AI TREND RESEARCH

ARTIFICIAL INTELLIGENCE: TRANSFORMING BUSINESSES

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With **SONAR Trend Platform** Reply is able to create an overview and mapping of relevant trends in the field of **Artificial Intelligence**, based on their occurrence within expert media articles, mass media, patents and scientific publications.

WHAT ARE WE TALKING ABOUT?

ARTIFICIAL INTELLIGENCE: A set of advanced technologies that enable machines to grasp and understand human intelligence, learn to imitate it, and act accordingly. There are two forms of AI:

- **Strong AI:** This form of AI is also called Artificial General Intelligence (AGI). It is capable of performing all the intellectual tasks that a human being can perform – and more.

- **Weak AI:** The focus of the so-called non-sentient artificial intelligence is on narrowly defined tasks such as image recognition or route planning.

MACHINE LEARNING
A part of AI that equips systems with the ability to learn from experience without being explicitly programmed to do so.

DEEP LEARNING
A subset of machine learning that uses artificial neural networks to classify information similar to the human brain.

UNSUPERVISED LEARNING
Machine learning algorithms used for unmarked data.

SUPERVISED LEARNING
Machine learning algorithms that access marked training data.
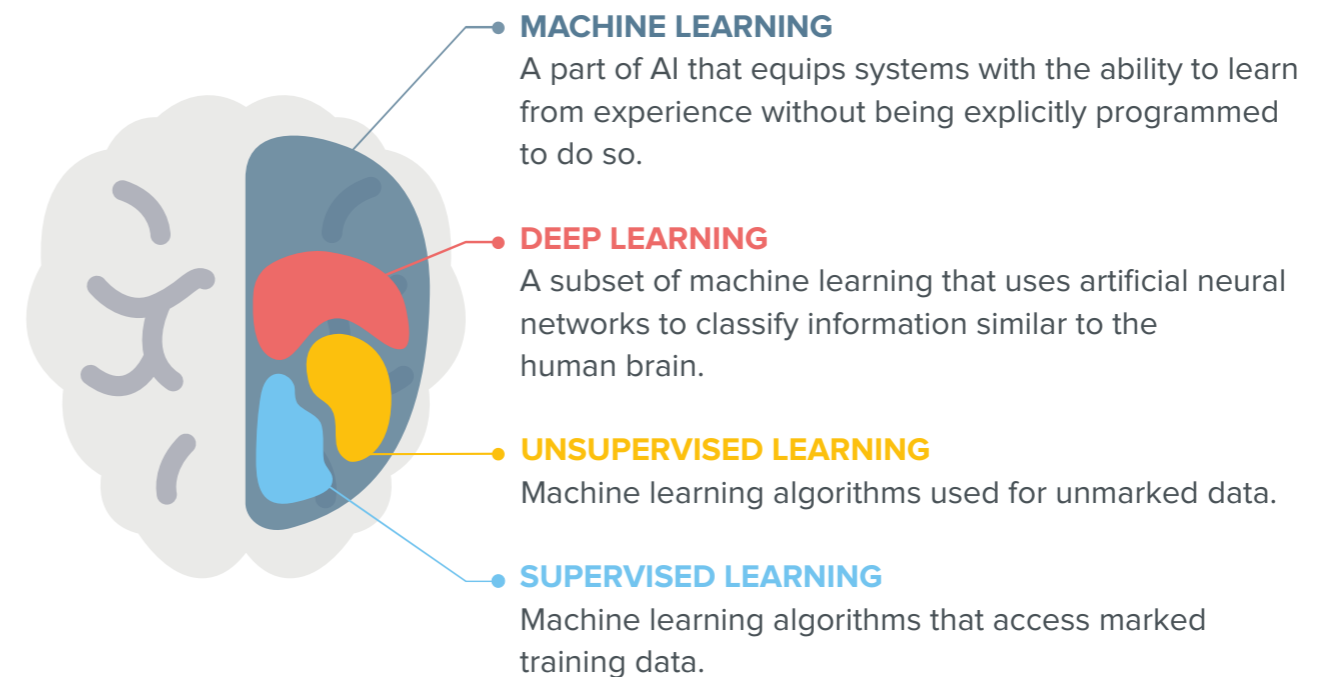
SONAR

SONAR is an innovative, **DATA-AS-A-SERVICE TOOL** for quantified foresight. It recognises, compares and analyses existing trends, and identifies new developments in real-time.

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A LONGER STORY OF AI THAN YOU MIGHT THINK

Artificial Intelligence has recently experienced a real boom in the interests of companies. With the advent of modern **deep learning**, we have gained a real insight into this technology in practice: From the creation of **medical diagnoses**, the **identification of criminals** in crowds to **autonomous driving**.
But the history of AI began earlier than you might think.

1950 1956 1960-2000 2011 2012 2014 2016 2017 2018

1950: Artificial Intelligence is not yet an independent field of research, but the Turing Test has already been invented. This concept was developed to test whether an AI system has the same ability to think like a human being.

1956: The groundwork for the establishment of the research discipline Artificial Intelligence is laid at the Dartmouth Conference. During the event computer scientist John McCarthy coined the term Artificial Intelligence.

1960 - 2000: Between the 1960s and the end of the 1990s, Artificial Intelligence experienced several boom and low phases. Among the highlights were the introduction of the chatbot Eliza in 1966 and a game of chess in 1997 that IBM's DeepBlue won against the then world chess champion.

2011: The prospects of AI become tangible as IMB Watson wins "Jeopardy" and the digital assistants Siri (2011), Google Now (2012) and Cortana (2014) are introduced successively.

2012: Google Brain is in a development stage that allows the AI system to recognize the image of a cat.

2014: Google Brain leaps a big step further and is already able to describe a scene in an image.

2016: The media attention for the topic AI increases. One of the most noticed events in 2016 is the presentation of Tay, an Artificial Intelligence that can post tweets. In no time she moved on to posting inappropriate words and images.

2017: The year before, DeepMind's AlphaGo managed to beat the Go champion. By 2017, the system is ready to teach itself Go.

2018: AI-based technologies are on their way to attracting more interest than smartphones. "In the long run, we are evolving from a "Mobile-first" to an "AI-first" world", says Sundar Pichai, CEO of Google.

KEY DRIVERS OF AI

Artificial Intelligence is the Game Changing technology of our time. It mainly is driven by all trending technologies that we can read in the news on a daily basis: Big Data, Cloud and the Internet of Things. On the technical side there are **three main drivers**.

COMPUTING POWER:

Digitization and the triumph of smartphones have led to ever more compact and at the same time more cost-effective computing power – in addition to sensors and cameras, which are also declining in price, but more sophisticated. The increasing competition between established and new players is currently leading to more and more AI-specific chip innovations.
In 2008, the world's first single-teraflop supercomputer cost USD 100 million and filled an entire room. Nvidia's Titan V, launched in 2017, is an AI processor chip with a capacity of 110 teraflops.

THE CONTINUOUS RISE OF BIG DATA:

AI systems live on data. The more data an algorithm can analyze, the better it can recognize and understand patterns. The still growing spread of mobile devices, the progress of the Internet of Things or the beginning use of self-propelled cars, will massively increase the amount of available digital data.
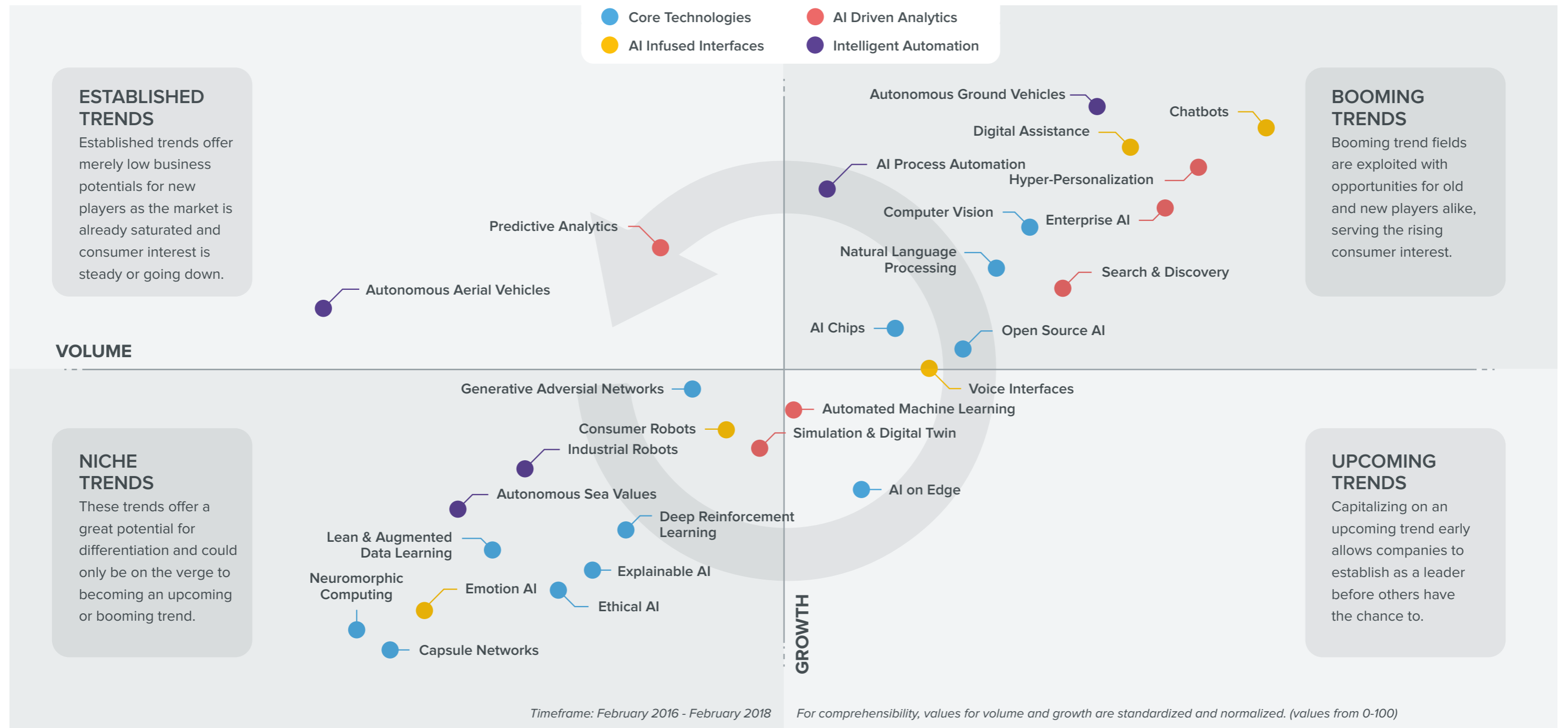
PROGRESS IN ALGORITHMS:

The algorithms used today for speech recognition and natural language translation have evolved remarkably over the last decade: What used to take weeks with a previous algorithm is now often solved within hours with new statistical models, neural network designs and learning methods.

WHAT IS TRENDING IN THE AI WORLD?

Here's an overview and illustration of the **relevant trends** around Artificial Intelligence, based on their appearance in trade media, mass media, patents and scientific publications.

The arrow in the illustration implies a typical trend development and a life cycle from a small and growing trend - which is discussed in relatively few scientific articles and publications - to a larger, established trend with stagnating growth, which has long been discussed in various media and has shifted from niche circles into the mainstream.

- Core Technologies
- AI Driven Analytics
- AI Infused Interfaces
- Intelligent Automation

ESTABLISHED TRENDS

Established trends offer merely low business potentials for new players as the market is already saturated and consumer interest is steady or going down.

BOOMING TRENDS

Booming trend fields are exploited with opportunities for old and new players alike, serving the rising consumer interest.

Autonomous Ground Vehicles

Chatbots

Digital Assistance

AI Process Automation

Hyper-Personalization

Computer Vision

Enterprise AI

Predictive Analytics

Natural Language Processing

Search & Discovery

Autonomous Aerial Vehicles

VOLUME

AI Chips

Open Source AI

Voice Interfaces

Generative Adversial Networks

Automated Machine Learning

Consumer Robots

Simulation & Digital Twin

NICHE TRENDS

These trends offer a great potential for differentiation and could only be on the verge to becoming an upcoming or booming trend.

Industrial Robots

Autonomous Sea Values

AI on Edge

Deep Reinforcement Learning

Lean & Augmented Data Learning

Neuromorphic Computing

Explainable AI

Emotion AI

Ethical AI

UPCOMING TRENDS

Capitalizing on an upcoming trend early allows companies to establish as a leader before others have the chance to.

GROWTH

Capsule Networks

Timeframe: February 2016 - February 2018

For comprehensibility, values for volume and growth are standardized and normalized. (values from 0-100)

MAIN FOCUSES

Innovative technologies open up new potential for Artificial Intelligence. **Edge computing** tools that reduce latency and other AI-specific hardware will create a variety of **new products and services** for Mobile Computing, IoT and Human Machine Interfaces and improve data protection, security and performance of autonomous systems.

TECHNOLOGIES

AI-DRIVEN ANALYTICS

AI-INFUSED INTERFACES

INTELLIGENT AUTOMATION
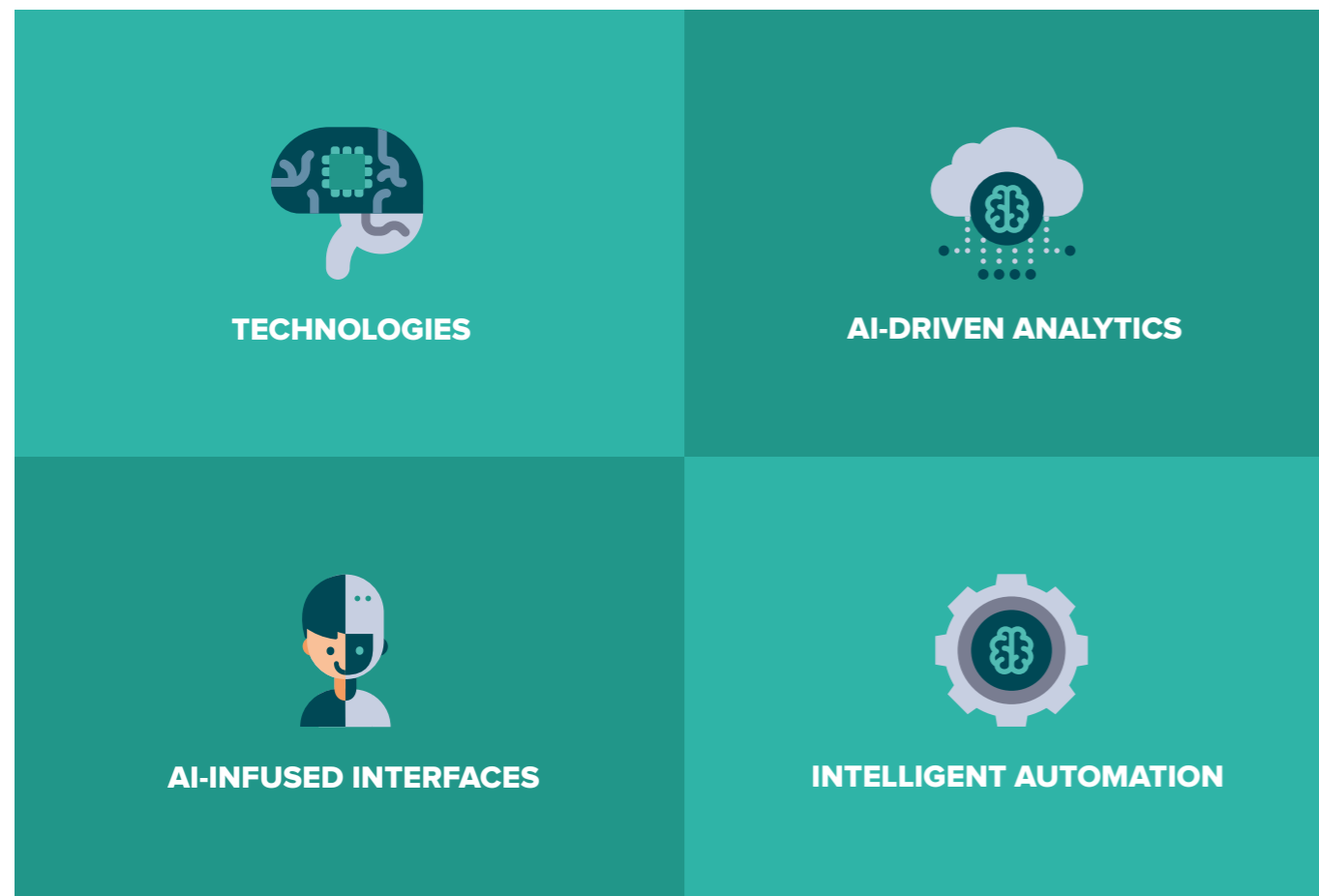
TECHNOLOGIES

The keywords to the current progress in the AI are: Capsule Networks, Explainable AI, Lean & Augmented Data Learning, Generative Adversial Networks and Deep Reinforcement Learning.

The developments are driven by both established and new players.

Increasingly, companies that develop the best AI hardware, the most sophisticated algorithms and the most widely used open source solutions are becoming the frontrunners.

Above all, open source tools play a major role: they are the ones that will contribute to the democratization of Artificial Intelligence. While AI techniques such as Natural Language Processing and Computer Vision are booming more than ever, the ethical and transparent use of AI is also becoming increasingly important.

In 2018, the market volume of AI, which is used in the area of computer vision, was USD 3.62 billion. Current projections have led researchers at MarketsandMarkets to predict that this figure will rise to **USD 23 billion by 2023.**

2023

$23 BILLION

24 HOURS
THREE GAMES
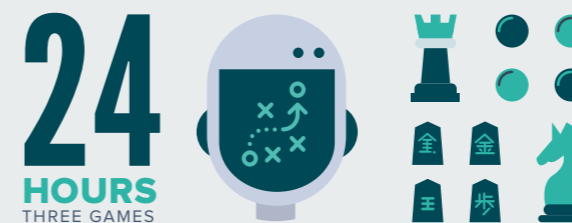
In 2017, it took DeepMind's **AlphaZero AI** only 24 hours, to **learn chess, shogi and go** without human input on a level that not even humans can reach.
Demis Hassabis et al.

ALREADY EXISTING:

Mythic has developed a deep learning inference model. It is based on digital and analog calculations and is able to eliminate expensive processors while extending battery life by a factor of 50 (or more).

The dimensions that this new design enables: Essential high-end desktop GPU compute functions can be handled by a module the size of a shirt button that can run for years like the performance of a watch battery.

A concrete application of AI can be found in the Signall Sign Language solution from SignAll, the world's first

automated translation solution for sign language. The product is based on Computer Vision and NLP.

The prototype is currently capable of translating part of an ASL user's vocabulary and generating text from the user's hands and gestures.
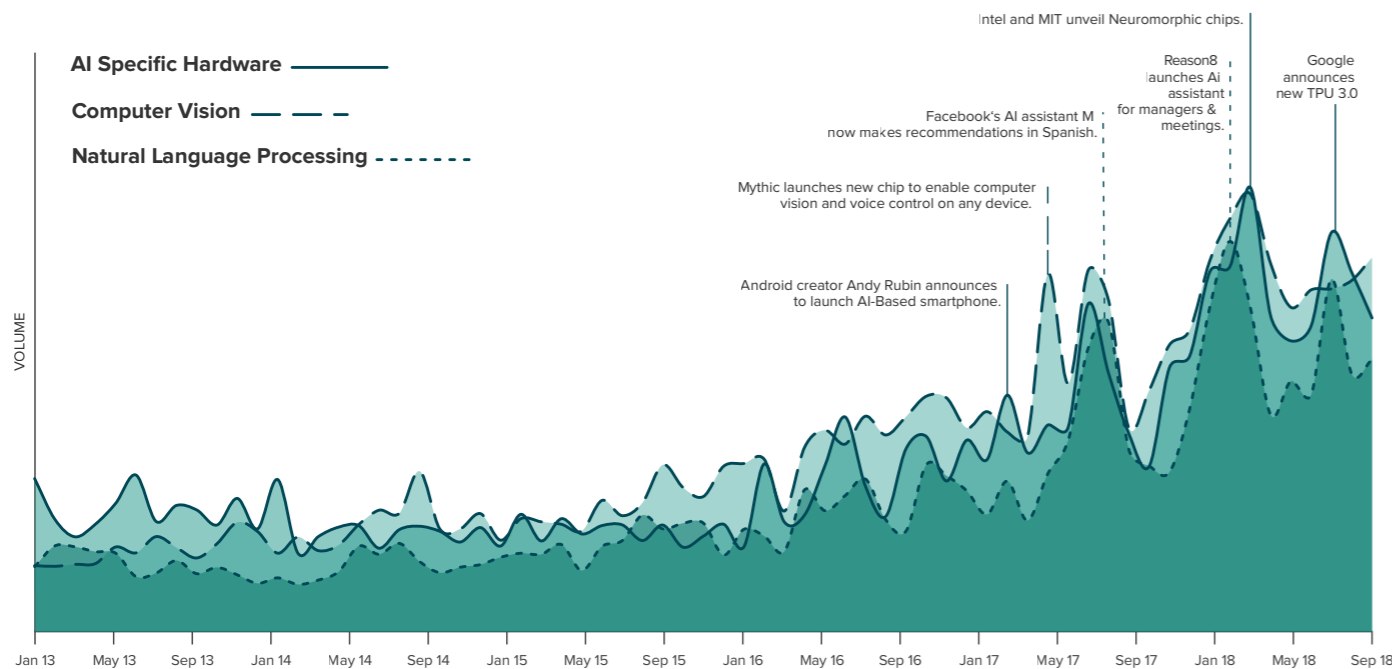
AI-DRIVEN ANALYTICS

We are in a phase of digital transformation in which data not only accelerates decision-making processes, but also forms the basis for future decisions with the help of predictive analytics.

Companies across multiple industries are using AI-as-a-Service solutions from both established vendors and start-ups and increasingly purchasing "out-of-the-box"

AI-based enterprise tools to obtain Amazon-like personalization, Google-like search mechanisms, and IBM Watson-like predictive capabilities.

AI Specific Hardware ——————
Computer Vision — — — —
Natural Language Processing - - - - - - -

Intel and MIT unveil Neuromorphic chips.

Reason8 launches AI assistant for managers & meetings.

Google announces new TPU 3.0

Facebook's AI assistant M now makes recommendations in Spanish.

Mythic launches new chip to enable computer vision and voice control on any device.

Android creator Andy Rubin announces to launch AI-Based smartphone.

VOLUME

Jan 13   May 13   Sep 13   Jan 14   May 14   Sep 14   Jan 15   May 15   Sep 15   Jan 16   May 16   Sep 16   Jan 17   May 17   Sep 17   Jan 18   May 18   Sep 18

These are booming or upcoming trends, meaning the number of articles in various media dealing with these phenomena has drastically increased over the past 12 months.

The market for predictive analytics is expected to be **USD 11 billion by 2022** - by **2016** the market was just **USD 3.49 billion.**
Zion Market Research

2016
3.49 billion
USD

2022
11 billion
**USD**

ALREADY EXISTING:

Dynamic Yield provides an end-to-end enterprise platform for personalization.

It leverages an organization's existing customer data with additional data sources to create accurate and detailed customer profiles.

The platform is used by more than 220 brands worldwide who want to take their personalization capabilities to a similar level as Amazon.

Google is also working to simplify the use of AI.

With Google's Cloud AutoML, companies with limited expertise can create customized machine learning models with their own data and labels without writing a single line of code.
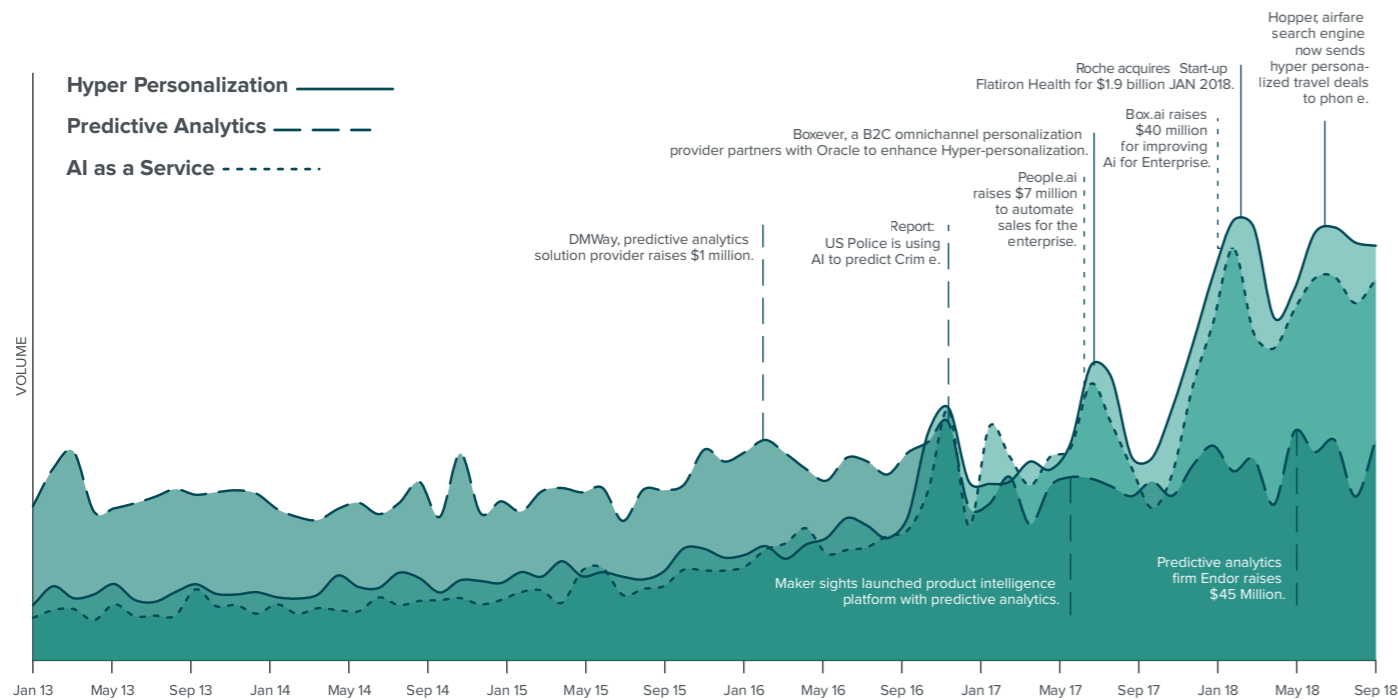
AI-INFUSED INTERFACES

Human-machine interfaces are on their way to becoming more and more natural and to replace smartphones or tablets; "How Smart Speakers stole the show from Smartphones" was the Guardian's headline on this topic at the beginning of 2018.

Tech giants in particular, but also newcomers are competing to be the developers of the "next platform". They use AI to increase the intuitiveness and intelligence of existing and new interfaces. Conversational user interfaces — especially voice-activated solutions — have experienced a massive increase in media attention and consumer

acceptance in recent years, due to improved processing and understanding of natural language. However, progress is also being made in the area of emotionally intelligent and empathetic AI, which means that more and more home robots can be developed. One example is Amazon, which plans to launch its first home robot in 2019.

VOLUME

Hyper Personalization

Predictive Analytics

AI as a Service

DMWay, predictive analytics solution provider raises $1 million.

Boxever, a B2C omnichannel personalization provider partners with Oracle to enhance Hyper-personalization.

Report: US Police is using AI to predict Crim e.

People.ai raises $7 million to automate sales for the enterprise.

Roche acquires Start-up Flatiron Health for $1.9 billion JAN 2018.

Box.ai raises $40 million for improving Ai for Enterprise.

Hopper, airfare search engine now sends hyper persona-lized travel deals to phon e.

Maker sights launched product intelligence platform with predictive analytics.

Predictive analytics firm Endor raises $45 Million.

Jan 13 May 13 Sep 13 Jan 14 May 14 Sep 14 Jan 15 May 15 Sep 15 Jan 16 May 16 Sep 16 Jan 17 May 17 Sep 17 Jan 18 May 18 Sep 18

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Every year the number of Smart Speaker users increases. The annual growth in the US is **48 percent** – for 2018 this means an increase of around **90 million users**.
eMarketer

Hey...

90 MILLION more users

57% consumers expect BIG IMPACT

The result of the Salesforce study "State of the Connected Consumer" fits in well with this. According to this study, more than one in two consumers (57 percent) expects smart assistants to have a strong or moderate impact on their lives by 2020.

ALREADY EXISTING:

A very well-known example of the use of AI-supported voice-controlled interfaces is Google Duplex, which arranged a hairdresser appointment for a customer in a lifelike telephone call during I/O 2018.

Xiaoice (pronounced Shao-ice) from Microsoft has also made it to a similar fame. The chatbot has 500 million followers, who can interact with Xiaoice.

In addition to text chats, she is also capable of telephone conversations.

Olly, on the other hand, is the first home robot with an evolving personality that adapts to each individual user.
This brain-inspired AI system, developed by Emotech's leading AI researchers and neuroscientists, is therefore capable of more than just executing commands.
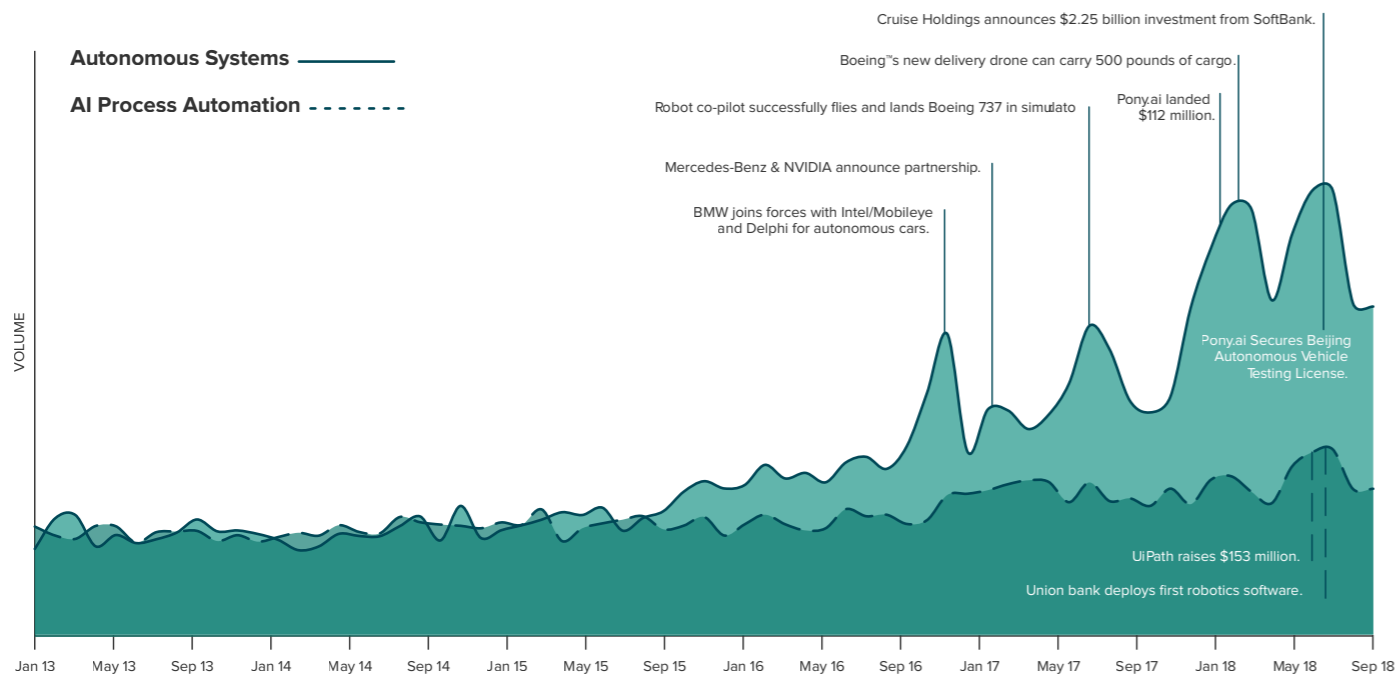
INTELLIGENT AUTOMATION

Artificial Intelligence is well on the way to automating cognitive tasks in addition to repetitive manual tasks.

Today, autonomous systems are not only used in factories, but more and more on our roads, in the air, on the water and in offices. Today, advanced AI-based systems are driving preventive plant maintenance and the optimization and automation of supply chain operations.
And increasingly sophisticated and diverse robotic process automation tools are helping to automate everyday rule-based

business processes, allowing companies to spend more time on higher-value work. According to Elon Musk, founder and CEO of Tesla, road traffic will also experience a revolution: "I think we will see how autonomy and artificial intelligence advance tremendously.
My guess is that in probably ten years it will be very unusual for cars to be built that are not fully autonomous", says Musk.

Autonomous Systems ——————
AI Process Automation - - - - - - -

Cruise Holdings announces $2.25 billion investment from SoftBank.

Boeing's new delivery drone can carry 500 pounds of cargo.

Robot co-pilot successfully flies and lands Boeing 737 in simulato

Pony.ai landed $112 million.

Mercedes-Benz & NVIDIA announce partnership.

BMW joins forces with Intel/Mobileye and Delphi for autonomous cars.

Pony.ai Secures Beijing Autonomous Vehicle Testing License.

UiPath raises $153 million.

Union bank deploys first robotics software.

VOLUME

Jan 13　May 13　Sep 13　Jan 14　May 14　Sep 14　Jan 15　May 15　Sep 15　Jan 16　May 16　Sep 16　Jan 17　May 17　Sep 17　Jan 18　May 18　Sep 18

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Toyota sees enormous potential in self-driving cars and invested **$500 million** in this division at Uber, Reuters announced in mid-2018.

TOYOTA - - > **UBER**
$500m
self driving cars division

50%
of all current work
AUTOMATED

50 percent of all current work can be **automated** using existing technologies, predicts McKinsey in his November 2017 "Jobs lost, Jobs gained" report.
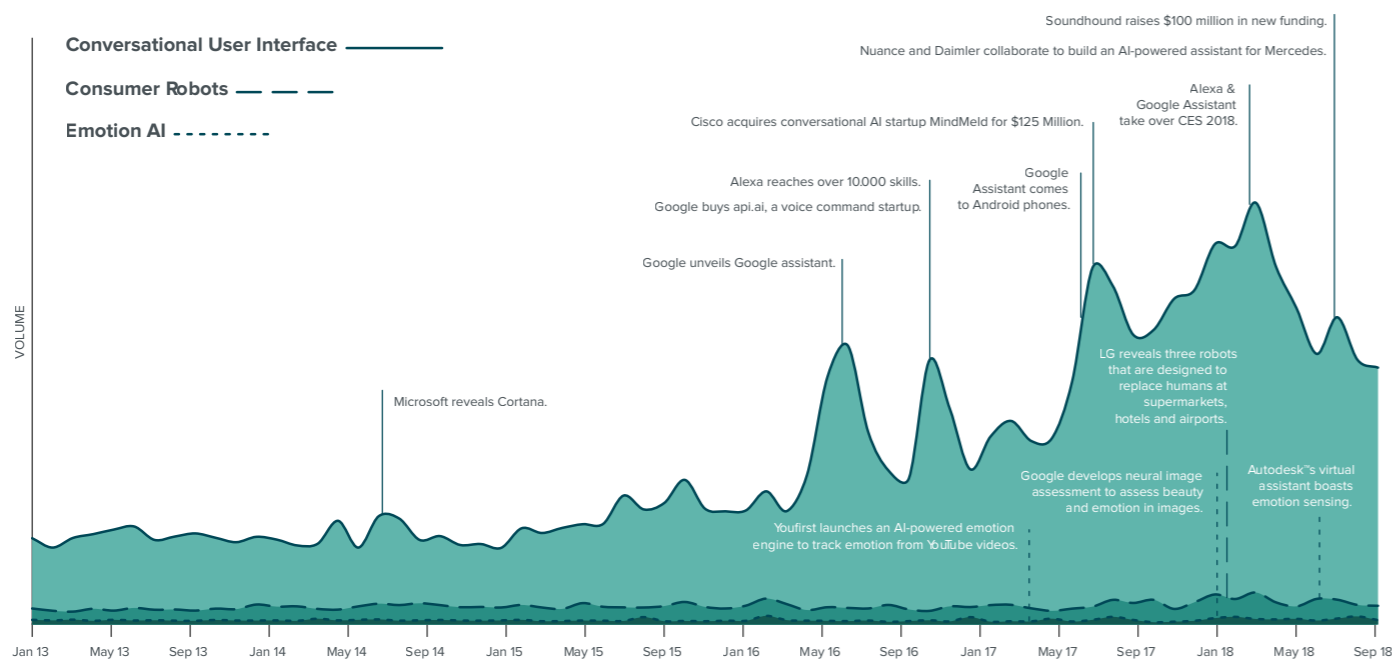
ALREADY EXISTING:

UIPath develops a platform that enables the automation of robotic processes without specific know-how.

The company thus offers development tools for the automation of complex processes in cloud or on-premise versions.

The platform allows several robots to run on a single virtual machine.Reuters relies on AI for journalism: Lynx Insight.

The tool will help journalists analyze data, tell stories and even write sentences. This is not to replace reporters, but to support them with a digital assistant instead. Lynx Insight, which has been tested by dozens of journalists since the summer, is now being introduced to Reuters editorial staff.

Conversational User Interface
Consumer Robots
Emotion AI

VOLUME

Microsoft reveals Cortana.

Google unveils Google assistant.

Alexa reaches over 10,000 skills.
Google buys api.ai, a voice command startup.

Cisco acquires conversational AI startup MindMeld for $125 Million.

Youfirst launches an AI-powered emotion engine to track emotion from YouTube videos.

Google develops neural image assessment to assess beauty and emotion in images.

Google Assistant comes to Android phones.

Soundhound raises $100 million in new funding.

Nuance and Daimler collaborate to build an AI-powered assistant for Mercedes.

Alexa & Google Assistant take over CES 2018.

LG reveals three robots that are designed to replace humans at supermarkets, hotels and airports.

Autodesk™'s virtual assistant boasts emotion sensing.

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BUSINESS OPPORTUNITIES

Training data is the lifeblood of machine learning – the more, better and more unique the data basis is, the more intelligent a system will be. If a business model is to be derived from this, it should be used to promote customer loyalty.
Create feedback loops to continuously improve your products and services. However, there is further potential:

1 PREDICTION AND PREVENTION OF OUTAGES

Predictive analytics will have a massive impact on the condition of machinery and equipment. By combining sensors, IoT platforms and AI-controlled analysis tools, companies will not only be able to monitor their equipment, but also predict failures and outages.

2 EMOTIONAL APPROACHES FOR A BETTER CUSTOMER EXPERIENCE

Enhanced interfaces will increasingly close the gap in Artificial Intelligence between IQ-intensive interactions and EQ-driven experiences, allowing brands to engage with customers at a much deeper, personalised level.

3 FASTER DECISION-MAKING THANKS TO MORE DATA POINTS

Thanks to breakthrough advances in computer vision, computers can recognise things faster and see differences that people can't see. Businesses can use these features to gain better insight into consumers or analyse vast amounts of visual data.

4 PROCESS AUTOMATION: MORE TIME FOR VALUE-CREATION

Chatbots for customer service, AI process automation, and AI-driven decision making reduce the effort required for more everyday cognitive tasks. This allows employees and organizations to focus more on higher-value tasks and work that requires more imagination or creativity.

THE NEXT GAME CHANGING TECHNOLOGY IS HERE!

It enables computers to see, hear and speak, at eye level with people.

REPLY AND ARTIFICIAL INTELLIGENCE

We are at a time when Artificial Intelligence is entering our everyday lives and the world of work at a rapid pace – some progress is happening so fast that we can hardly imagine things that will be possible tomorrow.
Start into the AI age together with Reply or get Reply on board to take your Artificial Intelligence to the next level.

REPLY specialises in the design and implementation of solutions based on digital media and new communication channels. Through its network of highly specialised companies, Reply partners with major European corporations in the telecoms and media, industry and services, banking and insurance, and public administration sectors, to devise and develop business models built on the new paradigms of big data, cloud computing, digital media and the Internet of Things. Reply's services include: Consulting, Systems Integration and Digital Services.

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