# Own the Future with Artificial Intelligence

TERATEC presentation

Paris, June 28th 2017

# At Roland Berger, we help our clients to **Own the future**

## The world is becoming increasingly VUCA …

**V** …**Volatile**

**Uncontrollable events, e.g. natural catastrophes**

**U** …**Uncertain**

Long-term planning increasingly difficult, e.g. precise budgeting

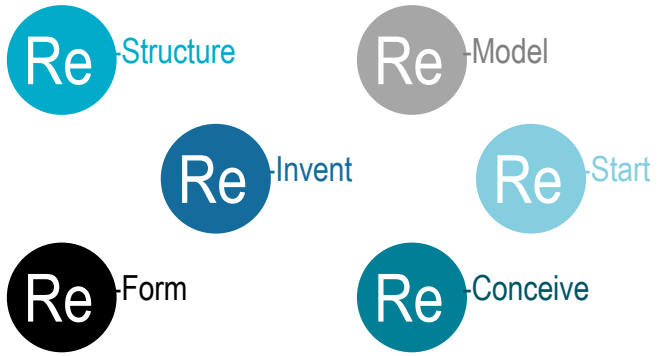
**C** …**Complex**

Non-linear interactions and blurry causal relations

**A** …**Ambiguous**

Unclear, indefinite and equivocal causalities

## We prepare our clients for the next massive transformation

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&Capital

**Entrepreneurship Excellence Empathy**

## …by leveraging our KTC approach

**K**nowledge

Strategy consulting services for private and public sector, incl. restructuring and complex infrastructure projects

**T**echnology

Extended core capabilities via technological foundation competencies, collaborations and partnerships

**C**apital

Combination of investor knowledge and strategic advice

Source: Roland Berger

"In the coming 10 years, AI-driven technologies will surpass the abilities of human beings in a lot of fields […] if the AI development is formulated as a national strategy, many industries and even the society will benefit from the move"

**Lei Jun**

"[Artificial intelligence] is the most exciting thing going on right now — it's the holy grail that anyone in computer science has been thinking about"

**Bill Gates**

"There is only a "one in billions" chance that we're not living in a computer simulation. Our lives are almost certainly being conducted within an artificial world powered by AI and highly-powered computers, like in The Matrix"

**Elon Musk**

# Artificial Intelligence is not a Technology…it is the Future!

# Agenda







A. Artificial Intelligence has reached a major tipping point and creates opportunities

# AI can trace its roots from the 1950s, yet only significantly developed in the late 1990s with advances in computing power

## History of the development of Artificial Intelligence (AI) and robotics

**Birth of AI**
> Term coined at Dartmouth conference

**First developments**
> Emergence of the first robots and intelligent "software"

**The first winter**
> Disappointment of ambitions and stop of funding

**Boom of AI**
> Symbolics Lips Machines commercialized

**The second winter**
> The field of study struggles due to the lack of practical and commercial applications

**Ramp up**
> Experiments are proliferating and practical applications start emerging






1956 1960 1974 1980 1987 2010

1941 1961 1973 1998 2006 2011 2014 2016


Enigma, ancestor of the computer (Turing)


Development of the Wabot 1 in Japan, the 1st humanoid robot able to play music


Deeper blue, a IBM computer, defeats Kasparov, the chess world champion

IBM develops Watson, which wins the Jeopardy game

AlphaGo, the software of Deepmind (Google) defeats Lee Sedol, the Go game world champion


UNIMATE, 1st industrial articulated arm a (General Motors)


Development of the robot Nao by Aldebaran Robotics

First apparitions of intelligence in the daily life (search engine, purchase recommendations, smart devices, drones…)

Source: Roland Berger

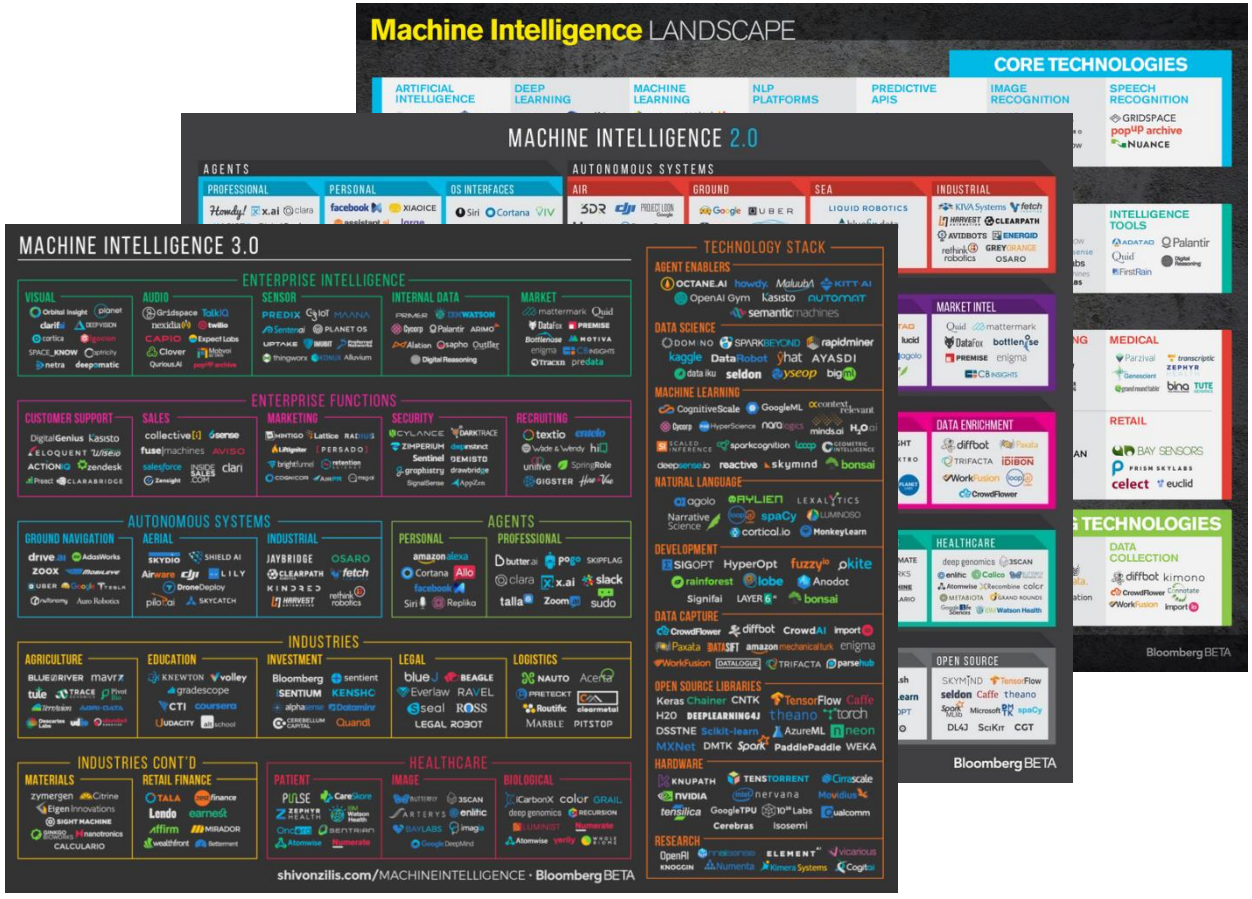

# What is Artificial Intelligence?

**Artificial Intelligence** is the science of self-learning software algorithms that execute tasks otherwise typically performed by humans

AI does not generate insights or predictions only. AI can be used to **make critical decisions** at the heart of businesses' workflows

# A large start-up ecosystem has emerged – Many companies aim at solving traditional business problems with AI mature technologies

## AI start-up landscape




- In 2014, the AI landscape already included more than 2'500 companies
- While in 2014 many start-ups focused on building broad technology platforms, there has been a **shift towards specific business problems** since 2015
- An increasing number of companies has **focused on fully autonomous systems** for the digital (e.g. virtual assistants) as well as the physical world (e.g. self-driving cars)
- In 2016 established companies started to build-up **machine intelligence capabilities**
- New players can now rely on a **mature technology stack** enabling them to build solutions based on existing tools

Source: Shivon Zilis; Tracxn; Roland Berger

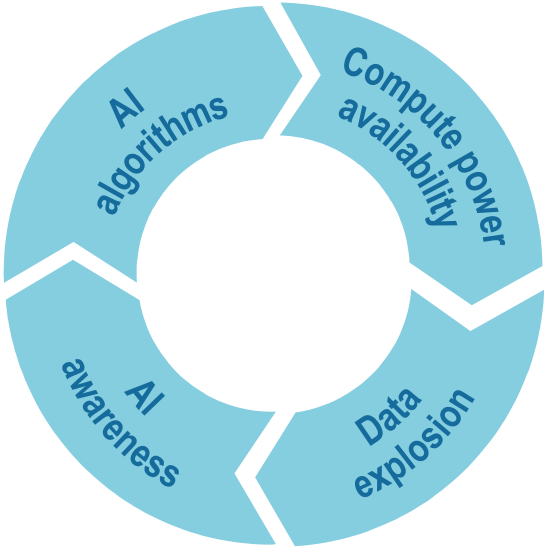
# Artificial Intelligence has now reached a major tipping point due to the combination of four technological and financial drivers

## Key drivers of A.I. development

### Better algorithms

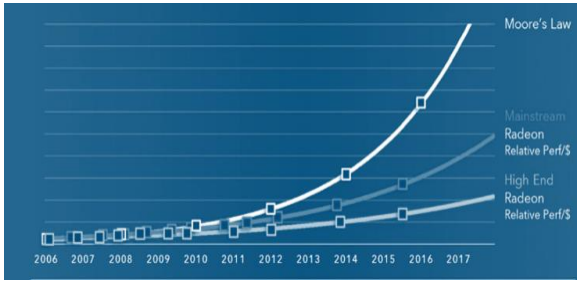
**Predictive** and **deep learning** algorithms (Deep & machine learning), especially based on numerous networks, replace pre-conceived scenarios

TensorFlow Caffe torch



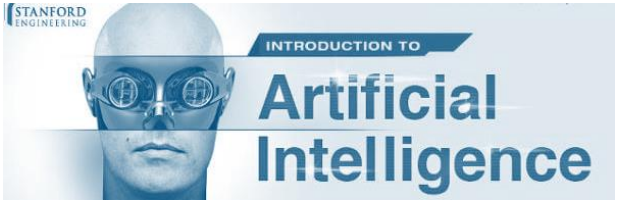

### Faster and cheaper computing

**x10e[12]** Processing Power in 6 years

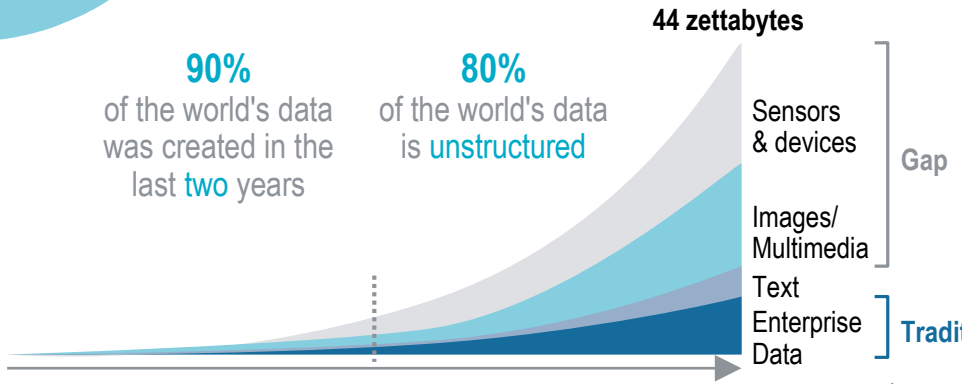



### Growing awareness

The most sought after course at Stanford:




### World data doubling every 2 years




Source: Cisco, Quataliyst Partners, analyses Roland Berger

# Artificial intelligence is helping businesses move towards a "zero-touch" real time model

## 4 key business impacts of artificial intelligence

### Automatization

> **Automatic execution** of tasks not handled by traditional technologies, i.e.
  – Based on **unstructured data** ("natural language")
  – Based on **judgment** (vs. rules-based)

### Scalability

> Activity **peak absorption**
> Transition **from sampling to exhaustiveness** (e.g. compliance, fraud detection, quality control, etc.)

### Efficiency

> Development of **personalized offers** (e.g. individualized marketing and customer path) improving hit rates
> **Quality and timeliness** improvement ("zero defect")

### Real time

> **Enhancing human capabilities** through real-time environment analysis (e.g. voice analysis of emotional states to deliver speaking guidance to sales reps)
> Reducing **lead time** (e.g. instant credit approval)

Source: Company information, Roland Berger

# AI applications are already yielding concrete benefits today, along three major benefit axes…

## Applications of Artificial Intelligence

| Benefit axes | | Examples of applications |
|---|---|---|
| Increase **operational efficiency** |  | > Task automation<br>> Decision-making support to managers and employees<br>> Significant decrease of required employees<br>> Skill shift for employees including management<br>> Predictive maintenance |
| Improve **customer experience** |  | > Personalization and engagement across entire shopper journey to deliver transformational improvement in revenues and conversion<br>> Chatbots / intelligent virtual agents<br>> Seamless user experience |
| Create **new business models** |  | > New products and services derived from direct and live interactions with consumers<br>> Breakthrough applications from text or video analysis & understanding (shoppable videos, safety compliance for workers' compensation, image descriptions for the blind …) |

Source: Roland Berger

# We have developed an extended ecosystem of partners to offer our clients the best of the Artificial Intelligence world

## Our ecosystem of partners includes startups, world experts, investors, incubators…


sentient technologies · tellmeplus · arago · EXAINTELLIGENCE · AUTOMATION ANYWHERE · REDWOOD · heuritech · ISG · davi · Narrativa · yseop · 4P · CreditX · UiPath Robotic Process Automation · DUMIAO · contextor Authorized Partner · {OWI} understand to succeed · PINTEC · seed fund PARIS-SACLAY · bootstrap labs

**~270 ideas generated** based on project experience in **omni-channel management**, **customer service and support**, **big data and customer analytics** and **efficiency of operations**

Source: Roland Berger

# B. Case studies : Efficiency

# The study aimed at estimating the potential impact on customer advisors of the deployment of an AI solution in a retail bank

## Project overview

### Background/objective

> Quantitative and qualitative assessment of the impact of the implementation of an AI solution for the customer advisors of a French retail bank

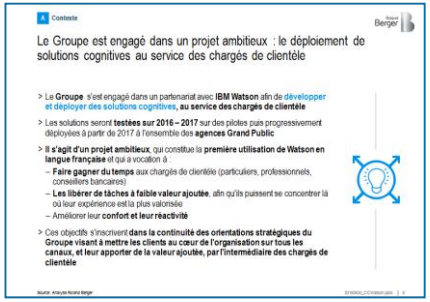
### Approach

> Bottom-up assessments to assess the quantitative potential on customer advisors :
  – Time spent per task for each type of customer advisors
  – Assessment of the AI potential to automate / speed up the tasks (assessment realized also through external benchmarks)
> Qualitative assessment of the impact of AI deployment through customer advisors interviews

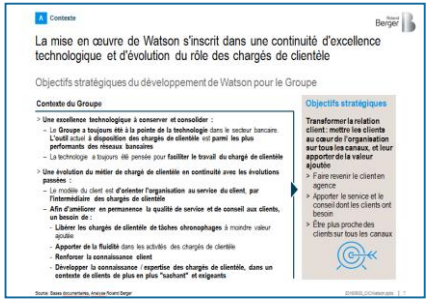
### Results

> Quantitative model built
> Assessments have presented to the Executive Committee and to the Employee Representatives

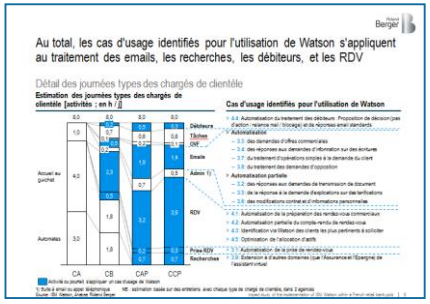
Background



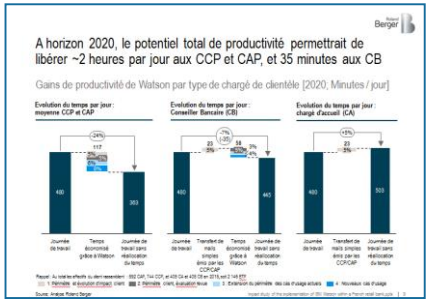

Objective




Approach




Results




Source: Roland Berger

# The AI solution was implemented on two pilots highlighting savings opportunities of up to 50min/day on account managers by 2020

## Productivity savings estimates [2016-2020] – Pilots

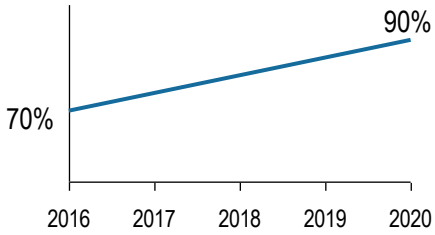
### Email analyser

**Description of levers**

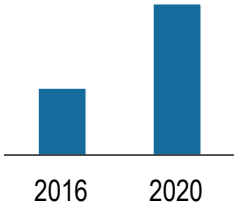
> **Automatized identification of e-mail intent and level of priority, sorting and visualization** based on those two criterias
> Automatic login into **IT applications** and pre-filling of some information in the target application
> **Customized client answer proposal**
> **Automatic answers on** simple cases
> Machine learning leveraged to continuously improve successful detection rate

**AI Performance**

Detection rate



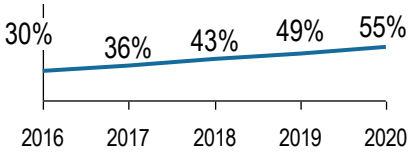

**Productivity savings [min/day]**

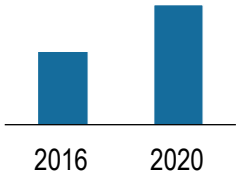



### Virtual assistant

> **Chat bot** to answer **simple and recurring questions** on products
> Connection to the **document database**
> Display of a short list of information specifically extracted
  – **Probability** estimate of successful answer
  – **Link** to relevant documents
> Machine learning leveraged to continuously improve successful answer rate

Satisfying answers rate



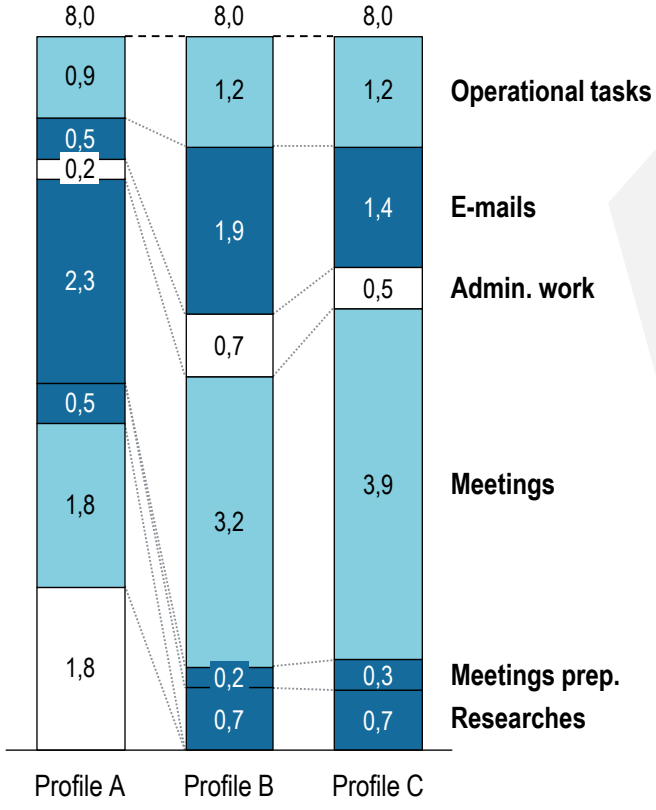

**Total** **25 min. 50 min.**

Source: Roland Berger

# AI extension to new use cases was assessed through a bottom-up analysis of account managers activities

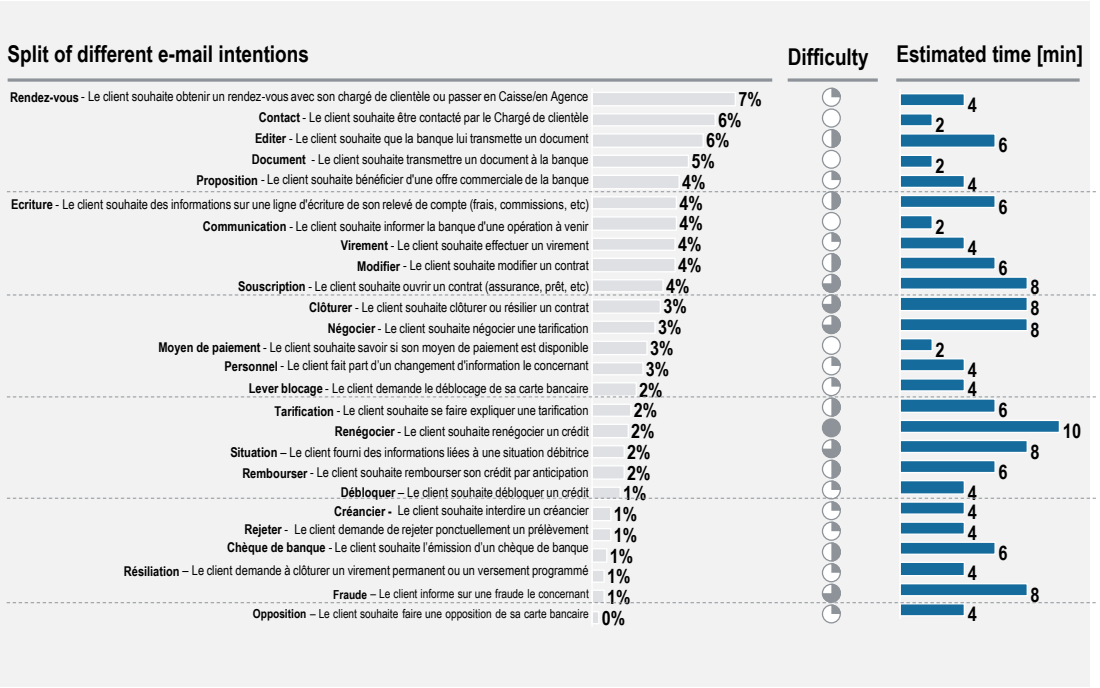
## Potential assessment - Analysis of an account manager typical day

### Split of activities per profile [hours/day]




Source: Roland Berger

### Illustration – Bottom-up analysis and sizing of e-mail activities



# We identified additional AI use cases which could lead to significant productivity savings

## Productivity savings estimates on potential extensions [2020] - not exhaustive

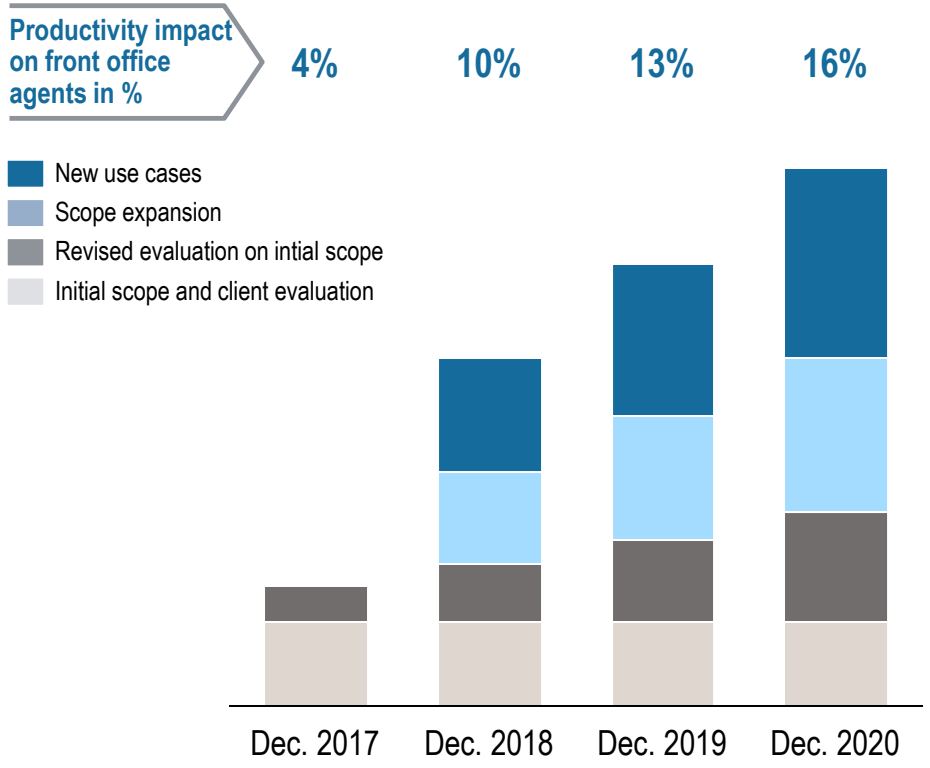
| | Description of the levers | Productivity savings |
|---|---|---|
| E-mail analysis | > **Automation of answers regarding document requests** (identification of detailed intent, proposition of answer with documents) | > ~x min / day |
| | > **Automation of answers to information requests on fees** (identification of the intent, proposition of a standardized answer for frequent cases) | > ~x min / day |
| | > **Partial automation of contract modifications or changes in client information** (including field matching and manual validation) | > ~x min / day |
| | > **Automation of rejected payment requests** | > ~x min / day |
| Virtual Assistant | > **Extension of the virtual assistant to additional fields**<br>– Financing<br>– Insurance… | > ~x min / day |
| Commercial assistant | > **Automation of meeting preparation**: Client history & status synthesis, Product recommendations | > ~ x min / day |
| | > **Partial automation of meeting minutes:** Filling of specific field based on minutes in free text | > ~ x min / day |
| | > **Client value management support:** Prioritized listing of clients to contact | > ~ x min / day |
| Processing assistant | > **Automation of overdraft management:** Recommended decision (no action /e-mail relaunch/ blockage) and standardized e-mail answers according to client history and situation | > ~ x min / day |

Source: Roland Berger

# Overall, the productivity improvements could reach until 16% in 2020

## Productivity gains (total potential) on the client network [2017-20]

**Productivity gains associated to AI implementation**




## Key learnings

> **In-depth analysis of activities** brings additional insights on AI potential

> **Almost all activities can be partially or totally automatized with AI** (even interactions / conversations with customers)

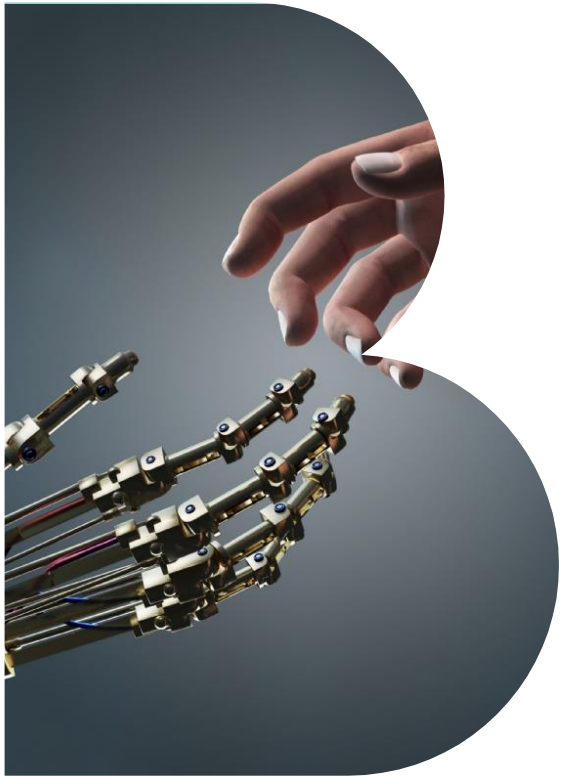
> **Machine learning gives an advantage to size and experience** / AI boundaries can gradually be pushed very far

> **2 types of AI solutions providers** : "universal" vs. "vertical"

> **Social acceptance and impacts** of AI solutions to be carefully handled and anticipated

Source: Analyse Roland Berger

# C. Case studies : Customer intelligence



# Machine Learning is the spearhead of AI adoption

Machine Learning…

## … is

a program that performs a task that was not explicitly coded by its author

## … solves

prediction and classification problems, and by extension language processing (incl. text generation)

## … is powered by

various models: regression (linear, logistic, …), neural networks, support-vector machines, and many more

## … requires

learning, therefore (a lot of) historical data, plus (a lot of) computational power.

## … deviates

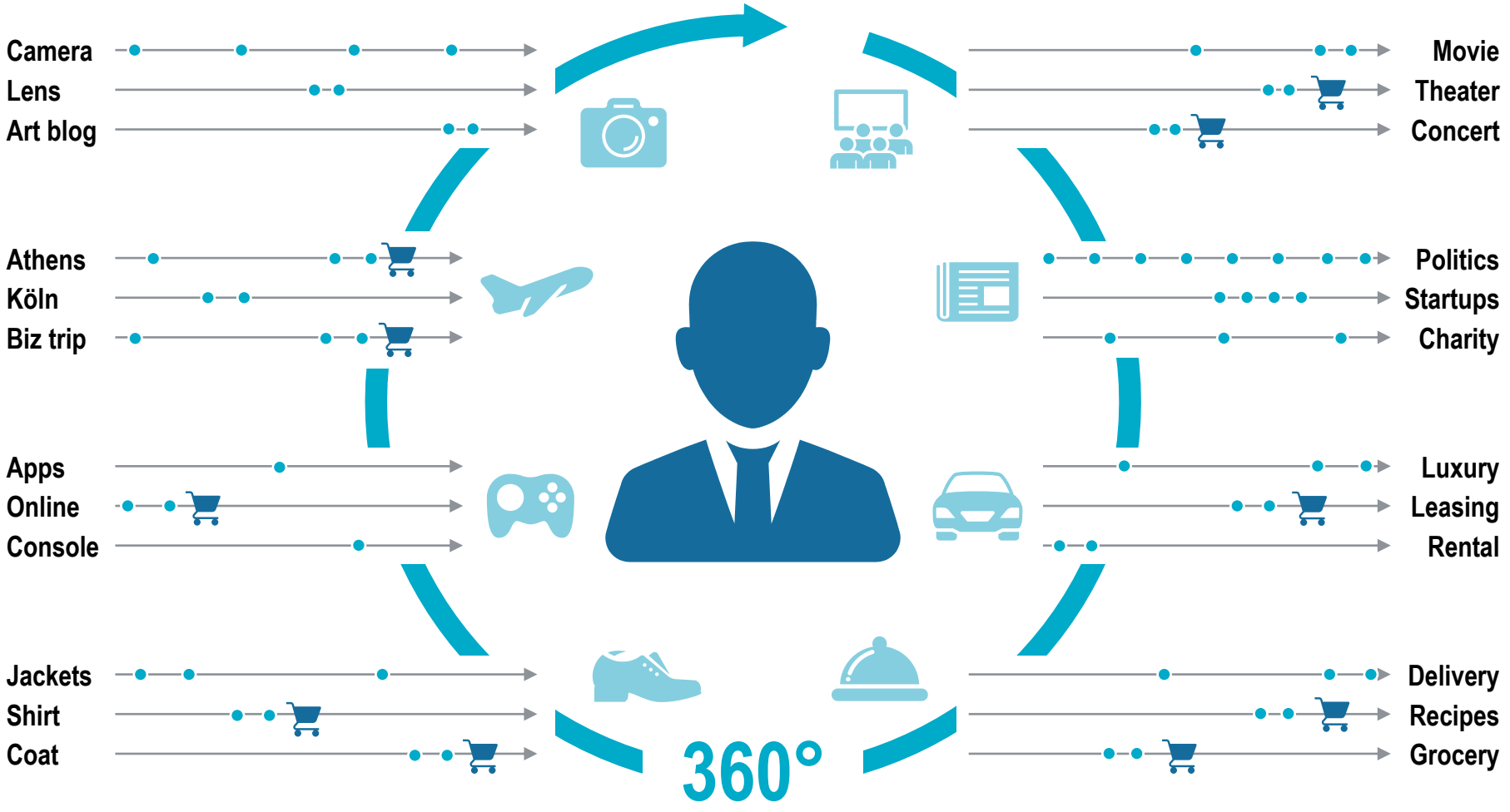
over time, therefore requires constant supervision and periodic re-training

## … is easier

than you think to prototype, but hard to industrialize and to supervise

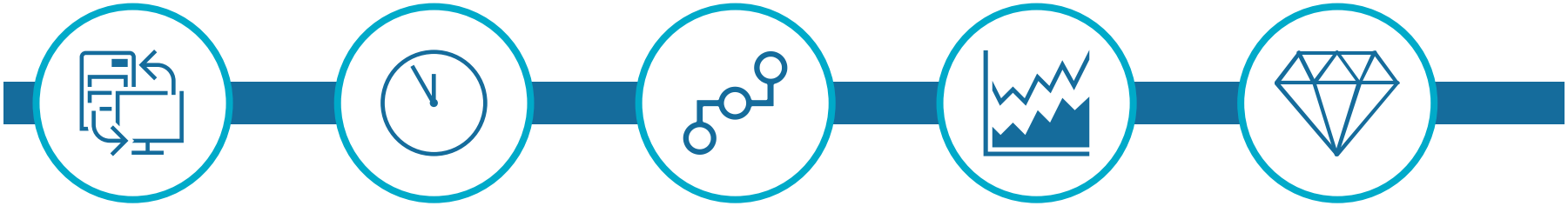
Source: Company information, Roland Berger

# Holy Grail of the AdTech industry: a single 360° user view




Source: Roland Berger

# This single user view enables a comprehensive user **context understanding** in the perspective of marketing targeting



**Cross-device graph**

Understand the several devices owned by a user, and how he/she uses them.

**Look-to-book cycle**

Understand the whole decision-making journey before a user purchases.

**Path to conversion**

Understand the marketing interaction impacts on the decision-making journey.

**Purchase intent prediction**

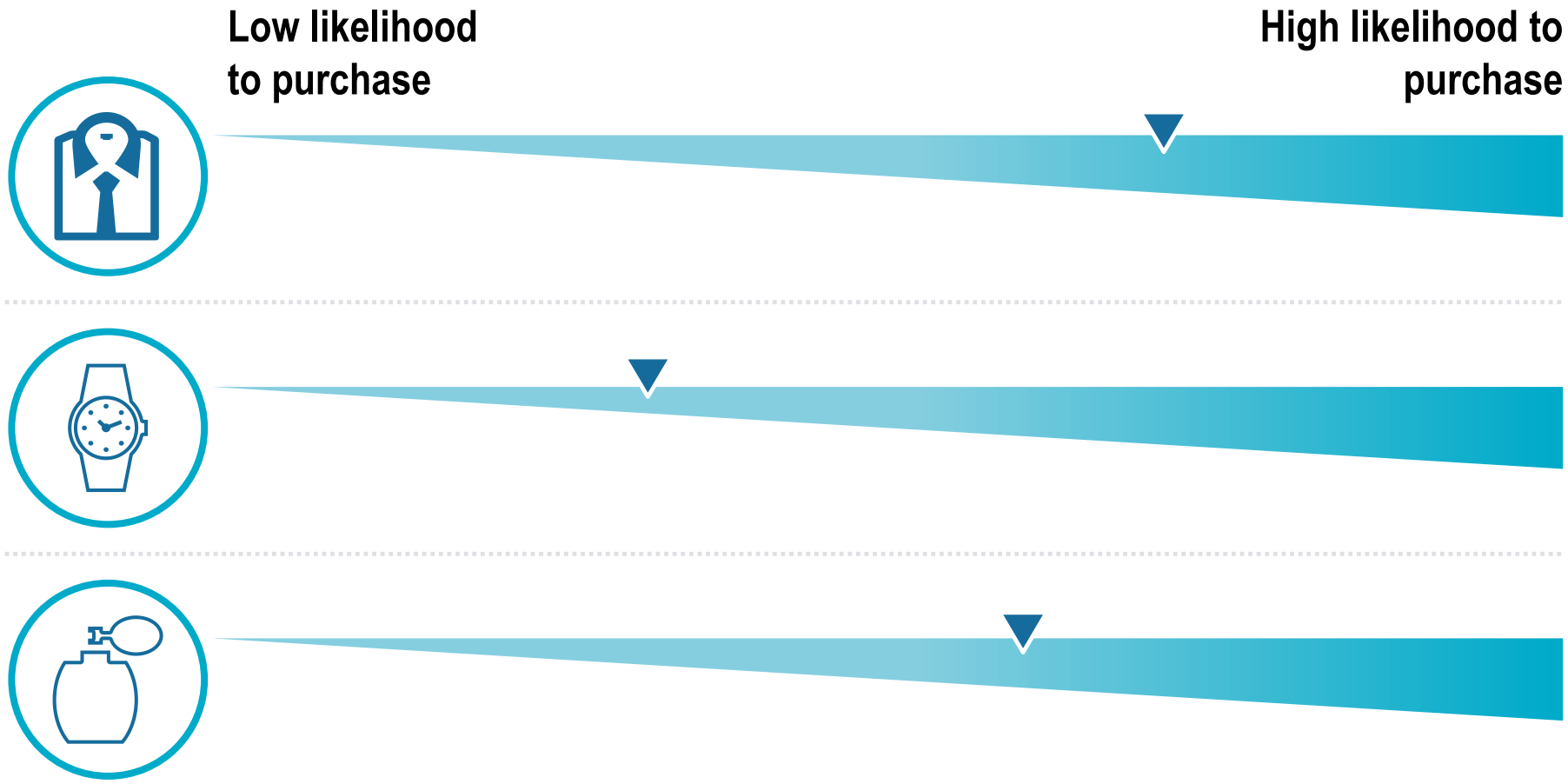
Compare each user profile to 1bn other profiles to predict purchase intents.

**Marketing Activation**

Build a language-agnostic, brand-agnostic, industry-agnostic user profile.

Source: Roland Berger

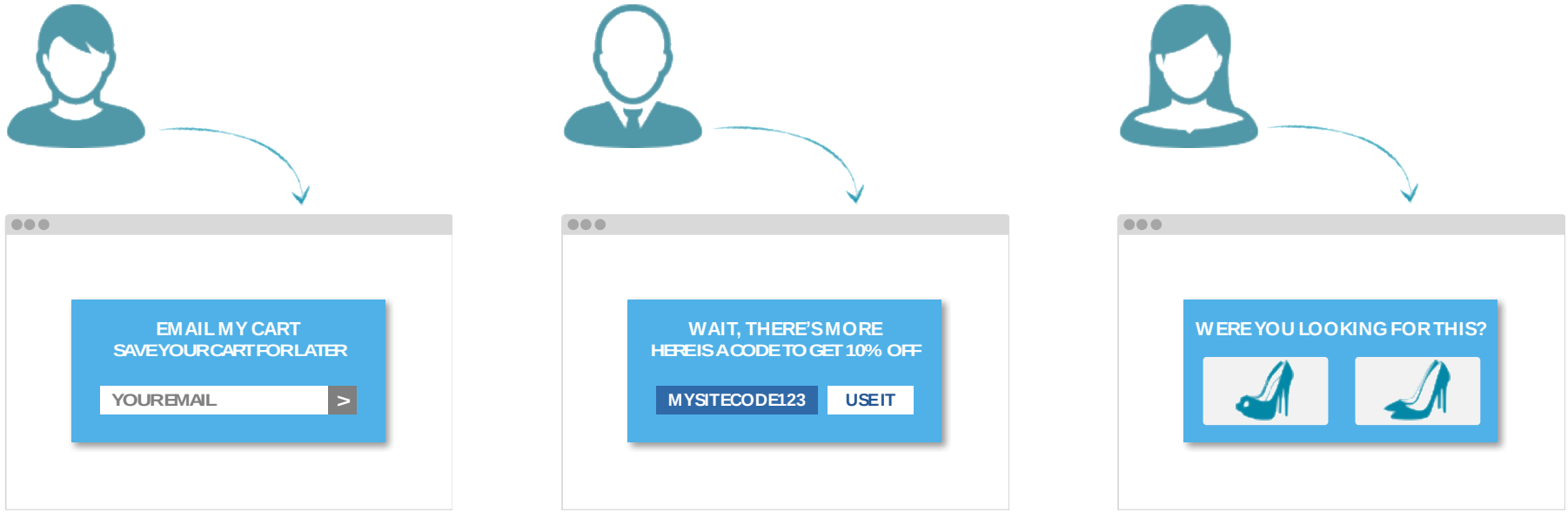
# ML applied to digital marketing (1/4): **Predict** every user's next purchase intents




Source: Roland Berger

# ML applied to digital marketing (2/4):
# **Adapt marketing touchpoints** to optimize user engagement

## User-aware engagement touchpoints



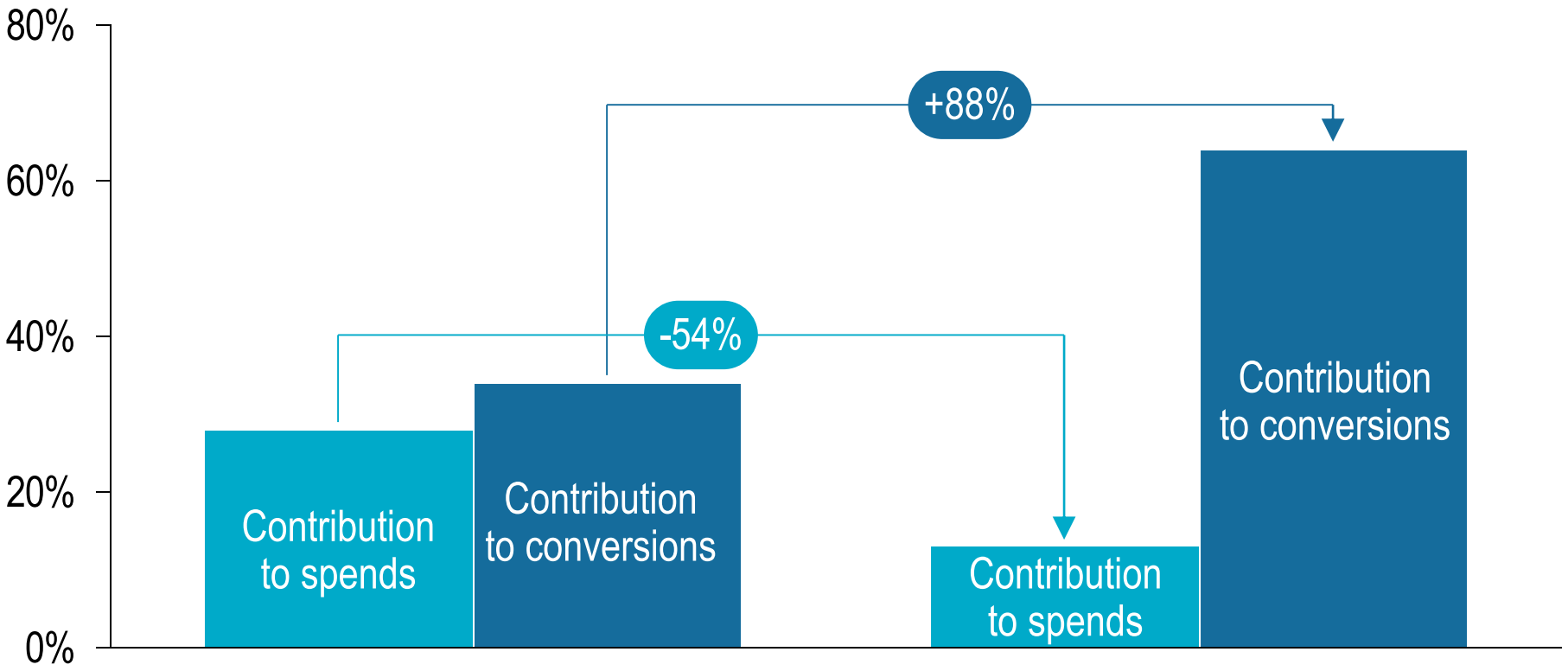

Source: Roland Berger

# ML applied to digital marketing (3/4): **Personalize featured content** to maximize conversion rate

## User-aware engagement touchpoints

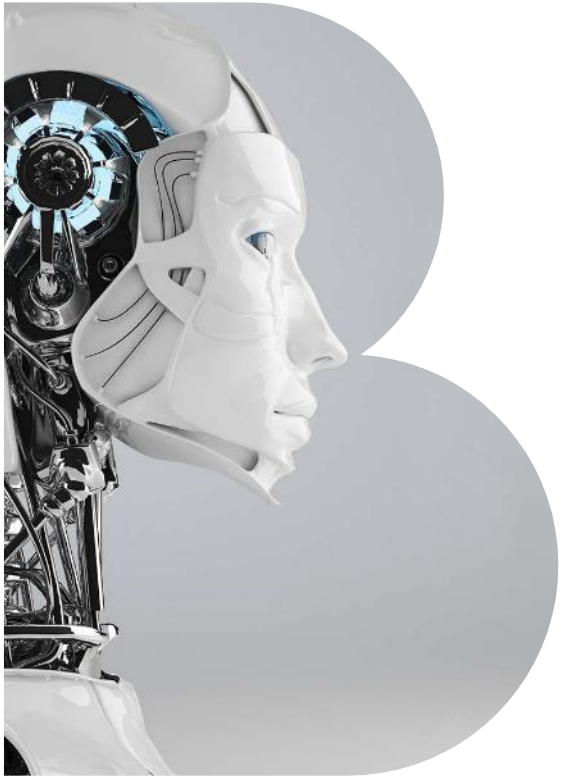
Source: Roland Berger

# ML applied to digital marketing (4/4): **Prospect in-market users** through RTB display advertising




Source: Roland Berger

# D. Closing remarks



# Artificial Intelligence and learning algorithms already claim multiple touchpoints in our daily lives, also impacting our decision making

## Ubiquity of Artificial Intelligence in our daily lives

Email spam filters



Self-driving cars

Adjusts room temperature

nest

Prioritizes relevant content for you

Tells you when to buy your flight tickets

Hopper

Automatically translates foreign-language websites

Google Translate

amazon NETFLIX Spotify


Recommends songs, movies and things to buy

Detects your speech to answer questions, make recommendations, and perform actions

Source: Roland Berger

# Artificial intelligence is more than a technology: it is set to dramatically transform society and business

## Key insights

### Changing the way we connect to the world

> From apps and websites to bots and personal intelligent assistants

### Massive use

> A.I. is not for business only; everyone will use it: "massive use" **like electricity**

### Changing paradigm

> From data ownership to real-time interaction with consumers
> Bringing power back to consumers and companies through direct access
> The end of GAFA?

### Emerging champions

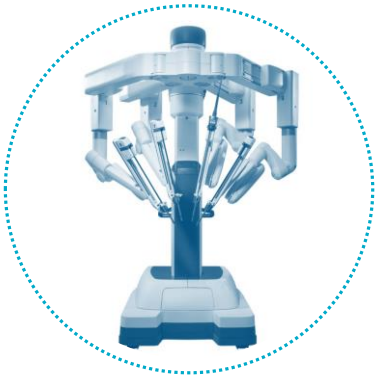
> The next 10,000 startups: business ideas + added AI = applied AI

Source: Roland Berger

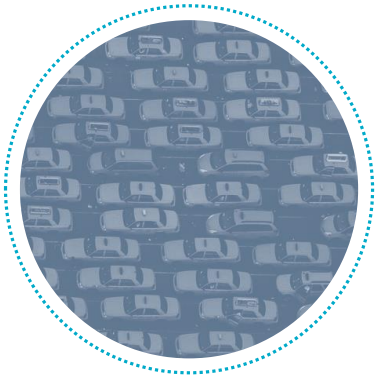
# By 2026, the world will be radically different: the AI market is expected to reach > USD 200 bn by that time

Agriculture & Mining

Consumer Services

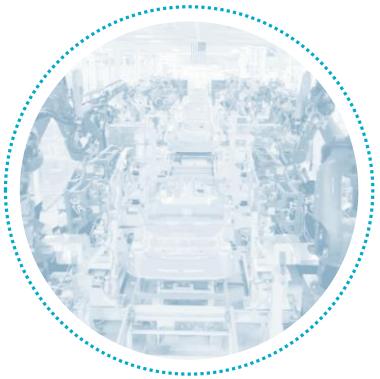


Healthcare



Autos & Transport

Domestic Services



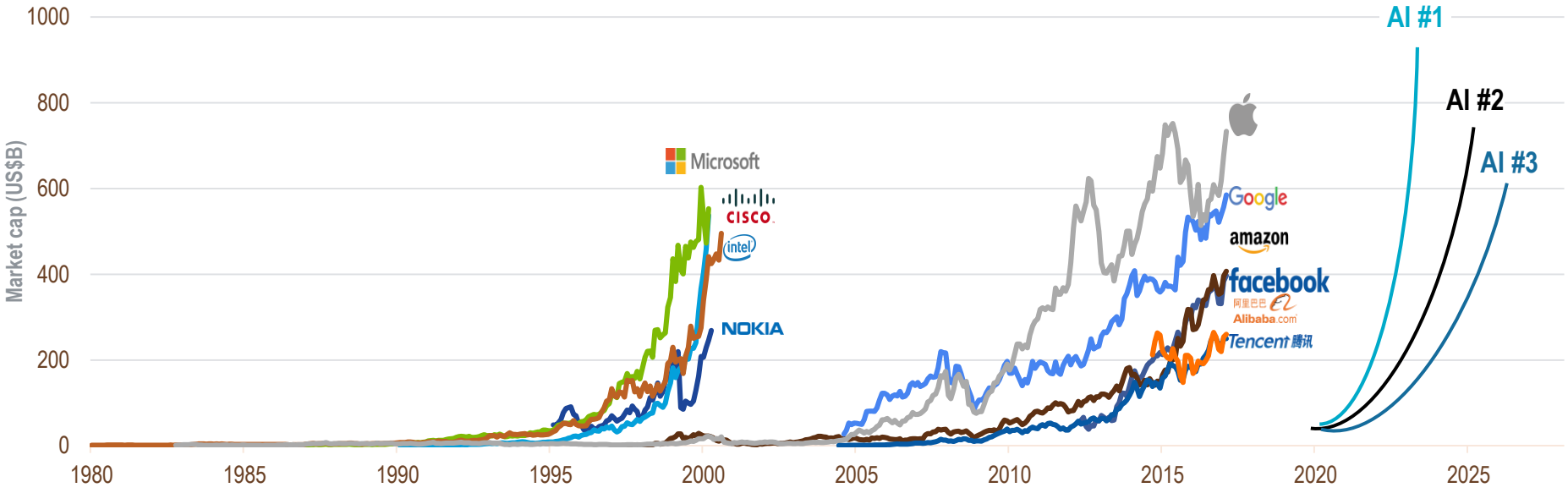
Industrials

Aerospace Defense


Financials

Source: Bank of America Merrill Lynch, Roland Berger

# The First Trillion Dollar Company Will Be An AI Company




**Wave 1**

- Portable computer — 1973
- Internet — 1989
- Mobile phone — 1991

**Wave 2**

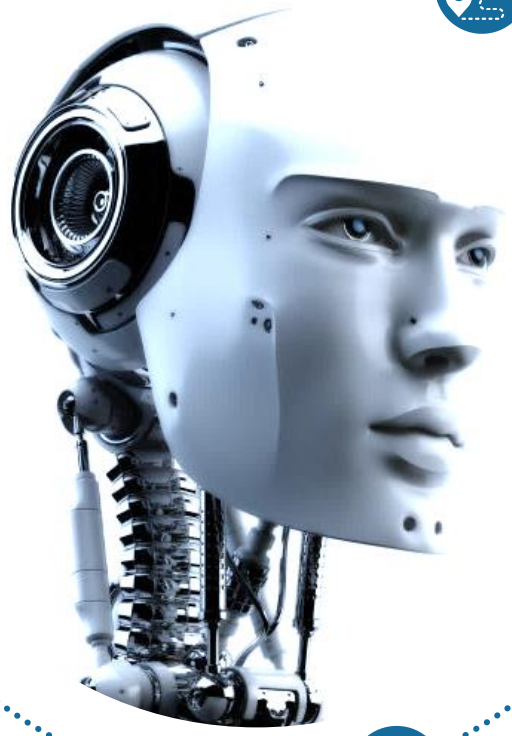
- Digital business models — 2000s
- Smartphone/ Mobile apps — 2007

**Wave 3**

- Artificial Intelligence — 2016 - 2036

Source: Capital IQ

# In the future, imagine that your business institution will need to be:



## Available from anywhere…

Integration with real time needs: mortgages granted while house hunting, transfers executed automatically at goods delivery, in and outside country, etc.

## …at any time…

All transactions executed and ledger balancing performed **in real time 24/7**, with no weekends, holidays, or working hour constraints

## …staffed with a whole new balance of competencies…

**All repetitive jobs -** no matter how 'complex' - have disappeared, including customer service, compliance, with 80% of staff composed of **highly skilled computer engineers** and **data scientists**

## …guided by a new management paradigm…

Board members and senior management to have **deep technological** acumen and a thorough drive for innovation

## …and constantly evolving

Unrelenting acceleration in the rate of development brings such frequent disruption that businesses will be in continuous flux, thus **no longer requiring change programs with implementation plans**

Source: Roland Berger

# We help our client to own the future through a range of tested approaches to tackle the different questions that AI poses for them

## Proposed approaches

### AI workshops

#### AI Bootcamp 1

**2 days**

Deep-dive on **AI in business**

Understand impact on **business models, organizations & cultures**

Get **inspiration** and deep **technology insights** from innovators and startups

#### AI Driver Licence 2

**2 weeks**

**Meet** experts, corporates & start-ups involved in AI

**Implement** small AI solutions in a test environment to **experience** the technology first hand

**Identify & prioritize measures** for own company

### Strategy projects

#### Comprehensive strategy 3

**12-16 weeks**

Full AI **potential assessment** and **roadmap** definition

**PoC** preparation and implementation to **on-board teams**

**Target operating model** definition (governance, IT and HR support schemes, etc.)

#### Targeted offers 4

**Industries**

Automotive

Energy

Retail

Healthcare

Insurance

Advertising Media

Finance

Oil & Gas

…

**Business functions**

Marketing

Sales

Customer Service/CRM

HR

Legal

Security Surveillance

Source: Roland Berger

# We have published various studies and books supporting our strategic thinking in the field of Artificial Intelligence

## Books

2017


The fall of human empire

2014


Confucius and the robots

By Charles-Edouard Bouée, CEO of Roland Berger

## Issue papers

2017


Smart strategies for smart sensors

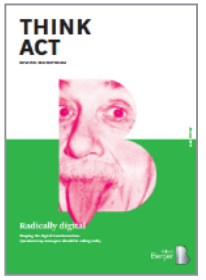
2017


Enhanced Underwriting thanks to Artificial Intelligence

2017


Rail supply digitization

2016

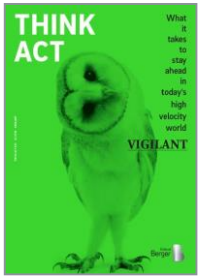



Radically digital

2016

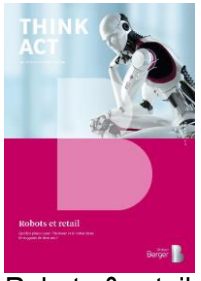

Of Robots and Men

2016



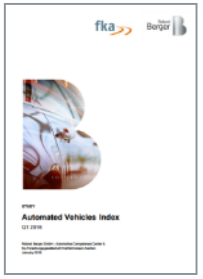

Vigilant

2016



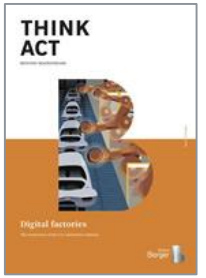

Robots & retail

2016




Automated Vehicles Index

2016




Digital factories: industry 4.0

2015


Industry 4.0 transition quantified

Source : Roland Berger

# We help our clients to own the future with Artificial Intelligence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