UREASON

Responding to your environment

Predictive Analytics

UREASON | PPA Conference February 2016

Agenda

UReason

- Company
- Products/Solutions/Customers

Predictive Analytics

- What is Predictive Analytics
- Why should you care about Predicitive Analytics
- Signs for Predicitve Analytics
- Predictive Analytics Program & Process

Closing

- Tooling for Predictive Analytics
- Round-up, What next?

UREASON

Dutch company founded in 2001

Main offices in the Netherlands (Delft) and the UK (Maidenhead)

A provider of a expert systems, in-house development, with amongst others machine learning capabilities

Data scientists specialized in increasing operational intelligence

Vast experience in data sciences and A.I.

Platform Capability Highlights

Data: Real-time: OPC DA, RDBMS, WITSML; Historical: RDBMS/Files/Replay WITSML

Dimension Reduction: PCA and SAX parsing and clustering methods such as DBScan

Model: Soft Class Model , Connectivity & Containment ship, full CRUD access

Machine Learning: Supervised Neural Networks, Unsupervised Neural Networks, Symbolic Anomaly Detection (unsupervised), Multivariate Symbolic Anomaly Detection (unsupervised), SVM (supervised)

Rules: Diagnostic Rules, Control Flow, Reusable Rule Blocks, Event Fault Trees, RT FFT, Bow-Tie Models, Decision Support Agents, Fuzzy Reasoning, Topology Reasoning, etc.

Results: WYSIWYG UI: Data Displays, Real-Time Trends, Alarm & Event Browser, SOP in Event etc. Instant web-dashboards – no programming

Deployment: High Availability support, data & event replication, public/private modules, remote deployment and updates.

Customers

Customers in Europe, North America and the Middle East

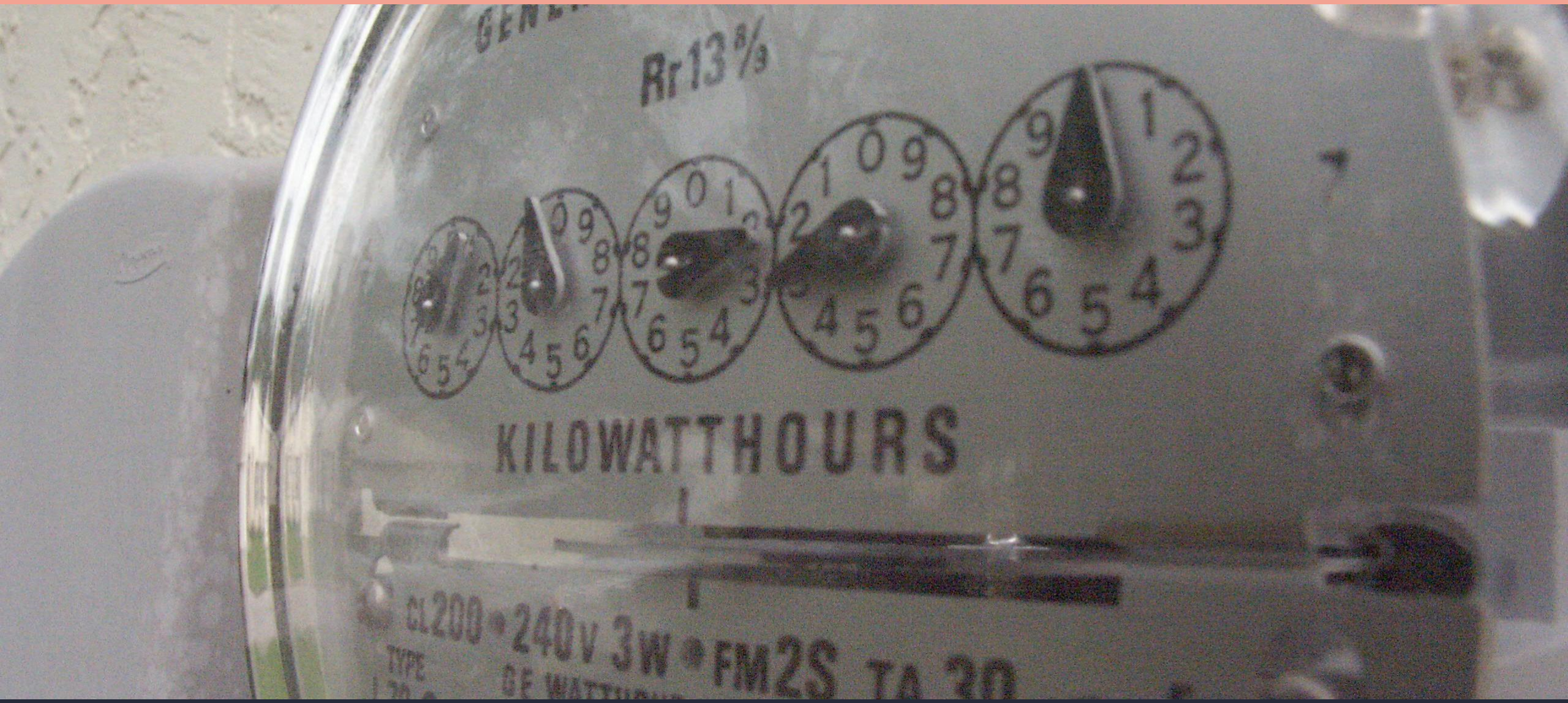
Industries: Oil & Gas, Petrochemical, Chemical, Traffic, Energy, Telecom and Utilities

Some Examples:

Sabic, Imtech, Halliburton, Siemens Power Generation, Vestolit, Shell Global Solutions/NAM, BASF, BP, Shell, KPE, OMV, SAFCO, Siemens Oil & Gas, LyondellBasell, Total E&P, Anglian Water, Tronox, Fluxys, Isover, Maersk, EMMI, SIAAP, Clough Amec, Cameron, ThamesWater, Telia, …

From Data Sciences to Solution Development

Predictive Analytics

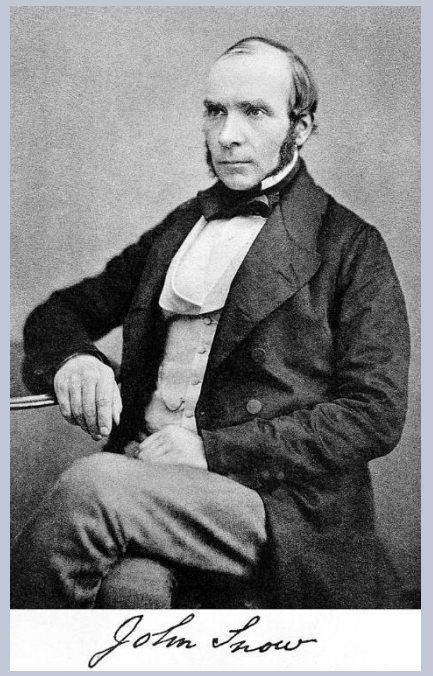


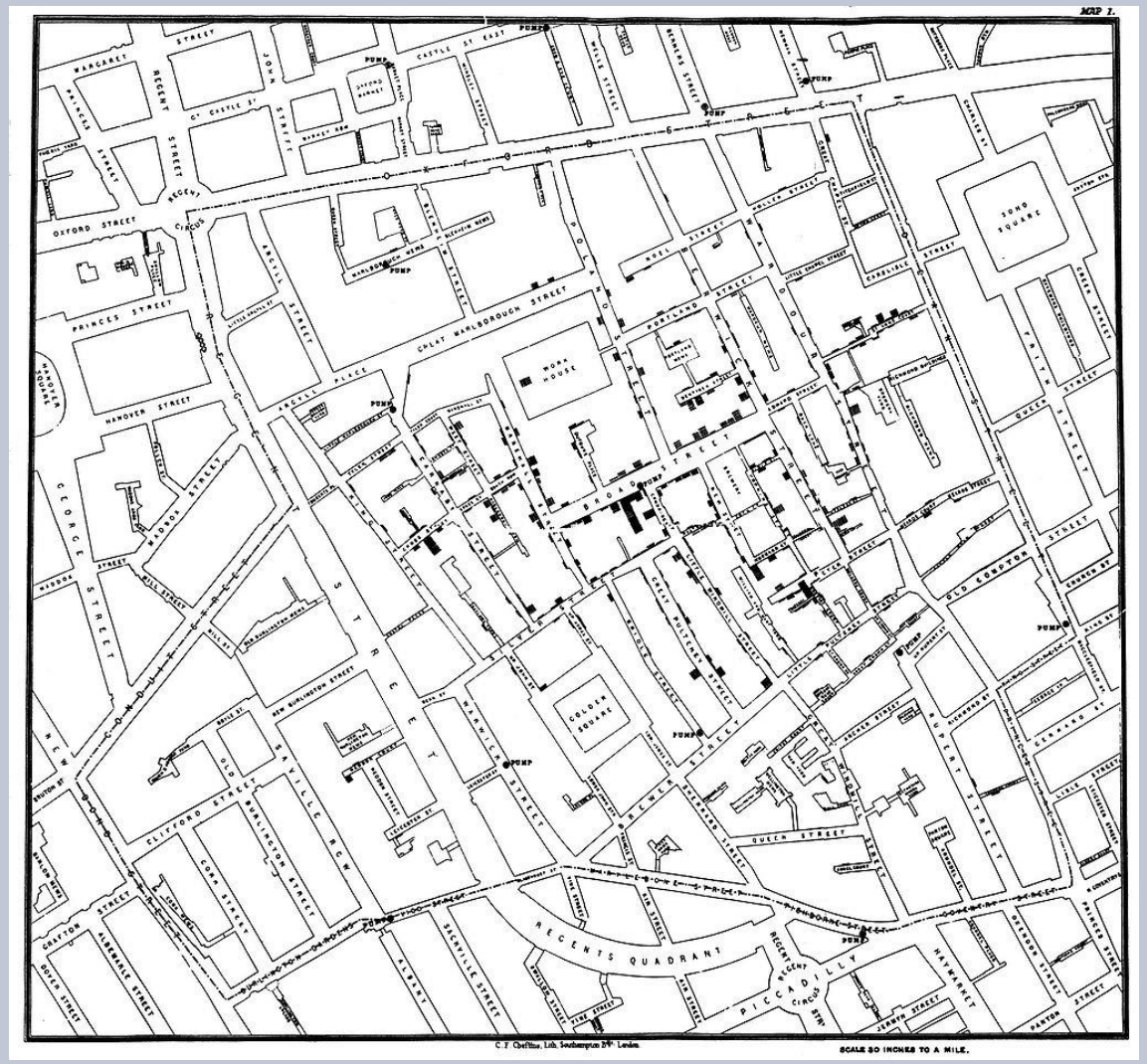
Birth of Analytics

Industrial revolution and Taylorism ~ 1911 ?

.. or earlier John Snow's analysis of the outbreak of cholera on Broad Street in 1854 ?

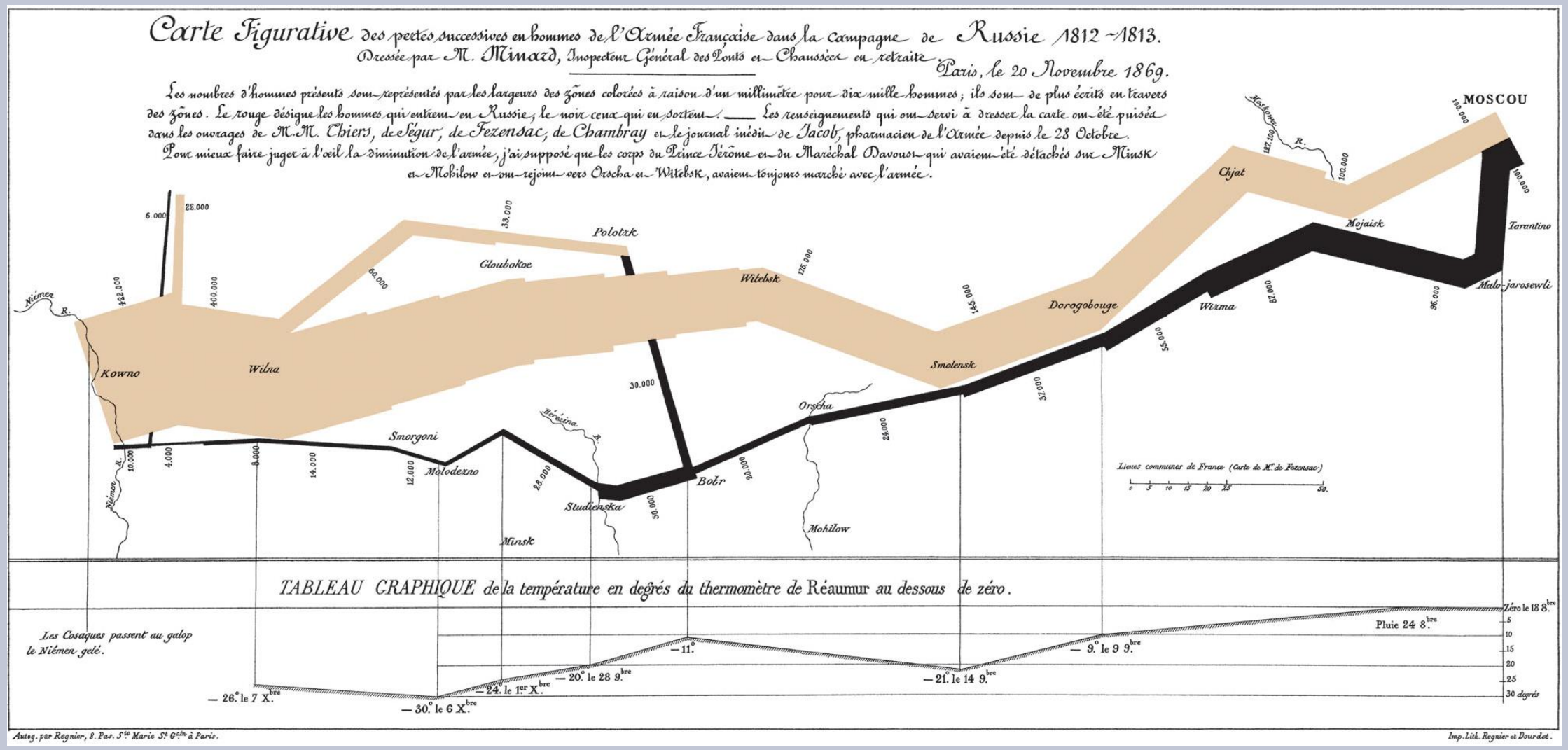
(Before the Germ Theory existed)





Data Visualization

1869 –Charles Josep Minard

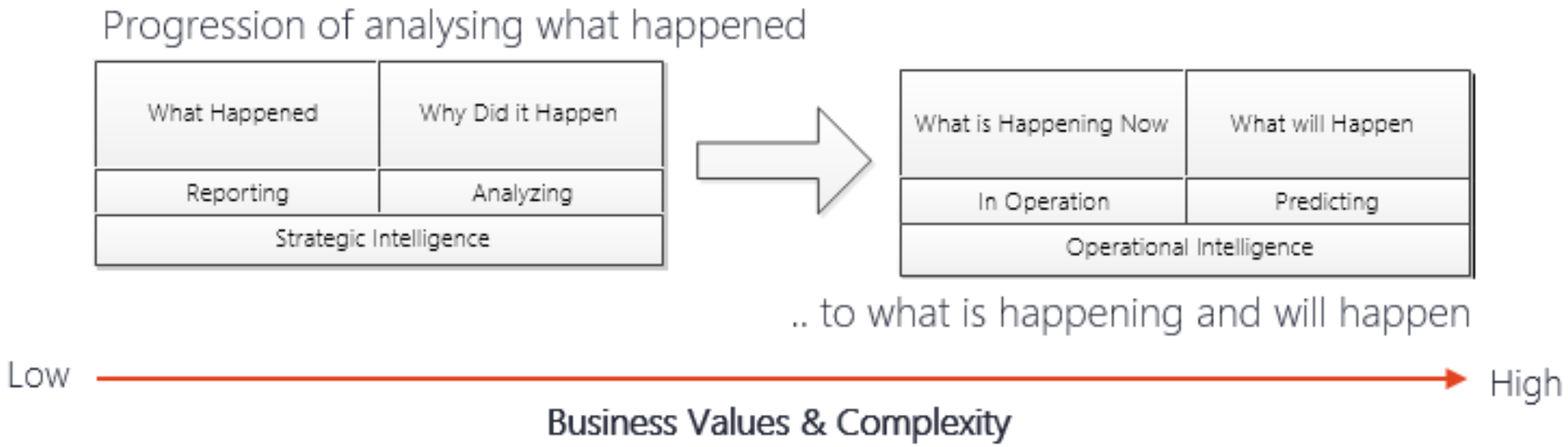


What is Predictive Analytics

Wikipedia: A variety of statistical techniques from modelling, machine learning, and data mining that analyse current and historical facts to **make predictions about future, or otherwise unknown, events**. I.e. a set of techniques to extract a model from data to understand what will happen.

Predictive Analytics enables Operational Intelligence ….

Operational Intelligence: A category of real-time dynamic, business analytics that delivers visibility and insight into data, streaming events and business operations (Wikipedia)



Analytics … Analytics … Analytics

	Descriptive & Diagnostic Analytics	Predictive & Prescriptive Analytics
Objective	Understand the Past Observe Trends Catalyst for Discussions	Gain Insights Make Decisions Take Actions
View	Historical & Current	Future Oriented
Metrics	Lagging Indicators	Leading Indicators
Users	Middle & Senior Management Analysts & End Users	C-Level & Senior Management Strategists, Analysts, Managers

Descriptive Analytics: Using **data** to find out what has happened
Diagnostic Analytics: Using **data** to find out why it happened
Predictive Analytics: Using **data** to find out what could happen
Presriptive Analytics: Using **data** to prescribe the best course of action for the future optimization

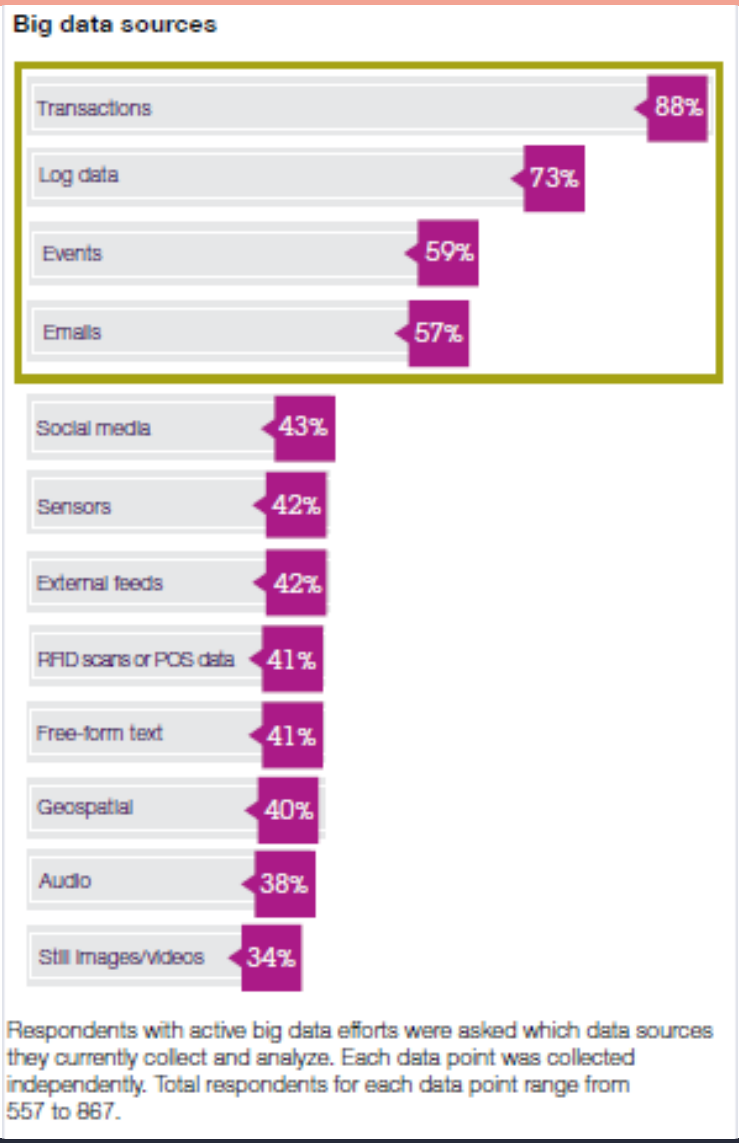
Data .. Data, Data

"Data is the new oil!" Clive Humby, ANA Senior marketer's summit, Kellogg School.

Data Vs

- Volume – Scale of data: Every 2 days we create as much data as we generated up to 2003
- Velocity – Speed of data
- Variety – Different forms of data: structured, unstructured, semi structured, complex structured data
- Variability – Data constantly changes
- Veracity – Uncertainty of data: data needs to be assessed if quality is good

Data is just like crude. It's valuable, but if unrefined it cannot really be used. It has to be changed into gas, plastic, chemicals, etc. to create a valuable entity that drives profitable activity; so must data be broken down, analysed for it to have value (Michael Palmer).



IBM 2012

Why Should You Care ?

Your data contains tremendous value ..

Increase Insight & Value:

- UPS downloads 200 data points from 80.000 vehicles daily, among other kinds of analytics, recommends driving adjustments to save 1.5 million gallons of fuel in 2012.
- Halliburton works closely together with UREASON to optimize drilling (reduce Invisible Lost Time) and predict unwanted drilling events. Halliburton acquired exclusive rights for Oil & Gas activities in 2013 of UReason's USE platform.
- U.K. grocer, Tesco, optimizes food refrigeration costs by collaborating with refrigeration unit manufacturers to feed refrigeration data from in-house controllers to a dedicated data warehouse. This data is used to control and optimize refrigerator performance and identify maintenance needs thereby saving 20% of Tesco's refrigeration costs (approximately €20 million annually).

Industries & Application Cases

- Energy and utilities: Energy consumption patterns and management
- Financial services: Fraud identification, loan defaults, and investment analysis
- Food and beverage: Supply chain demand prediction for creating, packaging, and shipping time-sensitive products
- Healthcare: Re-admission and risk patterns in health-related data
- Insurance: Fraud identification and individualized policies based on vehicle telemetry
- Manufacturing: Quality assurance optimization and machine failure and downtime predictions
- Transportation: Service and delivery route optimization
- Marketing: Consumer behaviour prediction, churn analysis, consumption, and propensity to spend
- Travel: Buying experience optimization, upselling, and customized offers and packages

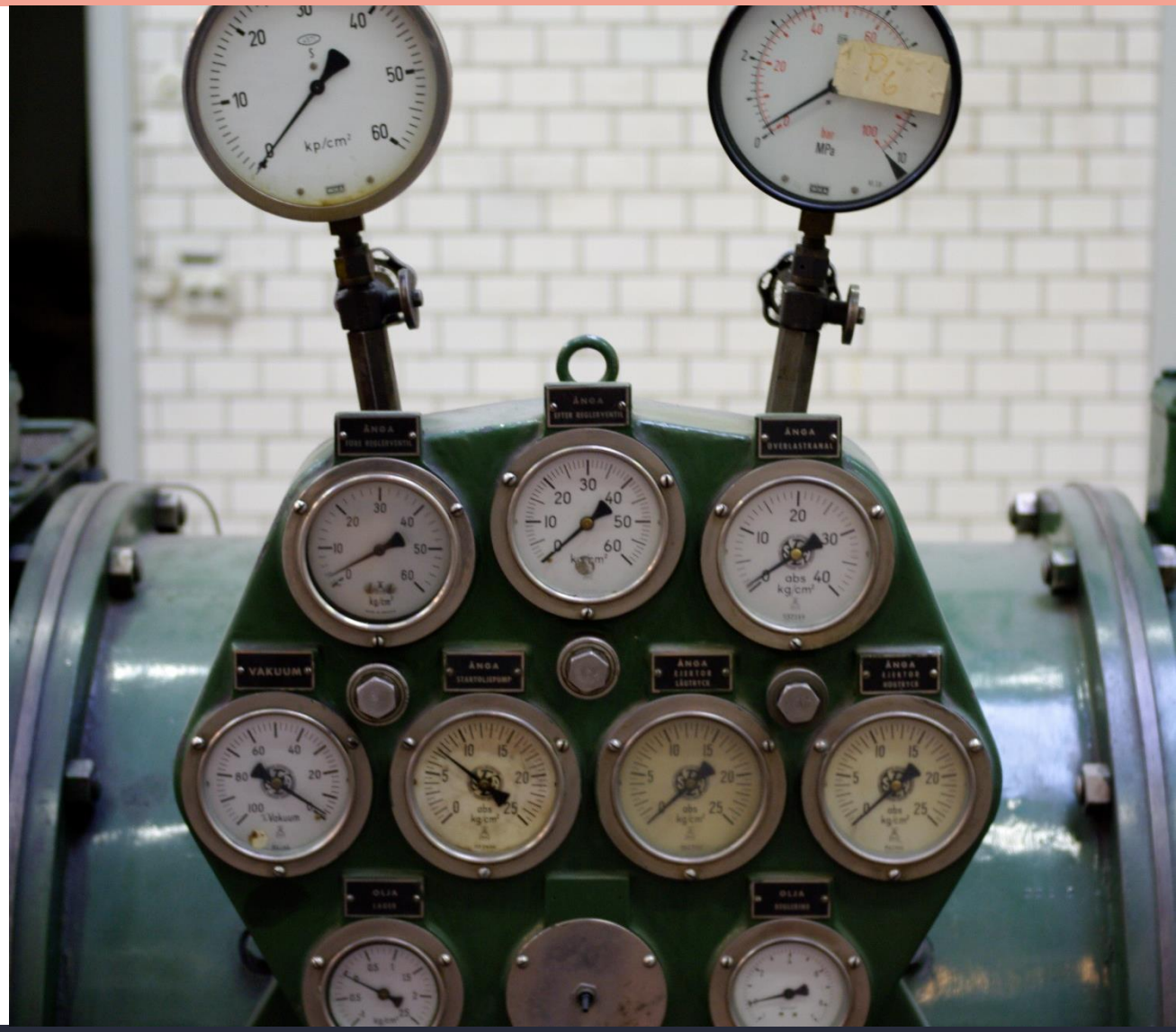
Signs for Predictive Analytics

Your decision cycle is fast

You know more about the past than about what will happen

A risk is associated with making bad decisions (and a reward with making good ones)

You need a consistent decision making process



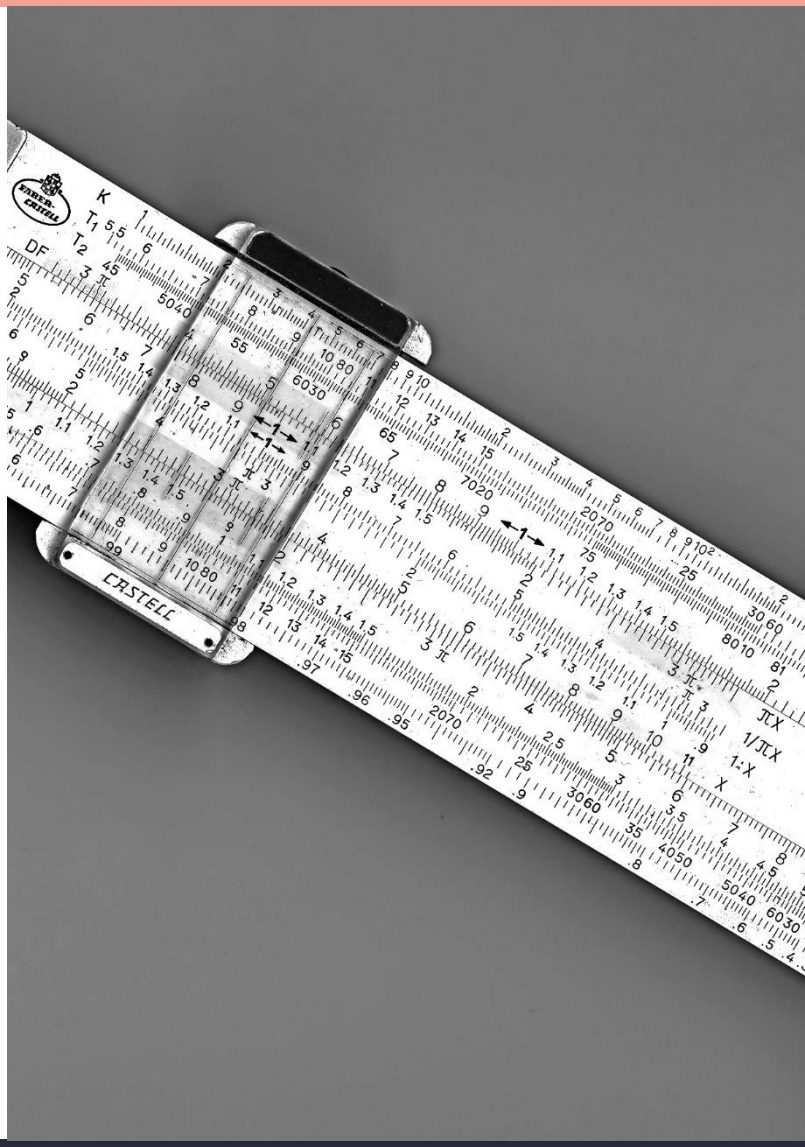
Techniques and Example Applications

Time Series Analysis:	Fraud detection, Load/demand Forecasting
Neural Networks:	Soft sensors (f.ex. electronic noses), Data Validation
Support Vector Machines:	Customer churn/retention, FX Trading
Topology Reasoning:	Cause-consequence analysis
Complex Event Processing:	Improve Situational Awareness in Control rooms
Cased Based Reasoning:	Decision Support
Genetic Algorithms:	Traffic Optimization

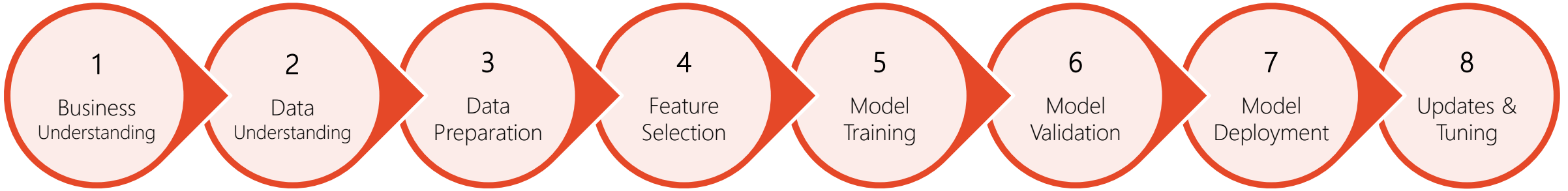
Predictive Analytics Program

Rules of engagement:

1. Clear business requirements and understanding
2. Take a systematic approach to data management
3. Select the right toolbox(es) for the job at hand
4. Involve the users early on
5. Data pruning and aggregation is key but useless without understanding state
6. Model training & validation is iterative as such difficult to fit traditional project planning – take a RAD approach



Predictive Analytics Process



Heavy end-user involvement
Knowledge Intensive

Heavy end-user involvement

Business Understanding

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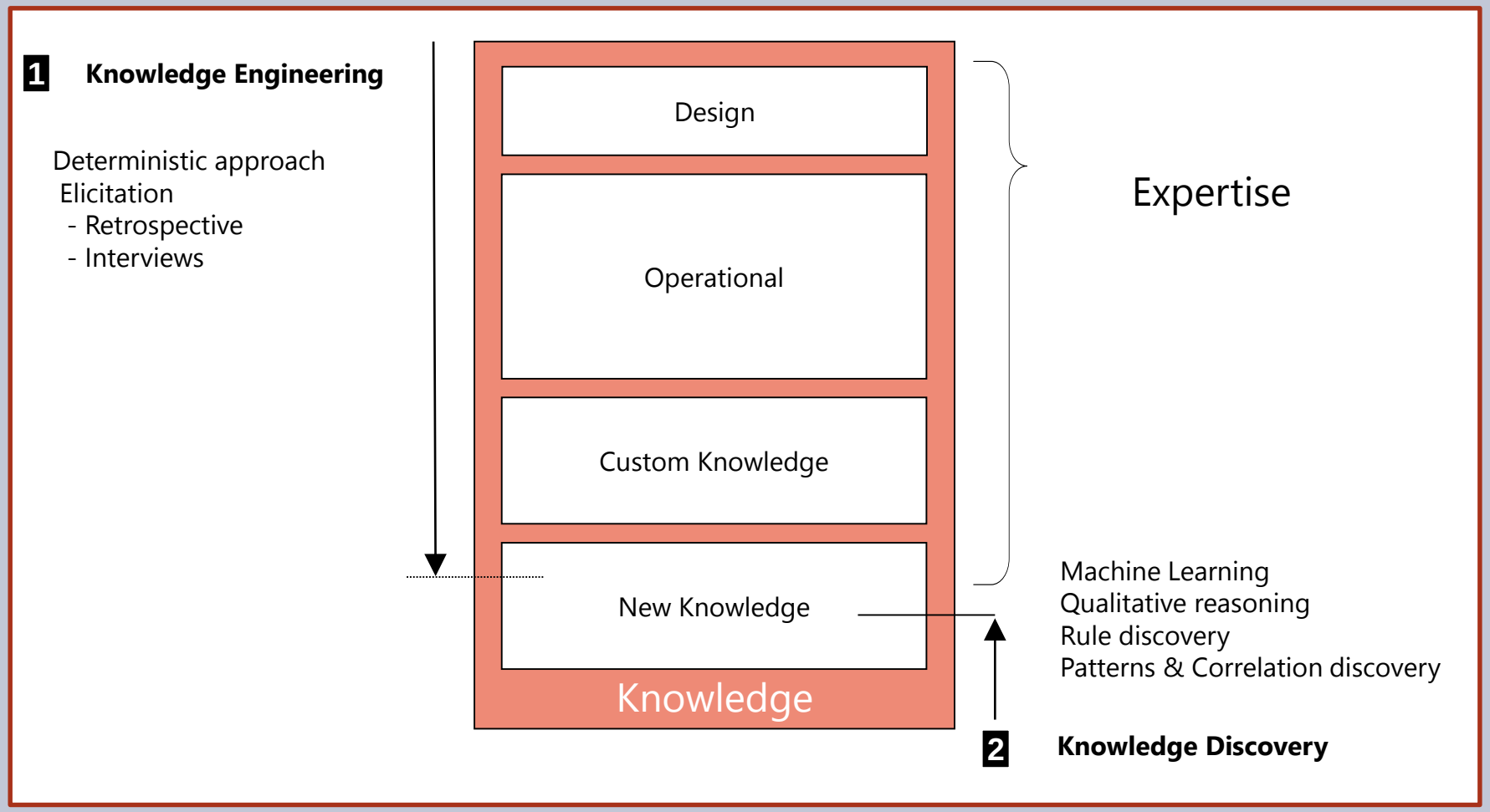
Business Understanding



Enabling Technology

Data:

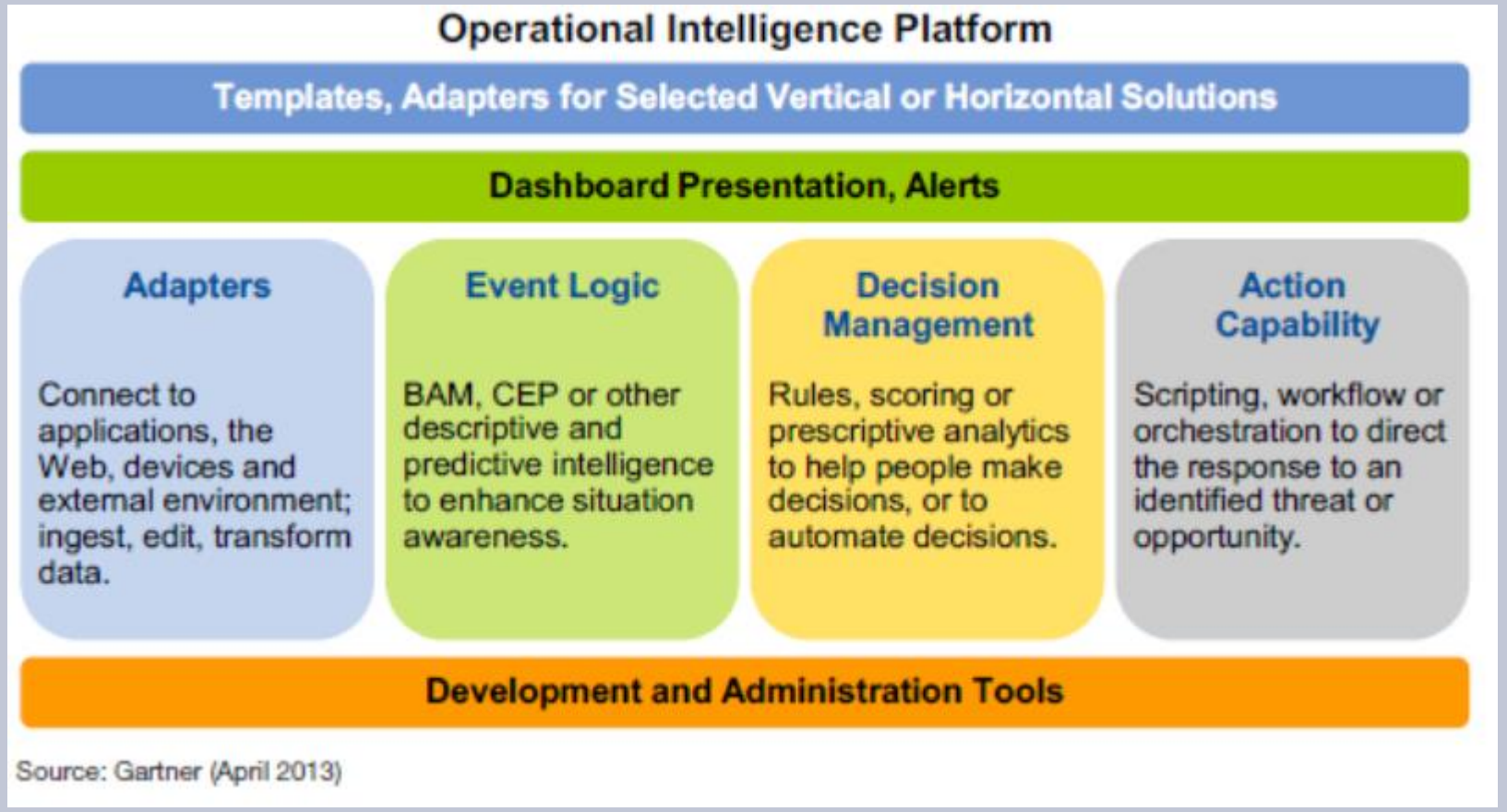
- Hadoop, Mongo, HP Vertica, IBM Nettaza, TIBCO, SAP HANA (In Memory), etc. etc.

Machine Learning:

- Azure ML, Weka, R, Apache Mahout, Phyton, Penthaho, RapidMiner, etc. etc

As important: you need an Operational Intelligence Platform!

UREASON's USE Combines All



What Next?

Reflect what you have learned today on your organisation, customer(s) and business processes

Identify where your organisation can benefit from Predictive Analytics

Keep in mind:

- More data ≠ More Insight
- Insight does not mean Value

UREASON can support you in

- Big Data & Advanced Analytics Training & Awareness
- Proof of Concept Advanced Analytics (Predictive & Prescriptive)
- Technology Selection
- Your Advanced Analytics projects – Technology & Knowledge

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