

# Siemens Enables Digitalization: Data Analytics & Artificial Intelligence

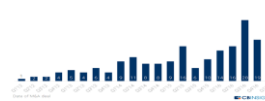
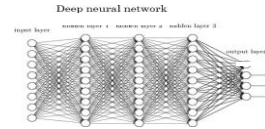
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# "Data Analytics & AI" is a highly dynamic innovation area – significant invest needed to win the race in industrial AI

## Emerging battlefields for industrial companies

### External dynamics

- Major **breakthroughs in Deep Learning since 2011** trigger huge expectations, also for industrial AI
- **Increasing investment deals** in AI (VC/internal research/M&A)
- **Availability of Open Source** tools, huge data collections and GPUs to accelerate global R&D



### Siemens footprint

- Siemens has a **good starting position** in the race for industrial AI, state-of-the-art use cases include:
  - MindSphere Advanced Analytics
  - Reinforcement Learning (e.g., for gas turbine efficiency)
  - Image Recognition @Healthcare
- Existing **nucleus of data scientists and machine learning experts**, and industrial use cases

**Engine for Industrial AI** exploiting comprehensive data pools and knowledge graphs by machine learning & reasoning technologies



**Digital companion for every product**, built on digitalized domain knowledge derived from experts insights and machine data















**War for data talents** from top-notch researcher in industrial machine learning to a standard need for data scientists



# Analytics @MindSphere

Consuming Analytics should be as easy as shopping

## Specific Analytics Building Blocks

<b>Signal</b> API for time-series analysis of sensors 	<b>Anomaly</b> API for anomaly detection in process 	<b>KPI</b> API for ISO KPI calculations 
<b>Performance</b> API for performance analysis 	<b>Trend Prediction</b> API for predictive trending 	<b>Failure Modes</b> API for various standard failure modes 
<b>Statistics</b> API for statistical functionalities 	<b>Clustering</b> API for Clustering (e.g. K-Means) 	<b>Regr. Analysis</b> API for Regression Analysis (e.g. Linear) 
<b>Rules</b> API for building rules 	<b>Event Analytics</b> API for Sequence Pattern Mining 	<b>Classification</b> API for Classification (e.g. NN or SVM) 

## General Analytics Building Blocks



# 4 Technology Pillars for Out-of-box Data Analytics Tools

## → 4 Technology Pillars



**Specific Industrial Analytics Algorithms**



**Large-scale Performance**



**Analytics Design Patterns / Architecture**



**UI / User Experience**

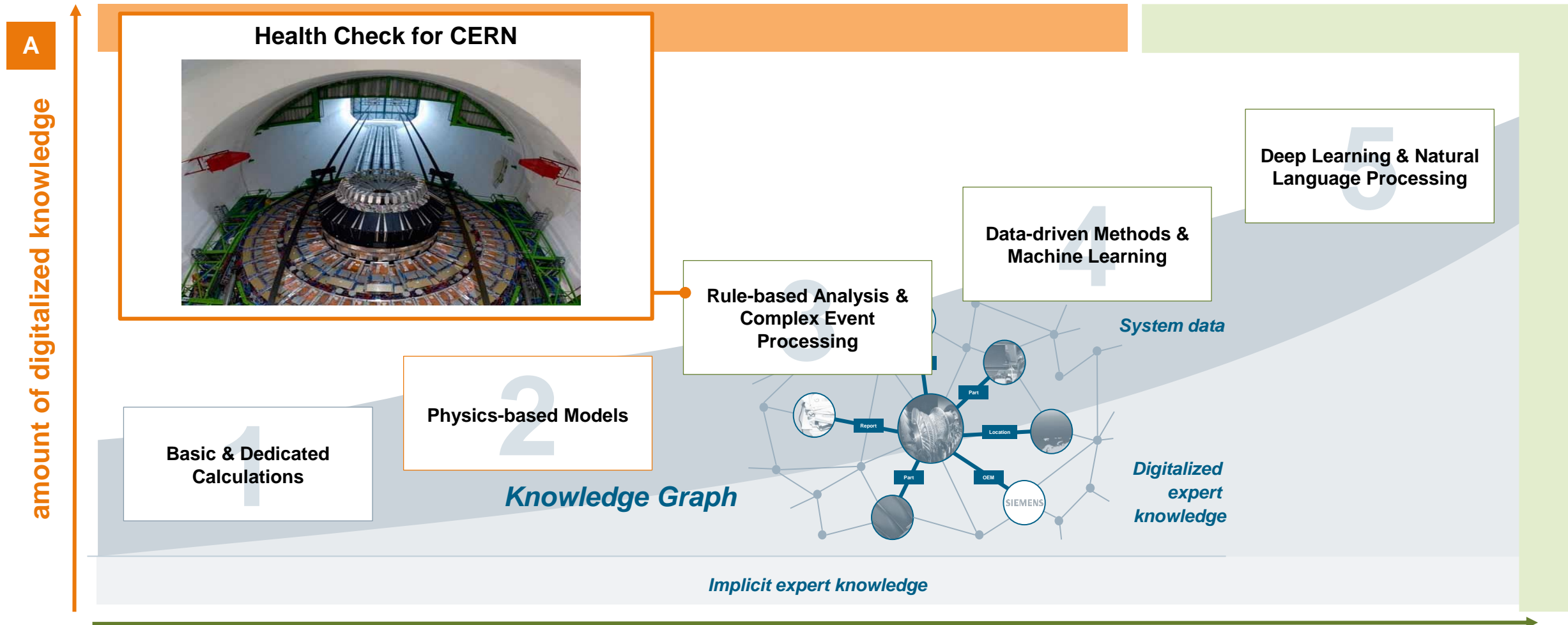
## Build up Siemens Data Analytics Tools

Technology-driven Tools stack that is continuously built-up and fostered with every new use case

Algorithmic modules		Algorithmic services		Pre-trained models
Sensor Processing	Text Recognition	Component Recognition	Optimization Service	Anomaly Detection
Planning & Scheduling (incl. optimization)	Image Processing	MI Studio	VPA Service	Part Classifier
Knowledge Graph	Speech Recognition	Chat Bot	Deep Learning Service	Image Context Annotation
Natural Language Processing (NLP)	Representation Learning	Annotation Service	Interpretable AI	Context Object detection
Agent technologies	Machine learning incl. Deep Learning	<b>UI / UX Elements</b> 		Speech recognition
Reinforcement Learning	Reasoning/ Semantics			Face feature recognition
Data labeling & Annotation	Transfer learning			Pump Ops Model
Anomaly detection				

Own SW development only where no viable market solution can be used

# Technology Field Business Analytics and Monitoring (BAM): Out-of-box Data Analytics Tools





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[siemens.com](https://www.siemens.com)