

Supply Chain Analytics

Lecture 5: Supply chain operations reference model

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CURRENT STRUCTURE AND TECHNOLOGY

- Structure:
 - Scheduled scripts
 - Ad hoc scripts
 - Specific audits
- Technology:
 - ACL
 - ACL DirectLink
 - Task Manager
 - Microsoft Excel

EXAMPLES

- Review access to restricted information
- Compare vendor and employee information
- Analyze employee expense reporting
- Monitor high-value inventory items
- Analyze journal entry populations
- Time & Materials review related to construction
 - Reasonable hours charged
 - Employer paid taxes
- Compare labor reported to evidence of work

WHERE TO NEXT?

- Reevaluate process
 - New company
 - New systems
 - New processes
- Researching data visualization tools

A Little Data Analytics Humor



Who is ATC?

Headquartered in Pewaukee, Wis.

- American Transmission Company (ATC) was founded in 2001, as the first multi-state, transmission-only utility in the United States.
- ATC owns and operates the electric transmission system in portions of Wisconsin, Michigan, Minnesota and Illinois. The red dots on the map indicate ATC offices.
- It is a privately owned company; with ownership by utilities, municipalities, municipal electric companies and electric cooperatives from Wisconsin, Michigan, Minnesota and Illinois.

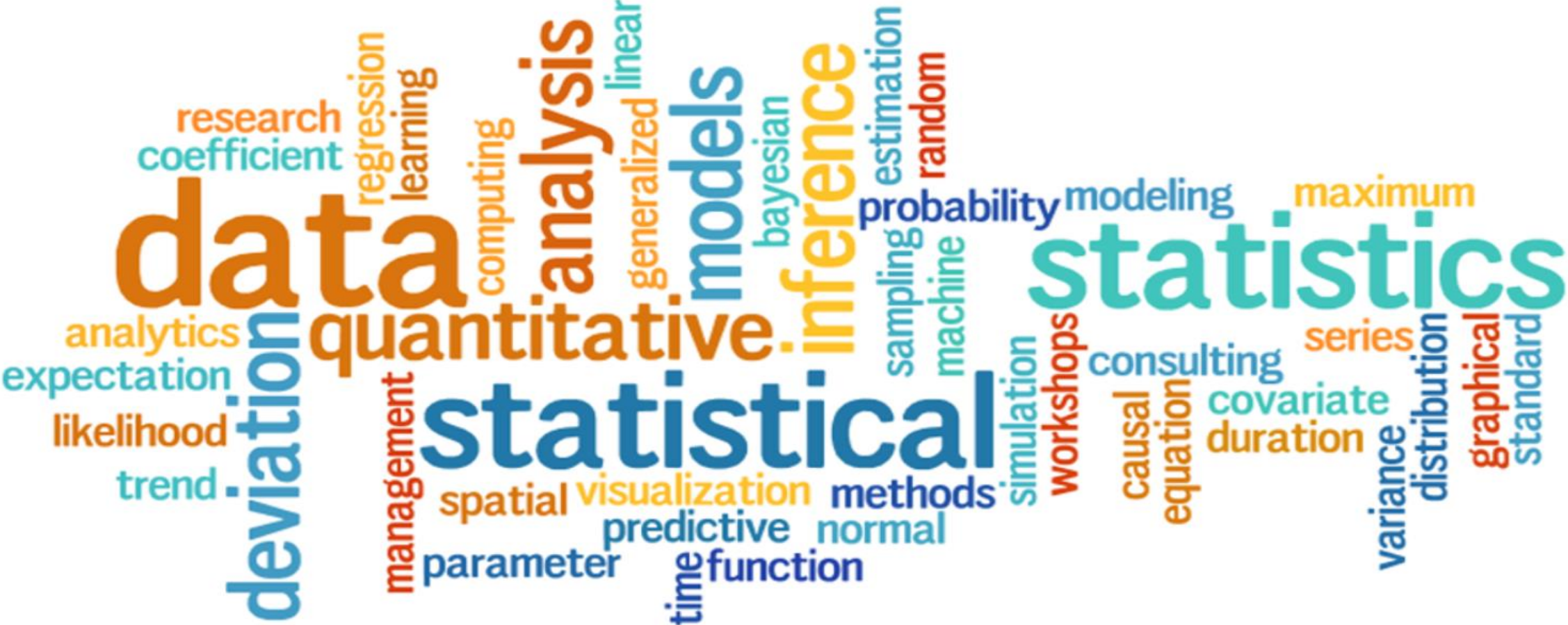


- \$4.4 billion in net assets
- 548 substations
- 9,540 circuit miles
- Approx. 8,100 ROW miles

ATC – Key Facts

- Grew from \$550 million in assets in 2001 to \$4.4 billion.
- Upgraded more than 1,944 miles of transmission line, built more than 620 miles of new line and improved 170 substations.
- Connected 6,000 megawatts of new generation at 24 sites.
- Saved customers more than \$100 million a year in reduced energy costs with access to the wholesale energy marketplace and lower line losses.

Data Analytics – Word Cloud



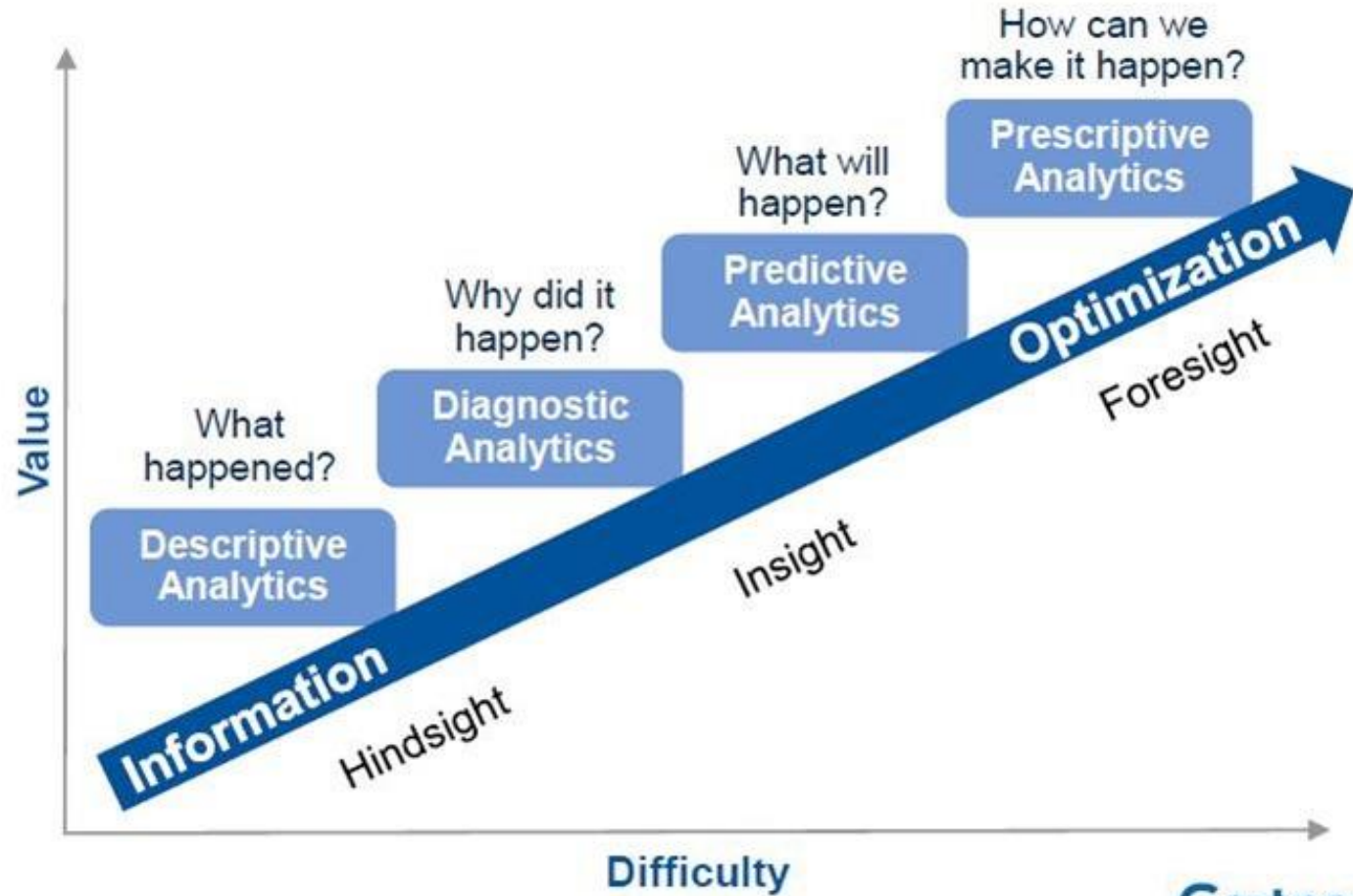
“The first and simplest emotion which we discover in the human mind, is curiosity.” ~Edmund Burke

What is Data Analytics?

- Data Analytics:
 - “is a process of inspecting, cleansing, transforming, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision-making”. - Wikipedia
 - "leverage data in a particular functional process (or application) to enable context-specific insight that is actionable." – Gartner
 - **“is using our current data sets to extract useful information to support advanced decision making” - ATC**
- Data Visualizations (i.e. Data Viz):
 - Visual context of data, Dashboards
 - Often single page, real-time user interface, graphical presentation of your data

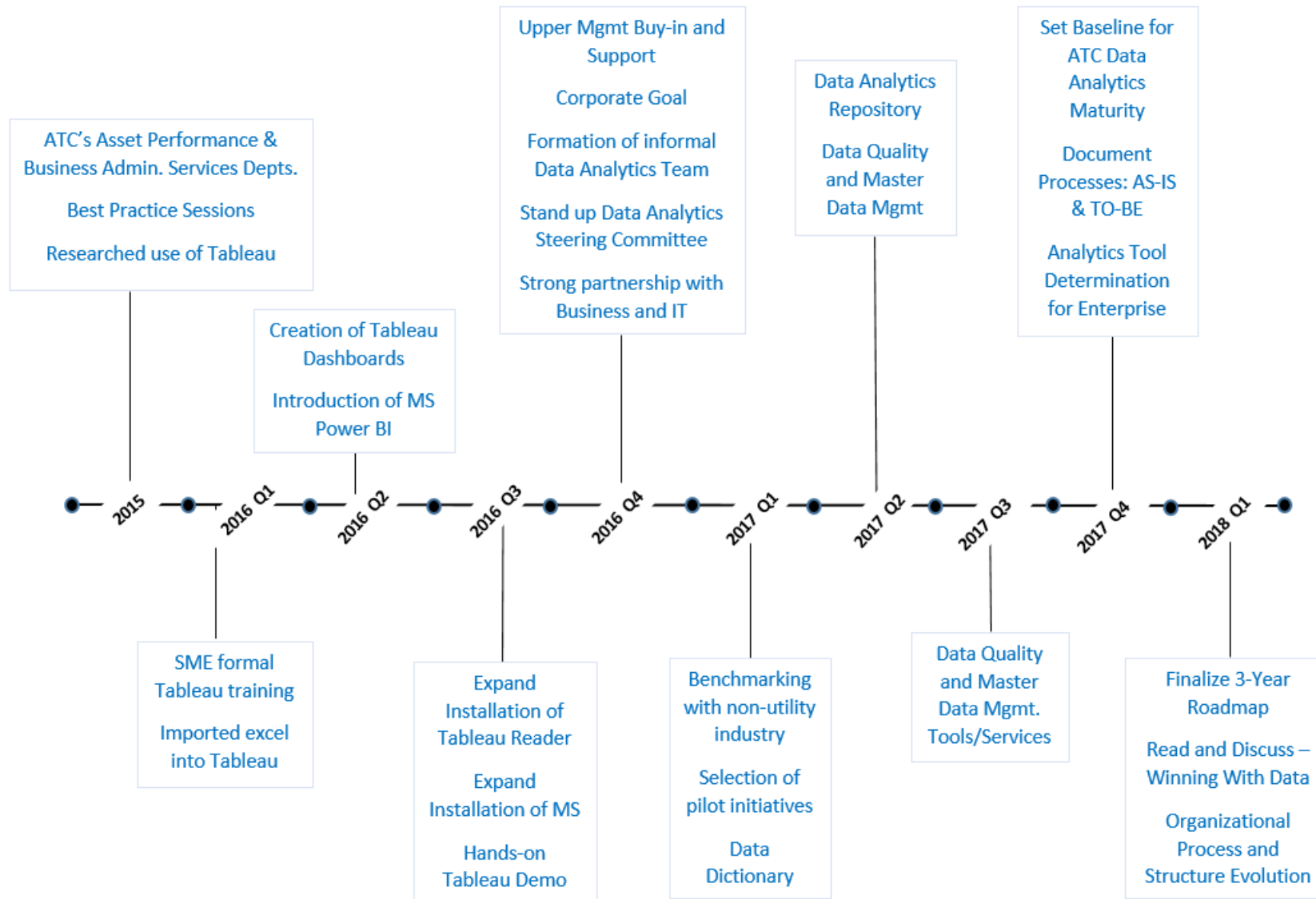
“Without data you’re just another person with an opinion.” ~W. Edwards Deming

Data Analytic Capabilities



"The greatest enemy of knowledge is not ignorance, it is the illusion of knowledge." ~Stephen Hawking

ATC High-Level Timeline



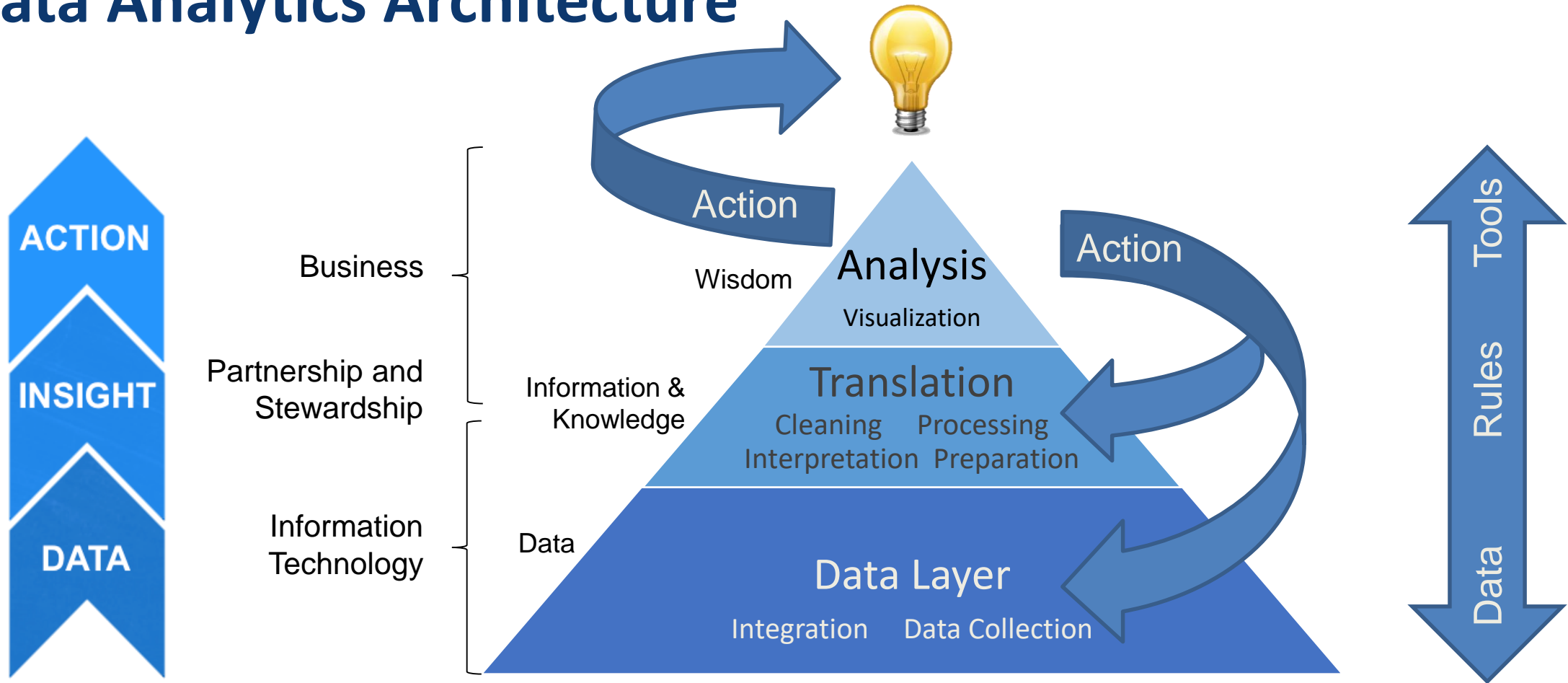
Analytics at ATC

	2000 - 2007	2008 - 2014	2014 - 2016	2017 - 2018	2018 -
Tools	Excel SAS	Excel SAS ORACLE BUSINESS INTELLIGENCE	Excel SAS +tableau splunk	Excel SAS +tableau splunk ORACLE BUSINESS INTELLIGENCE Power BI	Excel SAS +tableau splunk ORACLE BUSINESS INTELLIGENCE Power BI
Data Sources					
Measures	Data Integrity Self Service Analytic Capability Data Governance	Data Integrity Self Service * Analytic Capability Data Governance	Data Integrity Self Service Analytic Capability Data Governance	Data Integrity Self Service Analytic Capability Data Governance	Data Integrity Self Service Analytic Capability Data Governance

Data Analytics Pillars and Foundation

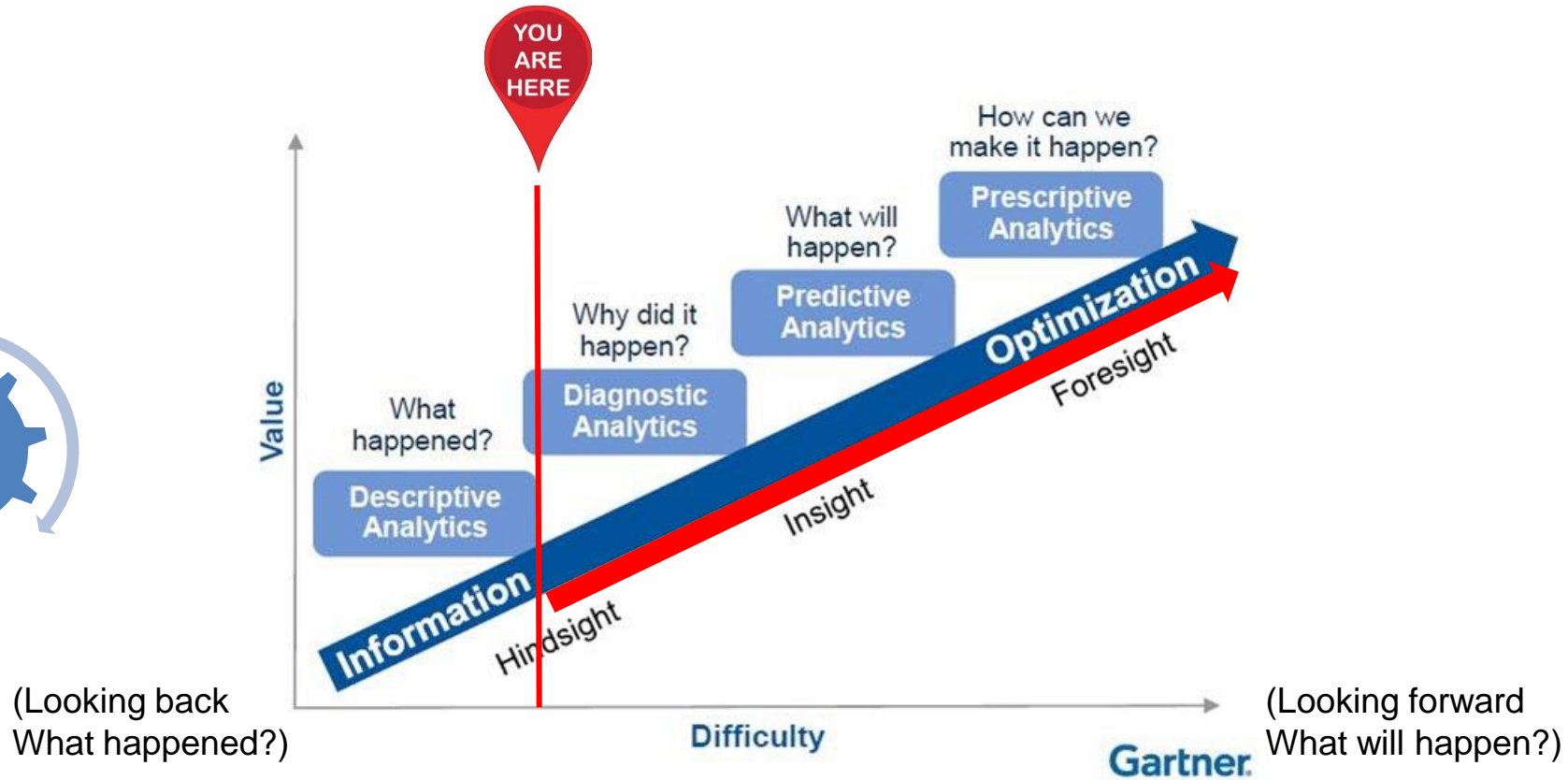
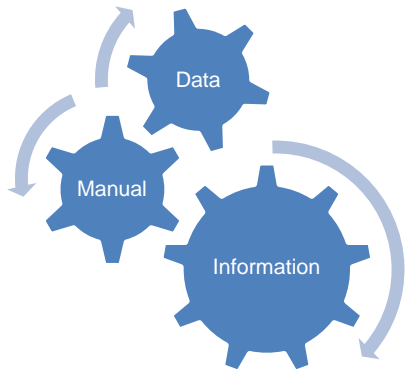


Data Analytics Architecture

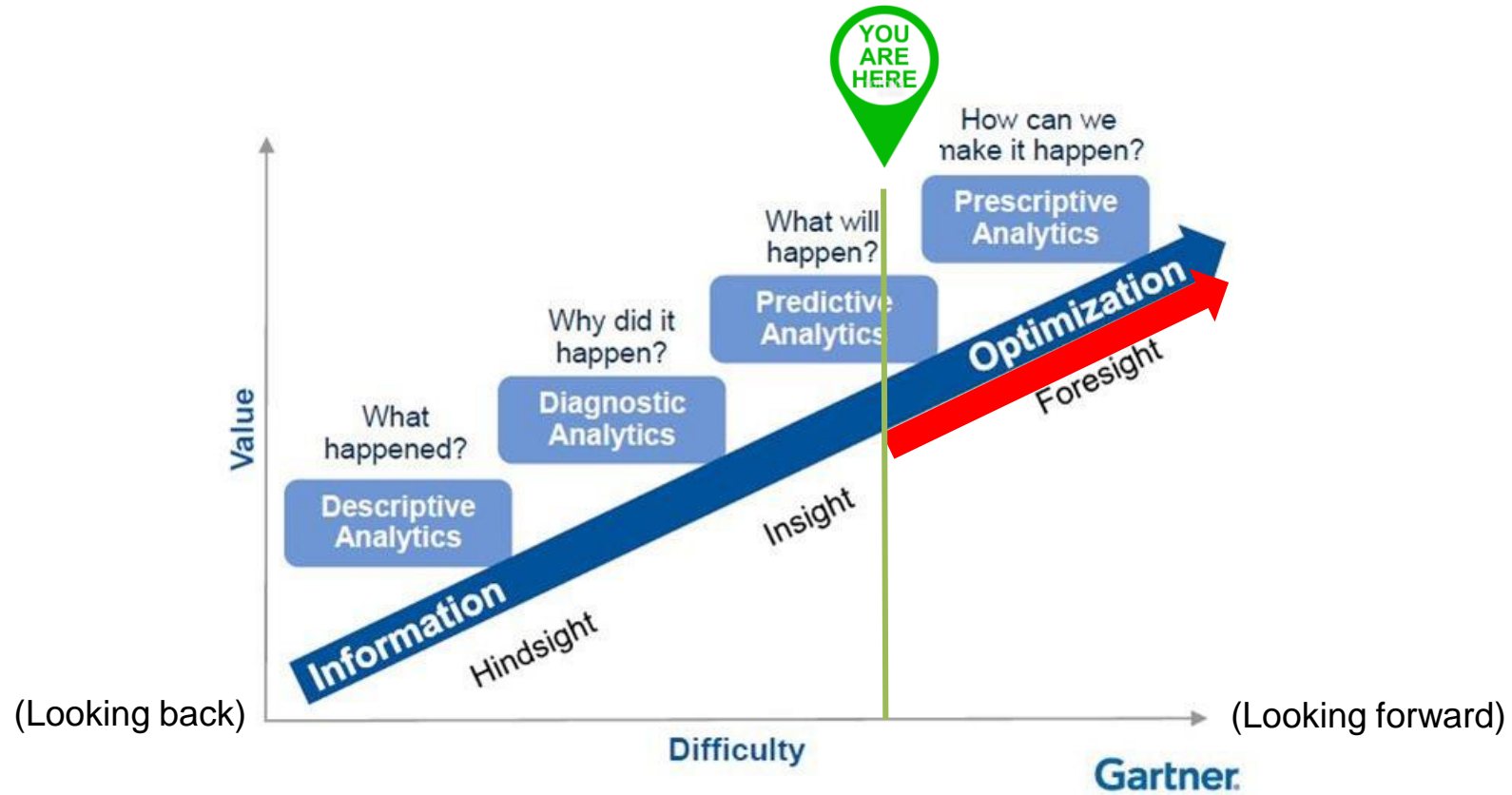


“The greatest value of a picture is when it forces to notice what we never expected to see.” ~John Tukey

Current state – Reliability Data

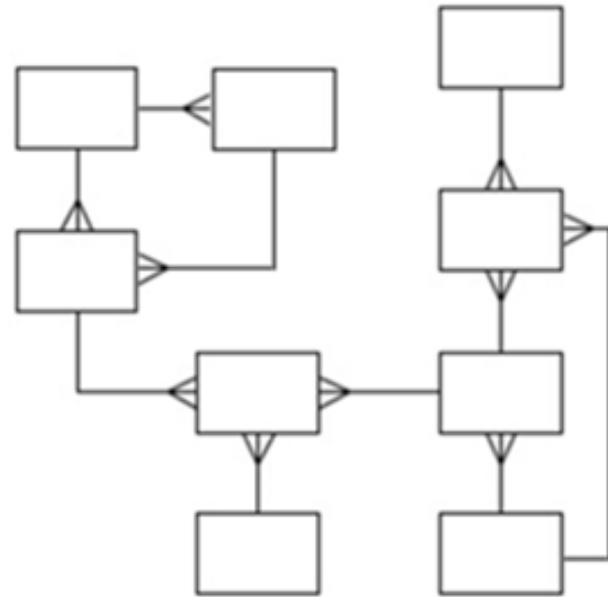


Current state – Reliability Data



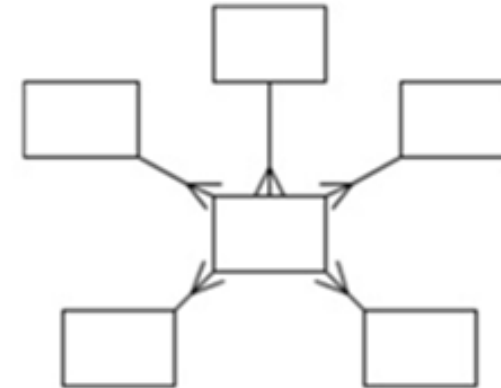
Design Differences

Transactional



High volume of transactions
Data In

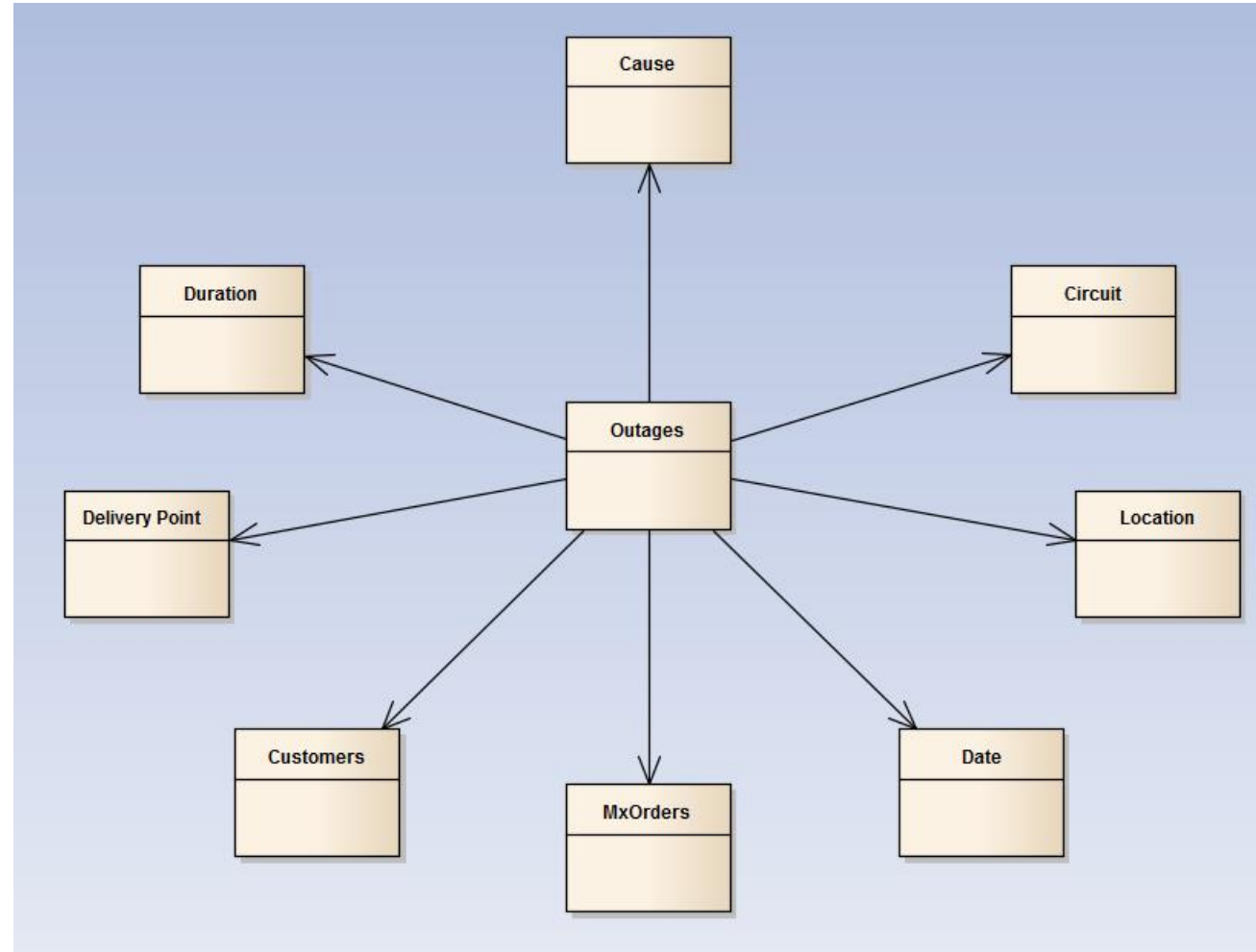
Analytical



Historical reporting & analysis
Information Out

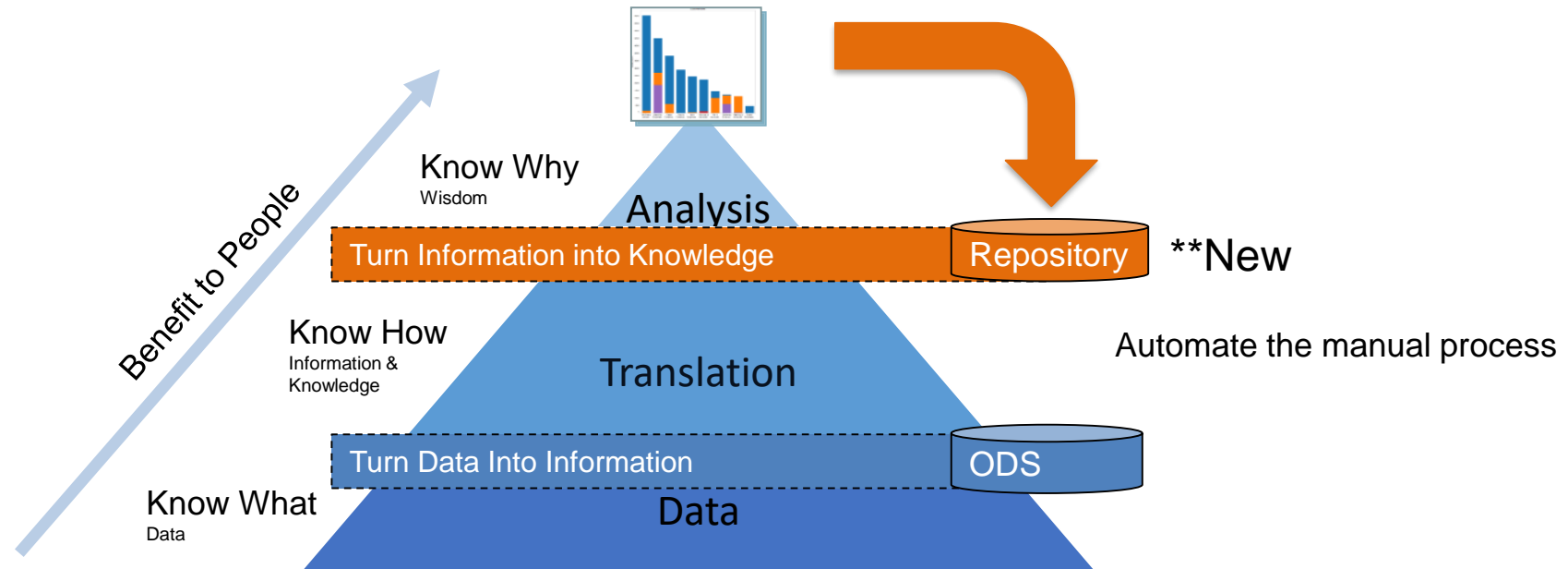
Key:
Organize the
data for
analytics

THE OUTAGE DATA IN THE ANALYTICS REPOSITORY



- Reliability measured against outages
- Outages are unexpected operation causing an interruption of power delivery, like a power outage at your home.

Current State - Approach

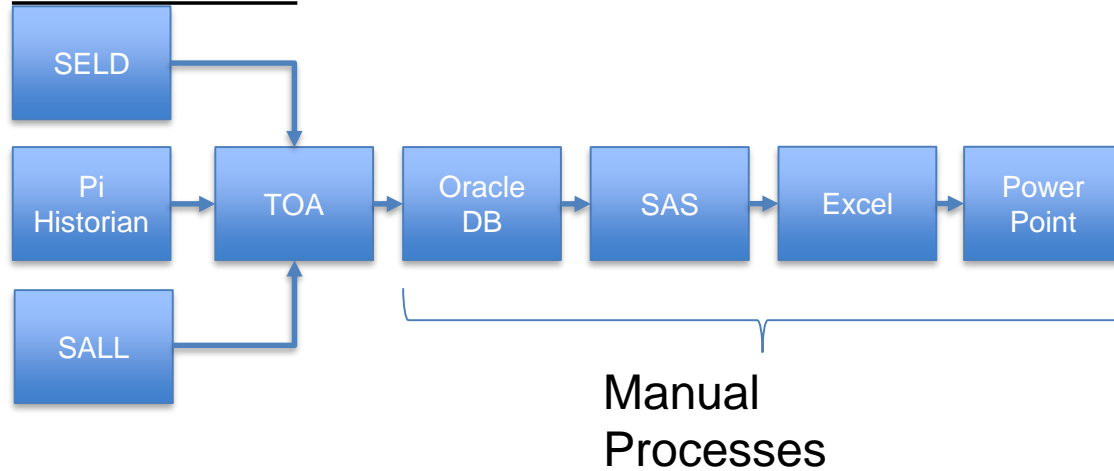


Reliability Performance Metrics – Pilot 1 – Selection Criteria

- Reduce time to create
- Reduce human error
- Highly visible
- Widely Used
- Regulatory ties
- Complexity in creation
- Demand / Urgency
- Increased analytical opportunities
- Tied to corporate goals
- Business continuity - cross training, skills, knowledge, transfer
- Good candidate for a DA tool (tool is separate)

Reliability Performance Metrics – Pilot 1

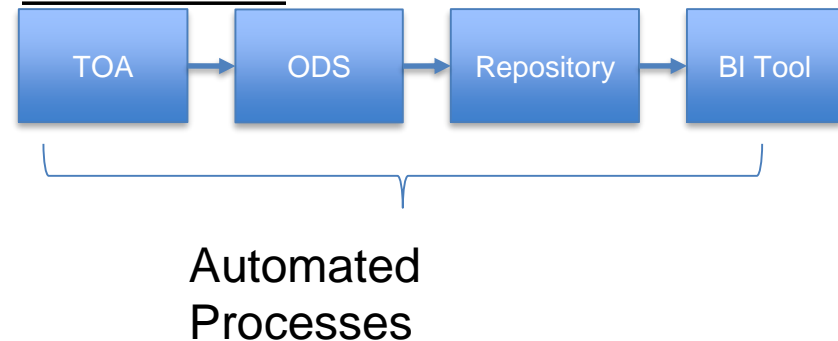
Current State



- Creation complexity (manual steps, data cleansing, data transformation, multiple people contributing data, multiple data sources, complex query, etc...)
- Monthly reporting, walk ups and phone calls

- Extensibility, transformation automation would reduce not only the time for one report, it could impact many similar reports.

Future State



Finale

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Case 1: Continental Airlines Survives 9/11

- Problem: Long before September 11, 2001, Continental asked what crises plan it could use to plan recovery from potential disasters such as limited and massive weather delays.

Continental Airlines (con't)

- Strategic Objectives and Requirements are to accommodate:
 - 1,400 daily flights
 - 5,000 pilots
 - 9,000 flight attendants
 - FAA regulations
 - Union contracts

Continental Airlines (con't)

- Model Structure: Working with CALEB Technologies, Continental used an optimization model to generate optimal assignments of pilots & crews. The solution offers a system-wide view of the disrupted flight schedule and all available crew information.

Continental Airlines (con't)

- Project Value: Millions of dollars and thousands of hours saved for the airline and its passengers. After 9/11, Continental was the first airline to resume normal operations.

Benefits

- **Integrity:** the “truth” of your data
- **Quality:** is the data of a “superior” nature
- **Gap Identification:** “completeness” of the dataset
- **Efficiency:** “productivity” in our practices
- **Continuous Improvement:** progressive advancement of our processes
- **Effective:** “valuable” as leading, lagging, & coincidental indicators
- **Evidence:** supports and proves our decision-making

Lessons Learned

- Manual processes may not be fully documented
- Manual process are complicated and difficult to document
- There are more data sources than you initially thought
- The data is not as clean as you thought
- Historical data will have a different format and will be hard to merge
- You may find data that did not make it back to the 'system of record', data governance needs to be addressed.
- Not everyone agrees on what the 'systems of record' are
- Resources may not be available; you need SMEs
- There are no short-cuts

Data Analytics

“If we have data, let’s look at data. If all we have are opinions, let’s go with mine.” *~Jim Barksdale, CEO of Netscape*

Thank You!

Data Analytics Forum Questions

- **1. Introduction - Setting the stage**
 - How do you define audit analytics?
 - Why are data analytics important?
- **2. People**
 - How do you determine who the best resources are in your audit group to move analytics strategy and execution forward?
 - Developing the right skillsets for data driven audits can be a challenge because the skills tend to fall out of the "audit wheelhouse". How do you provide staff with the capabilities to build the expertise they need or how do you partner with other teams to leverage their expertise?
- **3. Process**
 - How do you incorporate analytics throughout the full audit life cycle?
 - (Risk Assessment -> Audit Planning -> Fieldwork/Execution -> Reporting)
- **4. Technology**
 - What are some of the shifts you are seeing from a technology perspective in audit?
 - How do you pick the right tools for the job?
- **5. Practical Application**
 - What are some examples of "non-standard" audits or areas of the organization where you have deployed analytics in your audits?
 - Have you succeeded in pushing the analytics you produced for the audit into the organization to drive efficiency/effectiveness? How have you achieved that or what has been challenging for you?

References

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- 5. Data Science for Supply Chain Forecasting – March 22, 2021 by Nicolas Vandepuut (Author)
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