

Data-driven and AI- powered solutions for R&D

R&D in the financial industry

Data science 3.0 | What is next ?

The tendency, which seems to be converging towards a somewhat standardised, cross-industry risk framework, is forcing financial industry in the direction of automated straight through processes and intraday business monitoring. According to us, the emerging trend for treatment in banks is based upon four drivers:

Regulation	Transparency	Risk/Reward	Cost reduction
<ul style="list-style-type: none"> › Causing convergence across the industry with a narrowing freedom of interpretation and back stop models that are becoming the new standard 	<ul style="list-style-type: none"> › Shareholders, Stakeholders and customers all demand clear visibility. Clear and ordered data across the institution that generates coherent reports 	<ul style="list-style-type: none"> › Better understanding and management of risks; capturing, modelling, monitoring and optimizing all risk types 	<ul style="list-style-type: none"> › New technology and pressure to reduce costs drive automated solution and replacement of manual interference wherever possible

The Data science trends in brief | Future concepts & techniques

Algo Hedging - How AI and ML can influence or determine hedging strategy

- › A complex portfolio can be hedged in many ways. Here an algorithm using sensitivities and a library of hedging products would be able to construct alternative and improved ways to hedge a portfolio. Ways that are not intuitive to a trader and may be more cost effective. By combining the hedging tool with Machine Learning (ML) technics calibrated on past data, alerts for optimal hedge at optimal time could be generated, as could recommendations for switching to new hedging strategies

New ways of capturing risks - Supply Chain Finance and Complexity Networks

- › Embracing new methodologies to capture and view risk. For example consider Supply Chain Finance (SCF), this could be viewed as a closed system from a credit risk perspective. Which would open up new ways for raising capital, engaging with clients and offer services. Similarly one could use complexity networks to model market interactions and improve the understanding of various factors to enable impact analysis.

The old oldest trick in the book... to get off the books

- › Transferring risk through new products such as Credit Suisse's bond issue earlier this year. Could this be taken one step further and be tranching against the proposed buckets of operational risk losses in proposed in BIS new operational risk framework?

The full picture with the technology and techniques of tomorrow

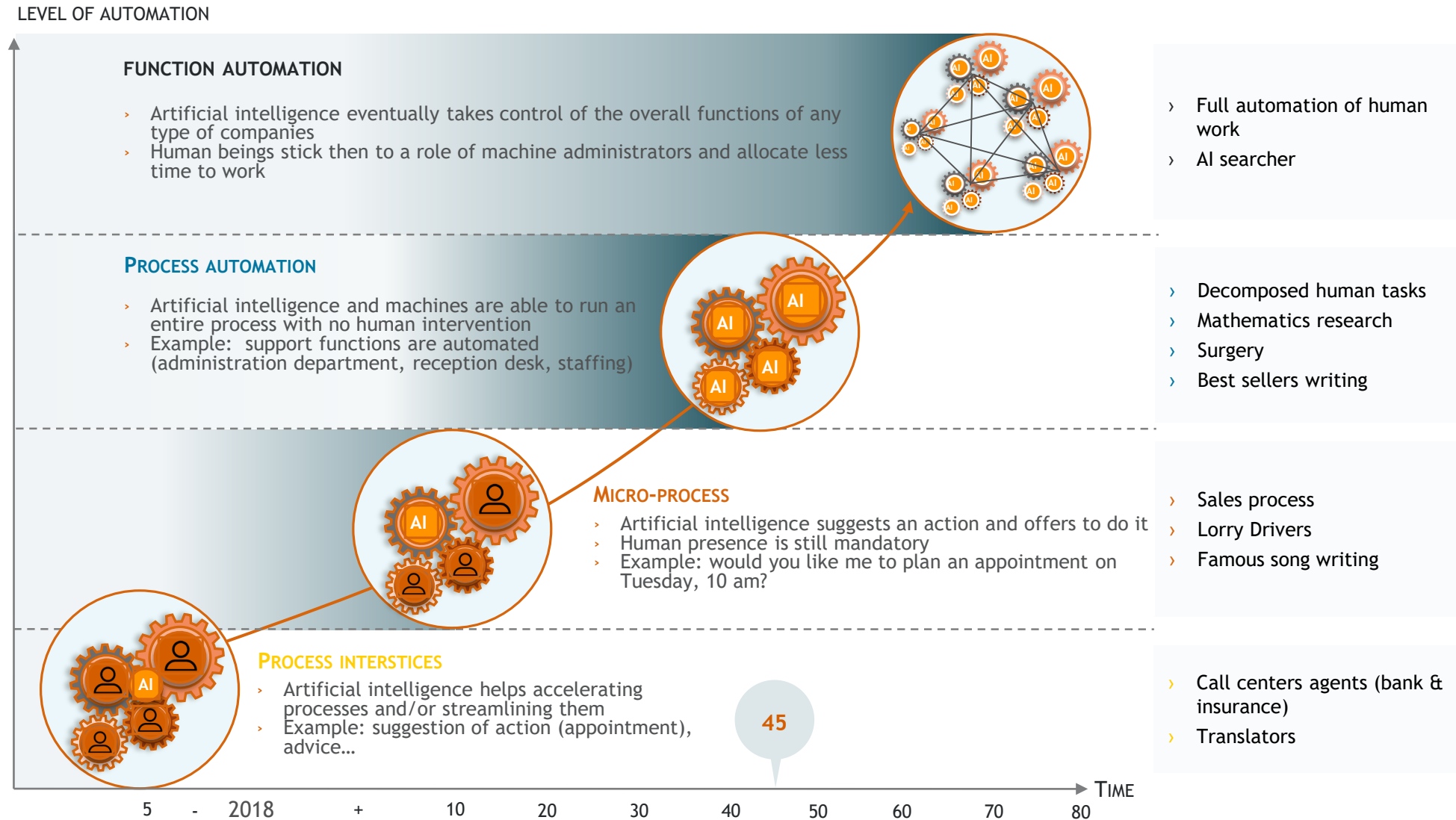
- › It is an overwhelming task to find the hedges or best collateral solution for a complex portfolio. Even more so to understand the future margin requirements and align this with other liquidity strains. To bring the full picture of outflows and inflows, risk and capital requirements an integrated system is required. What would the dashboard, an insightful overview with alerts look like? How can this be achieved? What can be monitored in real-time vs time-slicing?

Machine learning and Artificial Intelligence to increase effectiveness & efficiency

- › Leveraging new technology and methods by developing machine learning for back and stress testing (automation). This would reduce the cost of resources and free up quants to analyze and improve models.

Artificial Intelligence...

... irredeemably continues to expand



GRA and R&D

5 complementary dimensions as part of Data Revolution & the emergence of New Technologies

R&D advises on possible outcomes and results in actions that are likely to maximize key business metrics. It helps human mind evaluating efficiently scenarios when too many variables, constraints and data at stake.

	XXX	XXX
① Prediction, Anticipation and Simulation	<ul style="list-style-type: none">› Modeling of a variable from existing data, enabling its prediction & anticipation according to several scenarios	<ul style="list-style-type: none">✓ Prediction future value of a random process✓ Optimization of products offers✓ Detection of risk period and critical path
② Estimation	<ul style="list-style-type: none">› Estimate the value of a variable of interest based on explanatory variables	<ul style="list-style-type: none">✓ Estimation of a variable of interest of new individuals according to their characteristics✓ Estimation of future purchase
③ Behavioral analysis	<ul style="list-style-type: none">› Interpreting and predicting behaviour using statistical data and text/sound/image mining	<ul style="list-style-type: none">✓ Behavioral analysis from the emails database✓ Segmentation products investment risks
④ Ranking / Discrimination	<ul style="list-style-type: none">› Creating various homogenous classes making the ranking of individuals possible	<ul style="list-style-type: none">✓ Homogeneous Risk Class in Credit Risk (PD/LGD)✓ Human resources digitization
⑤ Self-learning models	<ul style="list-style-type: none">› Implementing models that automatically learns by themselves how to optimize their parameters from available data	<ul style="list-style-type: none">✓ Clients' targeting✓ Classification (including clustering logistic regression)

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Uses for Financial Services

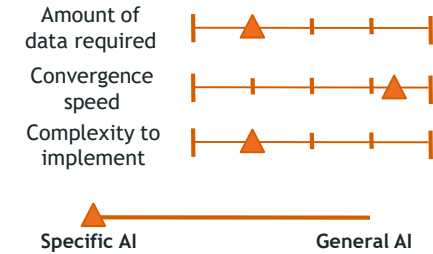
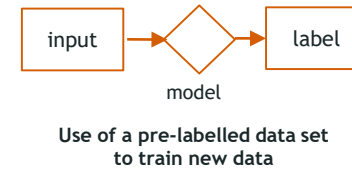
	Reporting and Descriptive Analytics	Predicting and Prescriptive Analytics
<p>①</p> <p>Marketing & Commercial Efficiency <i>(consumer behaviour)</i></p>	<ul style="list-style-type: none">› Customer Lifetime Value› Customer profitability dashboards› Drill down reporting by customer› Campaign analytics	<ul style="list-style-type: none">✓ Channel mix modeling✓ Next-best offer✓ Trigger-based cross sell✓ Bundled pricing✓ Social media listening and measurement✓ Customer and marketing segmentation and targeting
<p>②</p> <p>Risk & Finance</p>	<ul style="list-style-type: none">› VaR calculations (historical / non-parametric)› Suspicious activity reporting and customer risk scoring› Account validation against watch-lists› Risk alerts at customer / geography / product level	<ul style="list-style-type: none">✓ VaR calculations (variance-covariance and Monte Carlo)✓ Behavioral PD, LGD, and EAD modeling✓ Stress-testing against economical scenarios✓ Pattern recognition and ML
<p>③</p> <p>Process efficiency</p>	<ul style="list-style-type: none">› Measure the progress and productivity› standardize and simplify tasks to keep business running smoothly› Expense reporting	<ul style="list-style-type: none">✓ Predictive maintenance or condition monitoring✓ BPI and statistical tools✓ Predictive inventory planning✓ Alerts and diagnostics from real time data
<p>④</p> <p>Product and portfolio optimization</p>	<ul style="list-style-type: none">› Detailed asset level reporting› Portfolio dashboards› Static analysis of portfolio for capital requirements estimation› Collateral analysis› Collections delinquency	<ul style="list-style-type: none">✓ Simulations to predict default or repayment risk✓ Determining regulatory / economical capital based on credit portfolio✓ Central limits management

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Machine Learning Algorithmes

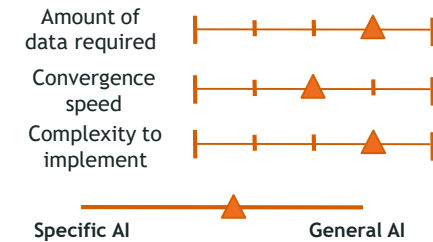
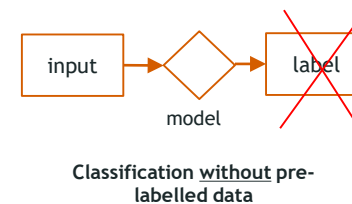
1
Supervised

- Supervised learning methods are used to classify observations into distinct categories, i.e. where we have an input variable (x) and an output variable (Y) and we use an algorithm to map the input and the output



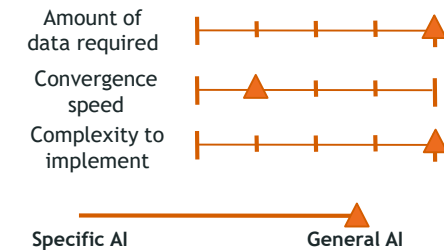
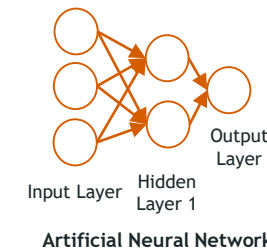
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Unsupervised

- Unsupervised learning algorithms are used to identify some relationships between variables and their common drivers, i.e. where we have an input variable (x) and no corresponding output
- The aim of the unsupervised learning is to model the distribution in order to better understand the data



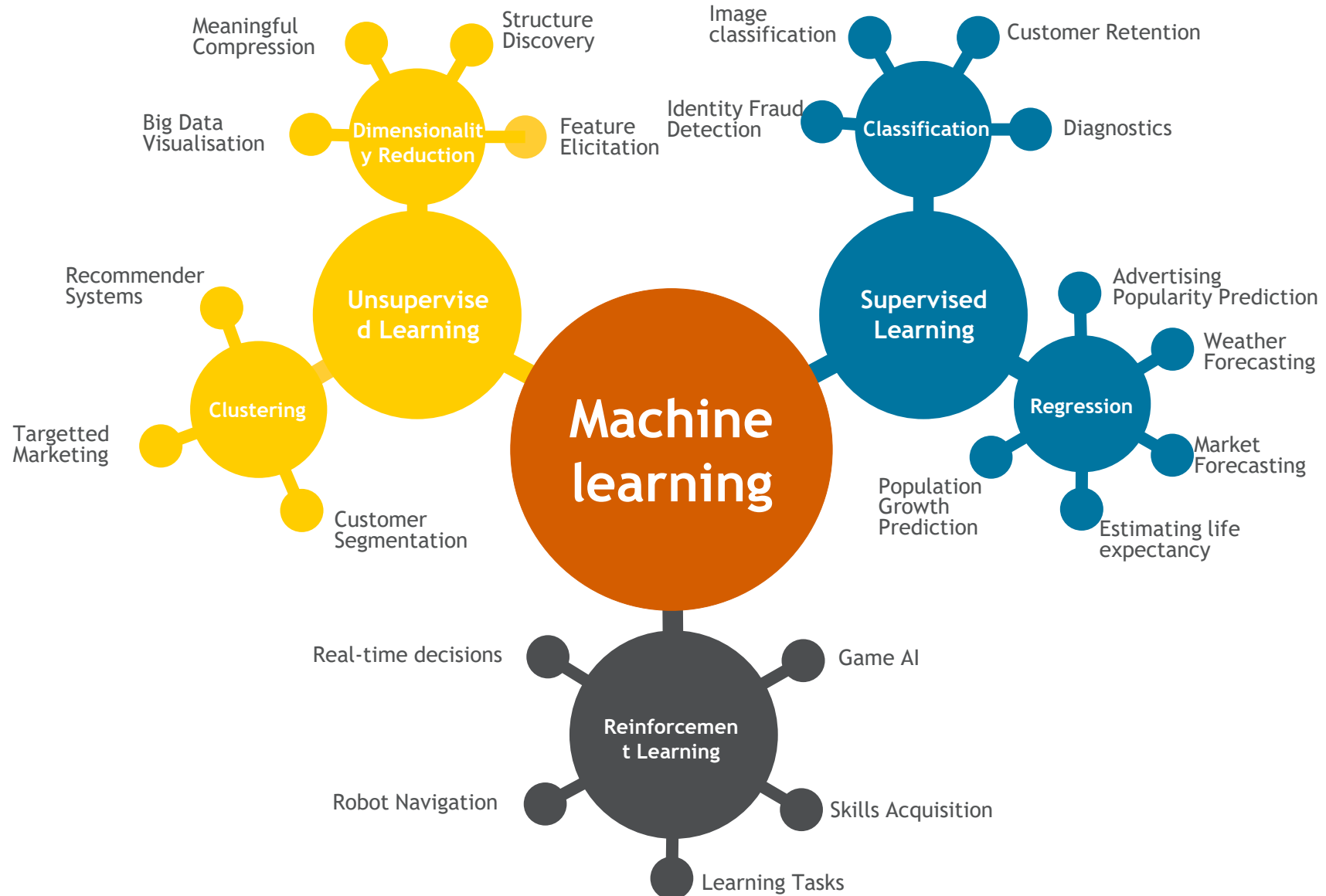
3
Deep & Reinforcement

- Deep learning is a Machine Learning method that analyzes data in multiple layers of learning. It may start by learning about simpler concepts, and combining these simpler concepts to learn about more complex concepts and abstract notions.
- Reinforcement learning doesn't know the correct action at each step, but learns over time which succession of steps led to the highest reward at the end of the process.



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Machine Learning Algorithms





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