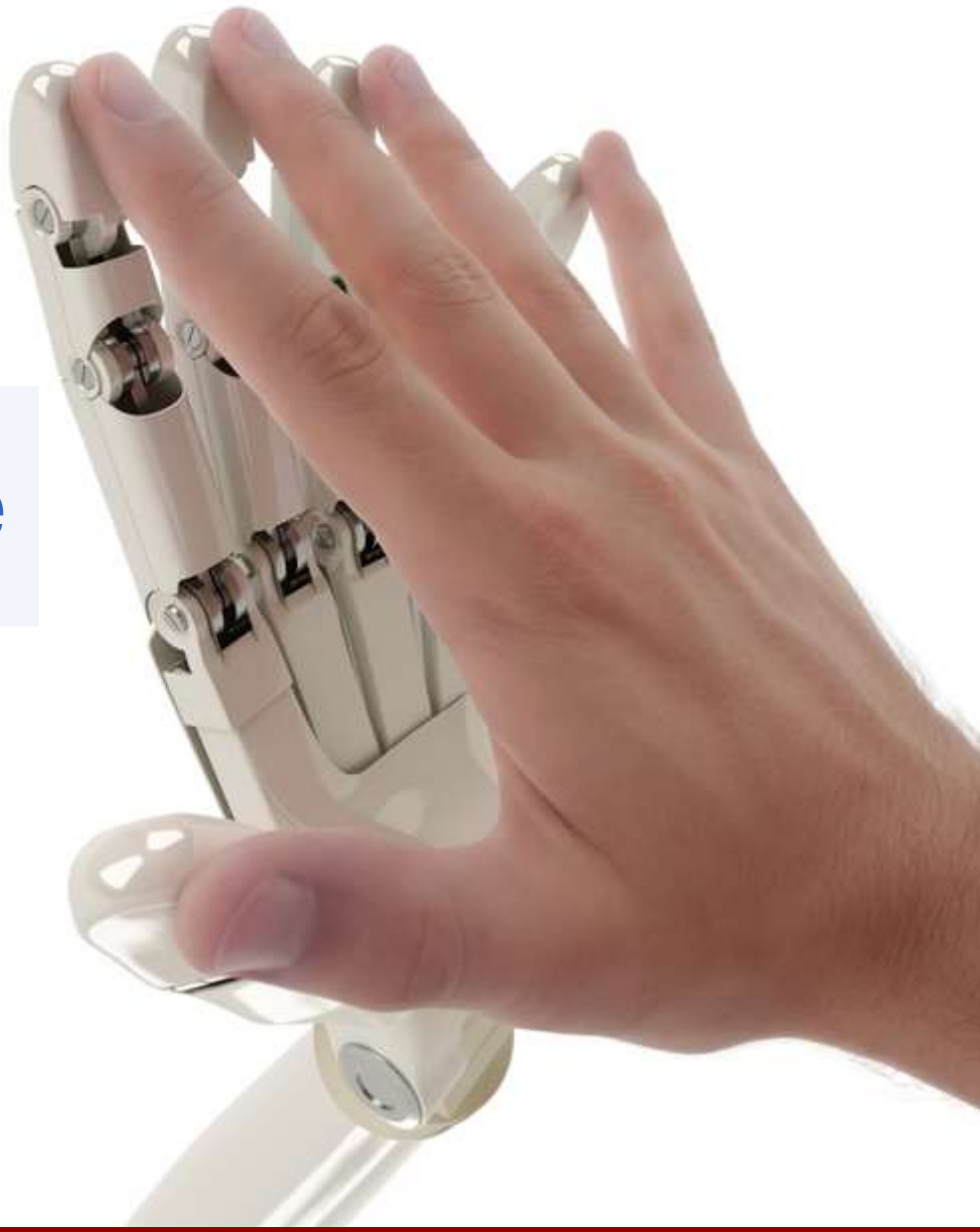
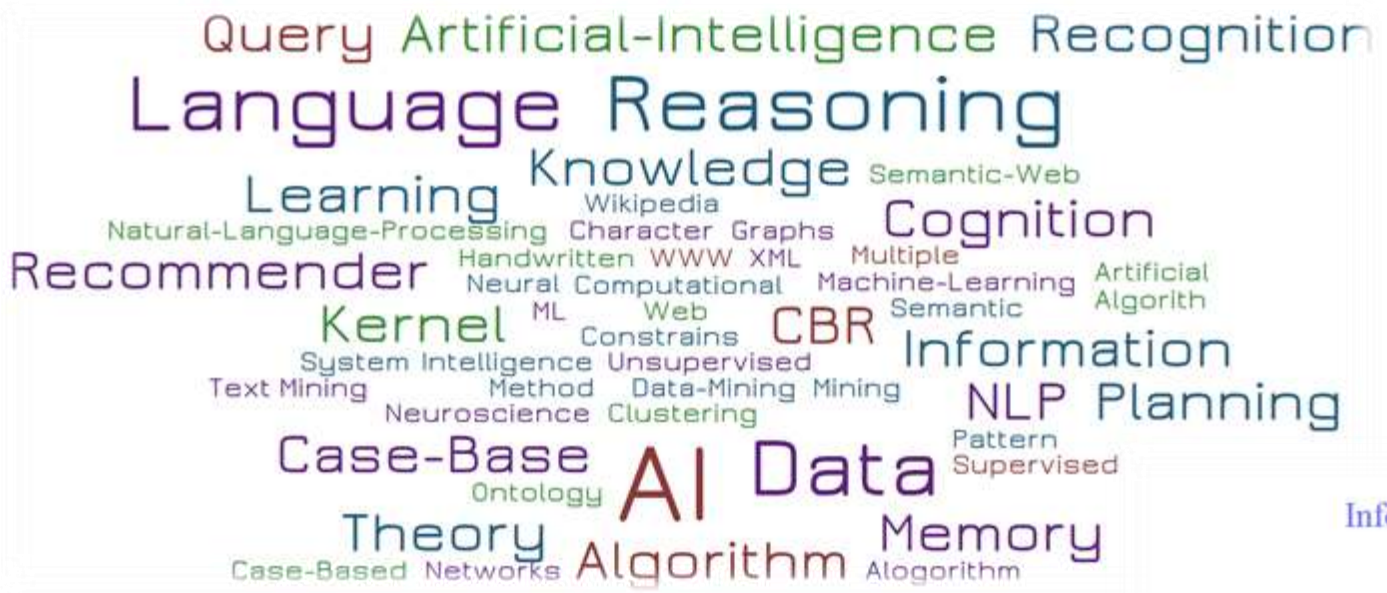
Machine Intelligence @ Swiss Re

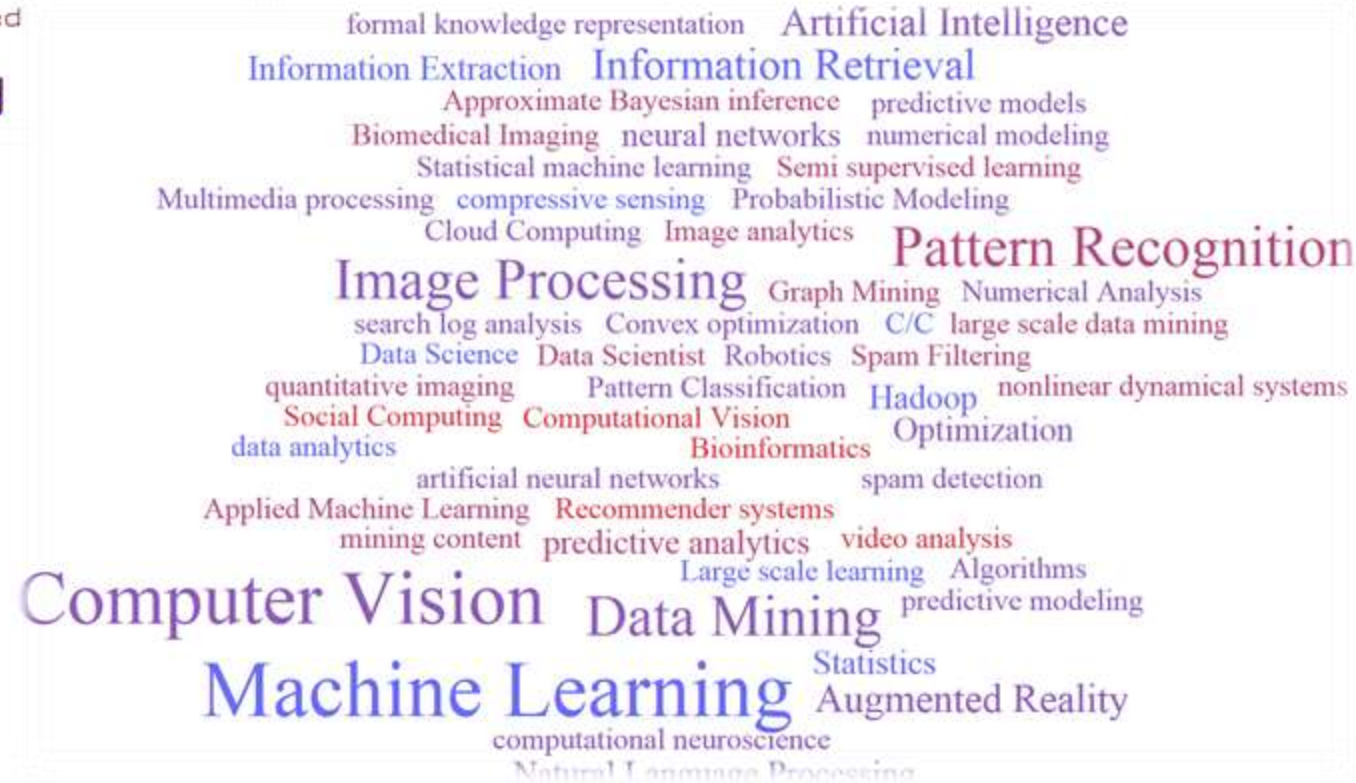


EURO Case 2018

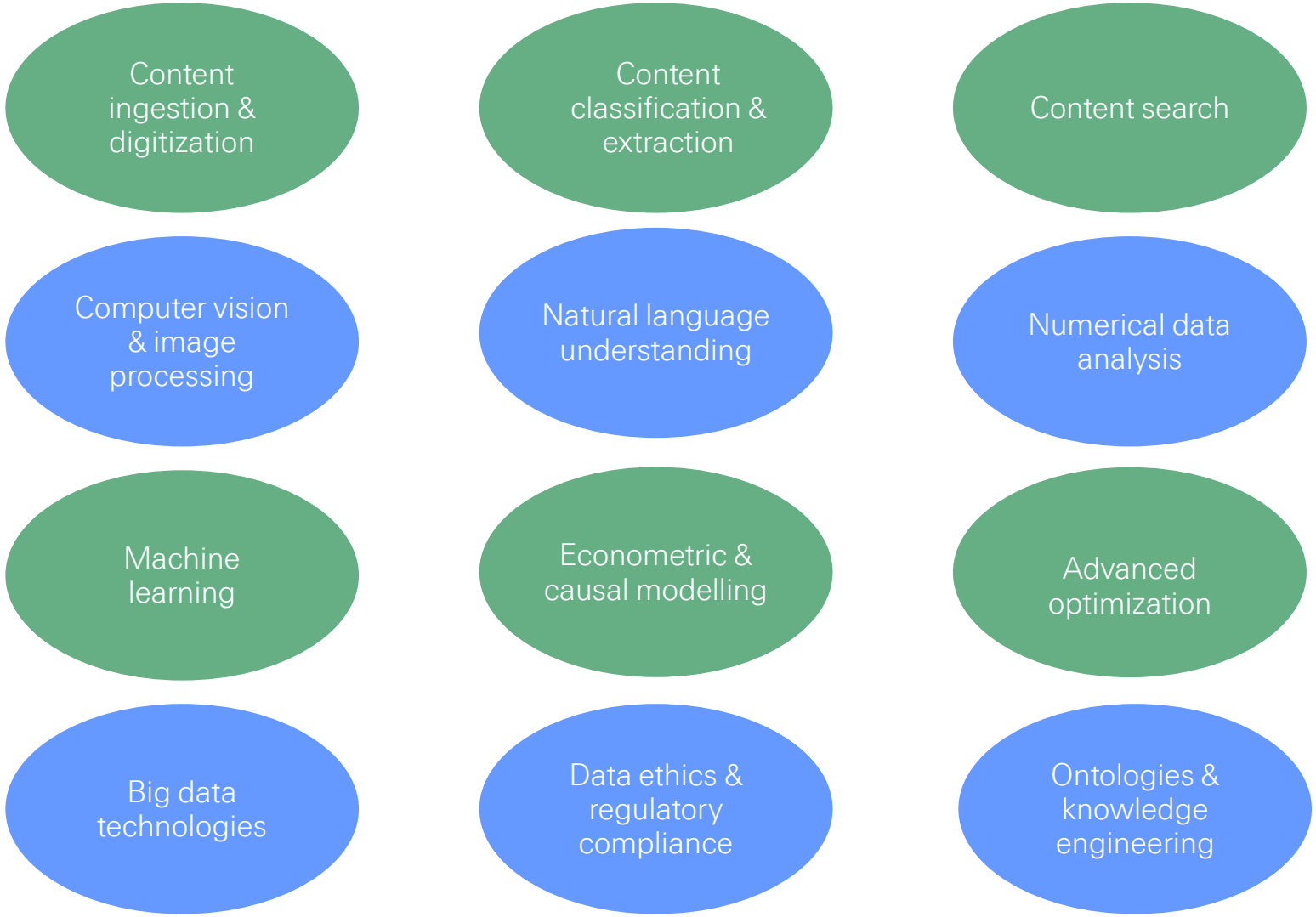
Swiss Re Center for Global Dialog

Rüschlikon, September 2018

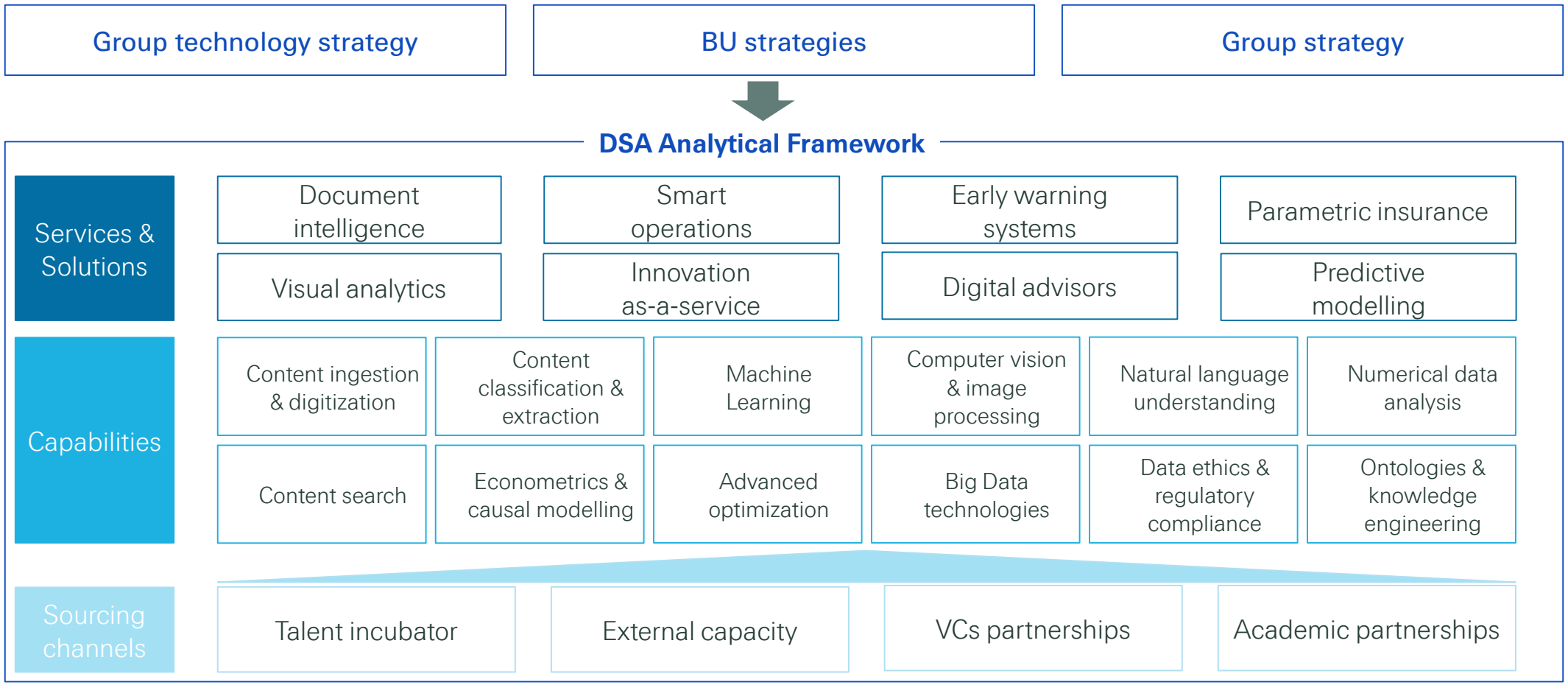

Query
Artificial-Intelligence
Recognition
Language
Reasoning
Knowledge
Semantic-Web
Learning
Wikipedia
Cognition
Natural-Language-Processing
Character
Graphs
Recommender
Handwritten
WWW
XML
Multiple
Neural
Computational
Machine-Learning
Artificial
Algorith
Kernel
ML
Web
Semantic
CBR
Information
Constrains
System
Intelligence
Unsupervised
Text Mining
Method
Data-Mining
Mining
NLP
Planning
Neuroscience
Clustering
Pattern
Case-Base
AI
Data
Supervised
Ontology
Theory
Memory
Case-Based
Networks
Algorithm
Alogorithm


formal knowledge representation
Artificial Intelligence
Information Extraction
Information Retrieval
Approximate Bayesian inference
predictive models
Biomedical Imaging
neural networks
numerical modeling
Statistical machine learning
Semi supervised learning
Multimedia processing
compressive sensing
Probabilistic Modeling
Cloud Computing
Image analytics
Pattern Recognition
Image Processing
Graph Mining
Numerical Analysis
search log analysis
Convex optimization
C/C
large scale data mining
Data Science
Data Scientist
Robotics
Spam Filtering
quantitative imaging
Pattern Classification
Hadoop
nonlinear dynamical systems
Social Computing
Computational Vision
Optimization
data analytics
Bioinformatics
artificial neural networks
spam detection
Applied Machine Learning
Recommender systems
mining content
predictive analytics
video analysis
Large scale learning
Algorithms
Computer Vision
Data Mining
predictive modeling
Statistics
Machine Learning
Augmented Reality
computational neuroscience

Machine Intelligence @SR – technical capabilities



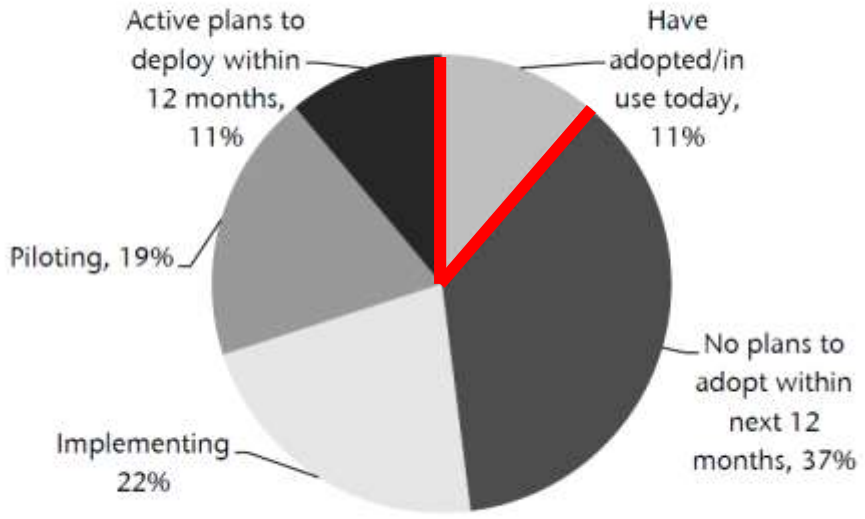
Digital & Smart Analytics framework



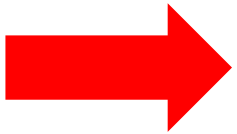
Activities
Examples

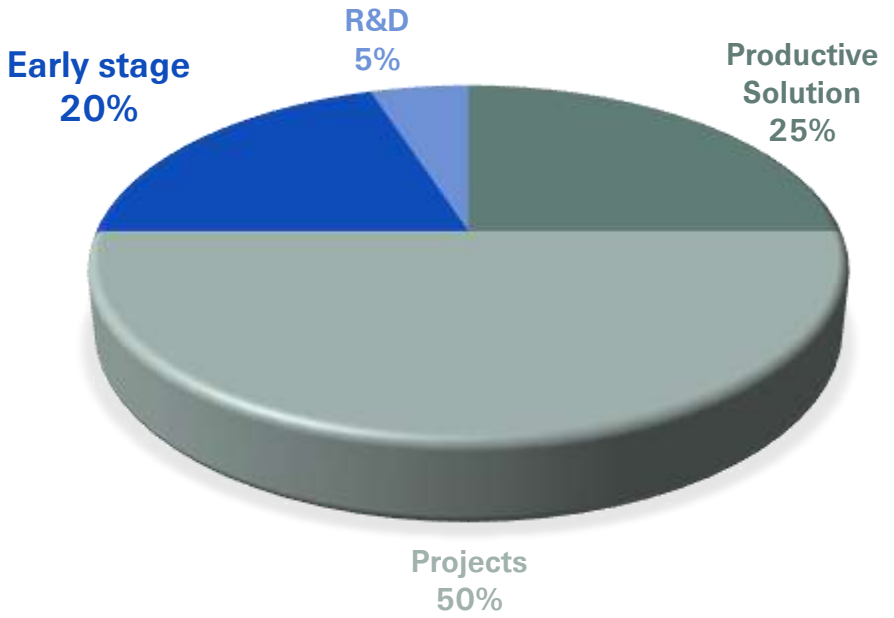
Balanced pipeline from productive solutions to R&D activities

Exhibit 10: Gartner Survey of IT Managers – Status of Adoption of AI/Machine Learning



Source: Gartner (March 2017), Jefferies





NLP for Interests & Liabilities

- Data
  - **All Property & Casualty treaty contracts (90K)** for the **period 2011-2016**
  - This corpus is digitized and quality-checked
  - Machine Learning/NLP methods are applied using a training set of **1,703 annotated I&L documents**

- Following up on an I&L signature, the contracts' corpus must be checked for legal changes
- **Legal change detection accuracy: 96%**

Proteus – Risk Scanner

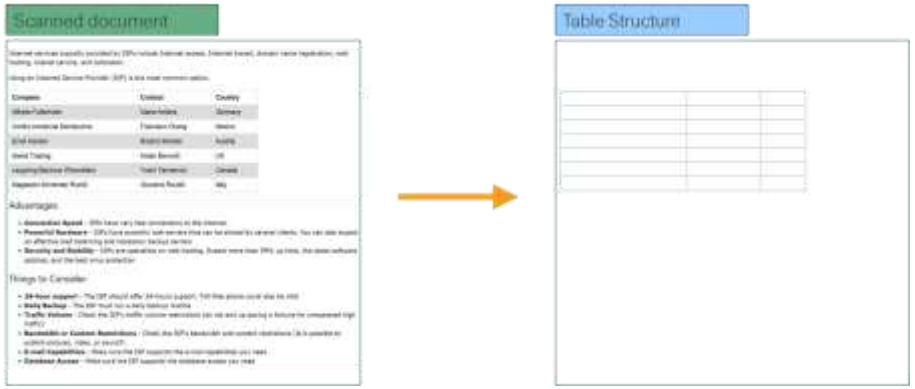
Group Qualitative Risk Management in the digital age

- Display relevant articles
- Classify articles and provide a taxonomy
- Maintain a database of relevant articles
- Allow modern searching/filtering
- Quantify and visualize identified risks
- Allow reports' personalization

- ❑ Proteus leverages Expert System semantic computing capabilities and their Cogito platform's knowledge graph
- ❑ Proteus aims at transforming work methods as qualitative risk managers into data driven, semi-automated processes, assisted by Tech expertise

Generative Adversarial Networks – an application to document processing

The problem



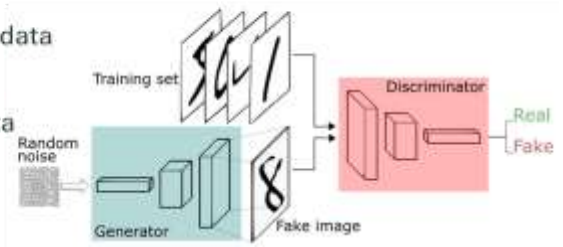
A new promising method to be explored

Generative Adversarial Networks

Two neural networks playing a game:

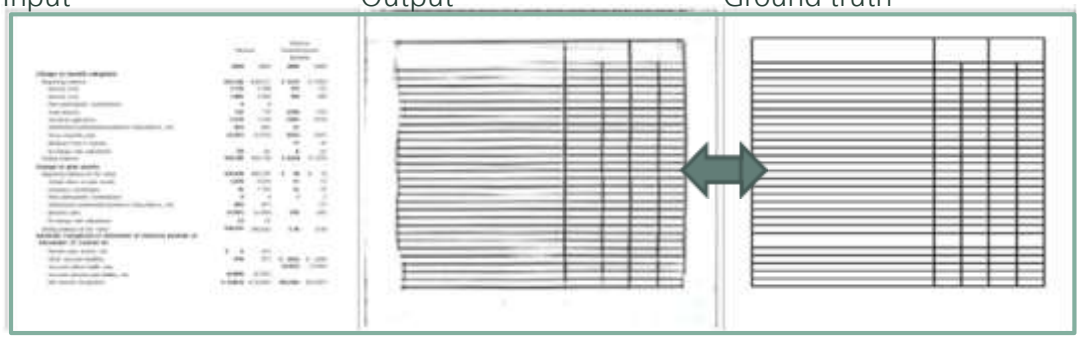
Generator:
Try to generate real looking Fake data

Discriminator:
Try to separate Real and Fake data



Preliminary results

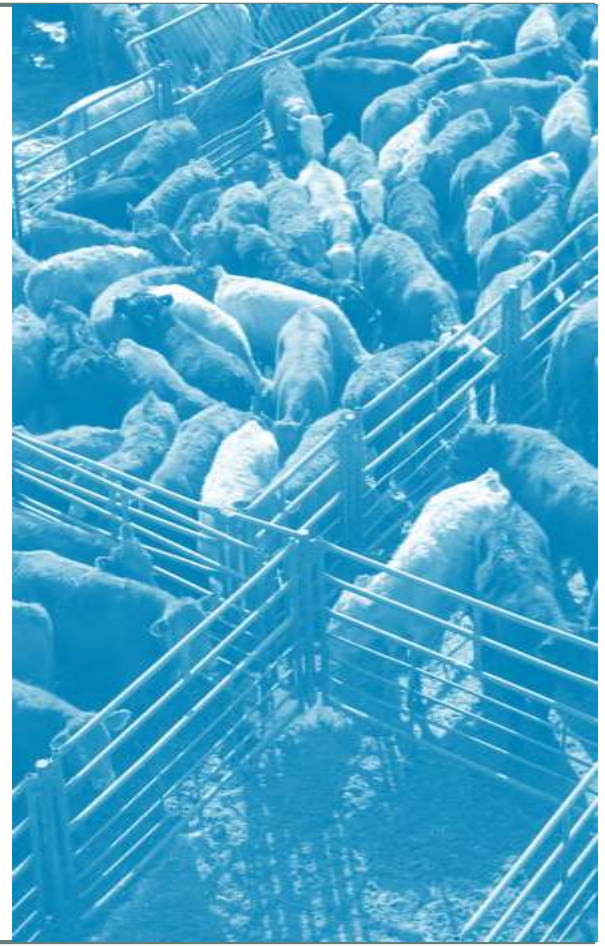
Input | Output | Ground truth



GAN was trained to convert **Scanned Tables** into **Table "Skeletons"**. The result is based on < 200 training samples

Application of deep learning technologies to agricultural reinsurance

- Livestock insurance is a cumbersome and manual process
- Can be plagued by fraud which causes high loss ratio
- We investigated application of computer vision techniques to cattle images in order to provide a cattle identification capability
- Assumption: cattles' muzzle areas as a sort of fingerprint



Muzzle Detection and Cattle Identification

Muzzle detection → **Cattle classification**

Transfer learning Based Object Detection

Deep Learning Based Classifier

Cattle Likelihood Score

Machine Intelligence for Construction Underwriting

Document Reading → Content Segmentation → Information Extraction → Information Structuring → Insight Generation

- **Scope:** Automatic processing of Construction submission documents from AIG, Ironshore and Starr
- **Goal:** Submission reading, automatic identification of the various document sessions and finally accurate automatic extraction of 55 fields
- **Overall accuracy:**

AIG	100%
Ironshore	99.4%
Starr	98%

Early Warnings System

Topic Definition: Define a topic and develop a hypothesis

Risk Driver Analysis: Build a model to quantify risk drivers

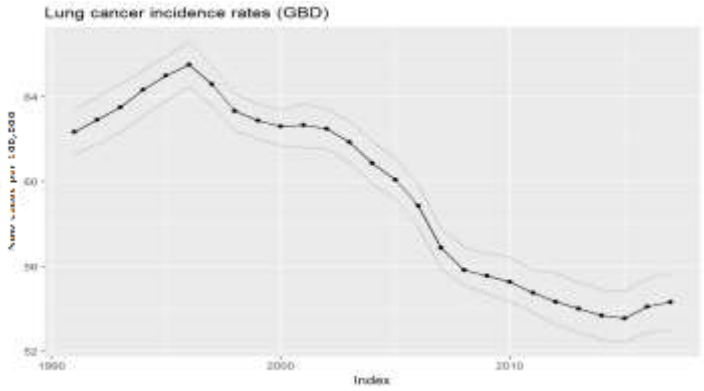
Signal Detection: Detect early warning signals

Alert Forecasting: Generate key alerts for risk monitoring

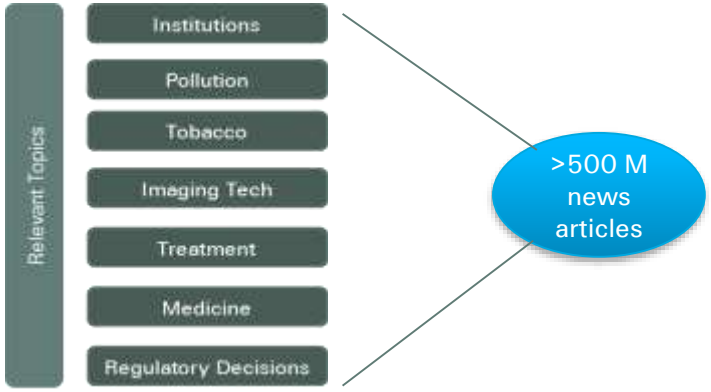
Scale Solution

Run Maintain

Variable of interest



Explanatory variables



Causal structure

Lessons learnt so far

A Data Culture is needed, independently from the methodology chosen for analysis

Methods based on *learning from data*

- Data sets containing examples must be available to train/test/validate models
- Often in Document Intelligence data are already into SR systems, so available. The limitation is that we only partially curate them, for example adding labels and/or annotations. So, they are not always 'actionable'

Methods based on *learning from rules*

- There is the (partial) mis-perception that rule-based systems do not require data
- While this is true for training (at the cost of flexibility), rule-based still needs data for testing & validation

More fundamental research is needed

Supervised vs unsupervised

- Supervised learning still dominates in academic labs and industrial applications
- In insurance the ‘cost of supervision’ could break the very business case for AI
- More research is needed in weakly supervised/unsupervised methods

Modern IT tools…are not modern enough!

- Today skilled (and expensive) professionals have to spend dedicated effort to provide feedback and training data
- We need a ***cognitive desk***: a new generation of IT tools, empowered by AI, able to capture expert knowledge during regular business activity

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