

ISACA Eindhoven

What's the impact of Artificial Intelligence for IT?

Martin Haagoort

ISACA Round Table Eindhoven, September 2019



Intellerts

Agenda

- Intro AI / Data Science
- Successful Data Science
- Discussion / Q&A

- Use case Data Driven Audit
(if time allows)

The public discourse on Artificial Intelligence is highly sensationalized, creating an excess of both exuberance and fear

Tremendous excitement is driving today's "artificial intelligence moment"

Significant cross-industry investment

~\$58 billion

Global AI investment by 2021¹¹

Sustained and strong investment growth

48% CAGR

Global cross-sector growth in AI investment through 2021¹¹

Tepid but significant investment from financial institutions

~\$10 billion

Investment in AI by financial institutions by 2020¹²

A top priority for financial service executives

76%

of banking CXOs agree that adopting AI will be critical to their organization's ability to differentiate in the market¹³

However, this excitement is also coupled with *significant uncertainty*



Sensationalism risks dampening the benefits that AI could bring to financial services, while exacerbating the harms

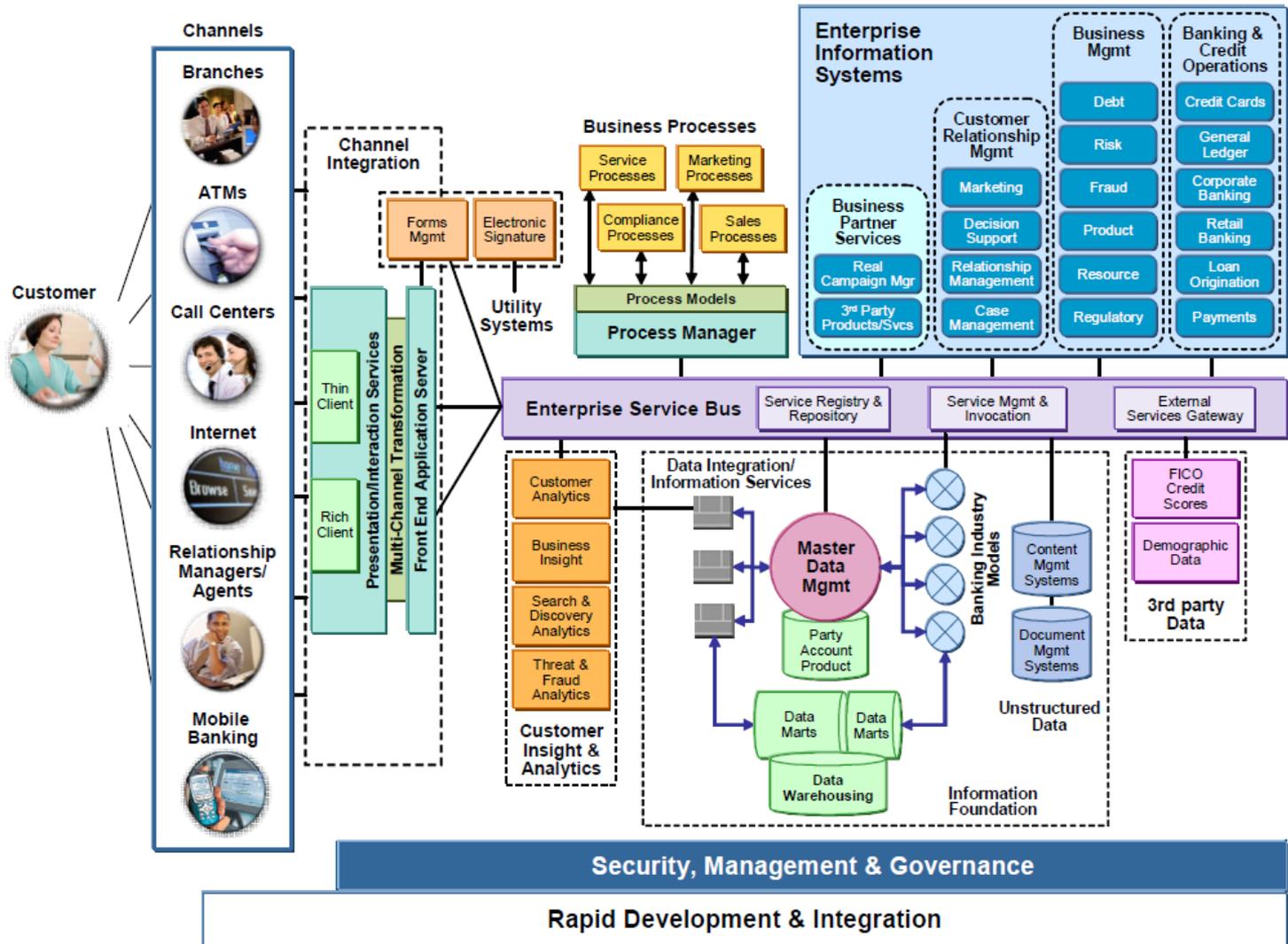
FAKE NEWS

Qualify the **F**uturists **T**houghts

Fake news

in the age of Artificial Intelligence

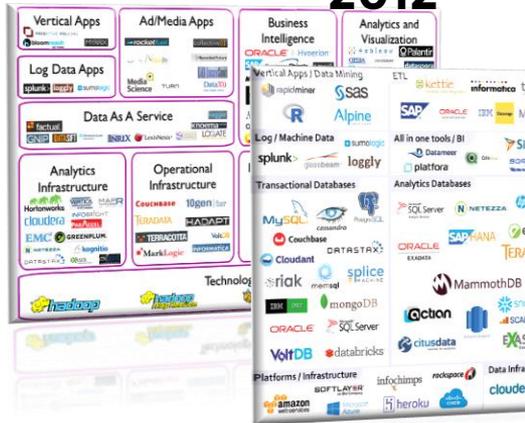
- Data quality is not so important anymore
- Data Science is for Data Scientists
- Technology will make things easy
- Our brain is like a computer
- AI will take over humanity



Technologies emerge like mushrooms

Big data / AI / ML / Data Science

2012



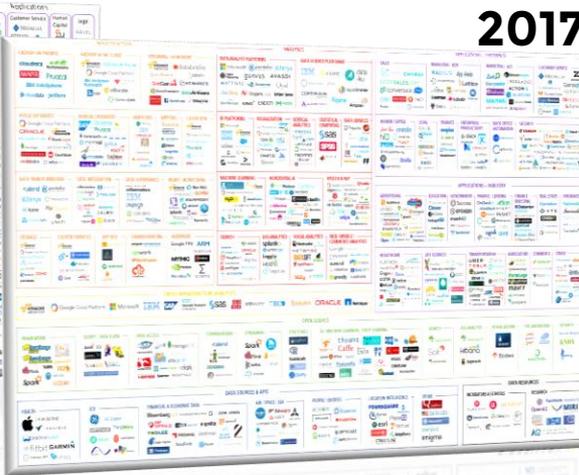
2014



2015



2016



2017

- Rapidly growing
- Diverse and fragmented
- Where to start?

Alphabet of Intelligence.....

(or a sensible approach to Data Science)

Ai



Artificial Intelligence

Apply AI with an understanding of its possibilities and its limitations.

Explain & simplify.

Bi



Business Intelligence

90% of businesses want AI but most need BI.

Keep asking basic questions to qualify.

Ci



Customer* Intelligence

With all you do: customer is the CenterPoint of your efforts.

Start with understanding who he/she is.

Di



Data Intelligence

Data Science = 90% Data + 10% Science.

Understand data in all its dimensions.

Ei



Equity Intelligence

Good data (products) will be regarded as equity.

Start treating your data accordingly.

Fi



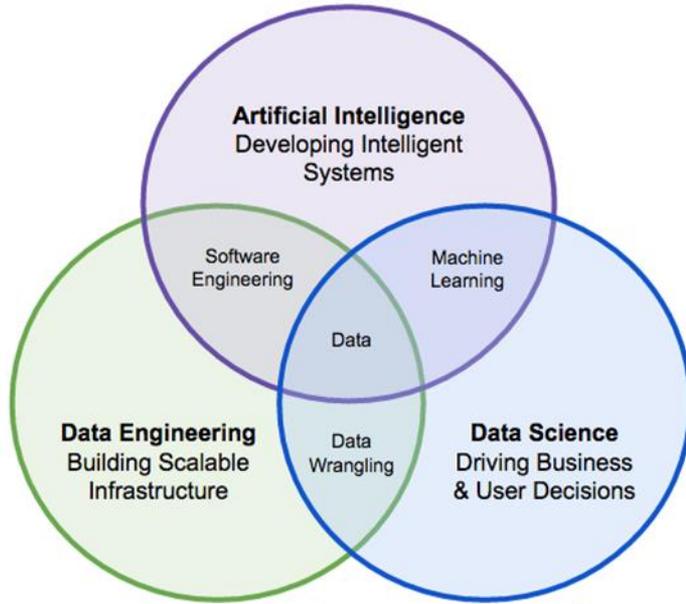
Financial Intelligence

If you understand Ei - getting the necessary financials will become less cumbersome.

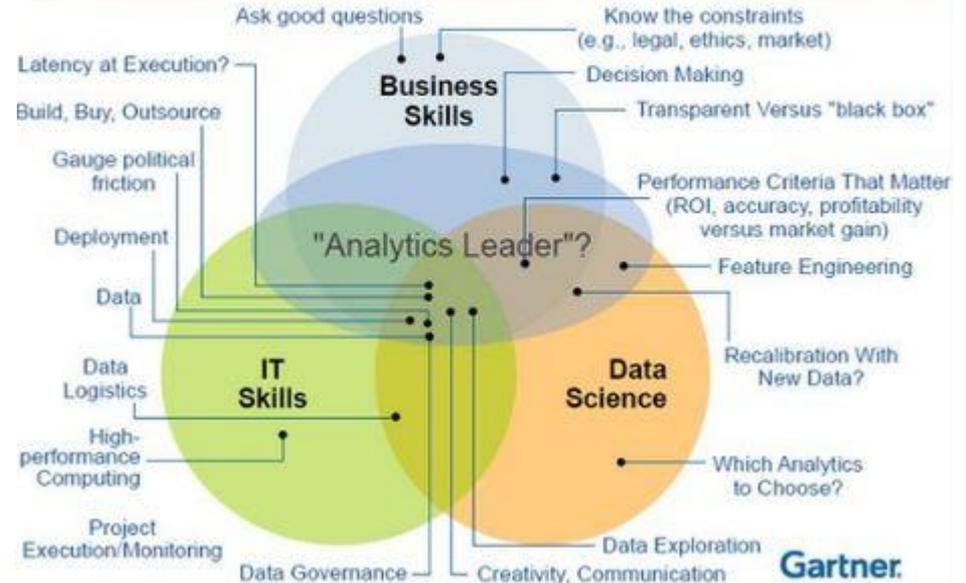
Quantify your records investments

Data Science Ethical Framework

Data Science

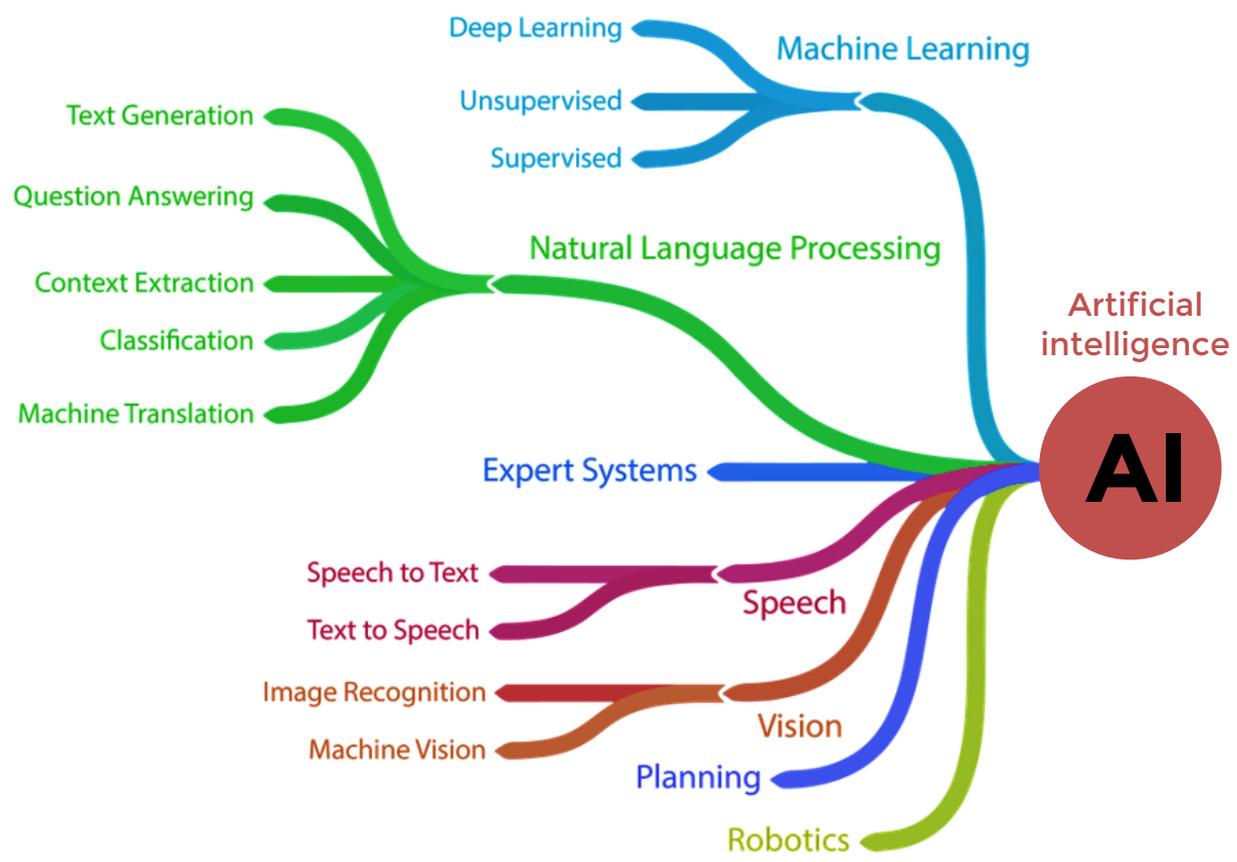
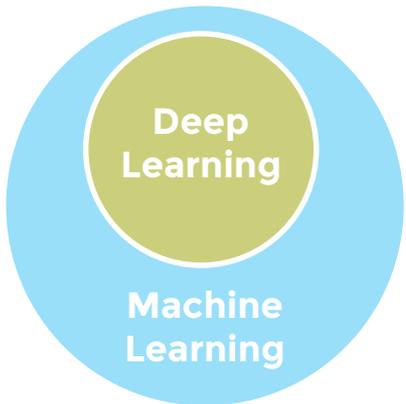


Driving the Success of Data Science Solutions: Skills, Roles and Responsibilities ...



AI

Is art(ificial)?



Our brain is not like a computer

The empty brain

Your brain does not process information, retrieve knowledge or store memories. In short: your brain is not a computer



Dr. Robert Epstein (@DrREpstein) • 2nd

Senior Research Psychologist, American Institute for Behavioral Research and
Technology

American Institute for Behavioral Research and Technology • Harvard University

AI will take over humanity



Vrij Nederland

woensdag 22 juli 2015 - 11 minuten lezen

‘Computers zijn nog net zo dom als dertig jaar geleden’

Het idee

Luc Steels, grondlegger van de kunstmatige intelligentie in Europa, lacht om berichten over machines met superintelligentie die de boel wel eens kunnen overnemen. ‘Mijn bewondering voor de menselijke intelligentie is alleen maar gegroeid.’

TEKST MARCEL VAN ENGELEN FOTO'S AN-SOFIE KESTELEYN

Algorithm

*“An algorithm is a finite procedure,
written in a fixed symbolic vocabulary,
governed by precise instructions,
moving in discrete steps, 1, 2, 3, . . . ,
whose execution **requires no insight, cleverness,
intuition, intelligence, or perspicuity,**
and that sooner or later comes to an end.”*

David Berlinski

In the logician's voice

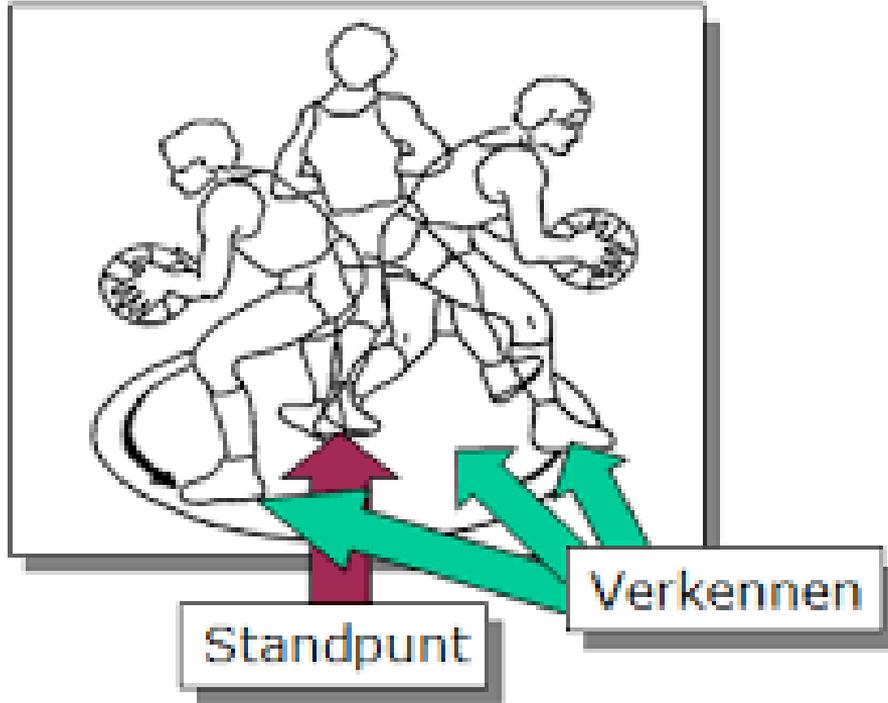
Artificial Intelligence (AI)

- An AI system uses mathematical algorithms that sort, filter and select from a large database.
- The system can '*learn*' to identify and interpret digital patterns, images, sound, speech, text data, etc.
- It uses computer applications to statistically analyse the available information and estimate the probability of a particular hypothesis
- Narrow tasks formerly (normally) done by a human can now done by an AI system.
- It's simulated intelligence is uncoupled from conscience.

BI

Business(es) are not very Intelligent (yet)

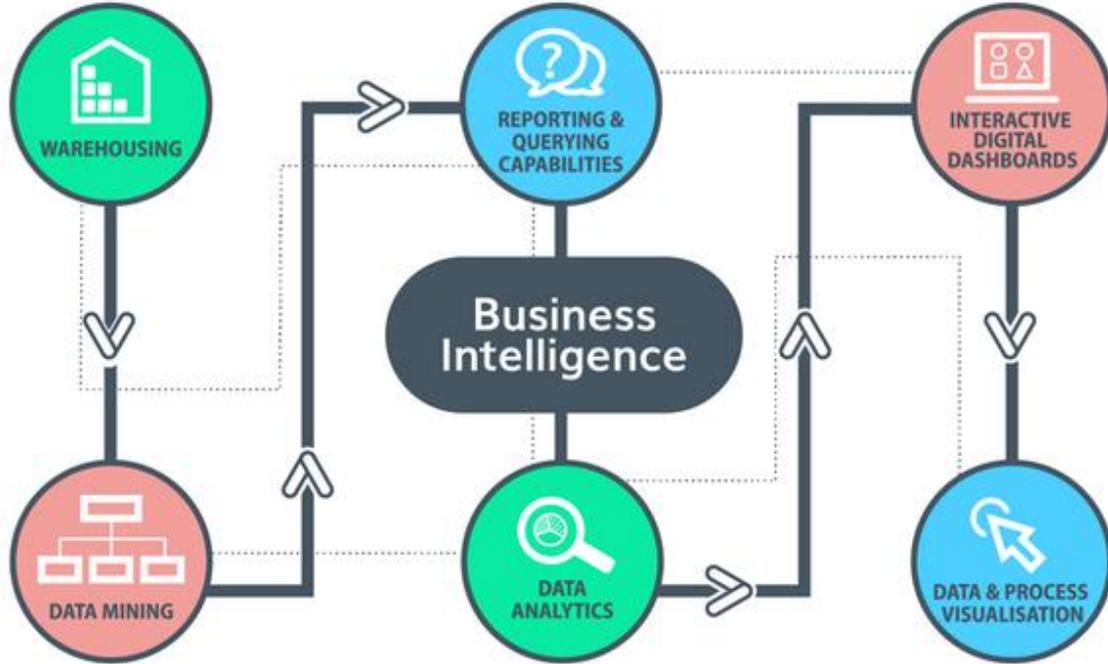
Do you pivot?



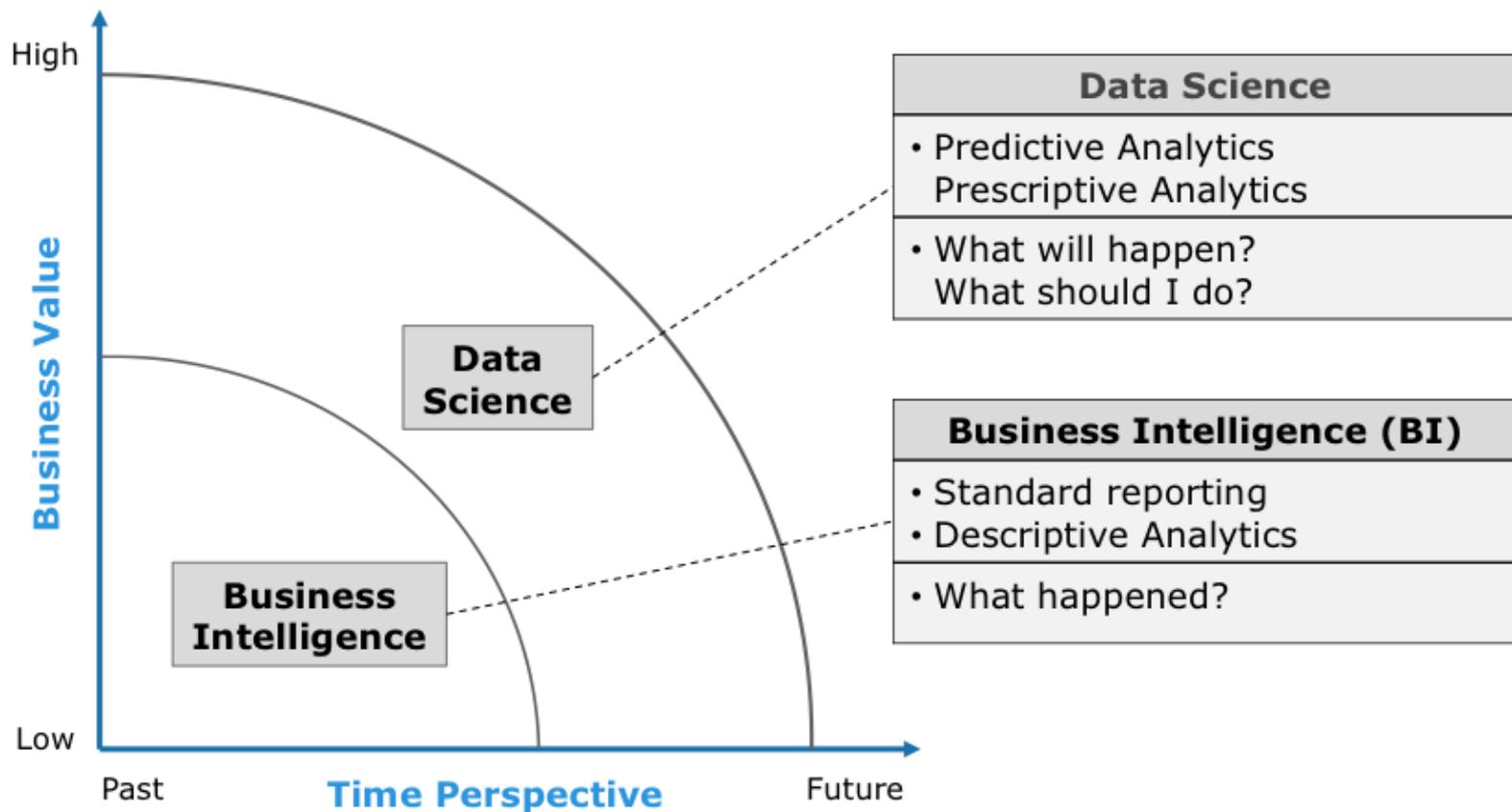
We all:

- Analyse
- Pivot
- Model
- Interpret
- Extrapolate
- Optimise

Business Intelligence



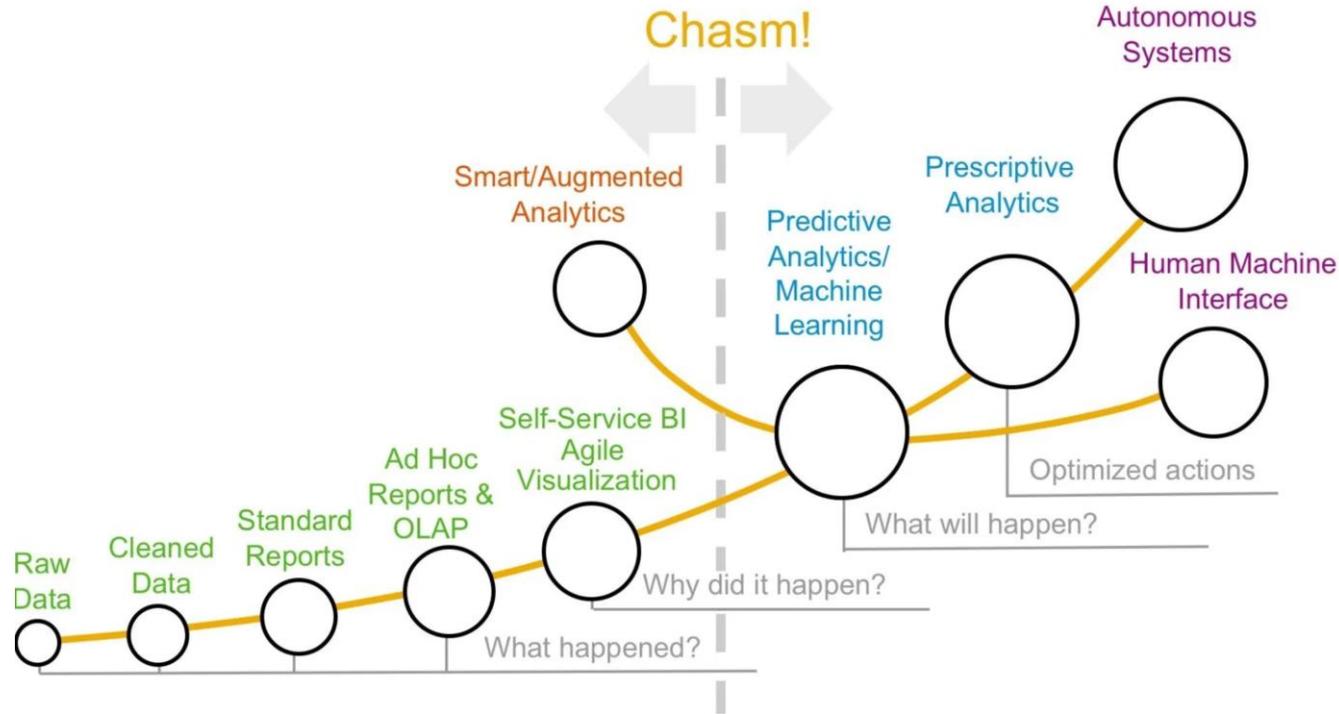
Evolution Of Analytics



Business Intelligence - questions

- Do you have an integrated view of your main operational data?
- Do you have the BI tools to have access to your operational data?
- Do you have the skills to mine your business data?
- Do you have the team to help you understand the data / processes?
- Do you have a good view how your key business functions are performing?

Maturity of Analytics



Advanced Analytics (not really new..)

(Applications of Data Science)

- Prediction (predict a value based on inputs)
- Classification (e.g., spam or not spam)
- Recommendations (e.g., Amazon and Netflix recommendations)
- Pattern detection and grouping (e.g., classification without known classes)
- Anomaly detection (e.g., fraud detection)
- Recognition (image, text, audio, video, facial, ...)
- Actionable insights (via dashboards, reports, visualizations, ...)
- Automated processes and decision-making (e.g., credit card approval)
- Scoring and ranking (Credit risk scores)
- Segmentation (e.g., demographic-based marketing)
- Optimization (e.g., risk management)
- Forecasts (e.g., sales and revenue)

DATA SCIENCE

What is required to be successful?

Successful Data Science

Key Success Factors

- Cultural change required
- Innovation understanding
- Technology challenge
- The Data challenge
- Availability of talent

Vendor	Infrastructure			Data Management			Analysis and Content Creation					Share Findings		Overall	
	Admin, Security and Architecture	Data Source Connectivity	Cloud BI	Self-Contained ETL and Data Storage	Self-Service Data Preparation	Metadata Management	Embedded Advanced Analytics	Smart Data Discovery	Interactive Visual Exploration	Analytic Dashboards	Mobile Exploration and Authoring	Embed Analytic Content	Publish, Share and Collaborate	Platform Workflow Integration	Ease of Use and Visual Appeal
Alteryx	3	4	3	3	3.5	3	5	1.5	2	2.5	1.5	2	2.5	4	3.2
Birst	4	4	4	4	3.5	4.5	2	1	3.5	3	4.5	5	3	4	3.5
Board International	4	4	3	3.5	3	3	3.5	2	3	2.5	3	2.5	3	4.5	3.4
ClearStory Data	4.5	3.5	3	4.5	4.5	5	2.5	2	3.5	3	2	4.5	3	5	4.3
Datameer	4	3	2.5	4	3	2.5	3	1.5	2.5	2	2	3.5	2	4	2.9
Domo	4.5	3.5	3.5	3	2.5	2.5	2.5	1.5	3	3	3	3	3.5	3.5	4.2
IBM (Cognos Analytics)	4	3	2.5	2	2.5	3	2	2	3	3	2.5	2	2	2	3.7
IBM (Watson Analytics)	3	2.5	3	1.5	2.5	2	2.5	3	3	2.5	2.5	2	2	3.5	3.9
Information Builders	4.5	4	2.5	4	2.5	3.5	3	2	3	3	4.5	4.5	3	3	3.0
Logi Analytics	4	4	2.5	3.5	3	2.5	3.5	1	4.5	4	2	4.5	4	3	4.2
Microsoft	4	4.5	3.5	4	3	3	2.5	2.5	4	3	4	3.5	2	2.5	4.2
MicroStrategy	5	4.5	3	4	3.5	4	3	1.5	4	3.5	4.5	3	3	5	3.7
Oracle	4.5	2.5	3	4	2.5	3	3	2	3	3	3	4.5	2	3	3.9
Pentaho	4.5	4	2	3.5	2.5	3.5	4.5	1	3	3	2.5	4.5	2	3.5	3.2
Pyramid Analytics	3	4	3.5	3.5	3	3	2	1	4.5	3	2.5	3.5	4	5	3.8
Qlik	4	3	3	5	3	3	2	2	3.5	3	2.5	4.5	3	3	4.1
Salesforce	4.5	2	3.5	3.5	2.5	3.5	4	4	3	3	3.5	5	3	2.5	4.4
SAP (BusinessObjects Cloud)	3	2.5	3	3	3	2.5	3	2	2.5	3	1	1.5	3	2.5	4.0
SAP (BusinessObjects Lumira)	4.5	2.5	2	2.5	3	3	1.5	2	3.5	3	3	3	2	2	3.8
SAS	4.5	3.5	3	4	3	3	3.5	2	4.5	3.5	3	2	3	3	3.3
Sisense	3.5	3	2.5	5	3	3.5	2	2.5	3.5	3	3	4	2.5	5	3.8
Tableau	3.5	4	3	4	3	3	3	2	4	4	4	3	2	5	4.3
ThoughtSpot	4	2.5	2.5	4	2.5	3.5	1.5	2	2.5	2.5	2.5	2	2.5	5	4.2
TIBCO Software	4	4	3	4	3.5	3.5	4	2	4	4	3	4.5	3	4	3.7
Yellowfin	3	3	2.5	3	3	3.5	2.5	2	3.5	3.5	4	4	4	5	3.8
Zoomdata	3.5	3	2.5	3	2.5	2.5	2.5	1.5	2.5	3	2	4	2	4	3.6

1 = Poor or Absent: 2 = Fair: 3 = Good: 4 = Excellent: 5 = Outstanding

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1 = Poor or Absent: Most or all defined requirements for a capability are not achieved.

2 = Fair: Some requirements are not achieved.

3 = Good: Meets requirements.

4 = Excellent: Meets or exceeds some requirements.

5 = Outstanding: Significantly exceeds requirements.

Elements of Data Driven Culture

Data culture is decision culture

- Don't approach data analysis as a cool "science experiment" or an exercise in amassing data for data's sake.
- The fundamental objective in collecting, analyzing, and deploying data is to make better decisions.

Data culture, C-suite imperatives, and the board

- Commitment from the CEO and the board is essential.
- But that commitment must be manifested by more than occasional high-level pronouncements;
- There must be an ongoing, informed conversation with top decision makers and those who lead data initiatives throughout the organization.

The democratization of data

- Get data in front of people and they get excited.
- But building cool experiments or imposing tools top-down doesn't cut it.
- To create a competitive advantage, stimulate demand for data from the grass roots.

Data culture and risk

- An effective data culture puts risk at its core—a "yin and yang" of your value proposition.
- Although companies must identify their "red lines" and honor them, risk management should operate as a smart accelerator, by introducing analytics into key processes and interactions in a responsible manner.

Culture catalysts

- The board and the CEO raise the data clarion, and the people on the front lines take up the call.
- But to really ensure buy-in, someone's got to lead the charge.
- That requires people who can bridge both worlds—data science and on-the-ground operations.
- And usually, the most effective change agents are not digital natives.

Sharing data beyond company walls? Not so fast

- There's increasing buzz about a coming shift to ecosystems, with the assumption that far greater value will be delivered to customers by assembling a breadth of the best data and analytics assets available in the market rather than by creating everything in-house.
- Yet data leaders are building cultures that see data as the "crown jewel" asset, and data analytics is treated as both proprietary and a source of competitive advantage in a more interconnected world.

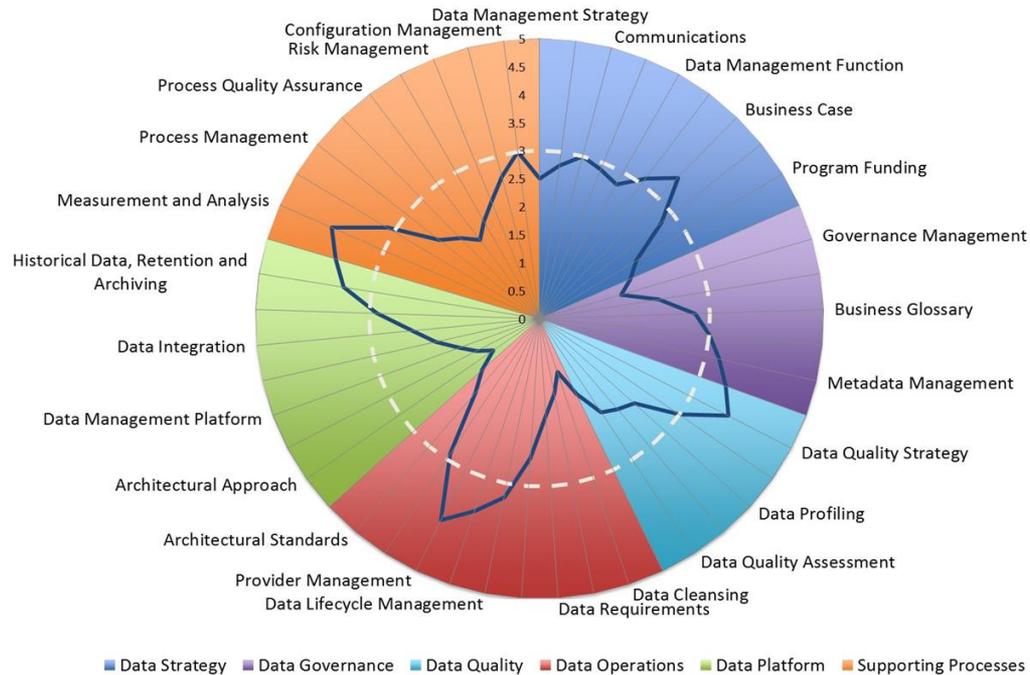
Marrying talent and culture

- The competition for data talent is unrelenting.
- But there's another element at play: integrating the right talent for your data culture.
- That calls for striking the appropriate balance for your institution between injecting new employees and transforming existing ones.
- Take a broader view in sourcing and a sharper look at the skills your data team requires.

Basics first

- State of your Data
- The Assurance of your Data
- Structures of your Data
- Your understanding of your Data

The state of your data



Data Assurance = Business & Technology

Data quality processes

1

Completeness



Are there missing values?

- Frequency table
- Comparison with original source

2

Conformity



Do the values correspond with the expected format?

- Frequency table
- Field
- Part of field
- Length of field

3

Accuracy



Are the entered values correct?

- Frequency table
- Descriptive statistics
- Reference table (internal or external)

4

Consistency



Is the data the same across all systems?

- Cross table
- KPI
- Correlation matrix
- Scatterplot

5

Uniqueness



Does the database contain duplicates?

- Count unique number of records
- Deduplication function

6

Timeliness



Are the data refreshed in time?

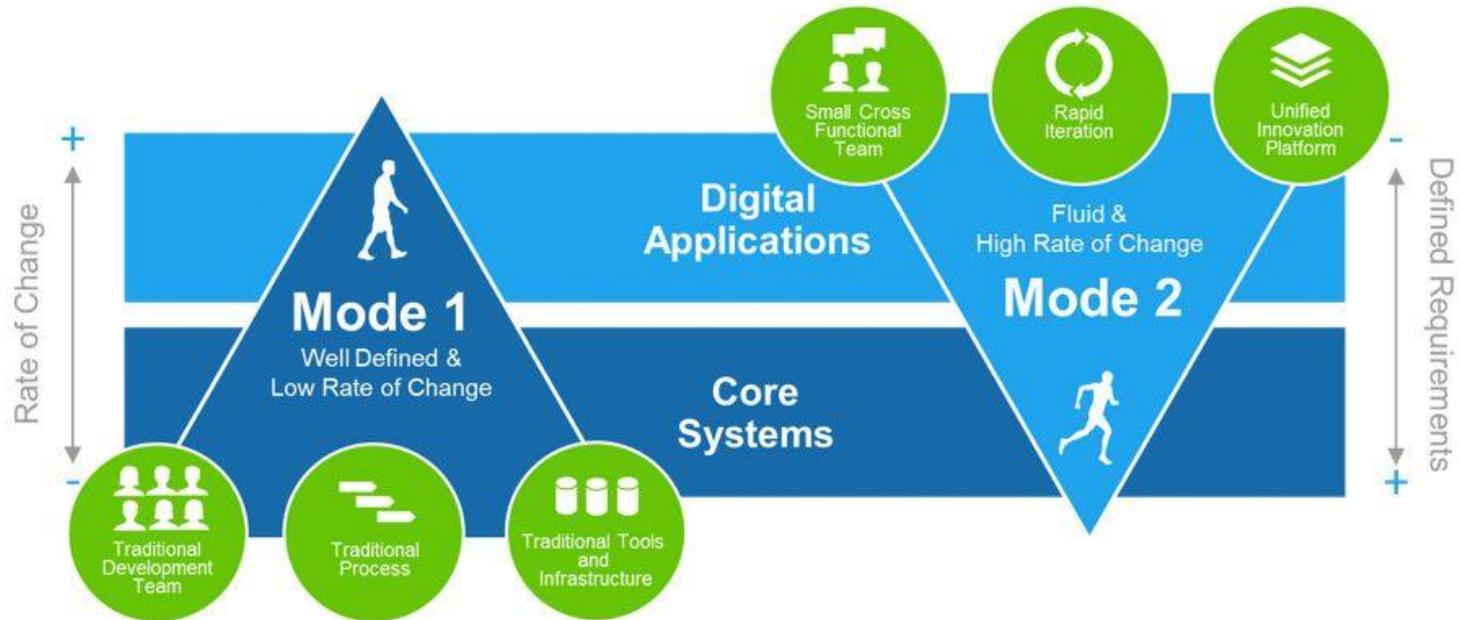
- Check date field
- Check with external file

DATA SCIENCE & IT

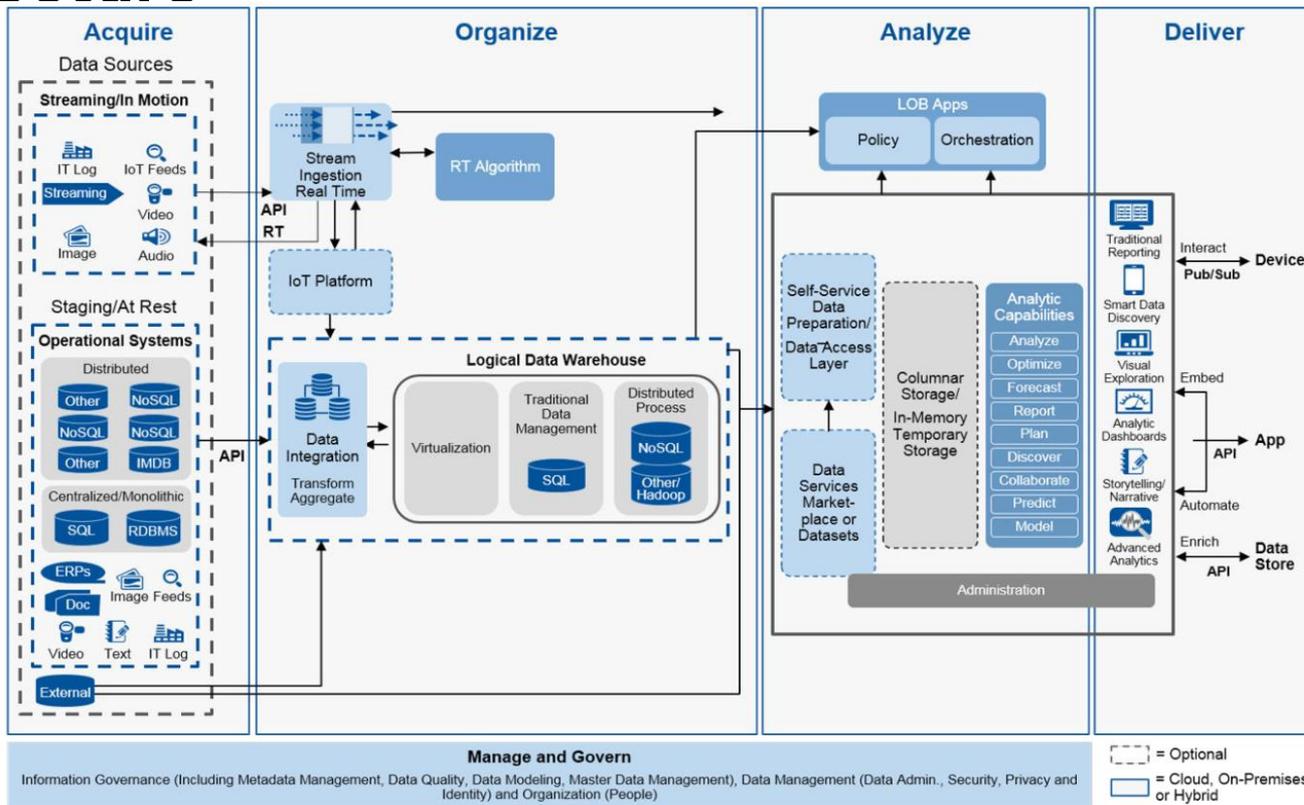
Match made in heaven?

BI-Model IT

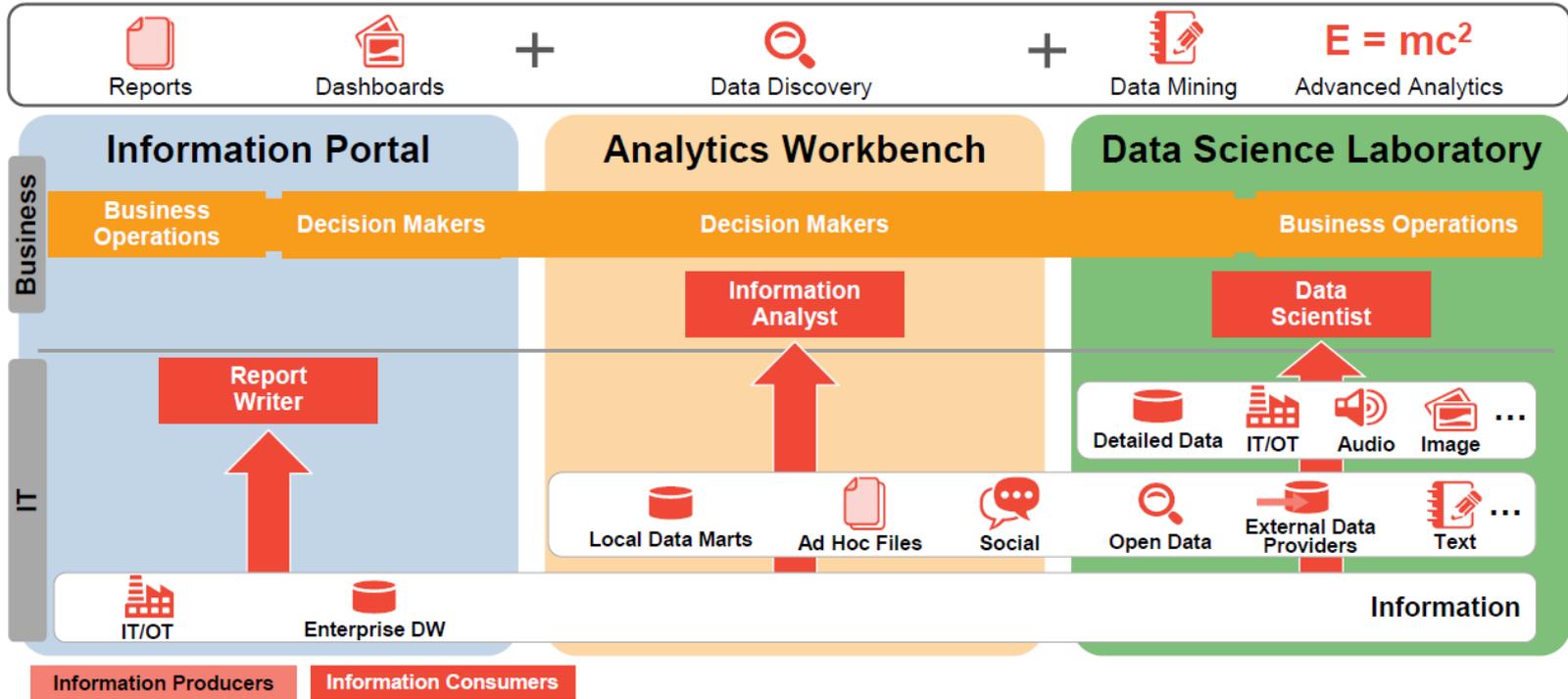
IT Future is Now. Gartner, John-MacDorman



A Comprehensive, End-to-End Data and Analytics Architecture

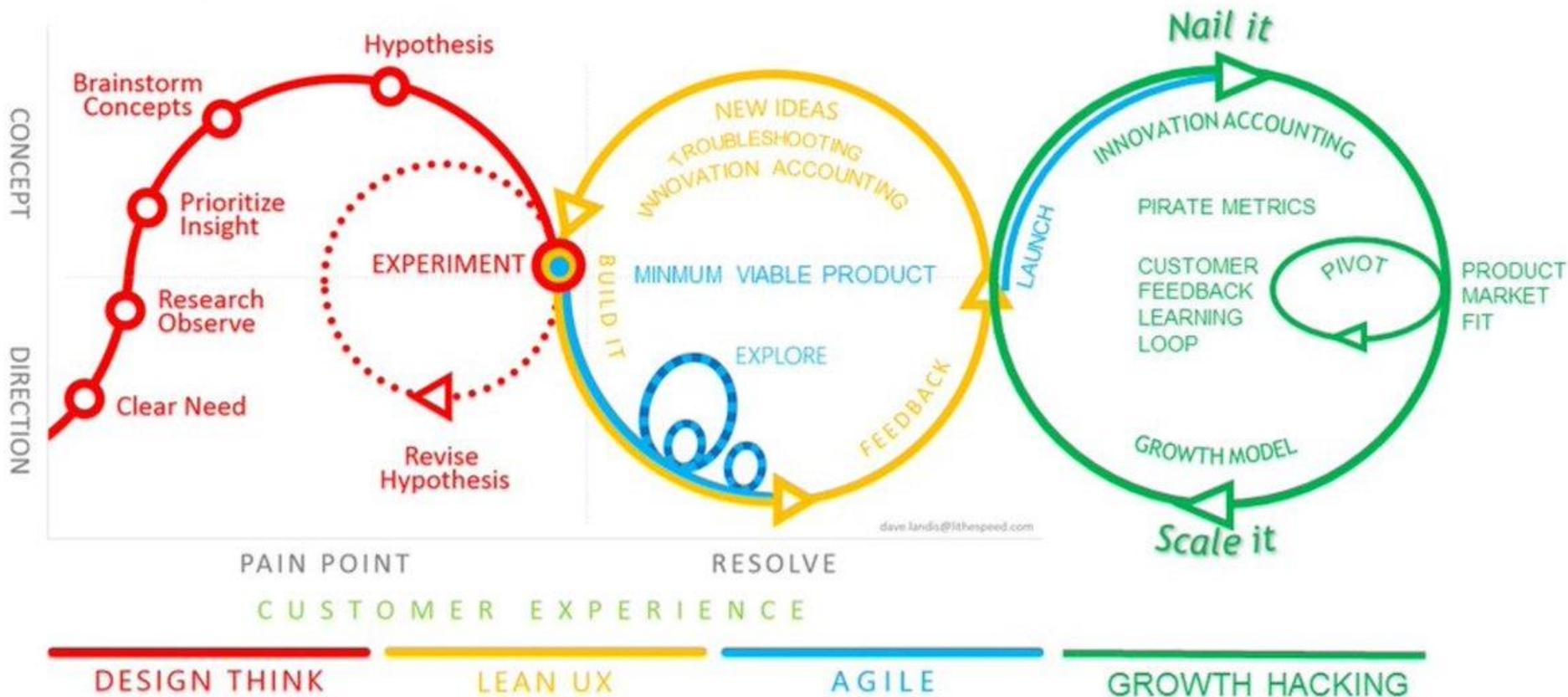


Tiered business analytics environment



LEAN STARTUP

BETTER TOGETHER



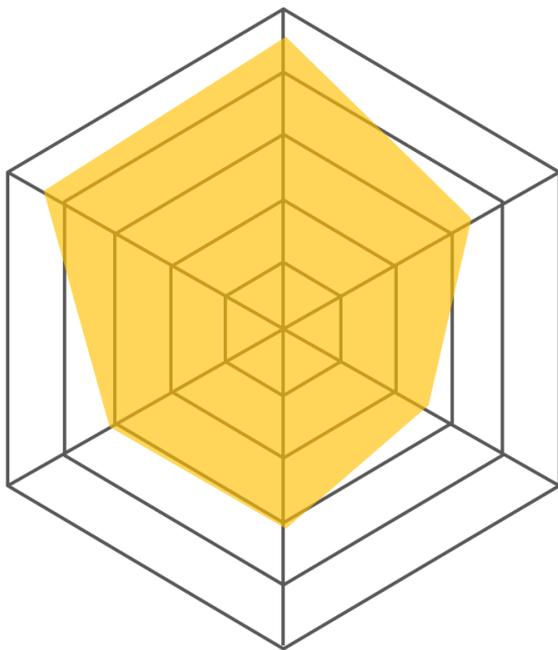
DATA SCIENTIST

Unicorns?

Competence

Communicator

Visualizer



Data Wrangler

Programmer

Technologist

Modeller

MODERN DATA SCIENTIST

Data Scientist, the sexiest job of 21th century requires a mixture of multidisciplinary skills ranging from an intersection of mathematics, statistics, computer science, communication and business. Finding a data scientist is hard. Finding people who understand who a data scientist is, is equally hard. So here is a little cheat sheet on who the modern data scientist really is.

MATH & STATISTICS

- ☆ Machine learning
- ☆ Statistical modeling
- ☆ Experiment design
- ☆ Bayesian inference
- ☆ Supervised learning: decision trees, random forests, logistic regression
- ☆ Unsupervised learning: clustering, dimensionality reduction
- ☆ Optimization: gradient descent and variants

DOMAIN KNOWLEDGE & SOFT SKILLS

- ☆ Passionate about the business
- ☆ Curious about data
- ☆ Influence without authority
- ☆ Hacker mindset
- ☆ Problem solver
- ☆ Strategic, proactive, creative, innovative and collaborative

PROGRAMMING & DATABASE

- ☆ Computer science fundamentals
- ☆ Scripting language e.g. Python
- ☆ Statistical computing package e.g. R
- ☆ Databases SQL and NoSQL
- ☆ Relational algebra
- ☆ Parallel databases and parallel query processing
- ☆ MapReduce concepts
- ☆ Hadoop and Hive/Pig
- ☆ Custom reducers
- ☆ Experience with xaaS like AWS

COMMUNICATION & VISUALIZATION

- ☆ Able to engage with senior management
- ☆ Story telling skills
- ☆ Translate data-driven insights into decisions and actions
- ☆ Visual art design
- ☆ R packages like ggplot or lattice
- ☆ Knowledge of any of visualization tools e.g. Flare, D3.js, Tableau



5 steps to 'Data-driven' organization

1. **Understand your data**
from there start understanding your business
2. **Create a data culture**
fundament for change
3. **Create an architecture**
to support a data and analytics strategy (BI & AI)
4. **Practical use cases**
select the right wins – maximize learning
5. **Train / coach continuously**
at all levels of organization



**WE ARE
ALL DATA
SCIENTISTS**



THANK YOU!

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Consulting



Data Science

Data Science analytics, modeling, ML, NLP, advice, consulting, data research

R&D



Big Data Lab

Data Science environment for exploration and development

Solutions



Big Data Platform

AI and BI applications as decision support systems – integrated data-platform

Academy



Training & Education

Training and learning programs