USING ANALYTICS TO IMPROVE DECISION-MAKING

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ANALYTICS is missed by most people because it is dressed in overalls and looks like work." Thomas Edison (1847 – 1931)

Ivey

Which of the following quotes best represents Analytics/AI/Big Data?

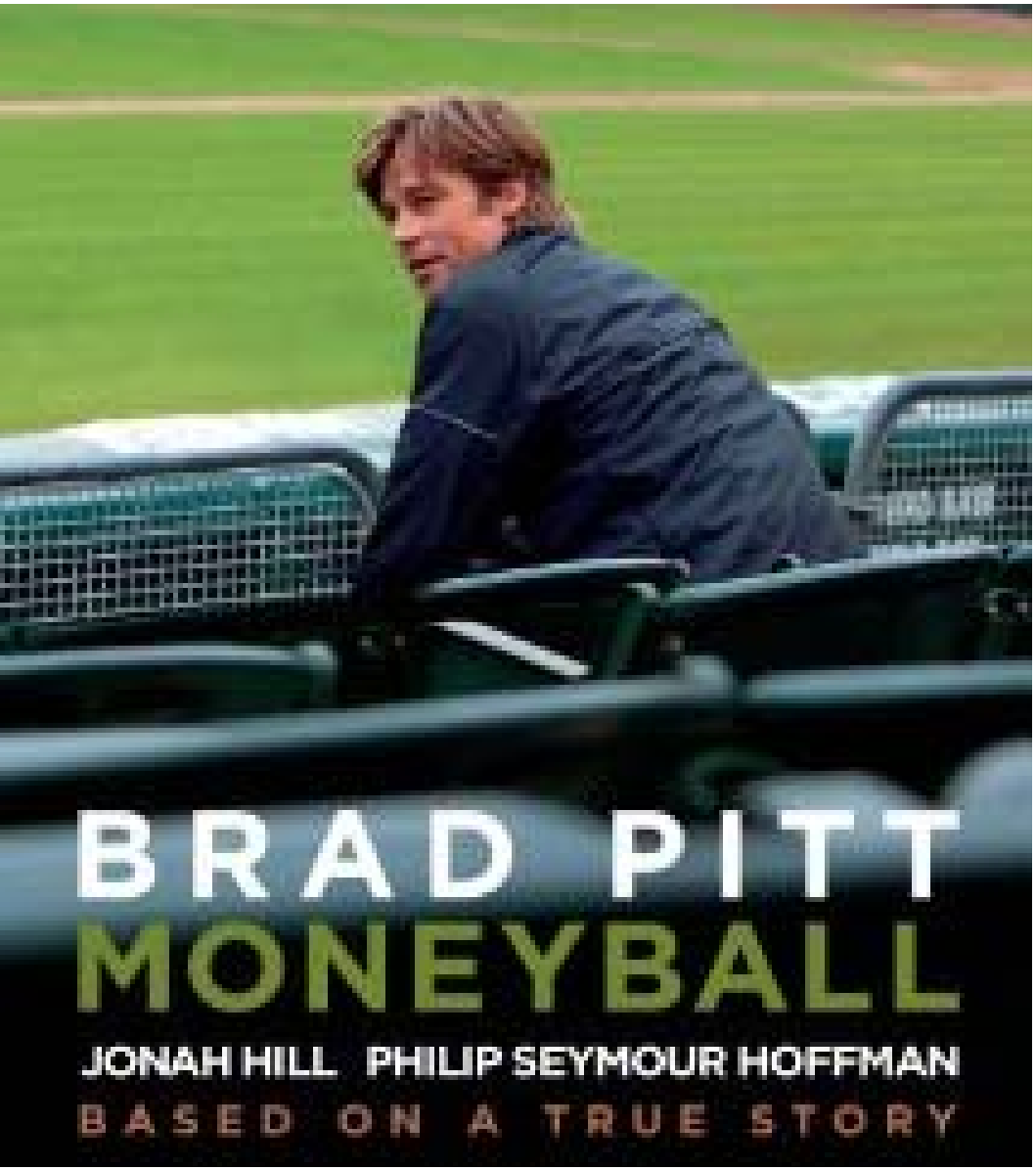
Poll 1

1. In God we Trust, all others must bring data. (Edward Deming, 1900-1993)
2. There are three kinds of lies: lies, damned lies, and statistics. (popularized by Mark Twain, 1835-1910)
3. Data is the new oil. (Clive Humby)
4. The future ain't what it used to be. (Yogi Berra, 1925-2015)
5. Big data is like teenage sex: everyone talks about it, nobody really knows how to do it, everyone thinks everyone else is doing it, so everyone claims they are doing it. (Dan Ariely)

Outline

- What is analytics?
- How to get started with analytics?
- Learning lessons from developing and using analytics.

What is analytics?



What does this movie have to do with analytics?

- Limited and smaller budget than competitors
- Find undervalued players
- Develop and use new performance measures
- Statistics, analytics and models

Ivey

What is analytics?

- Analytics is the art and science of using data and models to obtain managerial insights for decision making at strategic, tactical and operational levels.

- Way of thinking, managing and doing. It is a process.

- Source of competitive advantage. Industry.

Many names and related concepts…

- Data Science
- Machine Learning
- Predictive Modeling
- Use of Big Data for Better Decisions
- Decision Making with Data
- Artificial Intelligence
- Quantitative Decision Making
- Industrial Engineering
- Systems Thinking
- Algorithms
- Bots
- Cloud computing
- IoT
- …..

- Optimization
- Deep Learning
- Neural Networks
- Data Analysis and Visualization
- Simulation
- Probability and Statistics
- Forecasting
- Natural language processing
- Game theory
- Queuing theory
- Reinforcement learning
- Classification
- Clustering
- ….

Rise of analytics

- Generation, availability, accessibility, storage and of data and big data
  - Sales, social media, financial transactions, calls, jet engine sensors, ...
  - High volume, big variety, high velocity, varying quality (veracity), …
- Increased and cheaper computing
- Competitive advantage drive

➔

- Analytics, machine learning and AI applications
- Insights for decision making for business, engineering, healthcare, medicine, transportation, logistics, manufacturing, finance…

Examples of analytics

- Make a new business opportunity possible
  - FedEx starting story

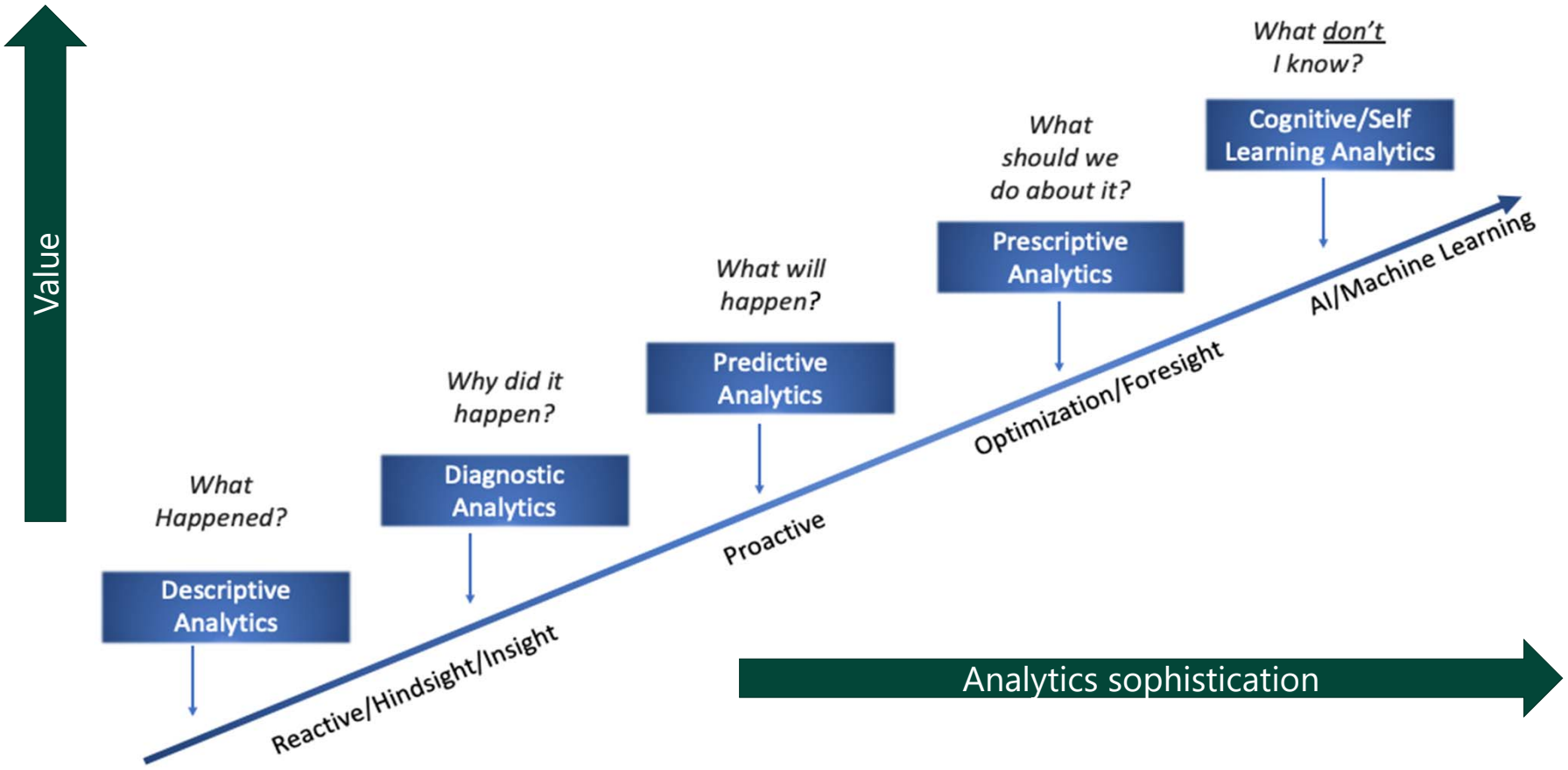
- Establish new strategy and strategic decisions
  - Amazon's first ship and then buy model

Examples of analytics

- Solve complex and critical business challenges and issues
  - Air Canada's scheduling, revenue management, maintenance ….
  - UPS' logistics, operations, scheduling, planning, …..
  - CapitalOne's fraud detection, credit approvals, …..
  - Major League Baseball games scheduling

- Using analytics gives a competitive advantage. If you are NOT utilizing it, you are leaving money on the table.

Levels of Analytics



https://www.ecapitaladvisors.com/blog/analytics-maturity/

Analytics at uncertain times such as the current pandemic

- Manage the current situation
  - **BlueDot Inc.**
  - **Policy Modelling**
    - Testing, gatherings, tracing policies, interventions….
    - Effects to the economy
    - Vaccine efforts
  - **Hospitals operations**
    - Capacity allocation
    - Planning to catch up with postponed treatments
- Find new opportunities
  - Walmart
- Minimize and limit loses
  - Toyota

Key takeaways

- Analytics
  - is the art and science of using data and models to obtain managerial insights;
  - provides solutions to complex challenges of our time;
  - gives a competitive advantage;
  - has many methods inside its toolkit;
  - is a process;

Analytics works and its time has come.

What is the biggest challenge for your organization to employ Analytics?

Poll 2

1. Problem Definition – we do not know what problems analytics can solve.
2. People & Capabilities – we lack people with the right analytical background.
3. D A T A ! ! ! – we have NO data [ALTERNATIVELY] we have TOO MUCH data.
4. Technology & Infrastructure – we do not have the tools for analytics.

How to get started with Analytics?

The Fundamental Business Equation

P = R - C

Profit = Revenue - Cost

Do you have a ten dollar problem or a million dollar problem?

Target and Pregnant Shoppers

- Problem:
  - How to get more people to shop at Target for ALL their daily needs.
  - People have entrenched shopping routines!

- Solution:
  - Promote Target's diverse retail selections.
  - People change their behavior with big events...
    - Graduation, Move, Marriage, Expecting Baby, ...

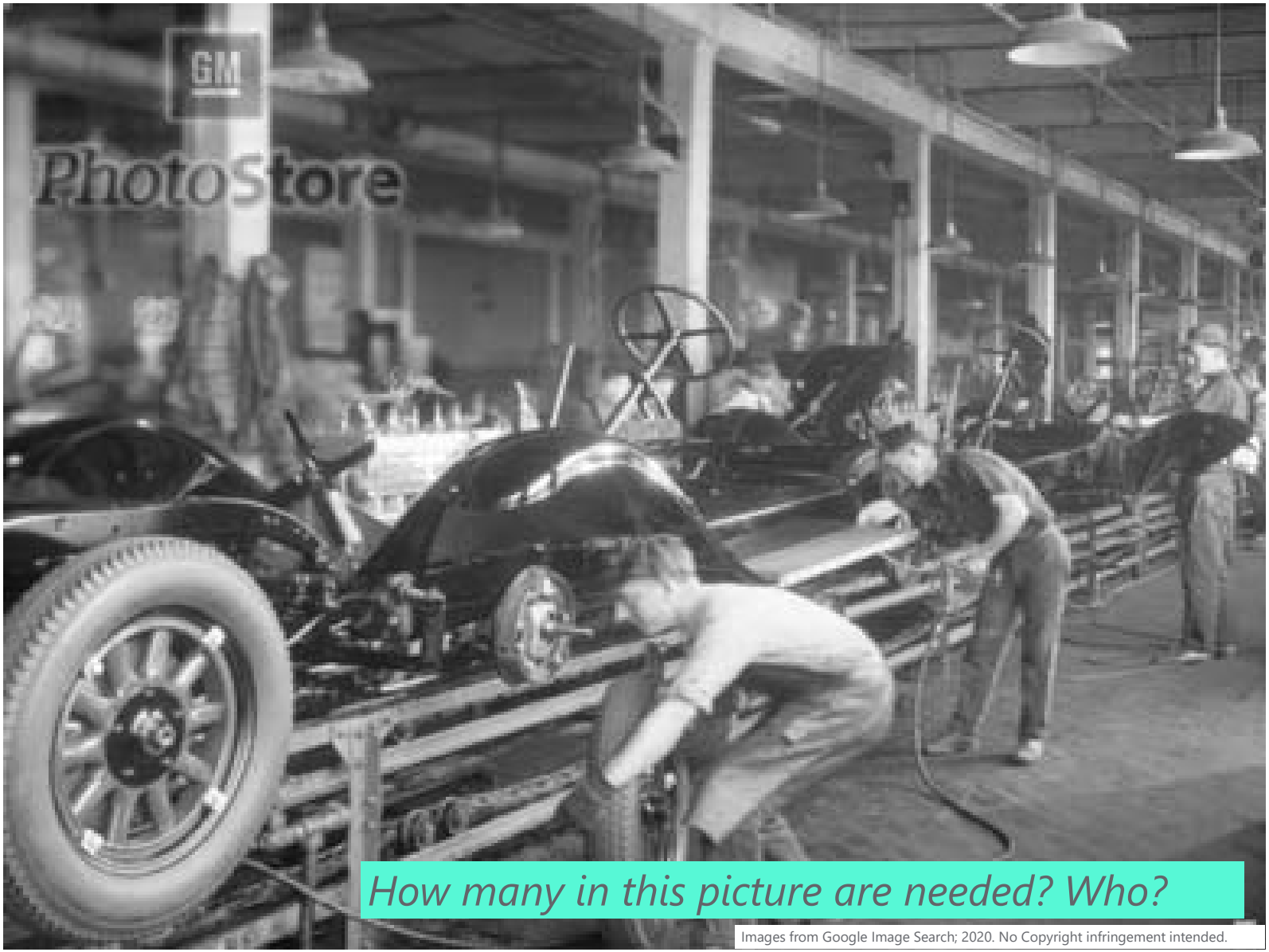
Can you determine if a customer is pregnant without asking them?

YES!!

Read More: http://www.nytimes.com/2012/02/19/magazine/shopping-habits.html?pagewanted=all&module=Search&mabReward=relbias%3Ar%2C%7B%222%22%3A%22RI%3A18%22%7D

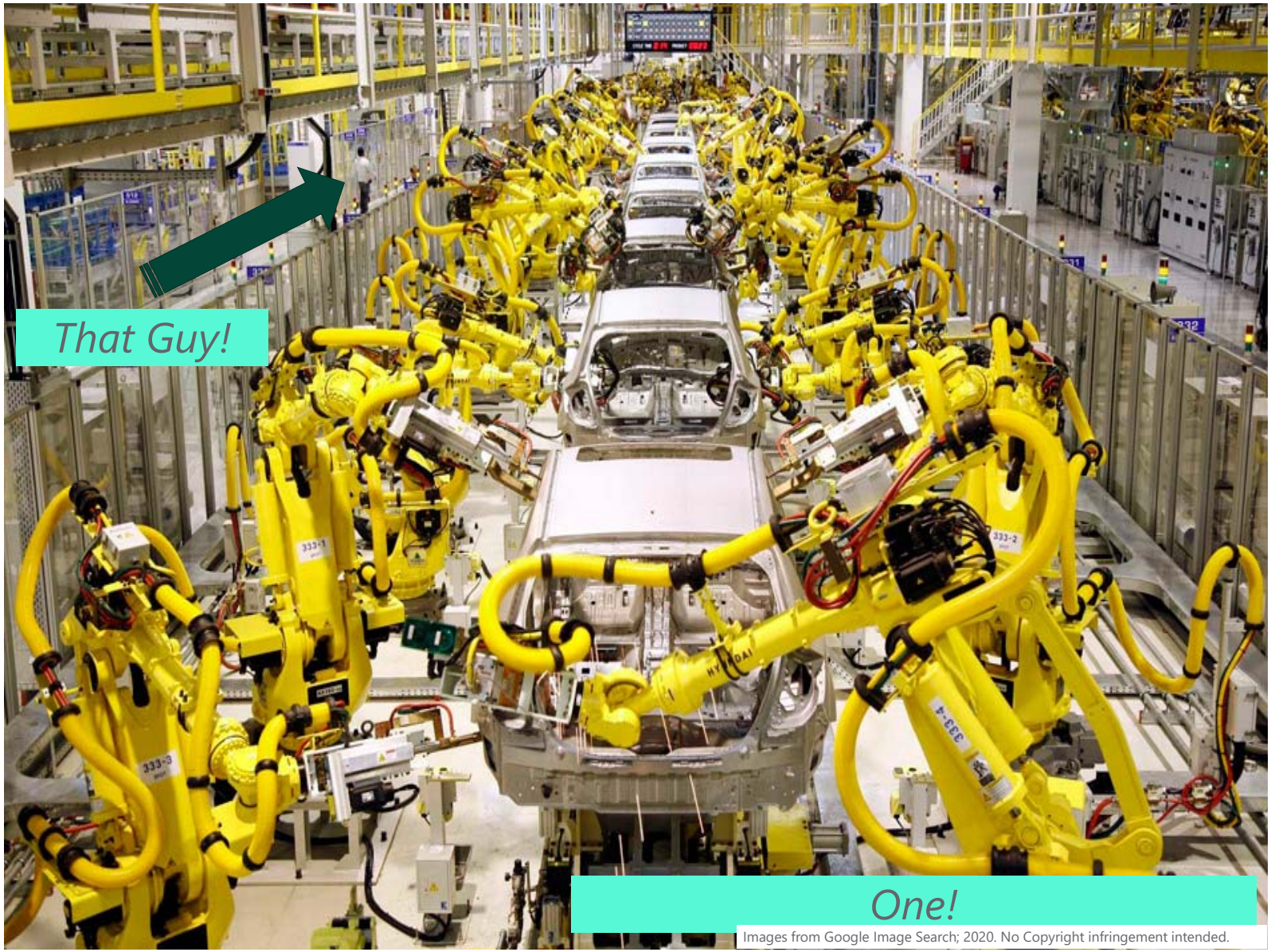
How to get started with Analytics

- Problem
  - Step 1: Define your problem; if possible quantify the impact.
- People
- Bits, Bytes & Terabytes (aka Data)
- Technology



How many in this picture are needed? Who?

Images from Google Image Search; 2020. No Copyright infringement intended.



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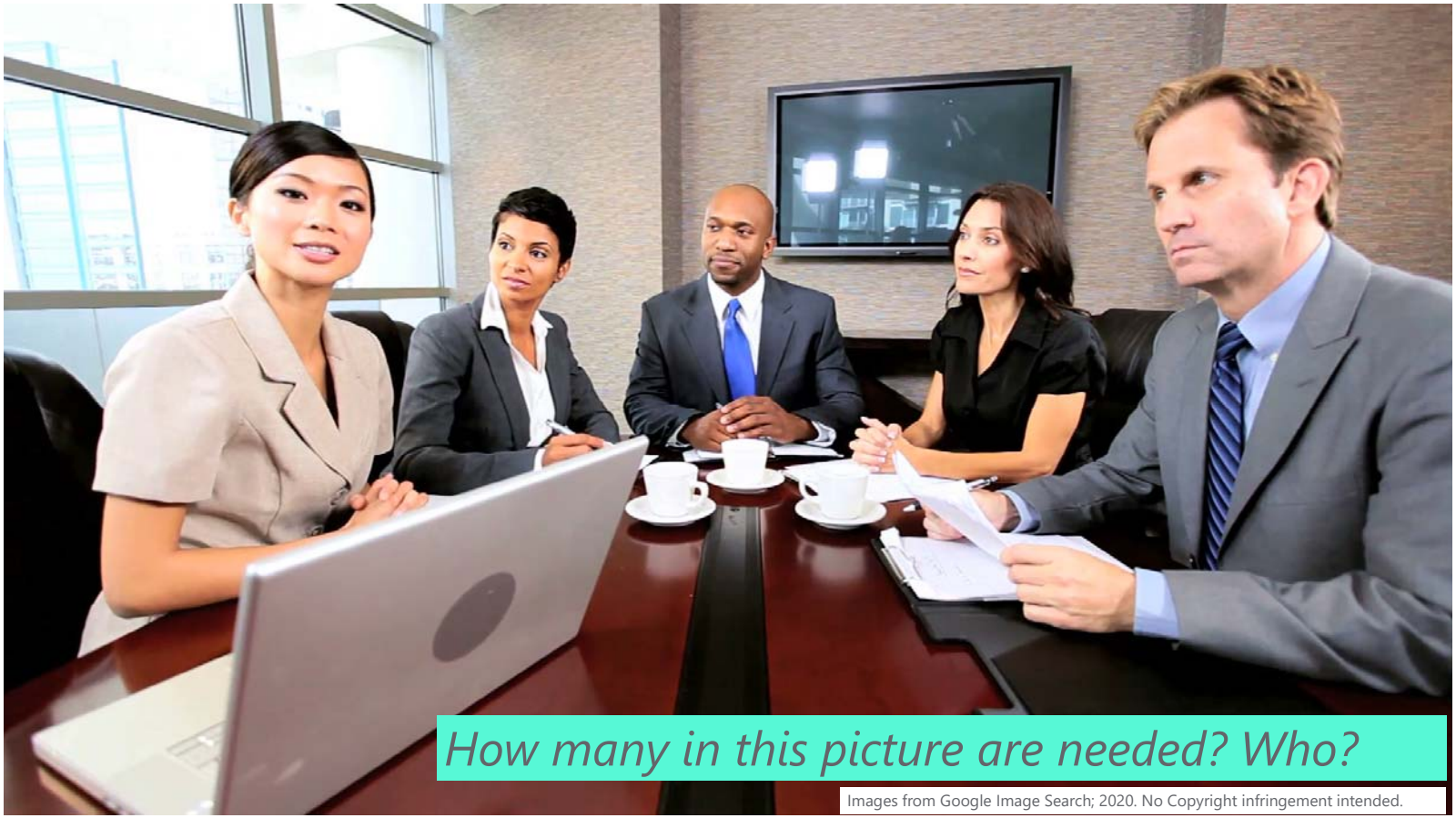

How many in this picture are needed? Who?

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Knowledge Transfer: who has the expertise?

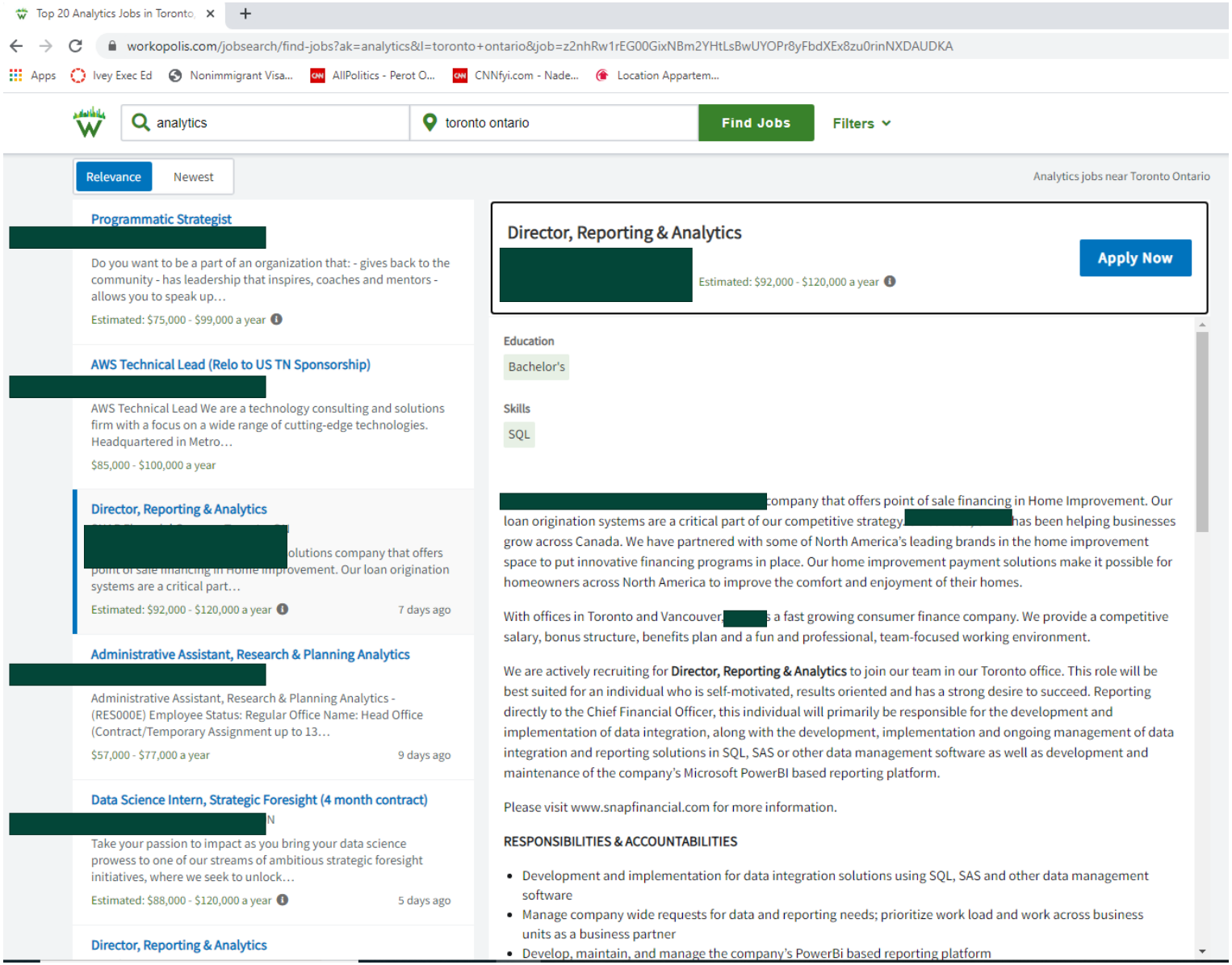
VS.

The "Manager" (architect, engineer, doctor,…) tells the "Analyst" (carpenter, construction worker, nurse,…) *WHAT* to do, *HOW* to do it, and *VALIDATES* the work.

i.e. "Blue-prints" transfer the knowledge!

The "Manager" tells the "Analyst" *WHAT* to do, at best occasionally *HOW* to do it, and rarely is able to *VALIDATE* the work.

i.e. "Spreadsheets" do not transfer the knowledge!


Top 20 Analytics Jobs in Toronto
workopolis.com/jobsearch/find-jobs?ak=analytics&l=toronto+ontario&job=z2nhRw1rEG00GixNBm2YHtLsBwUYOPr8yFbdXEx8zu0rinNXDAUDKA
Apps
Ivey Exec Ed
Nonimmigrant Visa...
AllPolitics - Perot O...
CNNfyi.com - Nade...
Location Appartem...
analytics
toronto ontario
Find Jobs
Filters
Relevance
Newest
Analytics jobs near Toronto Ontario
Programmatic Strategist
[redacted]
Do you want to be a part of an organization that: - gives back to the community - has leadership that inspires, coaches and mentors - allows you to speak up…
Estimated: $75,000 - $99,000 a year
AWS Technical Lead (Relo to US TN Sponsorship)
[redacted]
AWS Technical Lead We are a technology consulting and solutions firm with a focus on a wide range of cutting-edge technologies. Headquartered in Metro…
$85,000 - $100,000 a year
Director, Reporting & Analytics
[redacted]
olutions company that offers point of sale financing in Home Improvement. Our loan origination systems are a critical part…
Estimated: $92,000 - $120,000 a year
7 days ago
Administrative Assistant, Research & Planning Analytics
[redacted]
Administrative Assistant, Research & Planning Analytics - (RES000E) Employee Status: Regular Office Name: Head Office (Contract/Temporary Assignment up to 13…
$57,000 - $77,000 a year
9 days ago
Data Science Intern, Strategic Foresight (4 month contract)
[redacted]
N
Take your passion to impact as you bring your data science prowess to one of our streams of ambitious strategic foresight initiatives, where we seek to unlock…
Estimated: $88,000 - $120,000 a year
5 days ago
Director, Reporting & Analytics
Director, Reporting & Analytics
[redacted]
Estimated: $92,000 - $120,000 a year
Apply Now
Education
Bachelor's
Skills
SQL
[redacted]company that offers point of sale financing in Home Improvement. Our loan origination systems are a critical part of our competitive strategy. [redacted] has been helping businesses grow across Canada. We have partnered with some of North America's leading brands in the home improvement space to put innovative financing programs in place. Our home improvement payment solutions make it possible for homeowners across North America to improve the comfort and enjoyment of their homes.
With offices in Toronto and Vancouver, [redacted] is a fast growing consumer finance company. We provide a competitive salary, bonus structure, benefits plan and a fun and professional, team-focused working environment.
We are actively recruiting for Director, Reporting & Analytics to join our team in our Toronto office. This role will be best suited for an individual who is self-motivated, results oriented and has a strong desire to succeed. Reporting directly to the Chief Financial Officer, this individual will primarily be responsible for the development and implementation of data integration, along with the development, implementation and ongoing management of data integration and reporting solutions in SQL, SAS or other data management software as well as development and maintenance of the company's Microsoft PowerBI based reporting platform.
Please visit www.snapfinancial.com for more information.
RESPONSIBILITIES & ACCOUNTABILITIES
Development and implementation for data integration solutions using SQL, SAS and other data management software
Manage company wide requests for data and reporting needs; prioritize work load and work across business units as a business partner
Develop, maintain, and manage the company's PowerBi based reporting platform

Director, Reporting & Analytics

[redacted]

Estimated: $92,000 - $120,000 a year

Apply Now

- Experience with Microsoft PowerBi reporting platform

KNOWLEDGE SKILLS AND ABILITIES

- Ability to understand and explain each discipline of analytics, data management and programming and their differences
- High attention to detail, accuracy and good documentation habits
- Excellent communication and interpersonal skills.
- Developed judgment and problem solving skills sufficient to analyze information with the ability to interpret general procedures or approaches to formulate response/recommendations to problems
- Advanced writing skills sufficient to prepare written materials involving detailed descriptions and explanations requiring the accurate use of specialized terminology to effectively communicate information to stakeholders
- Proficient in self-planning skills sufficient to schedule, organize and manage multiple activities of varying complexity according to established plans and adjusting work schedules according to changing priorities, and time constraints
- Well-developed analytical skills with strong attention to detail

We would like to thank all applicants for their interest. However, only those under consideration will be contacted.

Job Types: Full-time, Permanent

Additional pay:

- Bonus Pay

Benefits:

- Dental Care
- Disability Insurance
- Extended Health Care
- Life Insurance
- Paid Time Off
- Vision Care

How to get started with Analytics

- Problem
  - Step 1: Define your problem; if possible quantify the impact.
- People
  - Step 2: Send *ALL* your employees for Analytics training at the Ivey Academy.
- Bits, Bytes & Terabytes (aka Data)
- Technology

How to get started with Analytics

- Problem
  - Step 1: Define your problem; if possible quantify the impact.
- People
  - Step 2: Hire, Train, and *Retain* Analytical talent.
- Bits, Bytes & Terabytes (aka Data)
- Technology

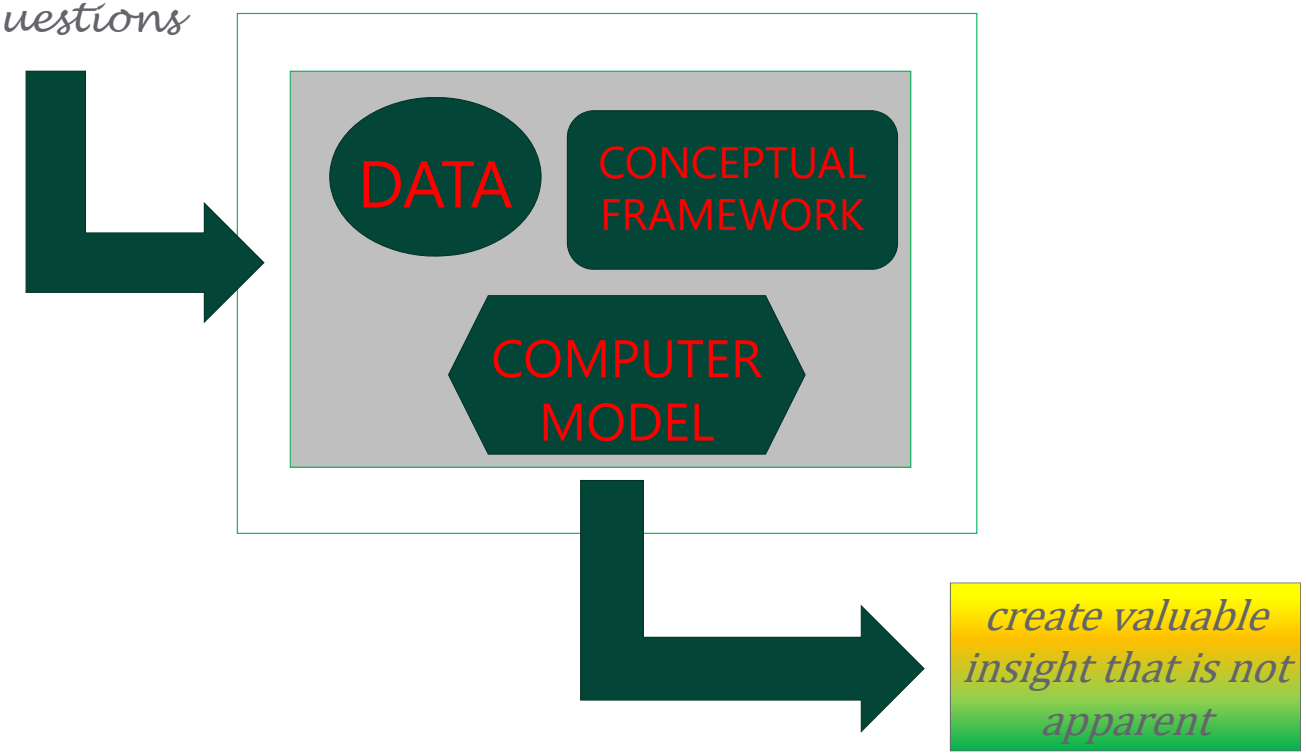
The Fundamental Analytics Misperception

Data

Answer

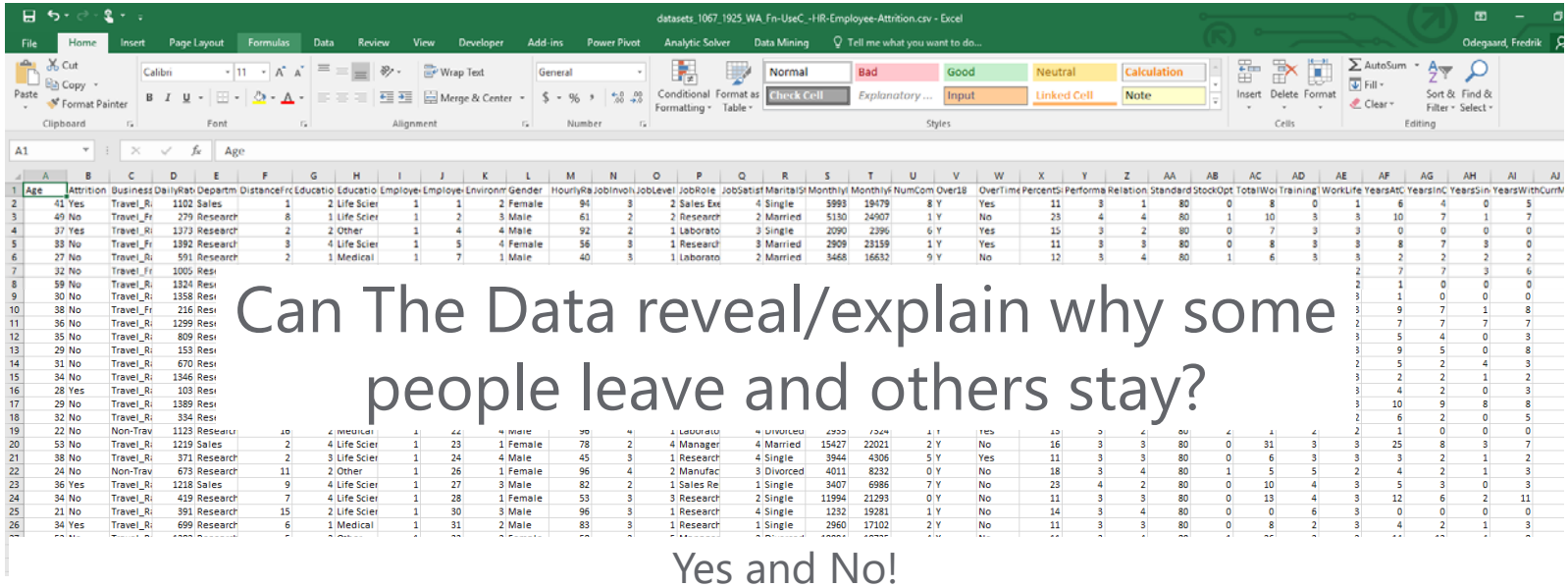
Business Analytics

Business & Industry
Insightful & Creative Questions



IBM Human Resource Data;

source: kaggle.com, 30 July, 2020



Can The Data reveal/explain why some people leave and others stay?

Yes and No!

1. Define the deeper problem or question.
   - ➢ Insight is never gained from vacuous questions.
2. Decide how to answer the question or analyze the problem.
   - ➢ Remarkably, most often this involves simple analytics.
3. Ensure you have The Data to enable step 2.
   - ➢ Often valuable insight comes from combining different data sources

How to get started with Analytics

- Problem
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- People
  - Step 2: Hire, Train, and *Retain* Analytical talent.
- Bits, Bytes & Terabytes (aka Data)
  - Step 3: Question $\Rightarrow$ Solution Method $\Rightarrow$ Data.
- Technology

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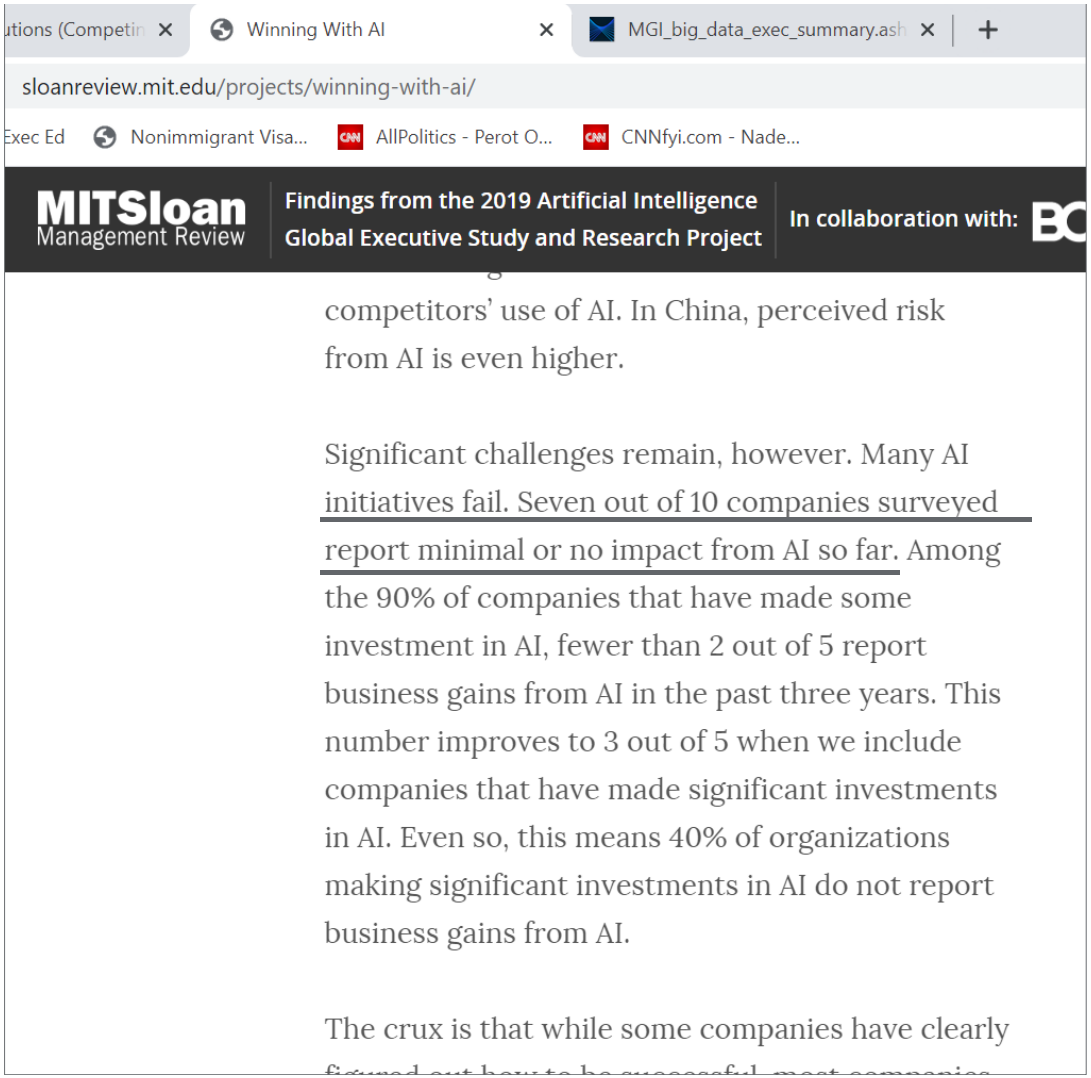
The Data-Technology Arms Race



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sloanreview.mit.edu/projects/winning-with-ai/

Exec Ed | Nonimmigrant Visa... | AllPolitics - Perot O... | CNNfyi.com - Nade...

MITSloan Management Review | Findings from the 2019 Artificial Intelligence Global Executive Study and Research Project | In collaboration with: BC

competitors' use of AI. In China, perceived risk from AI is even higher.

Significant challenges remain, however. Many AI initiatives fail. Seven out of 10 companies surveyed report minimal or no impact from AI so far. Among the 90% of companies that have made some investment in AI, fewer than 2 out of 5 report business gains from AI in the past three years. This number improves to 3 out of 5 when we include companies that have made significant investments in AI. Even so, this means 40% of organizations making significant investments in AI do not report business gains from AI.

The crux is that while some companies have clearly

BCG & Sloan Management Review, Oct 2019
Winning with AI

How to get started with Analytics

- Problem
  - Step 1: Define your problem; if possible quantify the impact.
- People
  - Step 2: Hire, Train, and *Retain* Analytical talent.
- Bits, Bytes & Terabytes (aka Data)
  - Step 3: Question ⇒ Solution Method ⇒ Data.
- Technology
  - Step 4: Do *NOT* invest in technology to get started with Analytics; make due with what you got.

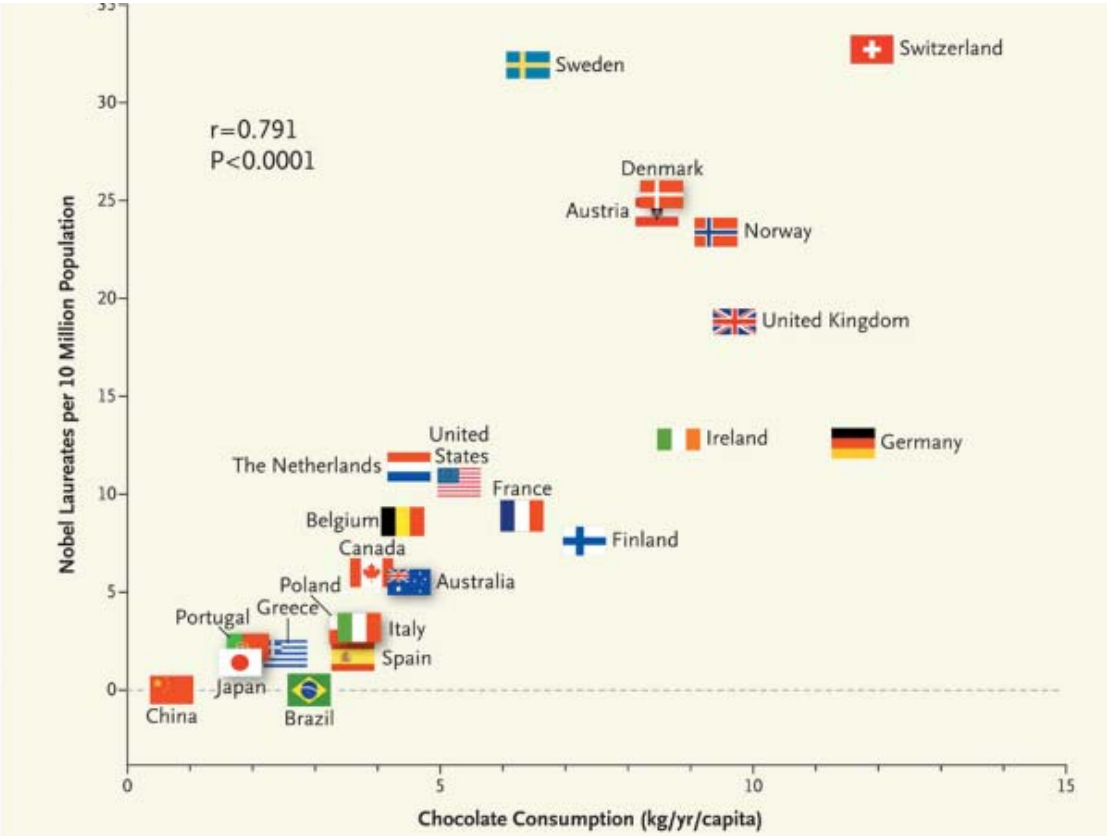
What prevents organizations from competing with analytics?

Poll 3

1. Lack of support from upper management
2. Conflicting internal incentives
3. Multiple stakeholders
4. Lack of resources
5. All of the above

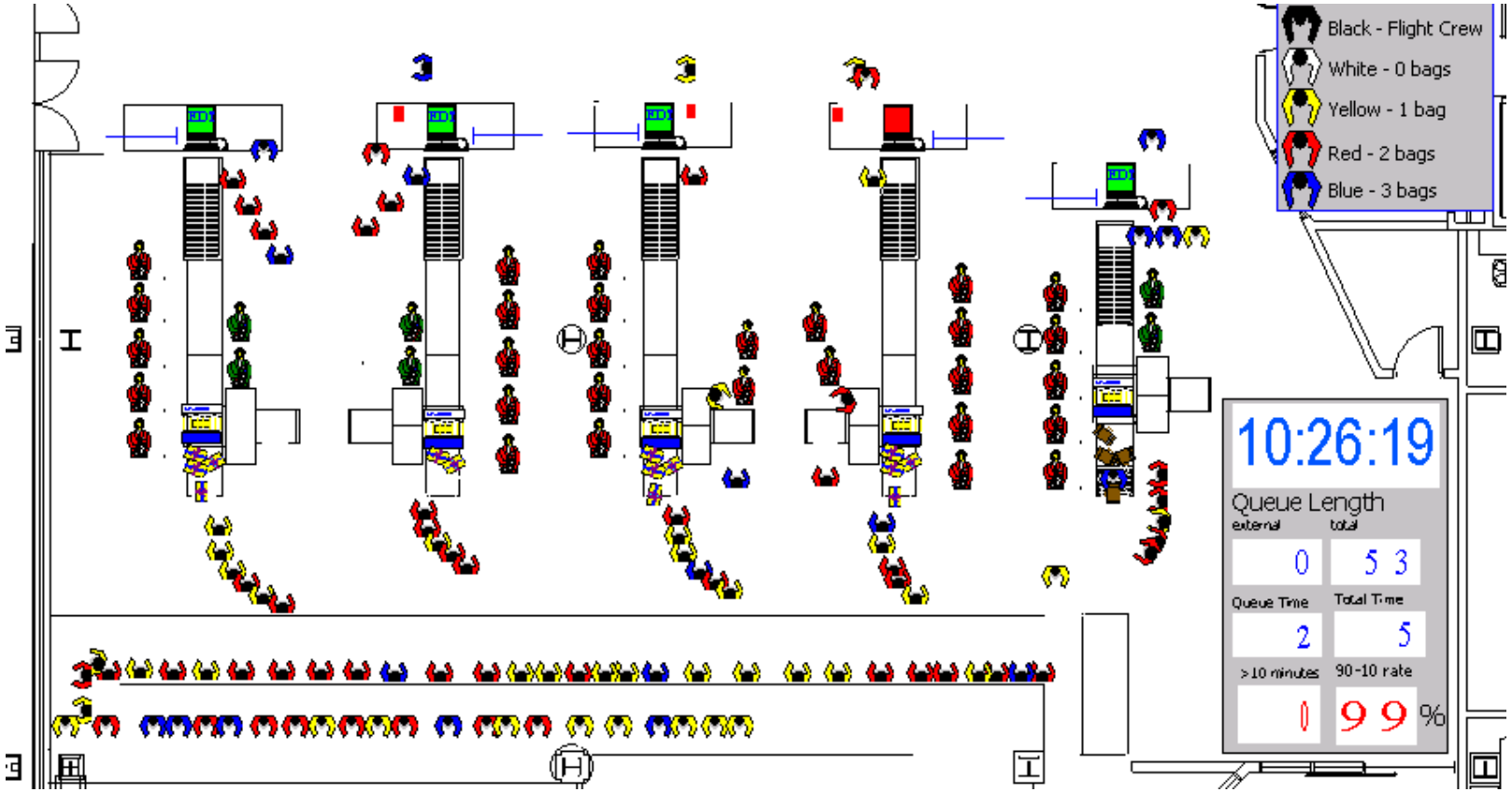
Learning lessons from developing and using analytics

Chocolate consumption and Nobel Laureates



https://www.businessinsider.com/chocolate-consumption-vs-nobel-prizes-2014-4?r=US&IR=T

YVR Pre-Board Screening



http://www.ivey.uwo.ca/faculty/MBegen

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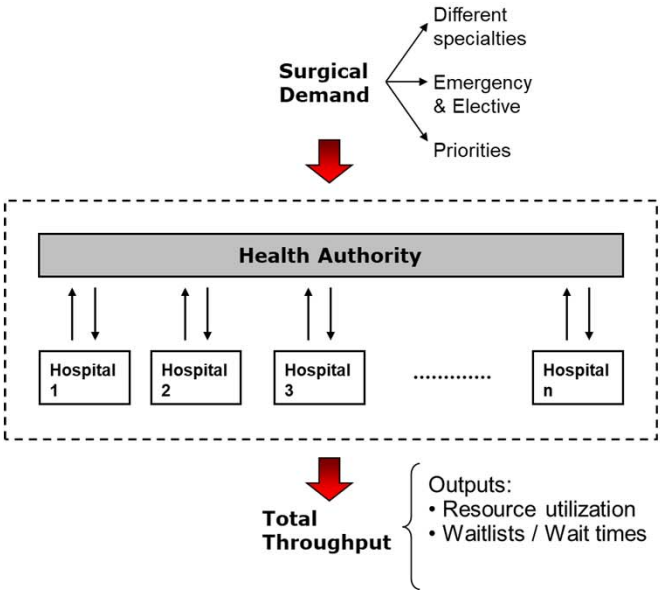
Project outcomes

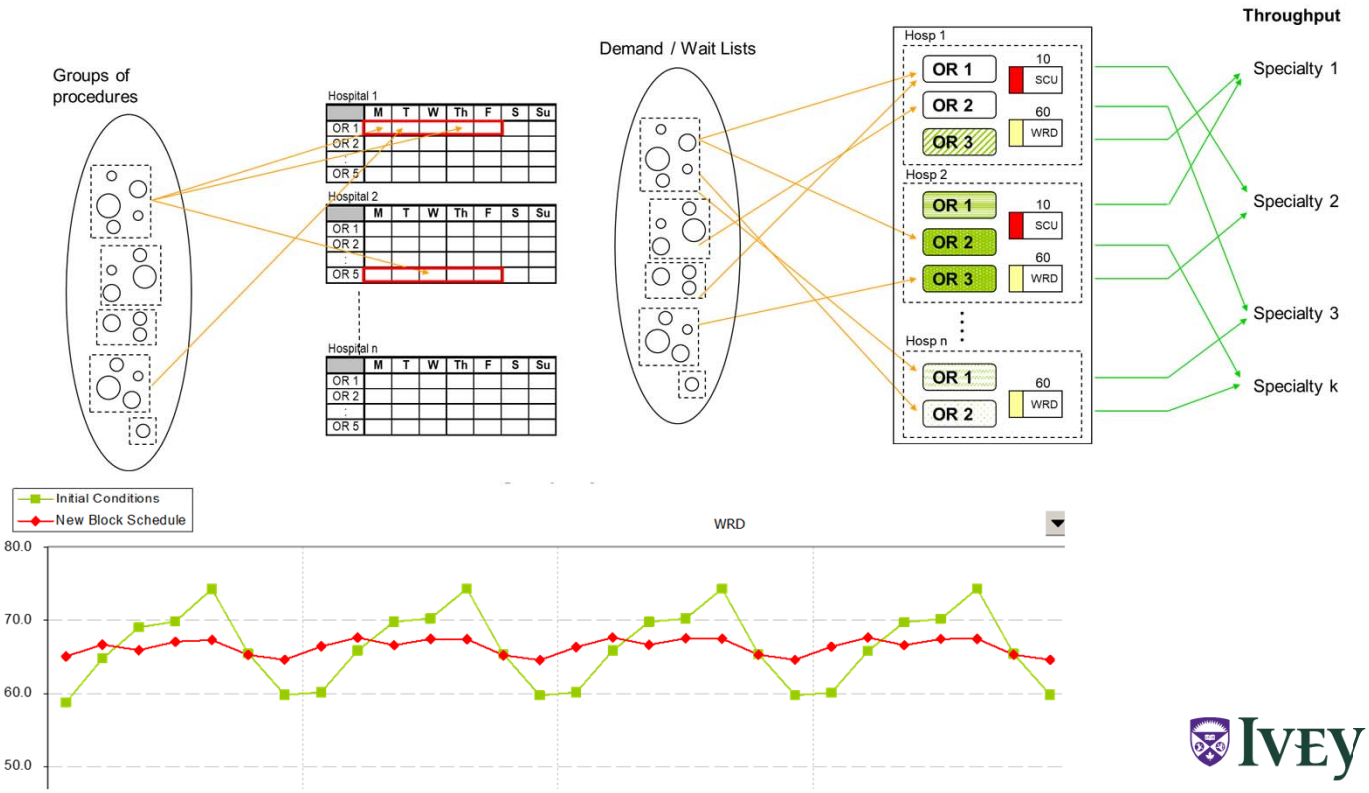
- Detailed process understanding
- Identified bottlenecks and evaluated configuration changes and work rules
- Established achievable service criteria
- Collected data on performance
- Methodology for forecasting demand and setting staff levels to meet service criteria
- Optimal staff allocation rules

Learning lessons

- Data
  - Collect, estimate and work with what is available. Determine which ones are critical.
- Multiple stakeholders
  - Air Canada, Airport Authority, security company, passengers.
- Validation (of analytical models)
  - Visual, numbers, absolute necessary for any analytical model/project
- C-level support
- Process mapping

Surgical block scheduling and wait list management for Fraser Health Authority





https://pubmed.ncbi.nlm.nih.gov/17695137/

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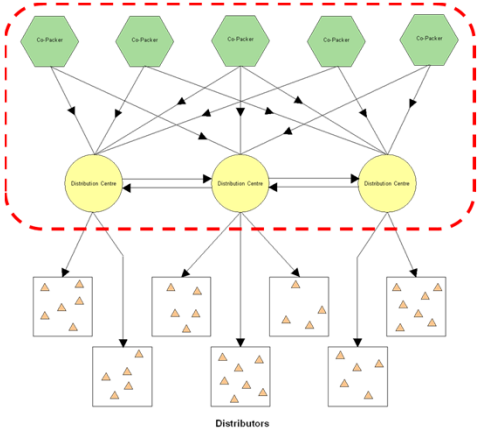
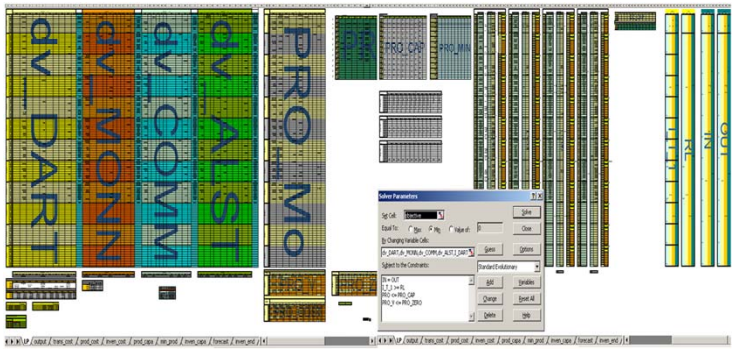
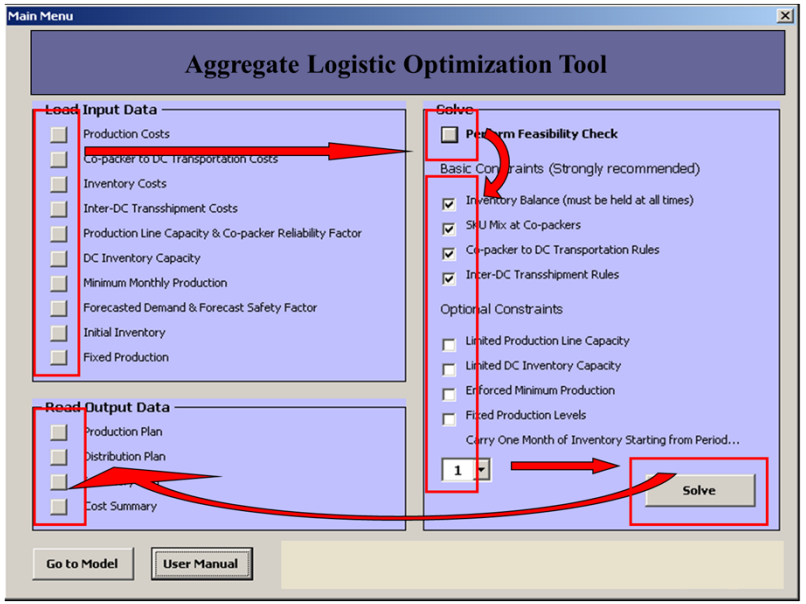
Learning lessons

- Need a champion (e.g., head of surgery on your side)
- Data issues
  - e.g., many different systems, not standardized, not available, takes month to get…
- Multiple stakeholders with different incentives
- Need to show no one will be worse-off (and hopefully all will be better-of)

Logistics Planning and Optimization for a Canadian Beverage Manufacturer







https://www.inderscienceonline.com/doi/abs/10.1504/EJIE.2019.098515

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Learning lessons

- Analytics can be most effective at the strategic level
- User friendly/easy to use tools work
- Proof of concept
- Validation with subject experts
- Need to work closely with decision makers and users

Thank you

See You Next Time