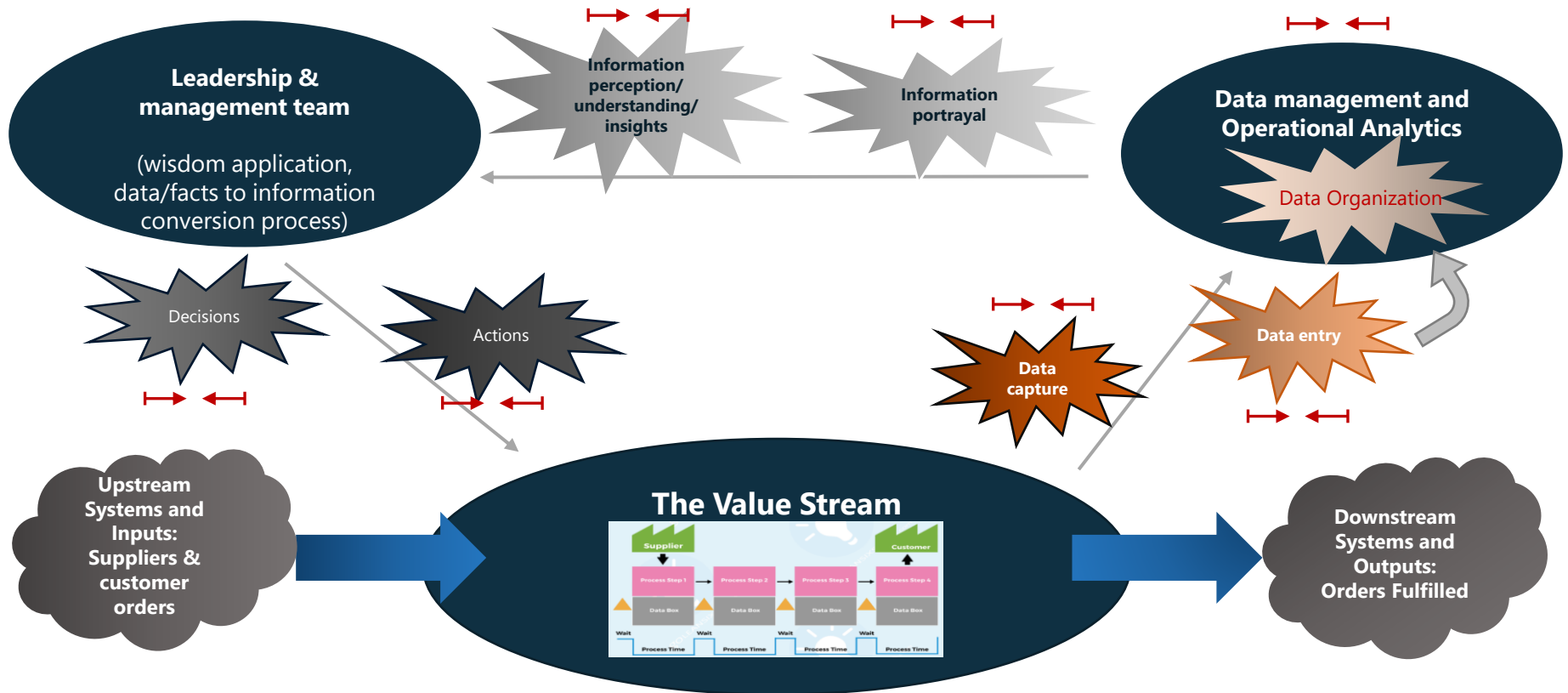
Results

- Data capture must be efficient, effective, reliable
- Analysis must provide "fastest path" to CDA
- Positioning strategy must result in rapid alignment to get to correct **decision** fast

Must do #2, Accelerate the Triangle

- Organizations must make the quick judgement – throw out or keep w/ 80% probability
- Support staff must integrate data creatively, from multiple sources, rapidly using atypical tools
- Visualizations must minimize the latency to get to the **"Ah-Ha" moment**

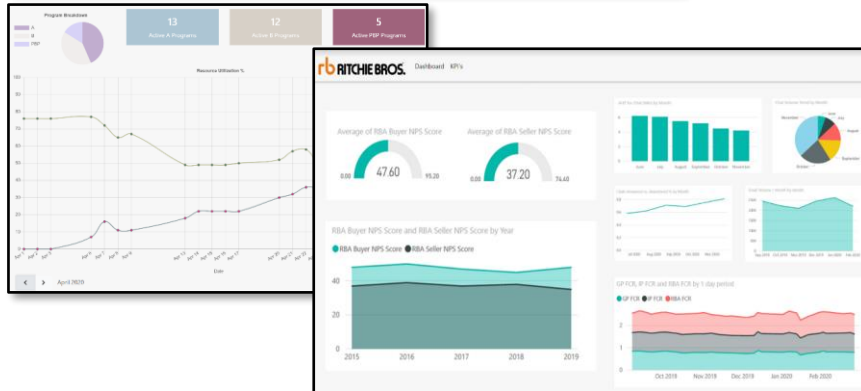
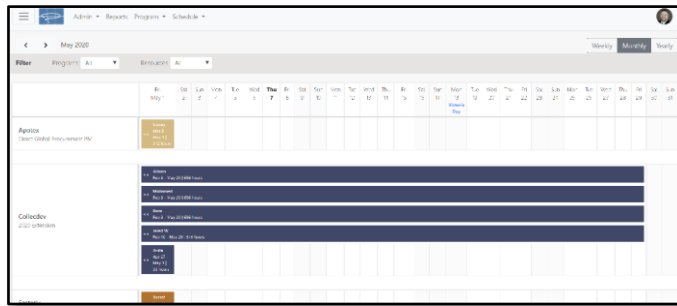
Similarly, Every Element of the Management Systems Model is Forced to Contract. Those That do it Best, Thrive. Those That do not, are Behind.



Example Scenario – Rapid ERP/MRP/BSC



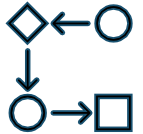
Applicable Industries / Org Sizes: All, with a particular impact in the mid-market



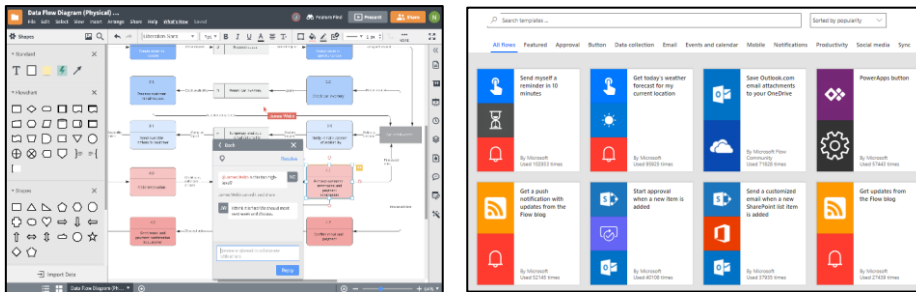
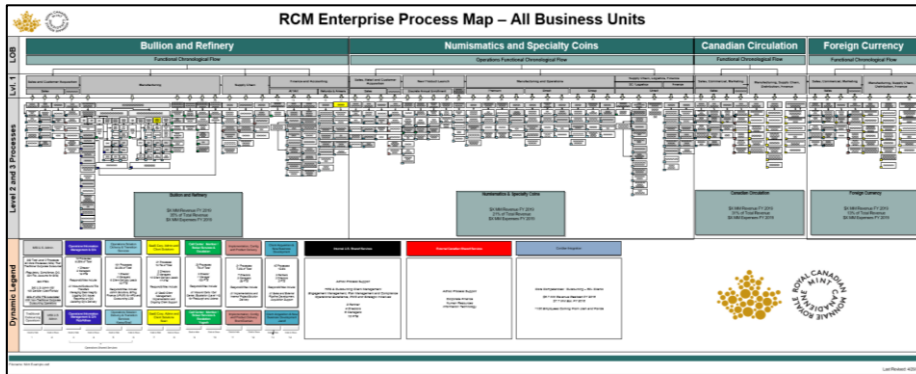
Key Steps / Tips:

- Typical MRP/ERP Implementations are too long and costly to undertake now
- .Net, Java, Azure combo is one example of how MRP/ERP can be deployed in 1-2 months, not 8-12 months or more
- Keep it simple, get the 80%
- Consider open source platforms
- Remember, you may have licenses already for Azure if you have Office 365
- Consider other rapid data warehouse and ETL tools out there
- Leverage Agile techniques, rapid cycles, no time for complex BRD's or perfection

Example Scenario – Rapid BPM & Workflow Management



Applicable Industries / Org Sizes: All, with a particular impact in large & complex org's



Key Steps / Tips:

- Visio + SharePoint Designer (Pre-365)
- LucidChart
- Microsoft Flow
- 3 simple examples – many more out there for rapid BPM deployment
- Connectivity to PowerBI for data on the status of processes
- Have to visualize the tough, cross functional business processes when organizations are virtual
- Can help reduce decision latency and create alignment

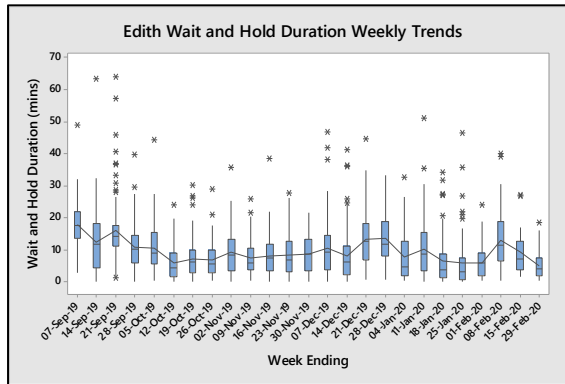
Example Scenario – Rapid EDA, Targeted CDA



Applicable Industries / Org Sizes: All, especially Tier 1, large ERP, data rich, info poor

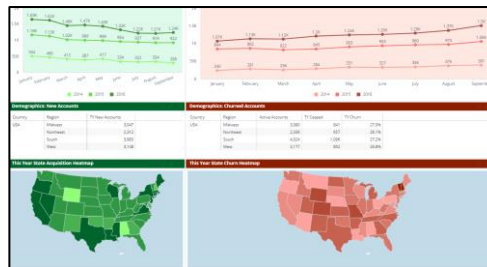
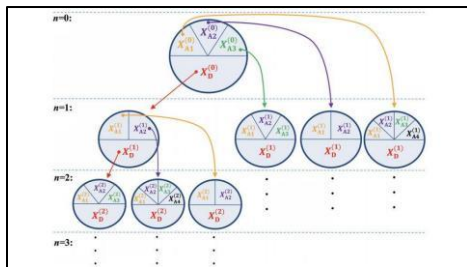
```
data = all %>%
mutate(
  type = substr(variable, 1, 2)
) %>%
spread(type, variable) %>%
rename(
  d = dx,
  i = ix
) %>%
mutate (
  beta = round(beta, 5),
  se = round(se, 5),
  pvalue = round(pvalue, 5)
) %>%
select(d, i, beta, se, pvalue)

head(data)
# A tibble: 1 x 5
#   d     i     beta se     pvalue
#   <chr> <chr> <dbl> <dbl> <dbl>
1 dx1  ix1  0.1   0.002 0.950
```



Key Steps / Tips:

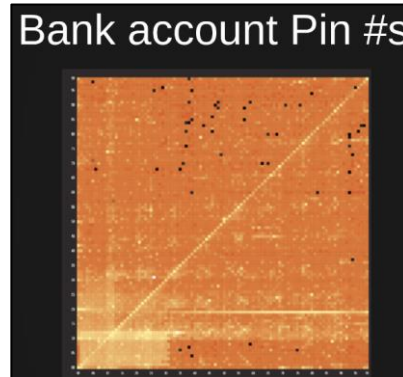
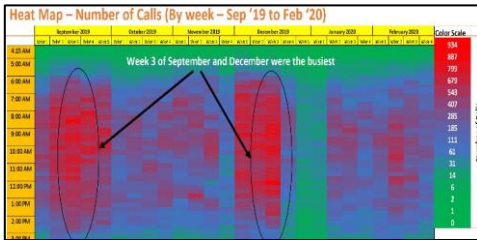
- EDA = Exploratory Data Analysis
- CDA = Confirmatory Data Analysis
- Get good w/ multiple regression testing, F-testing and ANOVA, distribution assessment
- Consider learning R, python or another language to run looped "fitmodel" based scripts w/ many ind. variables
- Understand data cubes
- Look at what Intel is doing using Bayesian structure learning
- Hone in on relevant predictor variables quickly to run confirmatory tests (chi², two sample t tests, etc.)
- Consider crowd-sourcing



Example Scenario – Better Visualizations, Made Rapidly – Top of Triangle

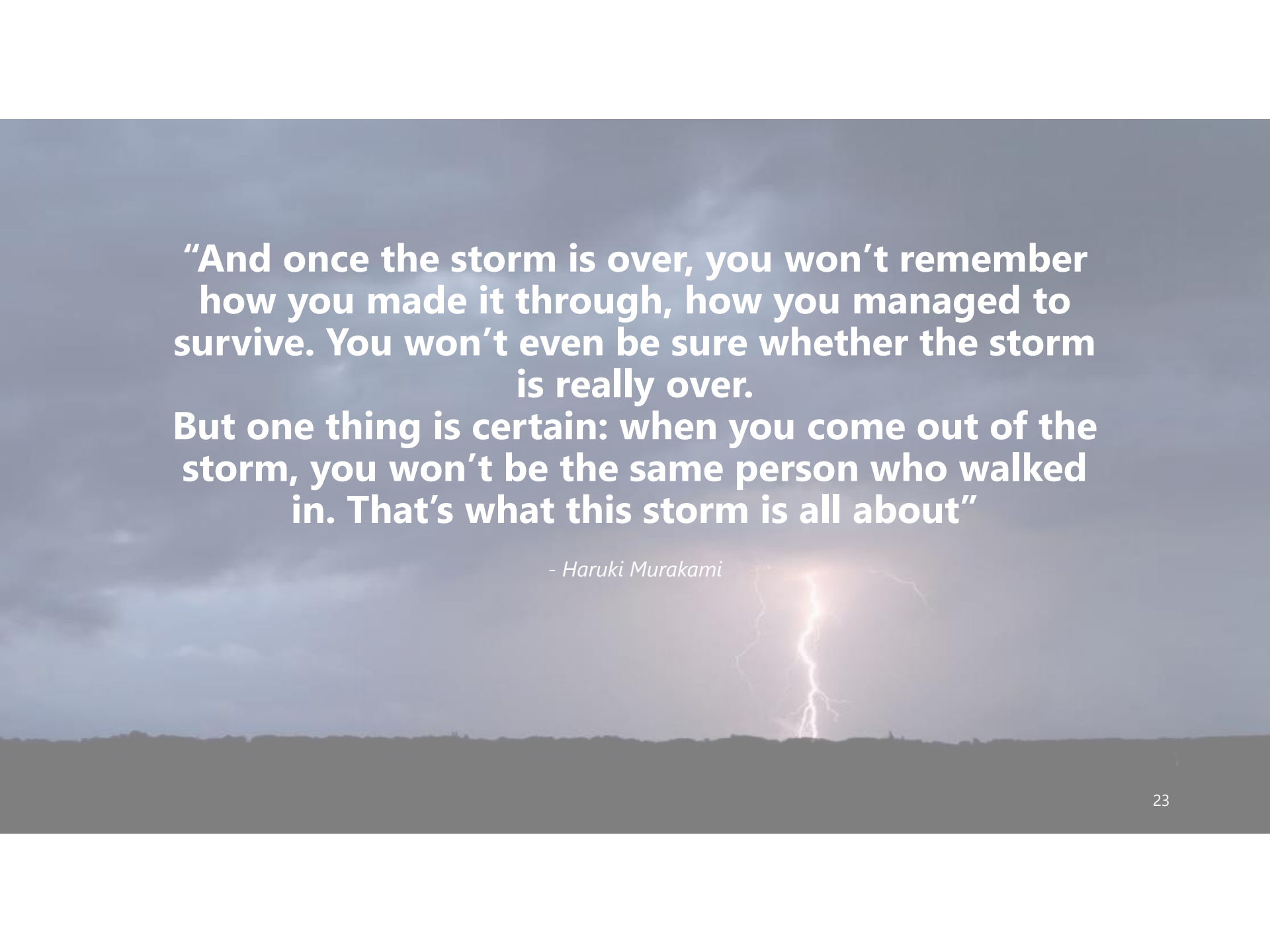


Applicable Industries / Org Sizes: All



Key Steps / Tips:

- Begin to get comfortable outside the confines of Excel
- BI tools are getting cheaper and cheaper, some are free
- Get creative – think about how the human brain thinks
- Understand your audience and their capacity for complexity
- Take your “analytics ego” out of the equation
- Ask the “so-what” questions on all portrayals
- Get them to the “Ah-Ha” moment rapidly



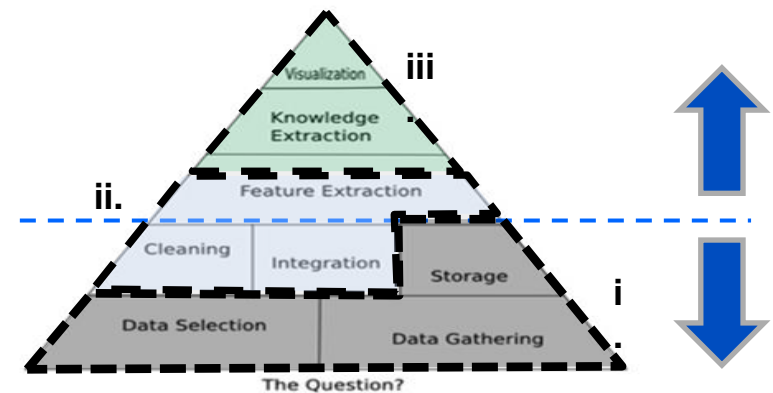
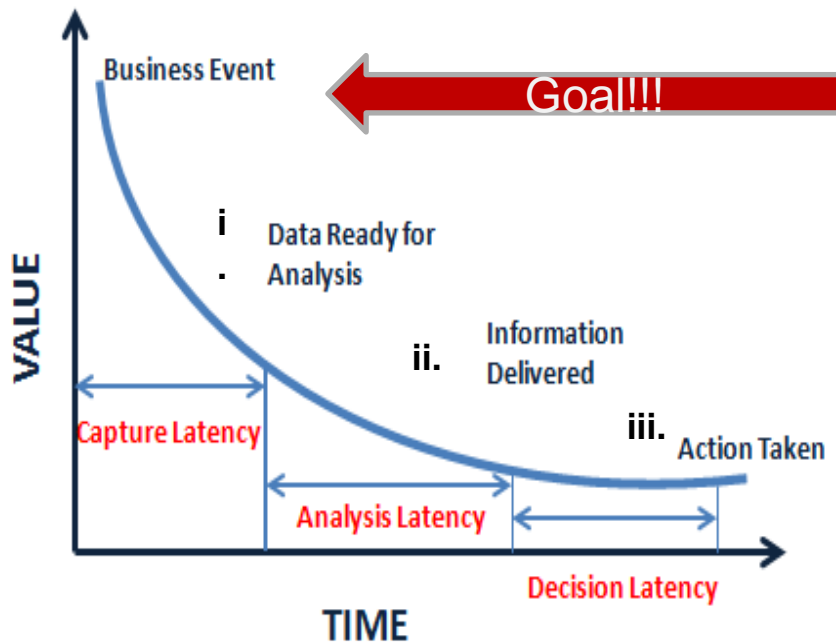
“And once the storm is over, you won’t remember how you made it through, how you managed to survive. You won’t even be sure whether the storm is really over.

But one thing is certain: when you come out of the storm, you won’t be the same person who walked in. That’s what this storm is all about”

- Haruki Murakami

Operational Analytics Module Selection. 9 Segment Series for Operational Analytics 101 Certification.

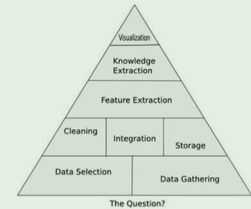
- “Driving better and faster organizational decisions through a multi-tiered operational analytics approach. We need to be equipped to play roles “above the line” and “below the line”.”
 - i. **Capture Latency** - 3 segments, Data Gathering, Data Selection and Storage – Develop critical skills needed to optimize the speed and efficacy of the metrics you obtain.
 - ii. **Analysis Latency** – 3 segments, Data Integration, Data Cleansing and Data Feature Extraction (pt. 1) – Leverage techniques to translate all types of data elements and convert into aggregates ready for visualization.
 - iii. **Decision Latency** – 3 segments, Data Feature Extraction (pt. 2), Data Knowledge Extraction and Data Visualization. Garner insights by creating “Ah-Ha” moments faster.



Design for the Series of Operational Analytics Webinars (series of 5 at this point)

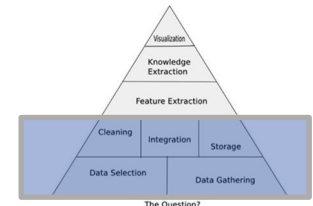
Webinar #1: Perspectives & Foundations

Share the Framework, the Models, the Abstractions, the Principles
Management Systems Model
Intel "Triangle" Model



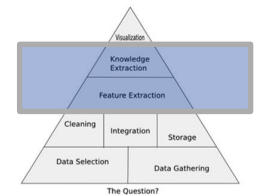
Webinar #2: Foundational Data Role--Measurement and Analysis Planning

Measurement Planning using Value Stream Maps, Data Models derive from refining the
Management System Model, The Data Management Role of ISE's in Process Improvement Projects



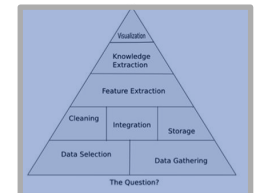
Webinar #3: Analysis Latency Reduction

Analytics Methods, Tools, Principles



Webinar #4: Decision Support Role—M&A Execution

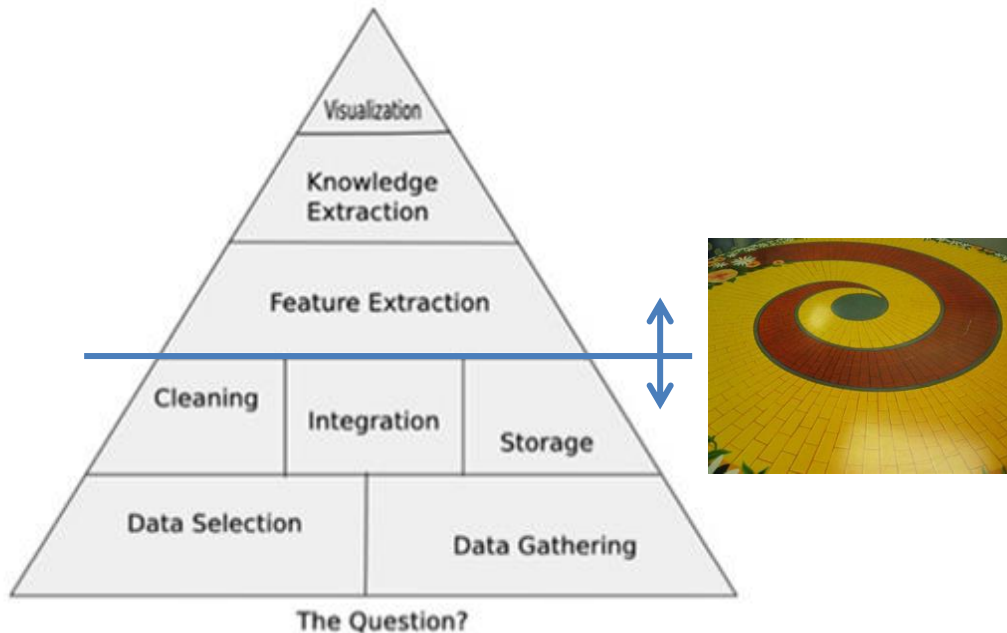
Feature and Knowledge Extraction, Creating Chartbooks and VSM's, supporting the evaluation phase of
DMAIC projects and then also the Control Stage.



Webinar #5: Putting it all together

Revisiting the Management Systems Model with Case Examples

Two Fundamental Roles involved in “Analytics” work to Support Enterprise Performance Optimization



- Most ISE/ILSS Process Improvement Projects require that the ISE/Belt do both roles, certification requires that
- Data is almost never stored in a common place and are not trusted nor available

- the current state process in many large organizations splits data and analytics
- Data are stored in a common place, and are trusted and available

You have the Intel Presentation in Canvas

- **“Above the line” analyst role**
 1. What are the fundamental Questions that have to be answered?
 2. What data elements do those questions require?
 3. Organize the data and facts and then export to your analytics app.
 4. Extract features from data through integration and manipulation of data that move us closer to answers. (torture the data)
 5. Apply business acumen to data & analyses – create new knowledge
 6. Apply data visualization techniques to aid in telling the right story – as in life, so in business: the best story wins ...
- **Foundational data role**
 1. What do we need to know in order to achieve the performance objectives—what are the questions we have to answer?
 2. Architect/Create the Measurement and Analytics Plan (Data Model included)
 3. Select and gather data from many sources, preferably through automated extract, transfer, & load (ET&L) process
 4. Create (observation, interviews, etc.) any data elements that don't exist (ISE Measurement)
 5. Assure data are cleaned & ready for analysts or you to use – data quality monitors
 6. Assure data are integrated & can be joined with other data – think LEGOs
 7. Assure data storage is high reliability & user-friendly – SSAS cubes, databases
 8. Integration and organization of foundational data elements as well as derivative data and other key metrics of interest

About Me



Matheus Scuta

Global Manufacturing Analytics Scientist
Ford Motor Company
+1 (614) 795-4543
mscuta@ford.com

“Success is no accident. It is hard work, perseverance, learning, studying, sacrifice and most of all, love of what you are doing or learning to do.” -

Pele

Career

- Global Manufacturing Analytics – Ford Motor Company
 - Jan 17 – Current
- Lean Six Sigma Consultant – Abbott Nutrition
 - Jan 16 – Jan17



About Me:

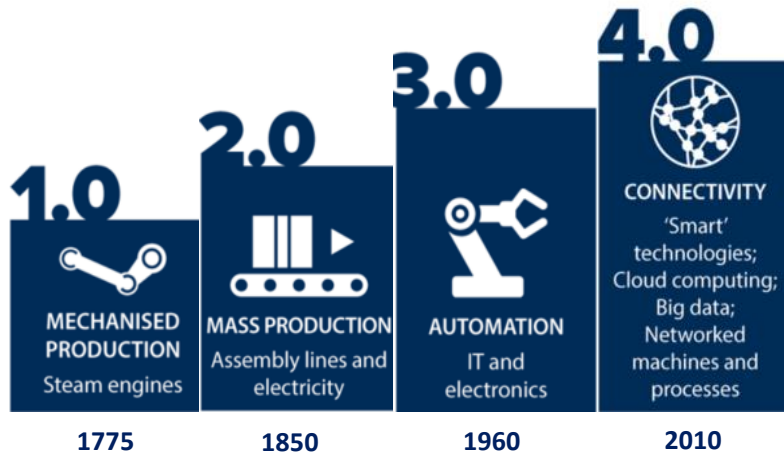
- The Ohio State University Class of 2017
- Hometown – Rio de Janeiro, Brazil
- Current Location – Detroit, MI
- Fun Fact: I have lived in 4 different countries (Brazil, USA, Nigeria and Colombia)



Most Fun

As internal analytics consultants, we get to be a part of projects that range across Ford’s entire Value Stream. This makes the entire experience very fun as you learn many new things every day and you get to help the entire business across the globe with your solutions.

How is Analytics changing Manufacturing?



Industry 4.0 – Highlights

Ability to collect, analyze and act on Big Data yielding a higher quality product at a lower operating expense & interconnection across all databases

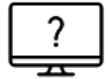
VS

Getting the right data for better decision, not necessary ALL the data

90% Human & 10% Machine



30% Human & 70% Machine

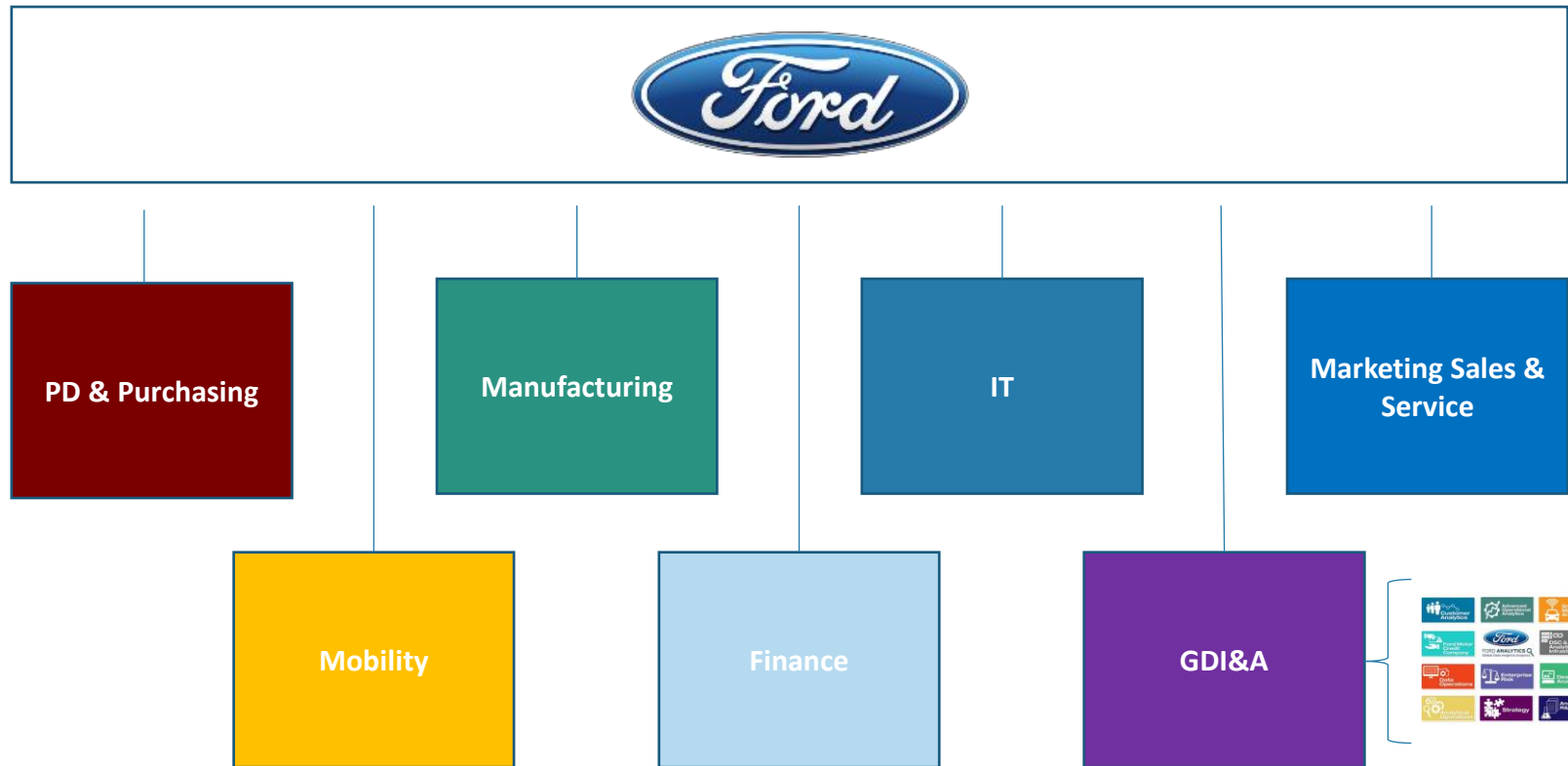


Advantages

- Increase Productivity, Revenue and Profitability
- Manufacturing Process Optimization
- Traceability

What is Ford's Analytics Vision?

Ford's Structure



What is Ford's Analytics Vision?

GDI&A Overview

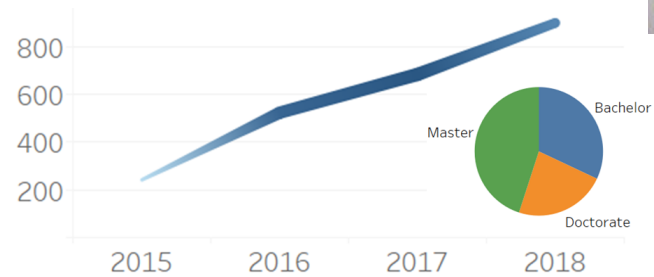


Fun Stats:

Hadoop

- RAM -> 90+TB
- Usable Storage -> 7+ PB
- CPU Cores -> 7500+

900+ DATA SCIENTISTS

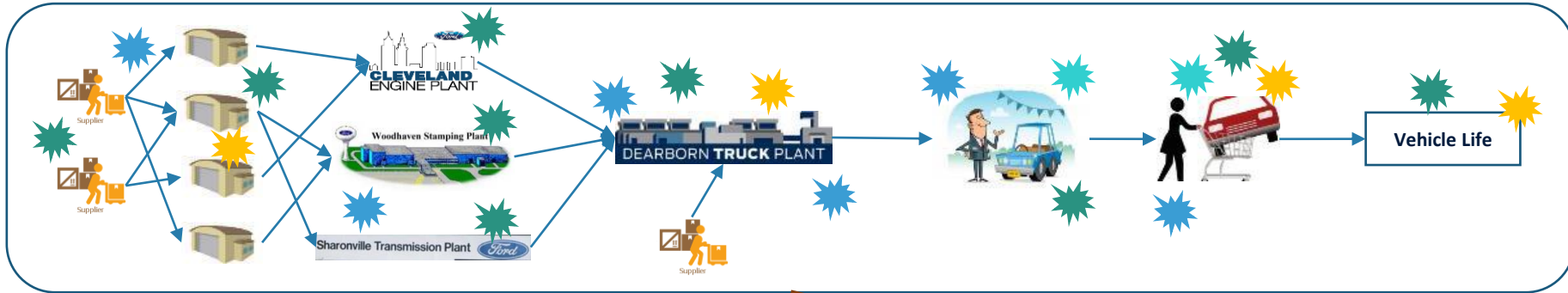


3.2K+ CITIZEN DATA SCIENTISTS



What is Ford's Analytics Vision?

Analytic Impact



Business Impact (Metrics)

Cost	<ul style="list-style-type: none"> • \$\$\$\$ savings • Cost avoidance 	Delivery	<ul style="list-style-type: none"> • Automated • Just in Sequence
Quality	<ul style="list-style-type: none"> • Increase quality • Lower defects 	Safety	<ul style="list-style-type: none"> • Worker Safety • Customer Safety
Maintenance	<ul style="list-style-type: none"> • Preventative/Predict • Scheduled (not-EM) 	Environment	<ul style="list-style-type: none"> • Energy Optimization • Emissions/Impact

What is Ford's Analytics Vision?

Analytic Impact on Manufacturing



Material Logistics



Freight and Customs

- Complexity / Batching
- Route Optimization
- Material Flow
- Customs, Duties and Tariffs

Plant Production



Plant Floor

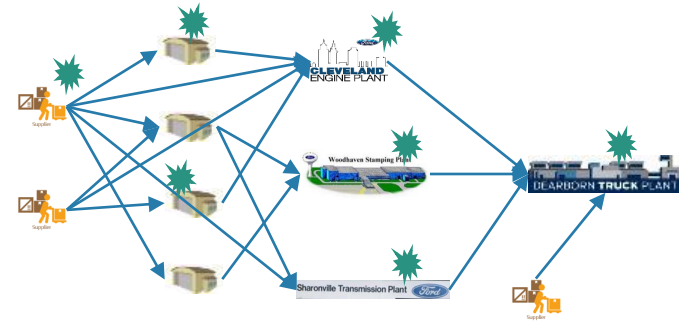
- Bottleneck Analysis
- Preventive Maintenance
- Plant Floor Data Visualization
- Quality Tie Back To Stations

Sequencing and Scheduling

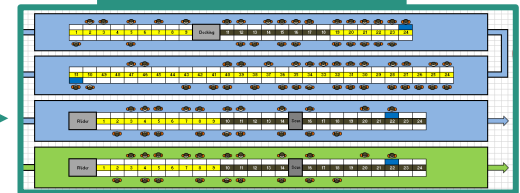


Scheduling

- Vehicle Sequencing
- Labor Optimization
- Batch Scheduling
- Economic Order Quantities (EOQs)

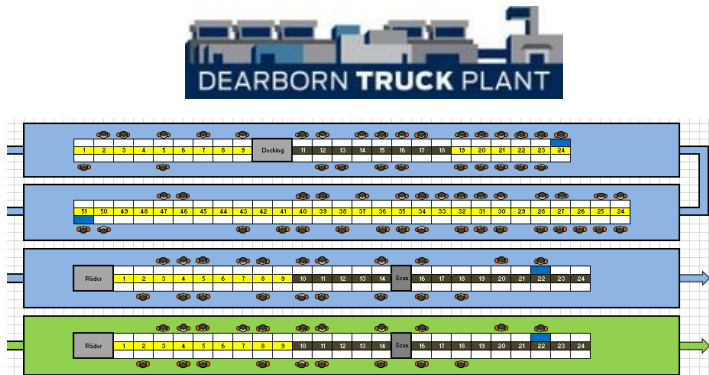


Industry 4.0 in Plant



What is Ford's Analytics Vision?

Analytic Impact on Manufacturing



66 Jobs Per Hour



How can we evaluate analytical solution's value and impact?

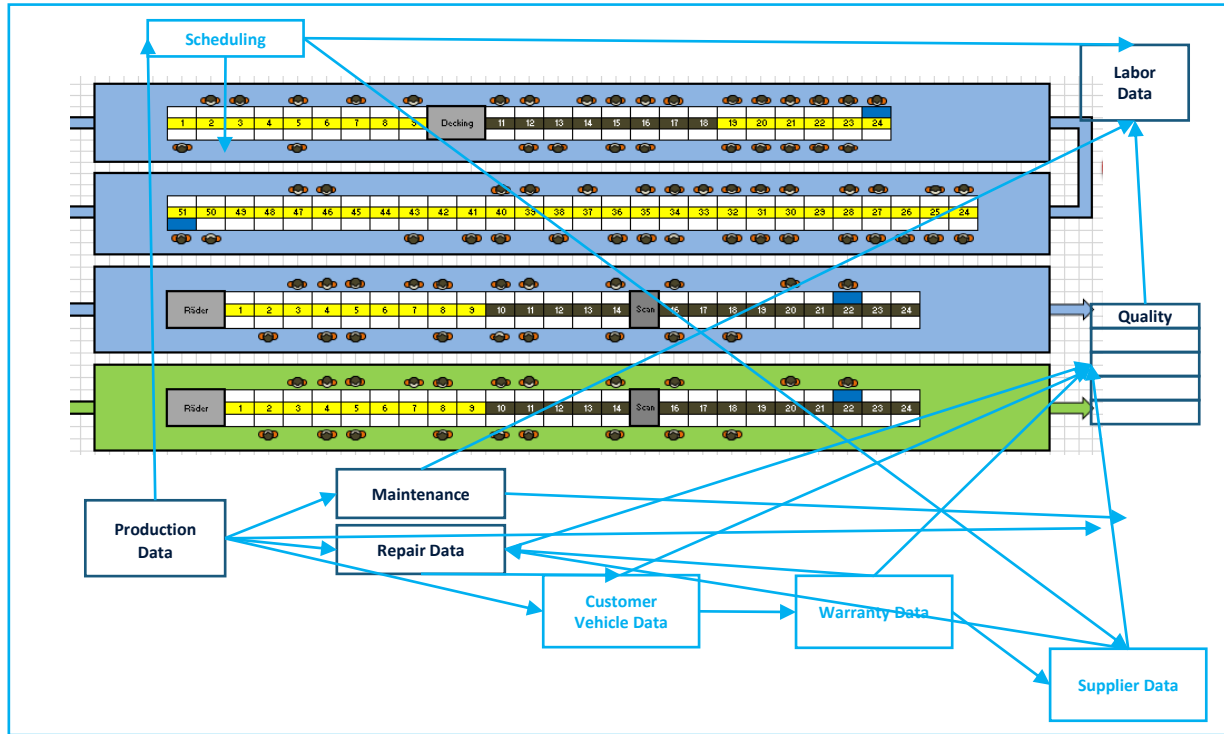


If analytics initiatives can reduce maintenance time (physically stop line) by one hour....



What is Ford's Analytics Vision?

Analytic Impact on Manufacturing



Predictive and Prescriptive

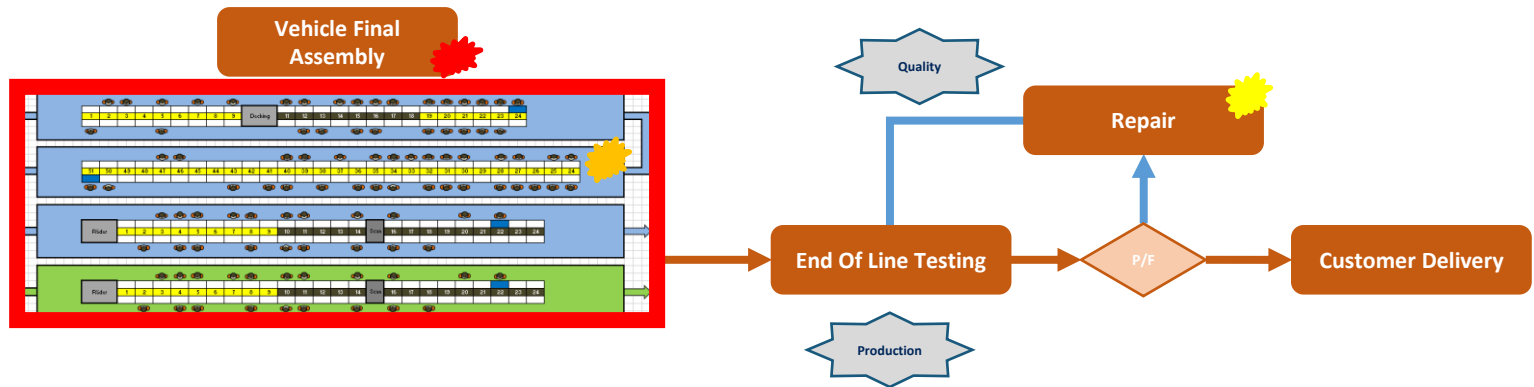
Descriptive – What happened in the past?

Predictive – What will likely happen next?

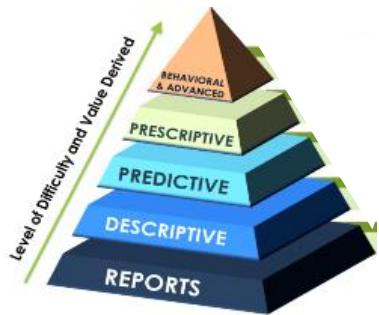
Prescriptive – What should you do?

What is Ford's Analytics Vision?

Types of Projects - EOL



Key Questions to Answer

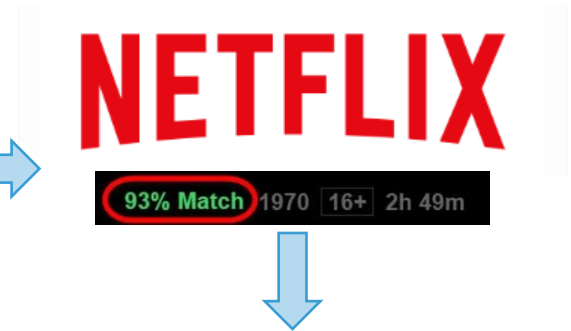


- Can we advise repairmen on what is the best solution to repair vehicle?
- Can we tie back repairs to individual assembly stations responsible for errors?
- Can we generate real-time feedback to stations, allowing process owners to take corrective measures before overall production quality decreases? And compare performance between shifts?



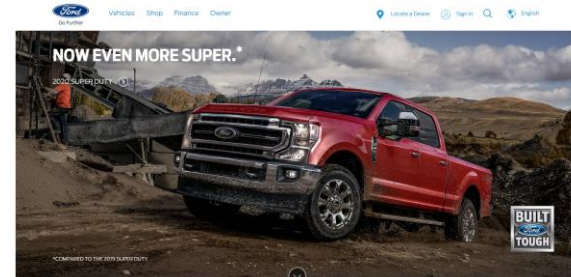
What is Ford's Analytics Vision?

Types of Projects - Customer



Key Questions to Answer

- Can we approach rebates with a customer targeting approach?
- Will this affect buying behavior?



Customer Profile (what we have)

Target Rebates to Specific Customers



How to Prepare/Adapt?

15-
25+

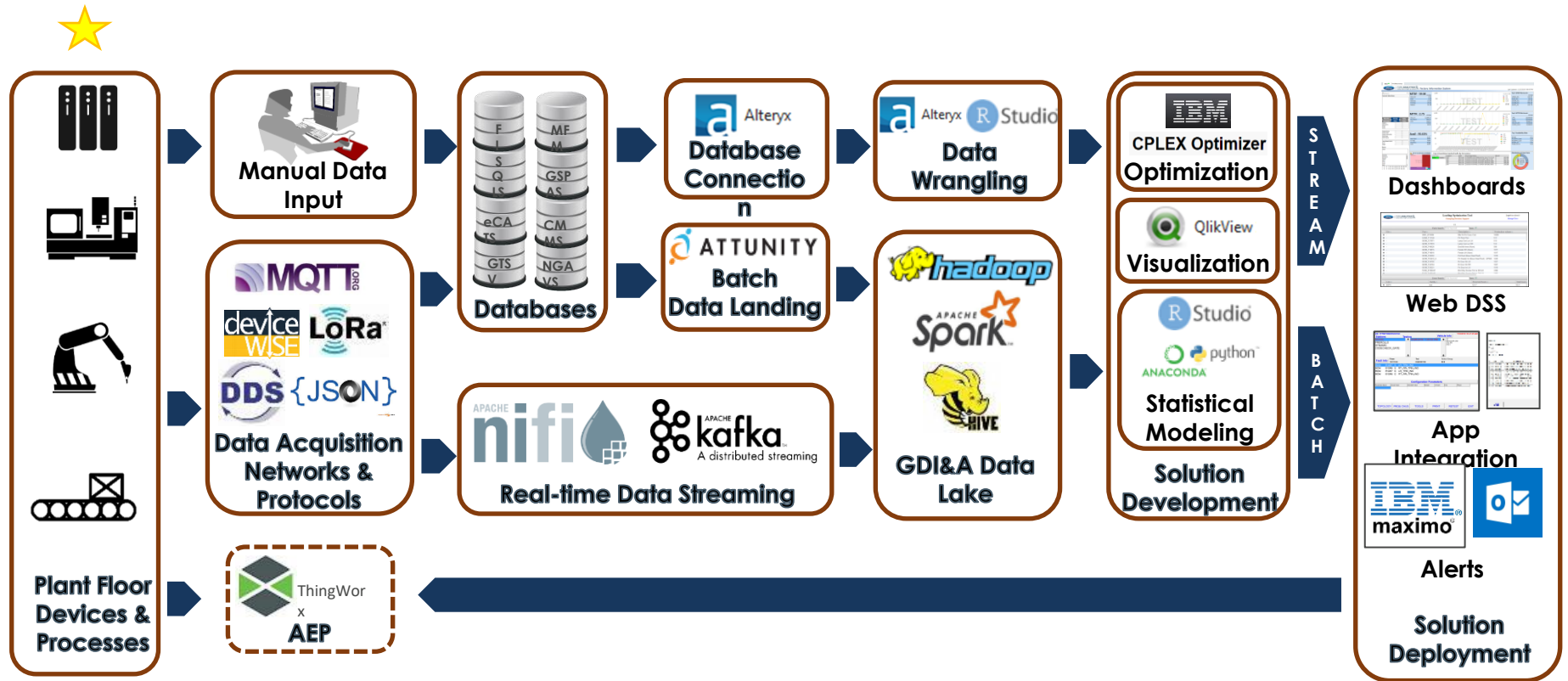
Time of Analytic Journey

- Benchmark companies, both competitor and non-competitors, that adopted analytics and evaluate the overall impact
- Be a change agent, encourage employees to explore analytics
- Don't think analytics is only for tech companies
- Educate yourself on analytics (be able to talk about it)
- Don't resist, assist!

0 - 15

- Integrate analytics to your major and/or career (LSS, Mft, SC, et al.)
- Understand how Analytics can be applied in ANY field
- Think How Analytics can make your job more efficient
- Courses available online (Coursera, Udemy, et al.)
- Learn the basics of a programming language
- Understand that real-world problems are not cookie cut (especially with data)
- Take a basic analytics class before you graduate

How to Prepare/Adapt?



Thank You!!!

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Data Analytics and Artificial Intelligence have become a Dominant Force in the Market



Ben Amaba, PhD, PE, CPIM[®], LEED[®] AP
Chief Technology Officer for the Industrial Sector
IBM Data Analytics and Artificial Intelligence

Dr. Ben Amaba's expertise is in executive management, strategic planning, operations, and engineering. Dr. Amaba is a registered and licensed Professional Engineer in several states with International Registry; certified in Production, Operations, and Inventory Management by APICS[®]; LEED[®] Accredited Professional (Leadership in Energy & Environmental Design); and certified in Corporate Strategy by Massachusetts Institute of Technology in Cambridge, Massachusetts. He is responsible for industrial manufacturing, infrastructure and logistics solutions.

You can't afford to ignore the importance of Data in the new Digital World.

Why, How and What's Next

- Pervasive impact of AI and ML have on reducing latencies results in speed to business outcomes.
- Laws of Science
 - Moore's Law – Capacity Achieved
 - Metcalf's Law - Faster Connection
- "Over the next decade, AI won't replace managers, but managers who use AI will replace those who don't." – Harvard Business Review
- Professional Status

Over the next decade, AI won't replace managers, but managers who use AI will replace those who don't."

Harvard Business Review

Analysts estimate that the companies in the **Fortune 500 lose a combined \$31.5 billion per year** because their employees fail to effectively share knowledge.

According to IDC®, an average enterprise can have as many as 900 different applications and only 29 percent are integrated.

According to McKinsey® and IDC, knowledge workers spend **19 and 30 percent of their time respectively searching for knowledge.**

Much of the content sits in PowerPoint® decks but unfortunately, search engines, such as Google and Bing®, cannot search the content inside the deck. – Keeeb

According to IDC, **20 percent of a knowledge worker's time is spent building assets that already exist.**

AI and machine learning are finally beginning to come into their own. The use of AI for data analytics and predictive capabilities has been one of the major talking points in 2020 and will only increase in the coming years. AI made the list of Gartner's Top 10 Trends in Data and Analytics for 2020. This list cited the need for "smarter, faster, more responsible AI," particularly those looking to "make essential investments to prepare for a post-pandemic reset." "by the end of **2024, 75% of enterprises will shift from piloting to operationalizing AI**, driving a **5X increase** in streaming data and analytics infrastructures." Evolved from a software **engineering** and practice that aims to integrate **software** development and software operations, it is the key to converting the work of AI engines into real business offerings and achieving AI at a large, reliable scale. - -

John Blyler .

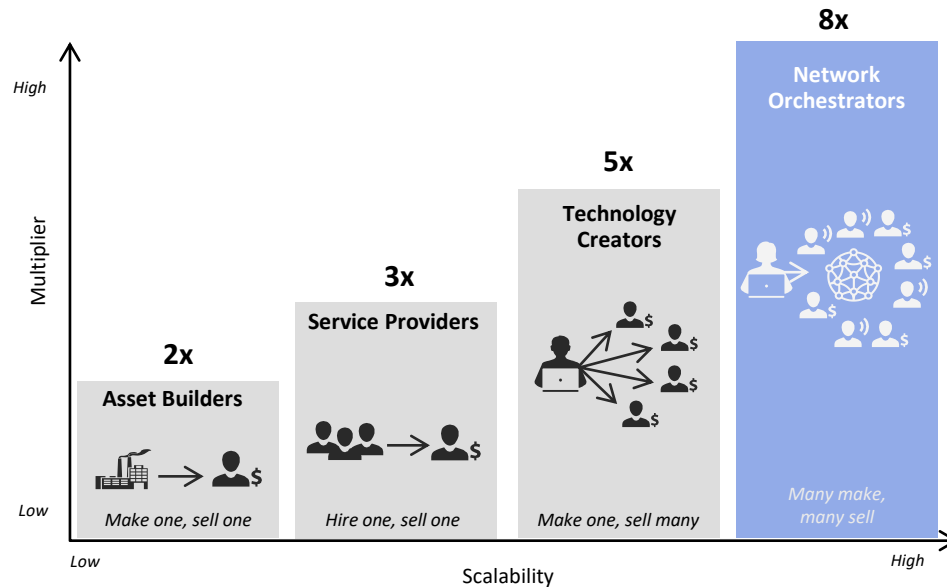
The leaders apply Moore's Law gives us Capacity and Metcalfe's Law gives us Connection Speed.

Network Orchestrators-

Metcalfe's Law

grow revenue faster and generate higher profit margins with

8x Market Value Multiplier



Data Analytics is Top-down decision-centric.

and AI is Bottom-up data-centric.

Capacity with Quantum Computing – Moore's Law.

Speed and Connection – Metcalf's Law

Data Analytics – Operations Research and Management Sciences

Artificial Intelligence

Machine learning

Neural networks

Deep learning

Leaders have a Knowledge Advantage



Benefits are Significant

Predictive maintenance enhanced by AI allows for better prediction and avoidance of machine failure by combining data from advanced Internet of Things (IoT) sensors and maintenance logs as well as external sources. Asset productivity increases of up to 20% are possible, and overall maintenance costs may be reduced by up to 10%.

Collaborative and context-aware robots will improve production throughput based on AI-enabled human-machine interaction in labor-intensive settings. Thereby, productivity increases of up to 20% are feasible for certain tasks—even when tasks are not fully automatable.

Yield enhancement in manufacturing powered by AI will result in decreased scrap rates and testing costs by linking thousands of variables across machinery groups and sub-processes. e.g., in the semiconductor industry, the use of AI can lead to a reduction in yield detractor by up to 30%.

Automated quality testing can be realized using AI. By employing advanced image recognition techniques for visual inspection and fault detection, productivity increases of up to 50% are possible. Specifically, AI-based visual inspection based on image recognition may increase defect detection rates by up to 90% as compared to human inspection.

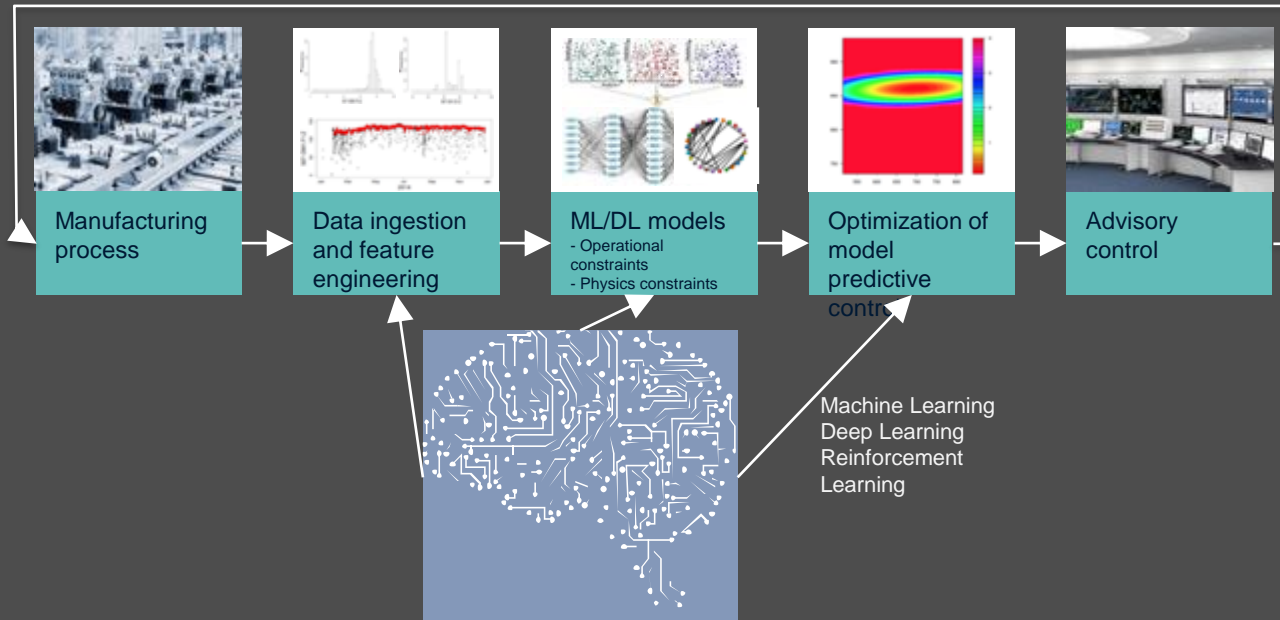
Siemens and Tech Clarity - IoT machine monitoring and optimization drives profitability: 80% of survey respondents say their profitability has increased by monitoring and optimizing machines; 35% report a significant increase.



“We teach Watson how to think like an Engineer,
Watson teaches us how to Think like 10,000 Engineers”

— Woodside Energy

Data-driven process improvement with Empirical knowledge is powerful



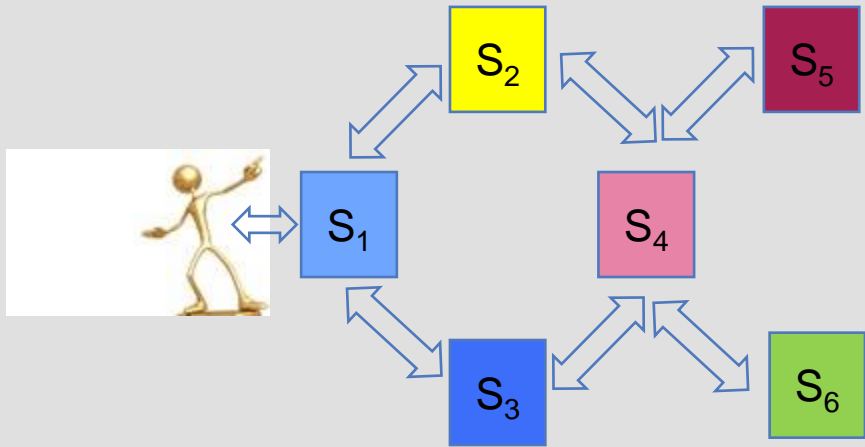
<https://www.youtube.com/watch?v=GFZ2IaTVky8&list=PLpLglqNNVKjAsgbvFWSCQ2FI8SE4bcPLo&index=3>

**"our civilization runs on
software"**

-- Bjarne Stroustrup

Yet the art of creating it continues to be a dark mystery. Never in history have we depended so completely on a product that so few know how to make well.

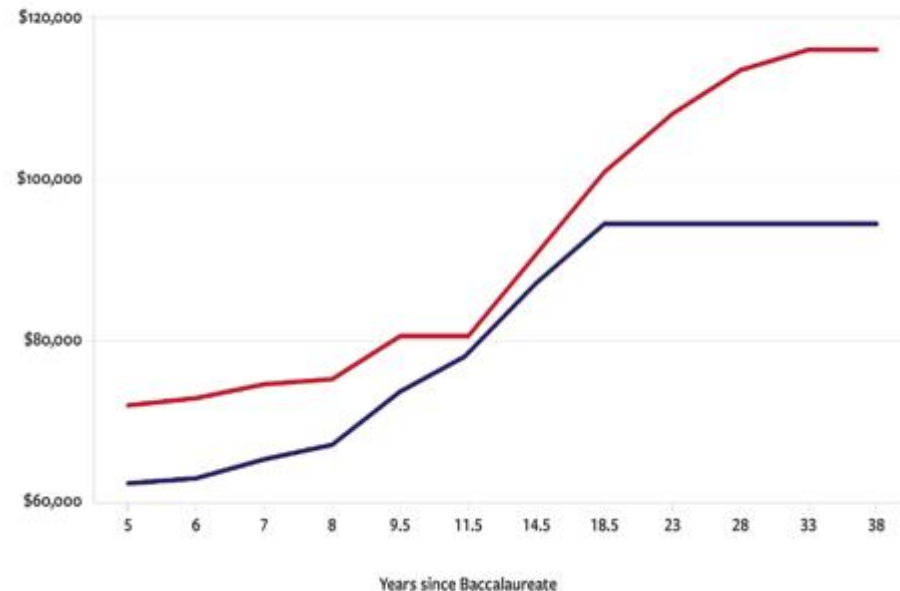
Professional engineering skills are desired in the world.



Legend:
Licensed Engineer (P.E.)
Unlicensed Engineer

- What is the process and technology?
- How does failure in S_n affect S₁?
- Can security vulnerability in S_n affect S₁?
- Who is responsible?
- Orchestrating: The physical, mathematical and social sciences = ISE Professional Engineer

Professional Engineers Earn More

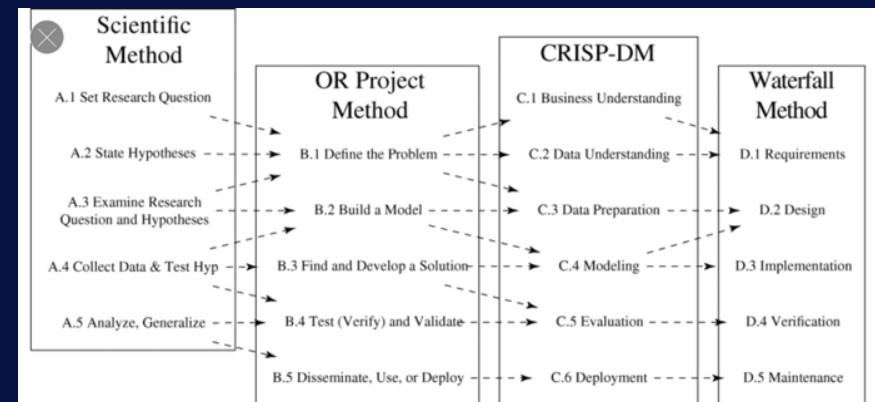


Drs. Joseph M. Juran and W. Edwards Deming who stress that the vast majority (85 to 94 percent) of the time, the answer is found in the processes in place are not up to the task of handling all the variations that exist in today's business climate, and as a result, customer expectations are not met.

Domain	Description	Weight
I	Business Problem (Question) Framing	15%
II	Analytics Problem Framing	17%
III	Data	22%
IV	Methodology (Approach) Selection	15%
V	Model Building	16%
VI	Deployment	9%
VII	Life Cycle Management	6%
		<hr/> 100%

Quality experts like Drs. Joseph M. Juran and W. Edwards Deming stress that the vast majority (85 to 94 percent) of the time, the answer is found in the processes in place are not up to the task of handling all the variations that exist in today's business climate, and as a result, customer expectations are not met.

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Thank You!



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How'd We Do?



Customer and Member Satisfaction and Feedback Survey

Operational Analytics: Perspectives, Points of View, Foundations



INSTITUTE OF
**INDUSTRIAL
& SYSTEMS**
ENGINEERS

You can download the deck (handouts)
You will receive an e-mail tomorrow with link to recording.
You can go to this IISE link soon and get deck and recording.
<https://www.iise.org/details.aspx?id=46729>

Quarter 1 Webinar Program/Lineup is a WOW!!!

Feb 16: Operational Analytics 101: Perspectives and Foundations

Registration URL <https://attendee.gotowebinar.com/register/8785162089172971787>

Mar 9: Data Sciences Overview—Strategy, People, Process and Technology (AI/ML/Decision Sciences/Benefits Realization)

Registration URL <https://attendee.gotowebinar.com/register/8255002871166158605>

Mar 16: Operational Analytics 201: The Foundational Data Role

Mar 18: Using Control Towers to Integrate your Digital Supply Network OR Using Control Towers to Digitize your Supply Chain

Registration URL <https://attendee.gotowebinar.com/register/7872822524972939276>

April 1: A Big Interview with a Personal and Professional Mastery Coach

April 15: Operational Excellence: Strategy and Migration Plan Development for Large-Scale Improvement Initiatives

April 27: Operational Analytics 301: The Analyst and Decision/Action Support Role

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- Virtual Networking worked great!!
- Can purchase access to our library of sessions from the conference even if you did not get a chance to attend.
- Sampling of Sessions on next slide



Sampling of Sessions just from the Performance Excellence Track for May 2021

Industry Best Practices Virtual Benchmarking:

- Healthcare
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- ISE in Small and Medium Size Enterprises
- ISE Deployments in Large Enterprises
- Simulation to accelerate Benefits Realization

Industry 4.0, Smart Factories

Operational Analytics

Strategies for Designing and
Executing Disruptive Innovation

Very difficult to get this kind of compressed learning at the price of registration anywhere, so please consider our upcoming Conference and Track.

Thank You!

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For IISE Webinar Ideas, Suggestions, Feedback, Requets, Scott Sink:

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