SAP Leonardo Machine Learning

Machine Learning Deep in Enterprise Applications

Erik Marcadé, VP Advanced Analytics, Products and Innovation, SAP

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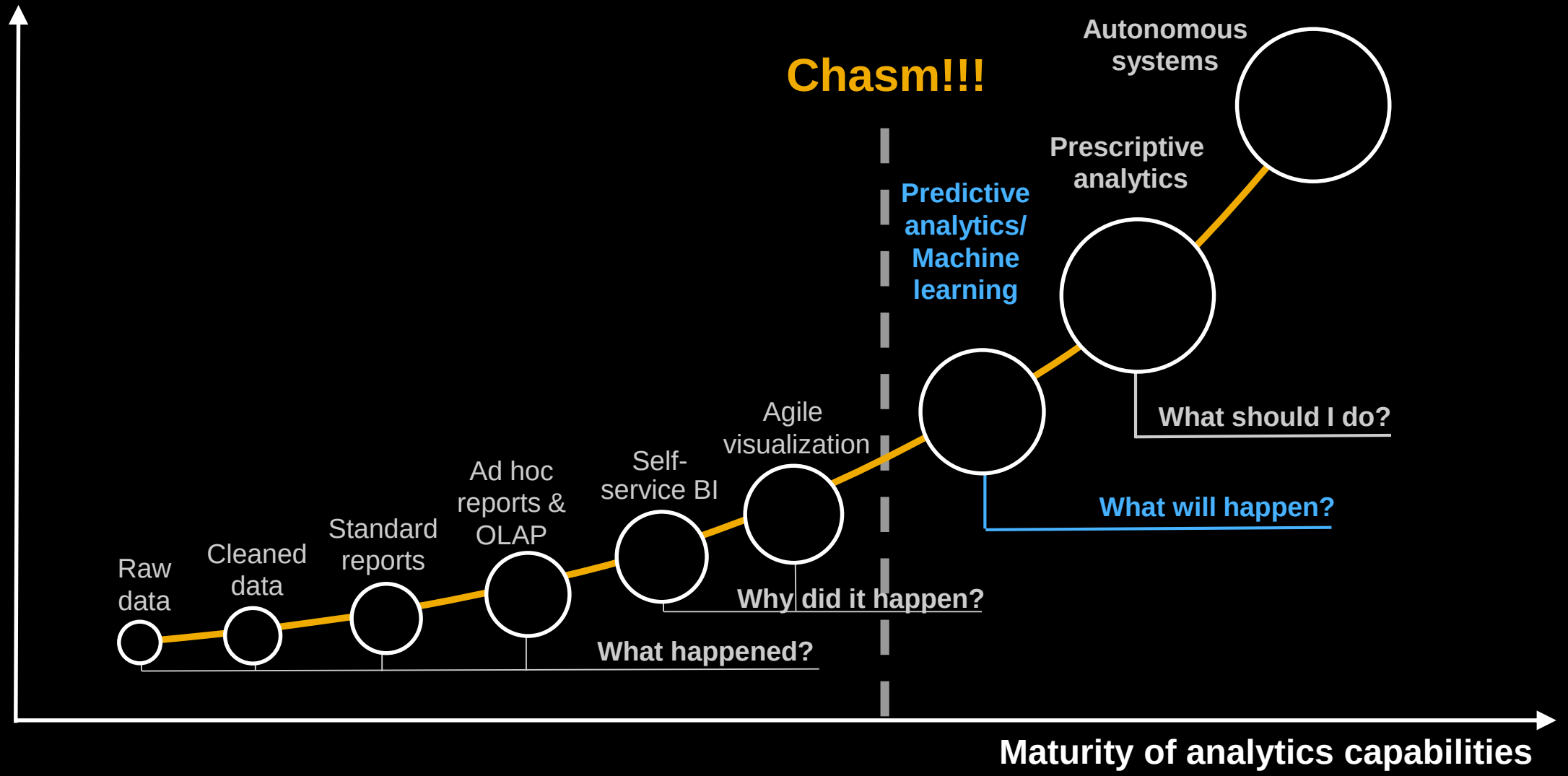
SAP Run Simple

Do not dream: We are still evangelizing

There is no such thing as an analytics continuum!



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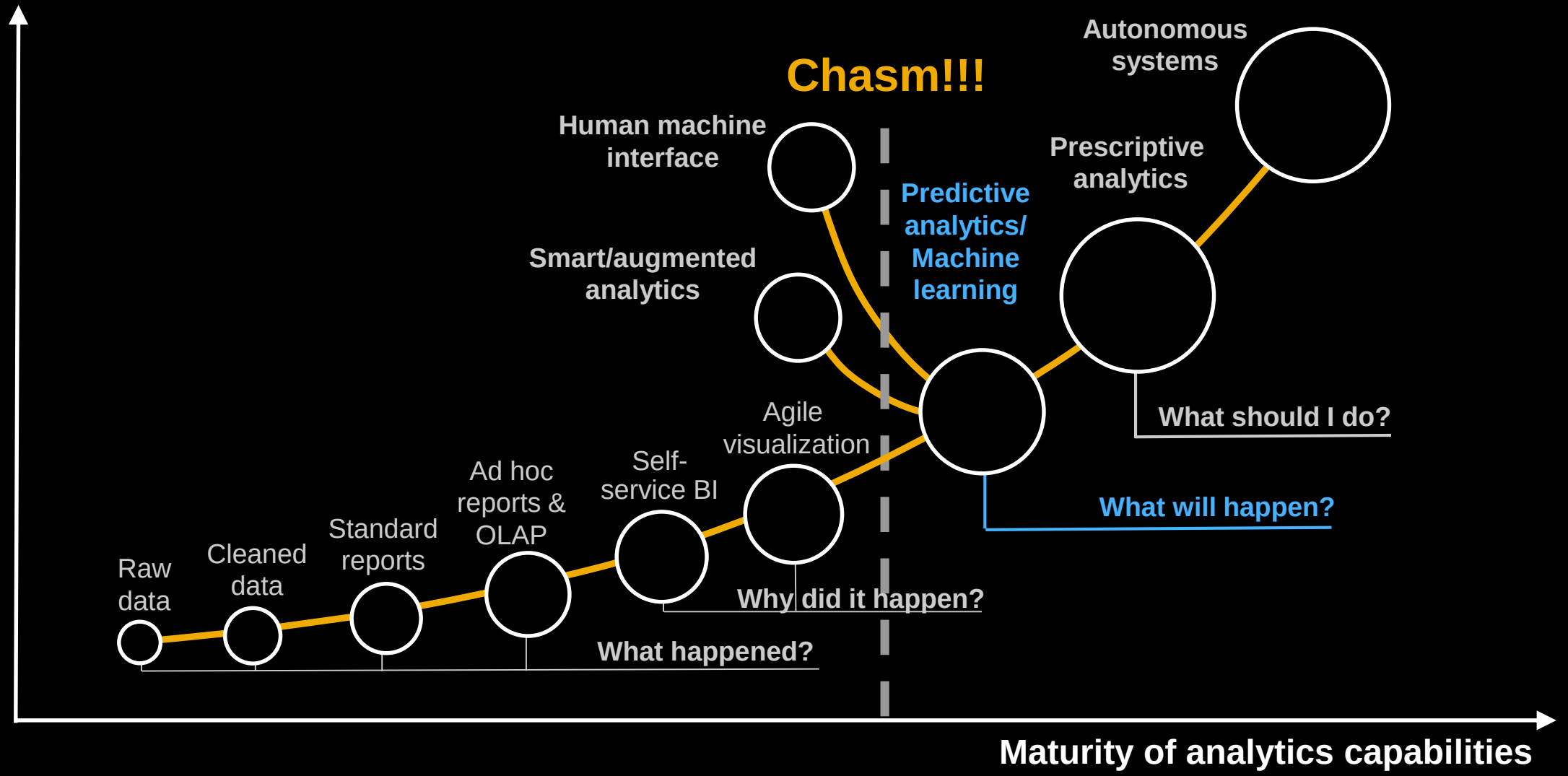

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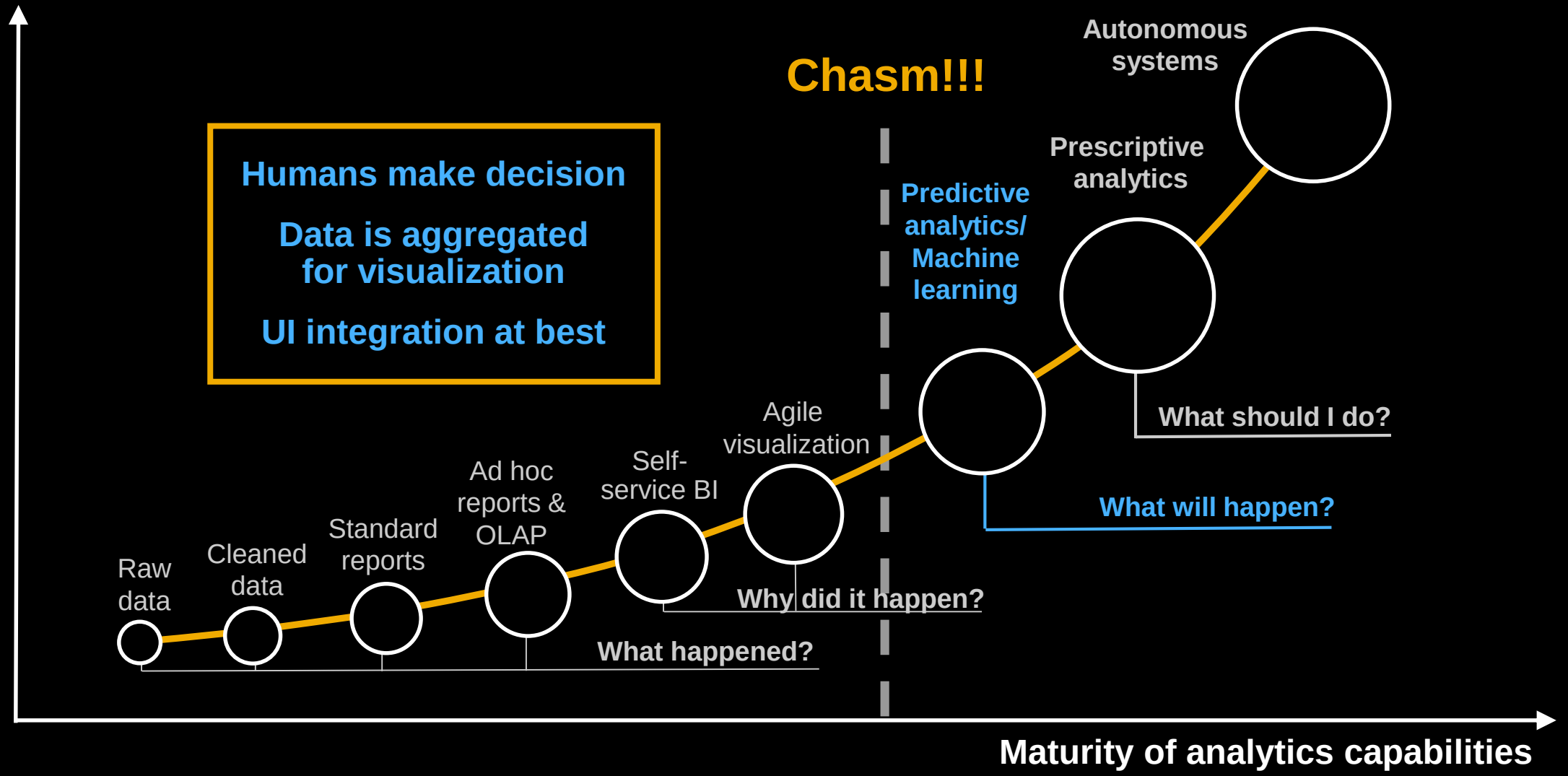

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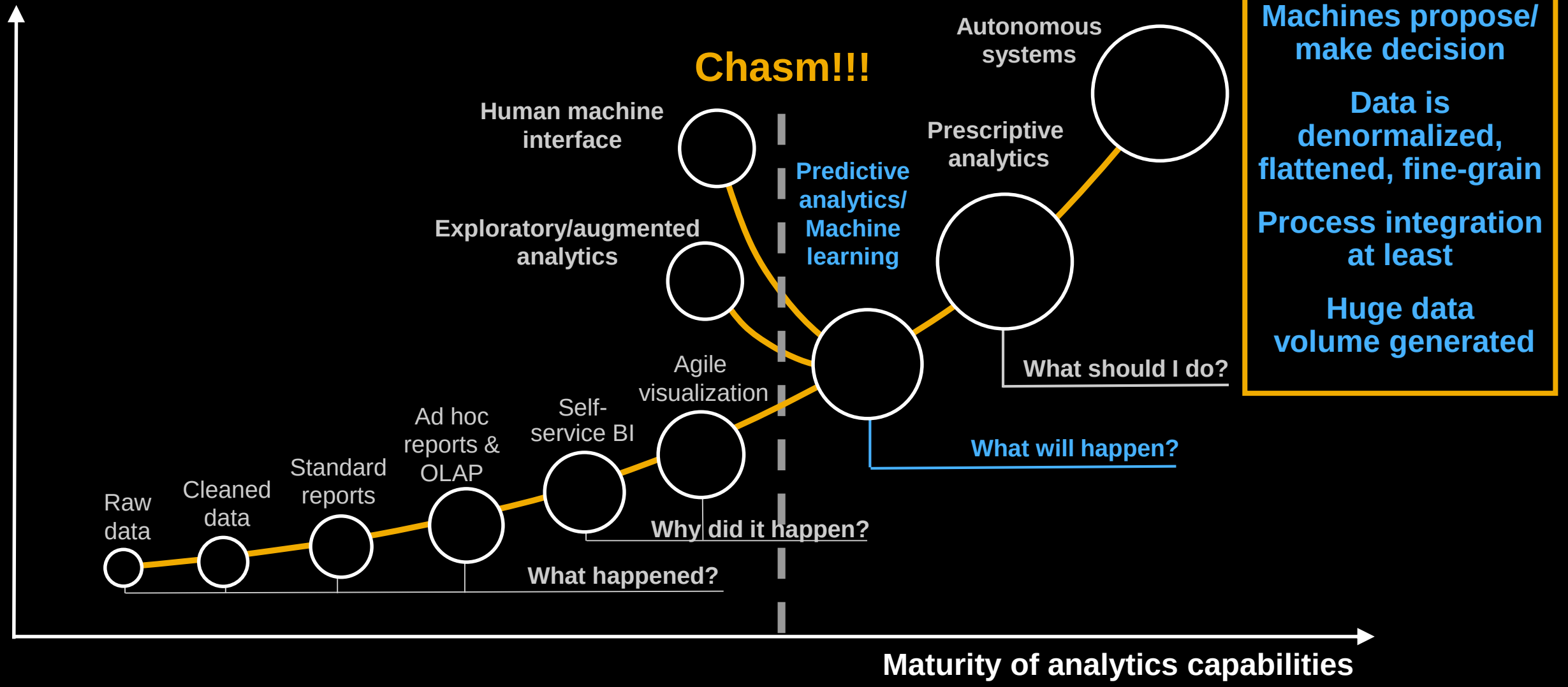

Machines propose/ make decision

Data is denormalized, flattened, fine-grain

Process integration at least

Huge data volume generated

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Analytics landscape and terminology: In the world…

Analytics		Exploratory analytics	Advanced analytics			Cognitive / Artificial intelligence (AI)
Descriptive	Diagnostic / Discovery	Assistance	Predictive / Machine learning (ML)	Semi-structured	Prescriptive	Knowledge representation and control
Powered by humans for humans		Powered by math for humans	Powered by math for processes (machines make operational / tactical decisions)			Powered by math for interacting with humans or for autonomous systems

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Analytics		Exploratory analytics	Advanced analytics			Cognitive / AI	
Descriptive	Diagnostic / Discovery	Assistance	Predictive / ML	Semi-structured	Prescriptive	Knowledge representation and control	
Reporting dashboard	Navigation OLAP Agile visualization Spatial visualization	Key influencers Hidden structure (rules) Outliers/ Anomalies/ Point of interest Segments / Groups / Bands Model-based What-if analysis	Classification Regression Time series Clustering Associations Sequences	Text analytics Entity extraction Search Taxonomy/Sort Link analytics Knowledge graph Spatial analytics Signal processing	Recommendations Scheduling Model Management Rule systems Optimization BPM automation	Speech to text Text to speech Natural language processing Natural language understanding Natural language generation Conversational Translation Sentiment analysis Emotion analysis	Image/video classification Face detection Authentication Visual recognition Reasoning Process control Gesture control Robotics Common sense
Powered by humans for humans		**Powered by math for humans**	**Powered by math for processes**			**Powered by math for augmented humans or autonomous systems**	

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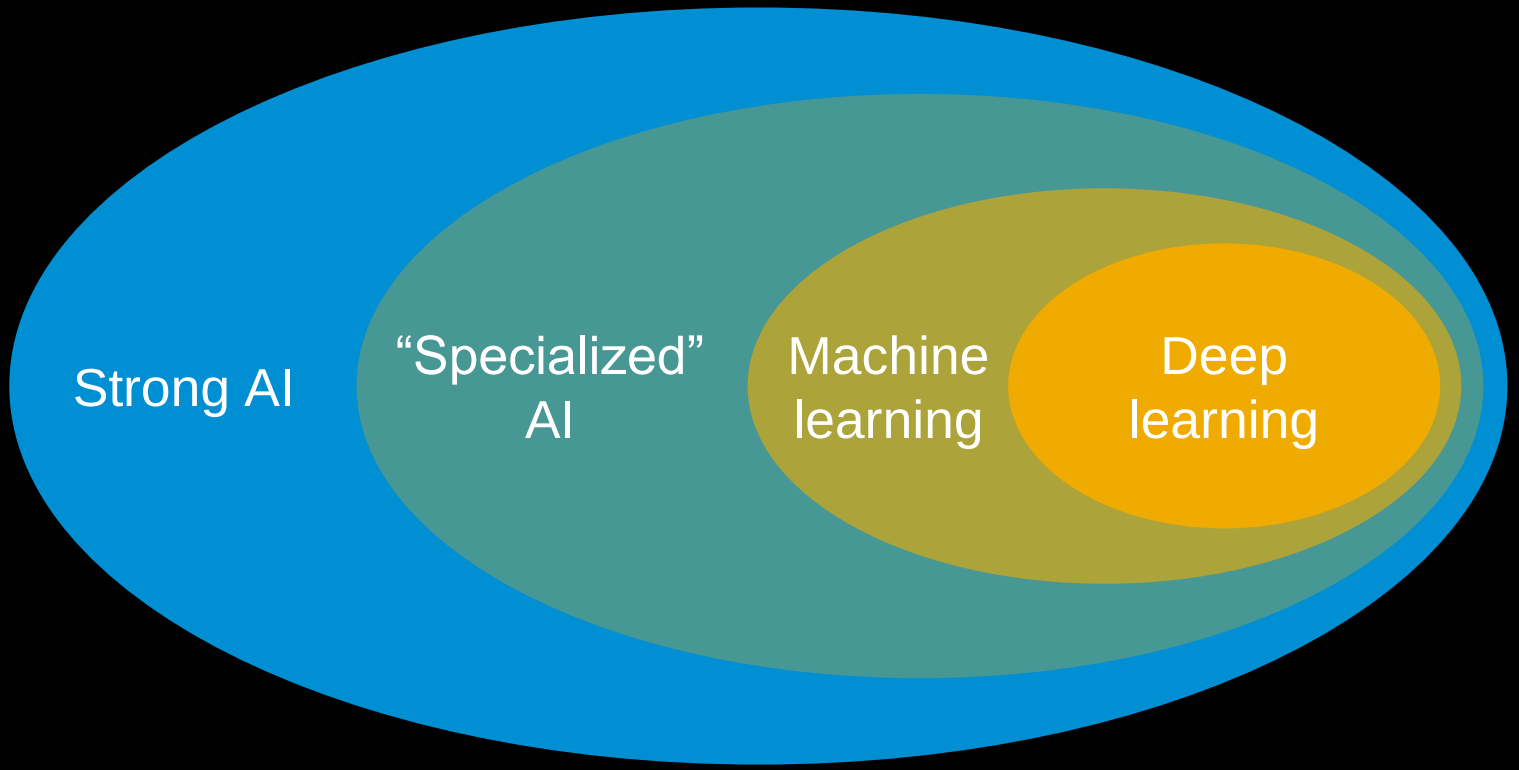
Technology taxonomy



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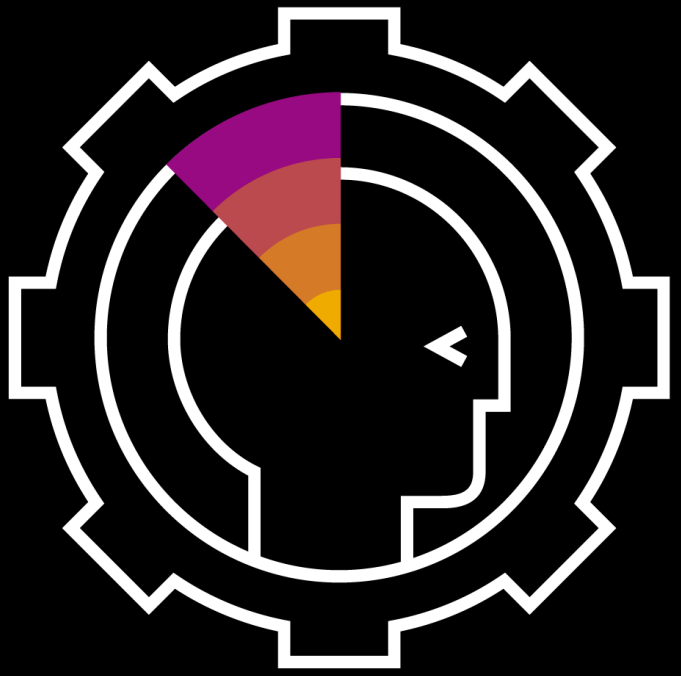
Market trends – digital transformation

Emerging systems of intelligence



Artificial intelligence and machine learning, Internet of Things (IoT), insights

By 2018, **75%** of enterprise and ISV development will include AI or ML. – IDC

Embedded machine learning, analytics providing built-in guidance

By 2019, **APIs** **will be the primary mechanism** to connect data, algorithms, and decision services. – IDC

Conversational applications: The new user experience

By 2019, **natural-language generation** will be a standard feature of **90%** of modern BI platforms. – Gartner

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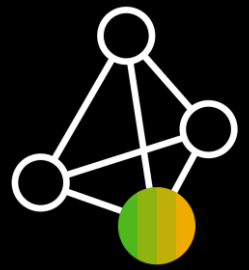
Models of the (machine learning) world

Like macroeconomics and microeconomics
Two modes



Macro machine learning

- (Predictive) model as a service
- Only a few systems are required: How many autonomous vehicle systems do we need on the planet?
- Winner take all
- More business-to-consumer (B2C)???

Micro machine learning

- Learning as a service
- Dedicated data for dedicated models
- Massive machine learning and automation
- More business-to-business (B2B)???

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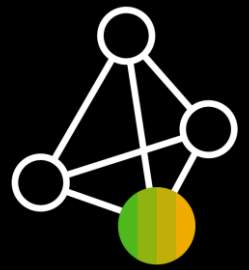
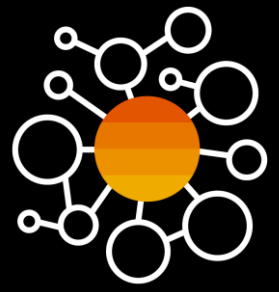
Like macroeconomics and microeconomics
Two operational contexts



Bring machine learning to data

- In SAP HANA: PAL, APL, R, TensorFlow*
- In Hadoop/Spark/SAP Vora: Leveraging ML, automated algorithms, TensorFlow*, connected to data hub*
- Future: SAP Analytics Cloud – hybrid mode
- Challenges: Sandboxing, tenancy, and deployment



Bring data to machine learning

- In the cloud: Predictive services, machine learning business and function services
- Challenges: Data transfer, security

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Structured or unstructured?
Three data universes

Structured

- What to do when connecting to a DB with 40,000 tables?
- Huge emphasis on “self-service” data manipulation
- Take into account access rights for enterprise data

Streaming

- IoT
- Real-time feature engineering
- Rare case events

Unstructured

- Unstructured data means very simple structure in fact (array of pixels, vectors to represent words)
- Heavily focused on deep learning nowadays
- AI 2017 = chatbots ?

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SAP’s vision for enterprise machine learning
Enabling the intelligent enterprise

Automate knowledge work

- Transformational **HR** services

- Lights-out **finance** operations

- Self-driving customer **service**
- Conversational **sales** bots
- Customer **lifecycle** optimization

Do the impossible

- Image-based SAP Ariba solutions for **commerce**
- Contextual Concur **travel** concierge

- Video-aware **marketing**
- Visual **store execution**

- Drone- and satellite-based **asset management**

- Vision-enabled **manufacturing**
- Contextual **logistics**

SAP Cloud Platform and SAP HANA

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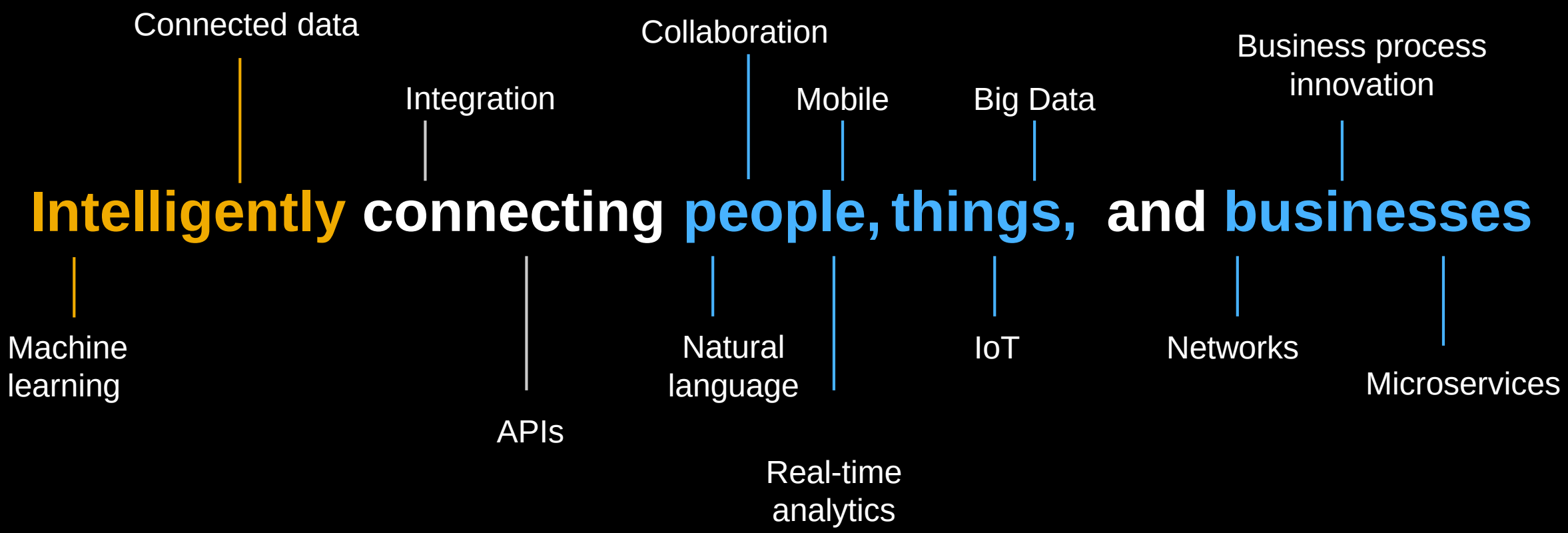
SAP’s answer: SAP Leonardo

Digitalization

Every company to become a software-driven company by



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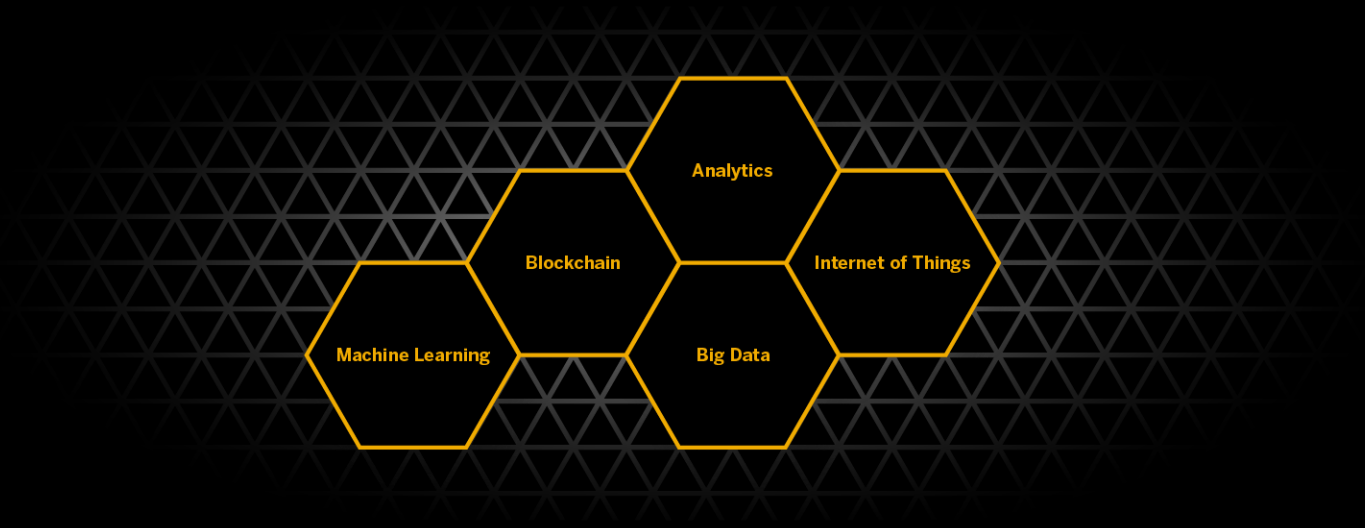
SAP Leonardo

Digital Innovation System

Solution Ideation & Vision → Rapid Prototyping → Business Case Development → Technology Blueprint

SAP Leonardo Capabilities



Design Thinking Services

SAP Cloud Platform — Microservices | Open APIs | Flexible Runtimes | Integration

Multi-Cloud Infrastructure — SAP Data Center · Google Cloud Platform · Microsoft Azure · amazon web services

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SAP Leonardo Machine Learning capabilities enable the intelligent enterprise

76% of the world's transaction revenue

25 industries

12 lines of business

The world's largest business network

SAP Leonardo
Machine Learning

Applications

Business services

Functional services

Lifecycle management

SAP Cloud Platform and SAP HANA

Business outcomes

Increase revenue with superior sales targeting and execution

Reimagine business **processes** with digital intelligence

Improving **quality time at work** for employees

Increased **customer satisfaction** with superior service

Enabling product, process, and business model **innovations**

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What is available today (1/2)

SAP Predictive Analytics

- Full lifecycle management of predictive analytics and machine learning projects (runs on SAP HANA Enterprise Cloud)

SAP Analytics Cloud

- Smart discovery: Data exploration powered by machine learning
- Smart planning: Time series forecasting integrated in planning
- Managed-R: Integration of R in SAP Analytics Cloud

SAP Cloud Platform Predictive service

- Key influencers, outliers, forecasts, recommendation, scoring equation, what-if service
- Predictive analytics integrator: Predictive scenario, predictive models and model versions, tasks to retrain and apply predictive models
  - Alpha version: Lead scoring in SAP Hybris Cloud for Customer

SAP Predictive Analytics integrator (SAP S/4HANA, ABAP layer)

- Integrated with SAP Fraud Management
- Released with SAP S/4HANA on demand (since 1705)
  - Contract consumption

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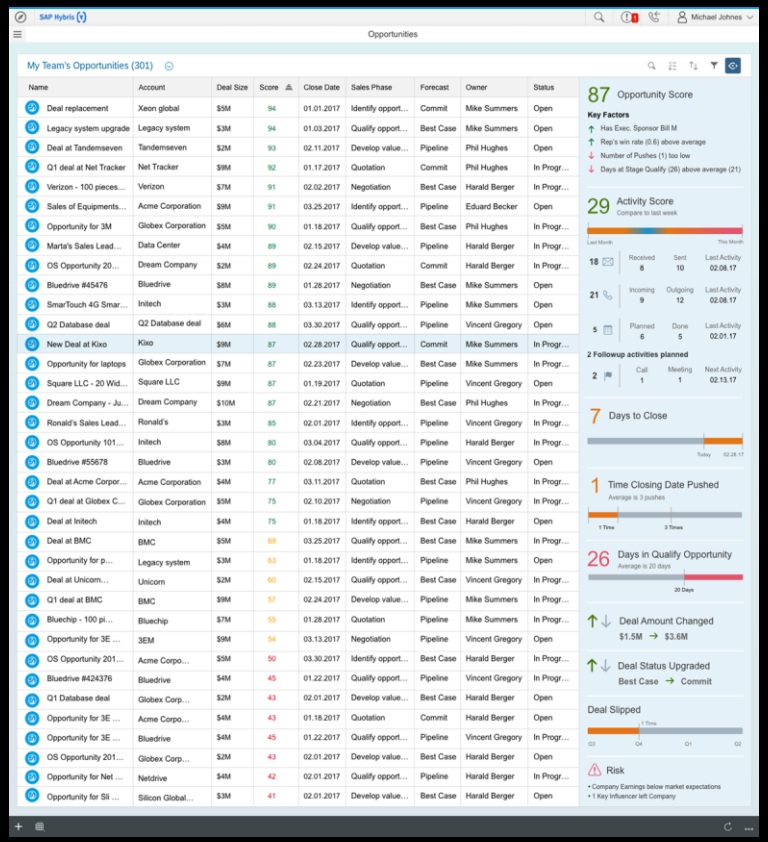
Examples of usage

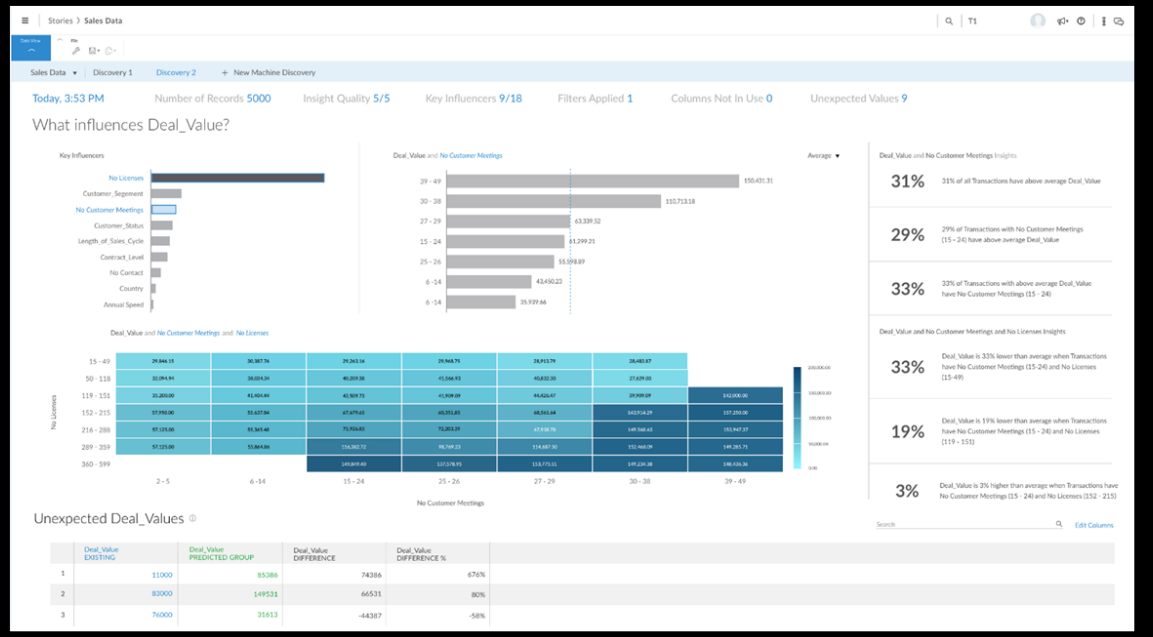
SAP Hybris Cloud 4 Sales



SAP S4/HANA on-demand/on-premise

Days since Post Date	Order	Quantity	Material	Receiving Plant	Predicted Shipment Days	Status	Title
5	4500002166	100.00 ST	USB Charter 230V (FIO-NAV-001001)	AU10	8	Still ok	
7	4500002170	500.00 ST	Windshield Mount (FIO-NAV-001005)	DE10	4	Inacceptable delay	
10	4500002171	200.00 ST	Windshield Mount (FIO-NAV-001005)	UK10	9	Longer as planned	
1	4500002173	100.00 ST	Trading Good for Consumption (TG0001)	DE10	4	Still ok	
20	4500002191	400.00 ST	Quickview Example 1 (FIO-TSC-QV001)	US10	15	Inacceptable delay	

SAP Analytics Cloud



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What is available today (2/2)

Text analytics from SAP

- Enterprise fact extraction, public sector fact extraction, sentiment analytics

SAP Leonardo ML: Business services

- Intelligent financing; SAP Service Ticket Intelligence: classification; SAP Service Ticket Intelligence: recommendation

SAP Leonardo ML: Functional services

- Time services change point, image classification, image feature extraction, topic detection
- Alpha version: Document feature extraction, product image classification, product text classification, similarity scoring, time series forecasting, translation

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Customer success: CISCO

Running a 50+ billion dollar business with dynamic insights in real time

Access to timely, accurate, and consistent data to inform decision making at Cisco, whether by company leaders or individual contributors, and provide better opportunities to plan the business

Results:

Improve Pipeline forecasting accuracy

Help Accounts manager sell more of the right products

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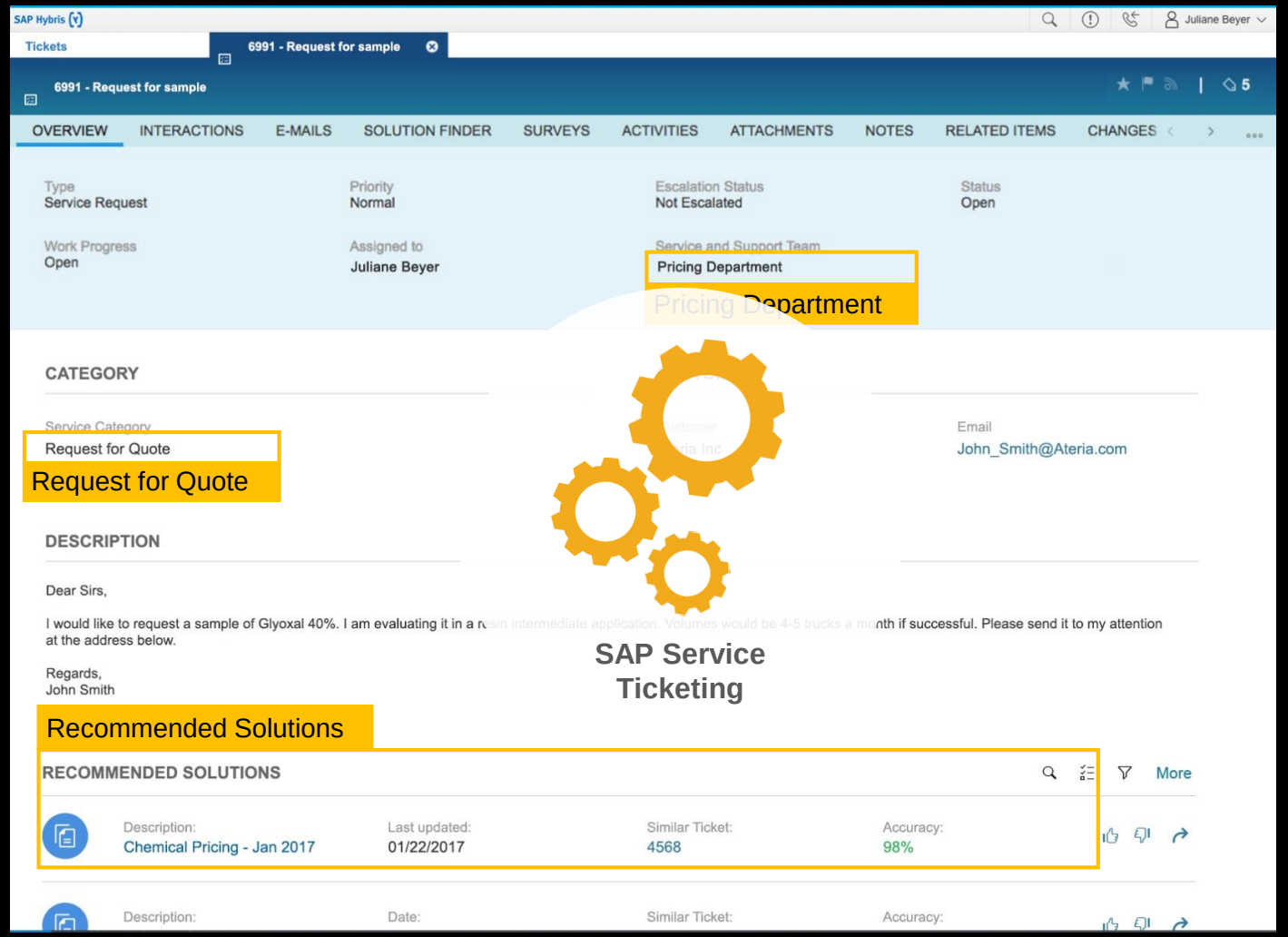
End-to-end tracking of 10,000+ customer requests per month with SAP Service Ticket Intelligence

Learn and apply ticket routing

Measure lead conversion

Improve customer satisfaction



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Thank you.

Contact information:

Erik Marcadé
VP Advanced Analytics, Analytics & Insights
Erik.Marcade@Sap.com

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