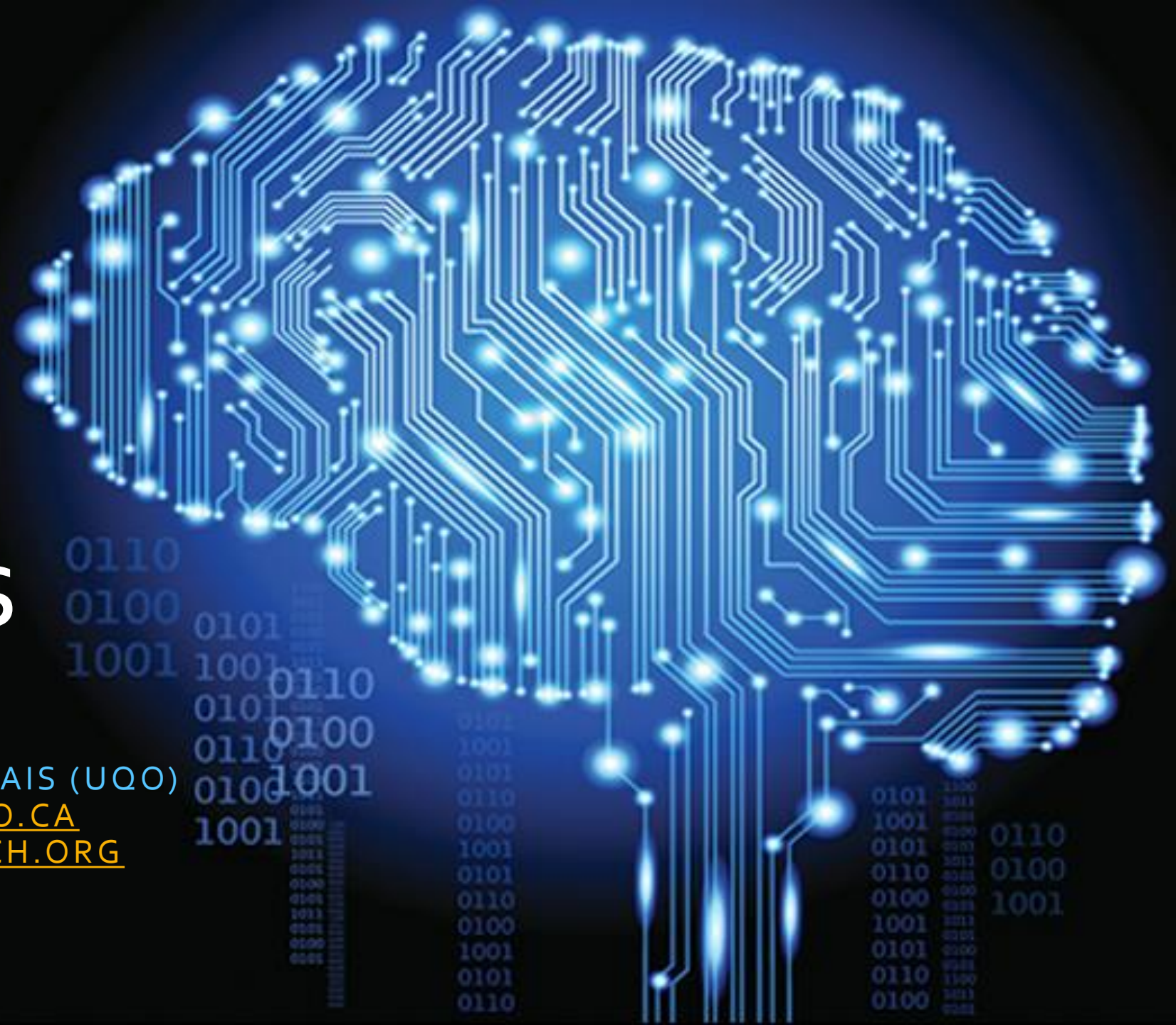
Cognitive Analytics Capabilities



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Outline

1. Business Analytics Capabilities
2. Cognitive Analytics
3. Example: High Frequency Trading

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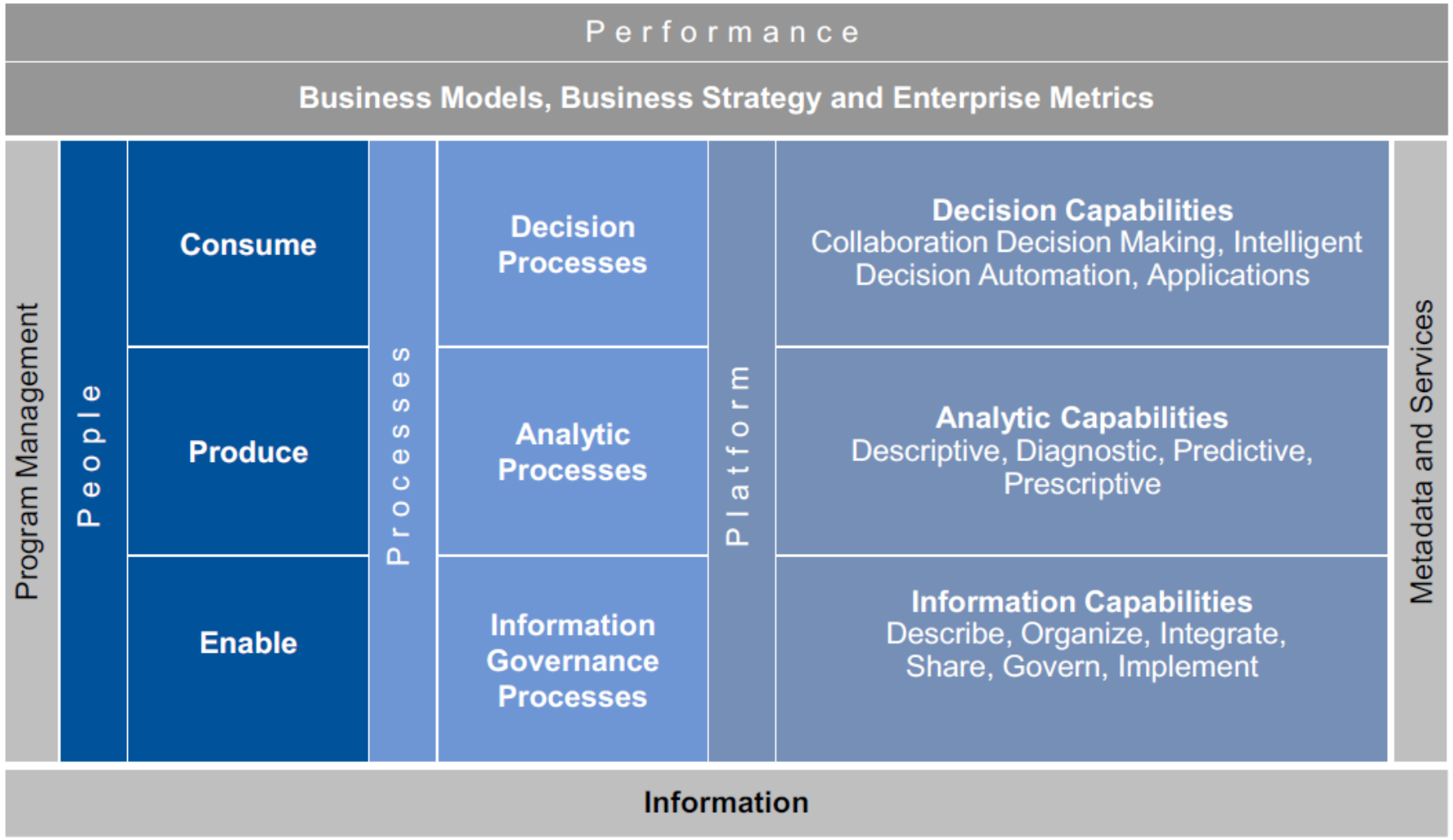
Business Analytics Capabilities (example 1)

Figure 1. The Gartner Business Analytics Framework



Source: Gartner (September 2011)

Neil Chandler, Bill Hostmann, Nigel Rayner, Gareth Herschel, "Gartner's Business Analytics Framework", Report G00219420, Sept. 20, 2011

https://www.gartner.com/Fimagesrv/Fsummits/Fdocs/Fna/Fbusiness-intelligence/Fgartners_business_analytics__219420.pdf

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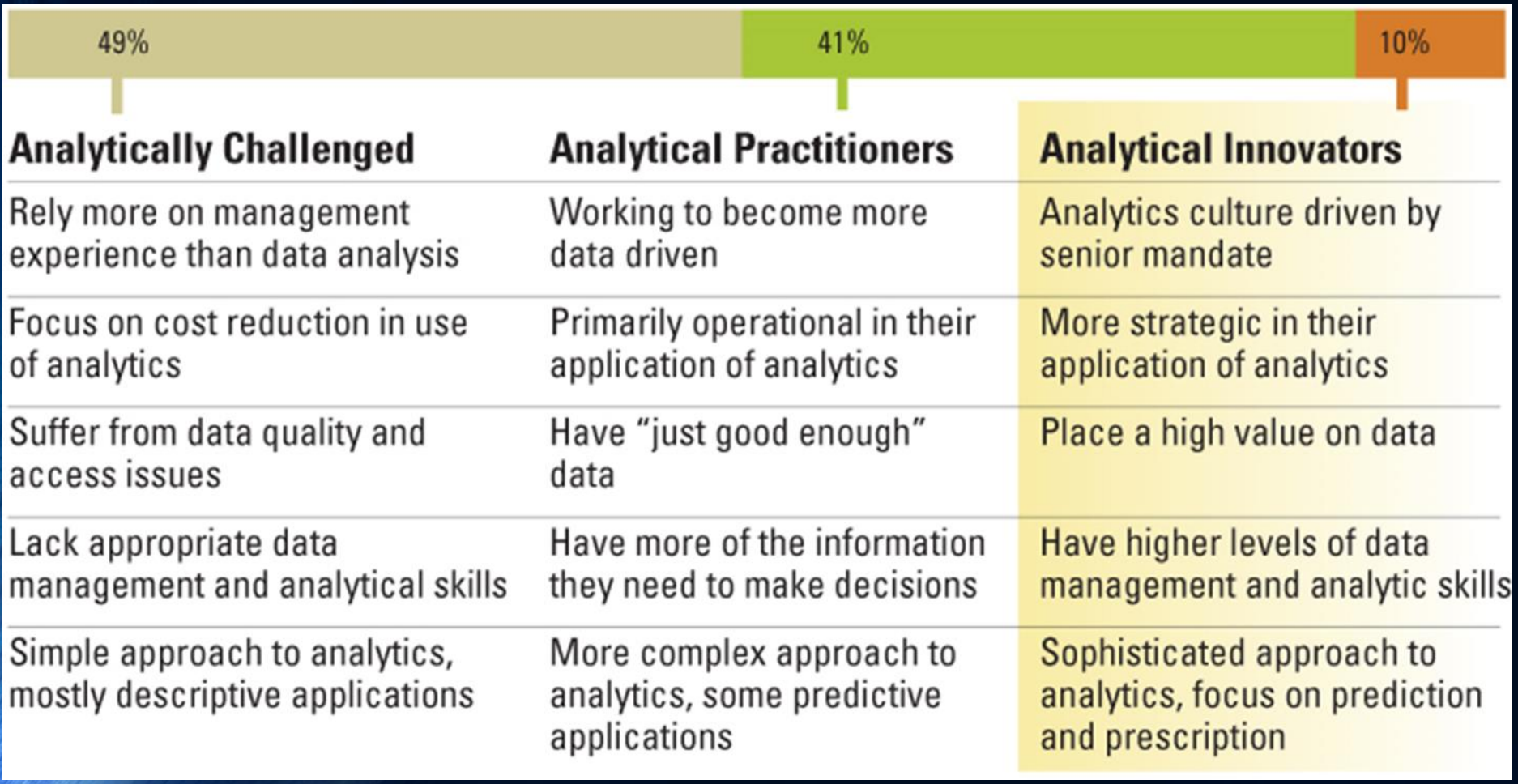
Business Analytics Capabilities (example 2)



Analytically Challenged	Analytical Practitioners	Analytical Innovators
Rely more on management experience than data analysis	Working to become more data driven	Analytics culture driven by senior mandate
Focus on cost reduction in use of analytics	Primarily operational in their application of analytics	More strategic in their application of analytics
Suffer from data quality and access issues	Have "just good enough" data	Place a high value on data
Lack appropriate data management and analytical skills	Have more of the information they need to make decisions	Have higher levels of data management and analytic skills
Simple approach to analytics, mostly descriptive applications	More complex approach to analytics, some predictive applications	Sophisticated approach to analytics, focus on prediction and prescription

Sam Ransbotham, David Kiron, and Pamela Kirk Prentice, "Beyond the Hype: The Hard Work Behind Analytics Success", MIT Sloan Review, March 8, 2016

http://sloanreview.mit.edu/projects/the-hard-work-behind-data-analytics-strategy/

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Business Analytics Capabilities (example 3)

INFORMS Certified Analytics Professional (CAP)

Domain	Approximate Weight
I. Business Problem (Question) Framing	12%–18%
II. Analytics Problem Framing	14%–20%
III. Data	18%–26%
IV. Methodology (Approach) Selection	12%–18%
V. Model Building	13%–19%
VI. Deployment	7%–11%
VII. Model Life Cycle Management	4%–8%

https://www.certifiedanalytics.org

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Cognitive Analytics: Leadership Capabilities

- **Cognitive Leadership Cycle (CLC):** An evolution of Analytics, Expert Systems, and Cybernetics research, a fusion of Cognitive Computing with leadership tasks at the core of organizational decision-making cycles.
- **Leadership in Decision Support:** The task of advising or leading decision-makers toward their goals, addressing risk and uncertainty, while ensuring ethical solutions.
- **Cognitive Computing:** Technology applications that mimic natural cognition (reasoning by know-ing/-ledge) in decision-making by integrating several methods in Computational Intelligence, e.g., machine learning, semantic rules/reasoning, graph theory, fuzzy or soft logic, multi-agents systems.
- **Cognitive Leadership:** Management processes relying on computational intelligence to handle complex risks in high-frequency workflows, with greater reach and concurrency as well as less error and gaps than other decision-making approaches.

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Cognitive Analytics: AI Technologies

Integrating artificial intelligence (AI) into analytics systems/capabilities

1. machine learning and pattern recognition
2. natural language processing
3. ontologies and semantic rules/reasoning
4. fuzzy logic and soft computing
5. graph analytics and network mining
6. stream and complex event processing
7. multi-agent and autonomic systems

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Cognitive Leadership Cycle (CLC)

4 Tasks, 8 Teams, 12 Technologies or Techniques

10. Text Mining
11. Semantic Reasoning
12. Complex Event Processing

1. Capability Meta-models
2. Innovative Governance
3. Ethical Project Leadership

7. Machine Learning
8. Sequential Rules Mining
9. Social Network Analysis

4. Multi-Agent Simulation
5. Hardware Acceleration
6. Secure Parallel Processing

Stéphane Gagnon, "Cognitive Leadership Cycle (CLC) ", Feb. 27, 2017, U of Quebec in Outaouais

http://gagnontech.org/index.php/en/research-en

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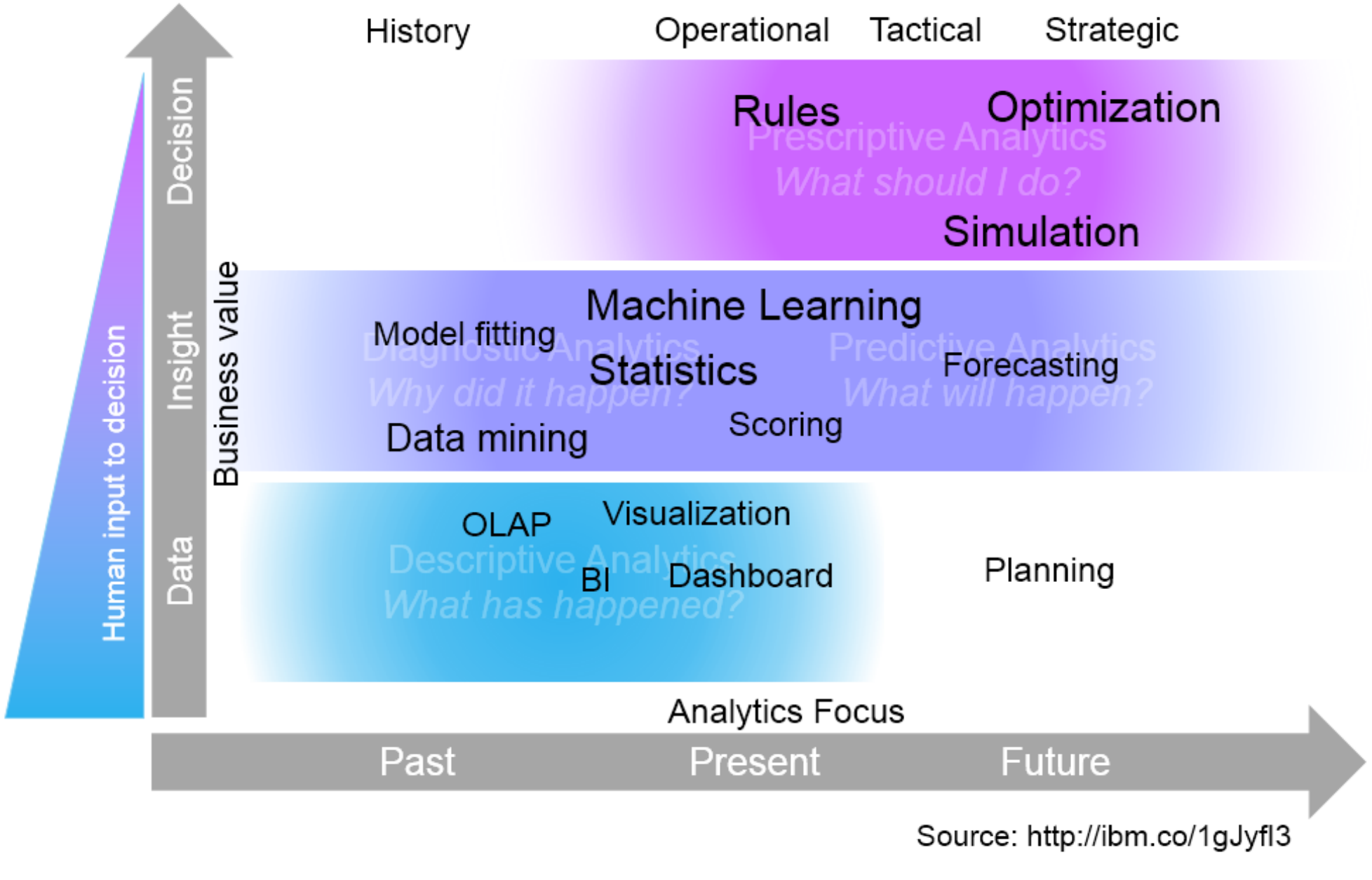

Jean-François Puget, "Analytics Landscape", Sept.15, 2015, IBM DeveloperWorks Blog

https://www.ibm.com/developerworks/community/blogs/jfp/entry/Analytics_Models?lang=en

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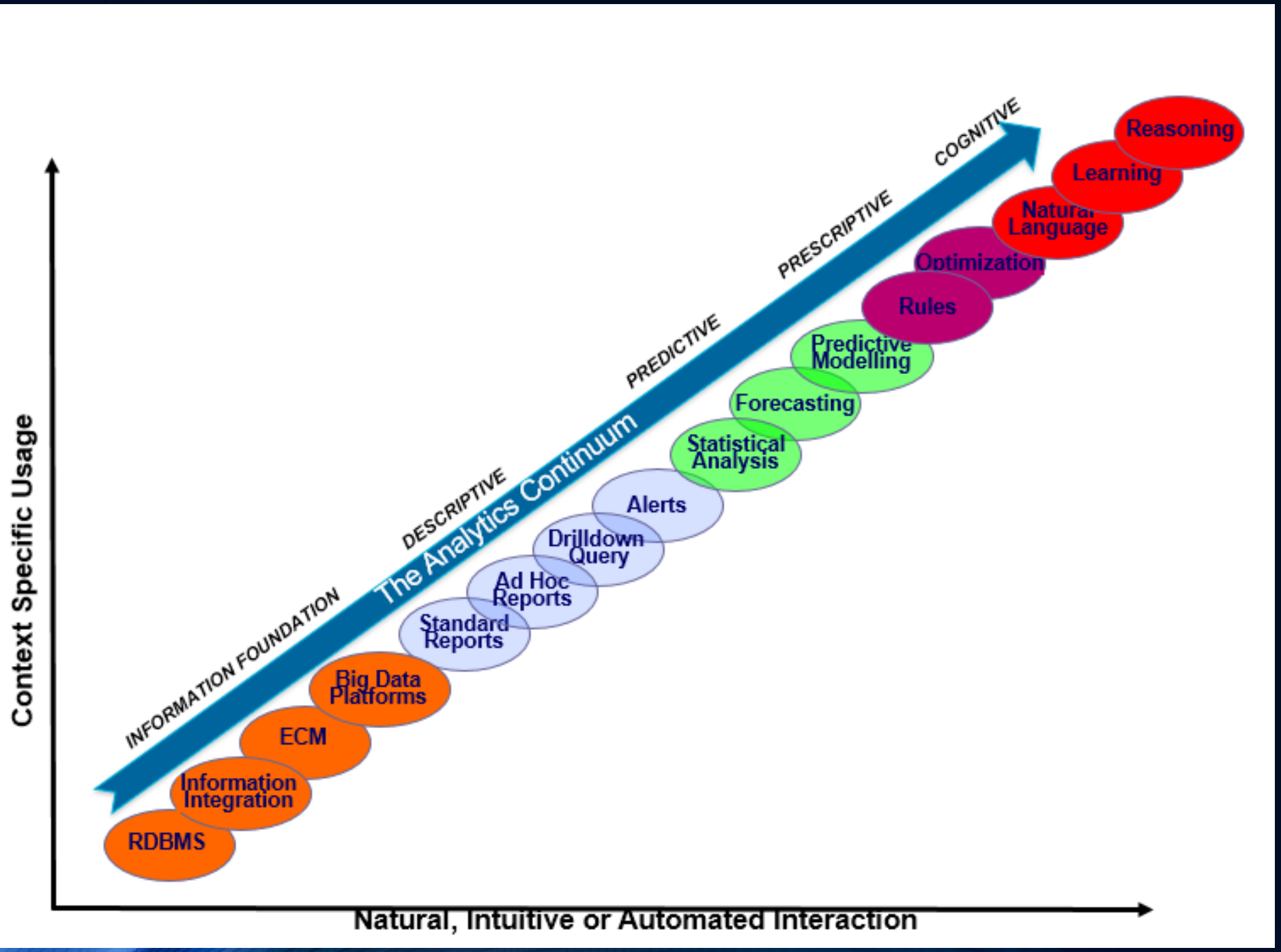

Jean-François Puget, "How Does Cognitive Computing Relate To Analytics?", July 30, 2015, IBM DeveloperWorks Blog

https://www.ibm.com/developerworks/community/blogs/jfp/entry/Cognitive_Computing_vs_Analytics?lang=en

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Example: High Frequency Trading

- News trading uses algorithms to correlate real-time market data and news to detect events that may trigger transactions
- Often used with algorithmic trading systems to support statistical and risk arbitrage
- May use between 10 and 100 data and text mining algorithms, typically 2-3 per professional trader at the same time
- Model parameters updated regularly through back-testing on historical databases, reporting results to trading desk

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Rules-Based Integration

- We propose a rules-based approach to optimize news trading systems
- Instead of running numerous algorithms in parallel, each event is screened by only a limited number of relevant text and data analysis algorithms
- A semantic rules-base learns and integrates algorithm execution in response to context
- A financial ontology relates data, models, text, and entities to screen events efficiently

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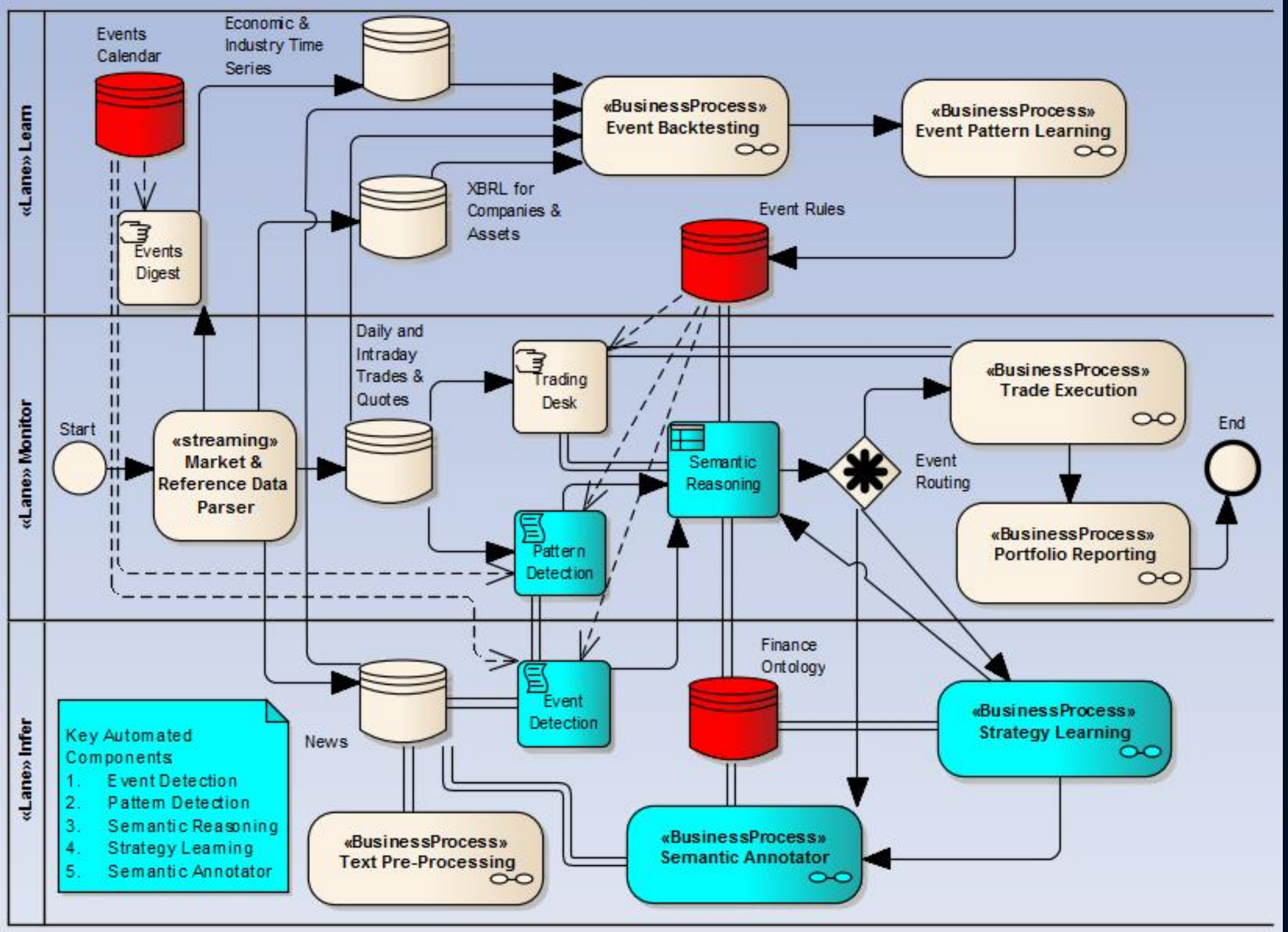

Rules-Based News Trading Platform

Stéphane Gagnon, "Rules-Based Integration of News Trading Algorithms", Journal of Trading, 8(1), 2013, pp. 15-27. Institutional Investors Journals (IIJ), ISSN: 1559-3967

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http://ardake.com/old/

2019-04-24

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Thank You!

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