International Telecommunication Union

Artificial Intelligence in the Telco Industry

On-Site Presentation

19 September 2019
Bangkok, Thailand

by Detecon Asia-Pacific Ltd.

German Design Award WINNER

brand eins Thema B 2019 BESTE BERATER Heft 12

BEST OF CONSULTING — 2018 — - AWARDED - Detecon International GmbH Wirtschafts Woche

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Detecon is a leading consulting company that unites management advisory with profound digital technology expertise, across the globe.

HQ: Cologne
more locations in Germany:
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- **More than 20,000 projects** realized worldwide
- **1,200 associates** in our offices worldwide
- Clients in more than **165 countries**
- Colleagues from over **40 countries**
- Worldwide **revenue** of **230 Million Euro**

* Detecon Digital
Engineering Center

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Detecon is a subsidiary of Deutsche Telekom. Integrated in the Telekom value chain, Detecon is the breathing place of digital transformation.

Products	Innovation	Digital Transformation

- About 1.8m marketed workplace systems
- > 165m mobile services customers
- > 29m fixed network customers
- > 19m broadband customers
- About 6.9m TV customers (IPTV)

- Present in 50 countries and employing 218,300 worldwide
- No. 1 on the German market: TC, mobile, IT
- Own computer centers and networks worldwide
- Over €70 billion in annual turnover

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AI DEVELOPMENT

ARTIFICIAL INTELLIGENCE
Any technique that enables computers to mimic human intelligence, using logic, if-then rules, decision trees, and machine learning (incl. deep learning).
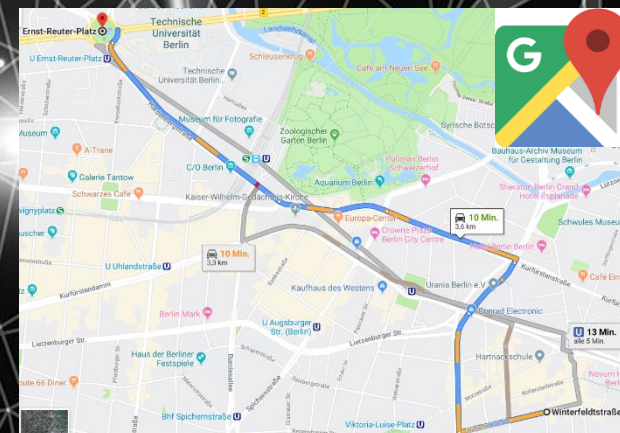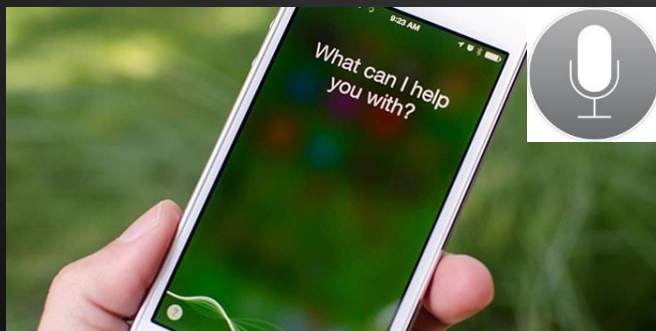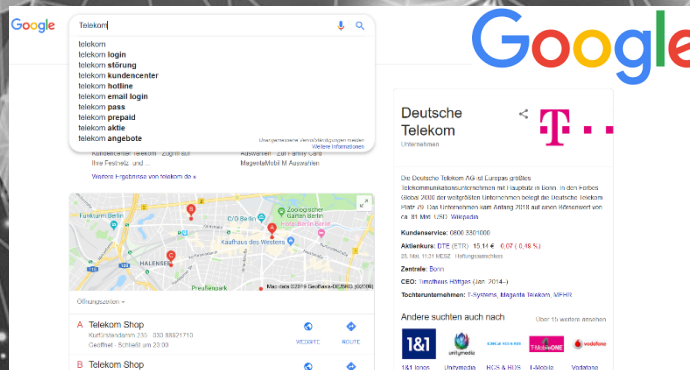
MACHINE LEARNING
A subset of AI that includes abstruse statistical techniques that enable machines to improve at tasks with experience.

DEEP LEARNING
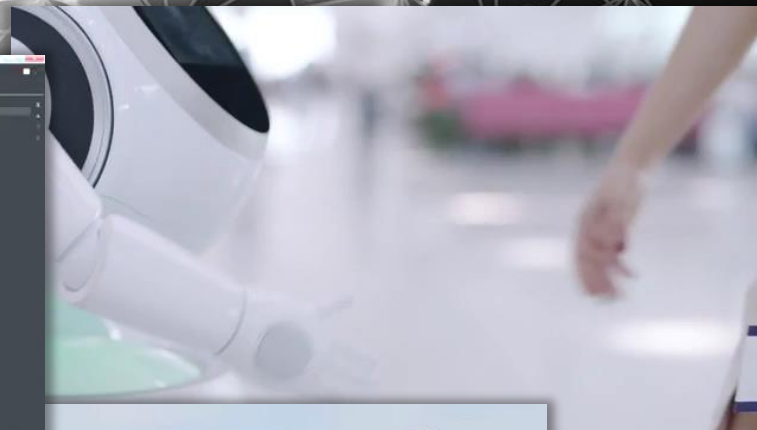A subset of ML that includes algorithms that permit software to train itself to perform tasks, like speech and image recognition, by exposing neural networks to vast amounts of data.

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AI EVERYWHERE!

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Short Description

- **Artificial intelligence** (AI) is increasingly used with **malicious intent**:
  - To deliberately fool existing AI solutions (e.g. autonomous cars, intelligent speakers, virtual personal assistants, etc.) to **actuate malicious behavior**
  - To **compromise** famous (but increasingly also regular) **people**
  - To **manipulate** public **opinion** (e.g., elections)
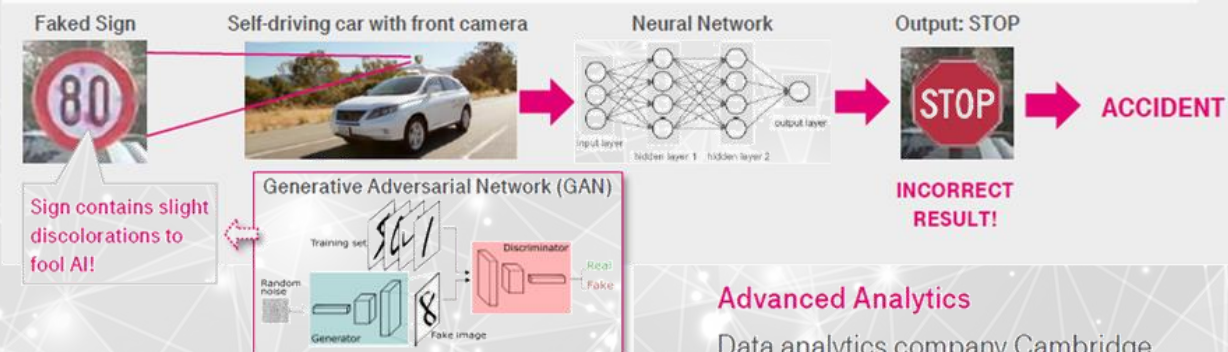
Challenges/ Opportunities

- **Provide AI solutions** (e.g. smart speaker) that are **hard to manipulate** via malicious AI
- Support R&D into **more robust** object/speech AI analytics

T·· LIFE IS FOR SHARING.

Malicious AI

Manipulation of traffic signs by AI (autonomous car concludes that the manipulated 80km/h sign is a „Stop" sign; Eyes can clearly distinguish)

Faked Sign — Self-driving car with front camera — Neural Network — Output: STOP — ACCIDENT — INCORRECT RESULT!

Sign contains slight discolorations to fool AI!

Generative Adversarial Network (GAN)
Training set — Discriminator — Real/Fake
Random noise — Generator — Fake image

Advanced Analytics

Data analytics company Cambridge Analytica spies for many years on +50mn Facebook users through data loop hole

How Cambridge Analytica turned Facebook 'likes' into a lucrative political tool

The algorithm used in the Facebook data breach trawled through personal data for information on sexual orientation, race, gender – and even intelligence and childhood trauma

Original — GAN — Fake

Deep Fakes

Automated (GAN-enabled) swapping of gestures (or a whole face; e.g., celebrity, politician) onto face (or body of a performer of alternative contents, resp.; e.g., adult content, fake speaker)

SELECTED (TELCO)
AI USE CASES

Go to **www.menti.com** and use the code **45 79 01**

■ Mentimeter

Which use cases do you see most relevant in the Telco industry? You can submit multiple answers.

targeted advertising	Customer Retention	fake news
chatbot	Network Usage Optimization	customer services (chat bot)
Voice assistant	copy right of VDO/TV content	Disinformation
Customer churn prediction & preventions	Facial recognition	Automated interconnection

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Tentative only

AI Trends

DEVICES
- Quantum Computing
- Collaborative Robots
- Home Robots
- Autonomous devices

BUSINESS SERVICES
- AI-as-a-Service
- Intuitive AI
- Process design by AI
- Predictive Maintenance
- Logistics optimization
- Smart Building (NB)
- AI driven energy management
- Digital smart assistant
- Voice Assistants
- Smart Speaker
- Smart Home

PROCESSES
- AI driven Operations Management
- Automated data Migration
- Unified data model
- AI driven Workflow Optimization
- Data Quality
- DevOps for AI
- Process Mining
- RPA
- Customer credit risk assessment
- Automated Fraud Detection
- Fraud Detection /Prevention

BILLING & CONTRACTS
- Automation of accounting & procurement processes

SALES & MARKETING
- Dialogue Marketing
- Real-time Offers
- Next gen video experience
- Product clustering
- Customer Engagement
- Staff-less stores
- Automation of Churn management
- Automated customer routing
- Customer Behavior Prediction
- Virtual customer service
- Automated Customer Handling
- Automated Ticket Handling
- Picture Anonymization
- Predictive Policing

NETWORK
- AI for 5G
- Edge Computing
- Autonomous cellular network
- Self-organizing networks
- AI threat intelligence
- Cyber defense Systems
- AI Network Rollout Planning
- Anomaly detection
- AI in network operations
- Smart Traffic Management
- HR Analytics & Forecasting
- Automated Connectivity
- Customer network quality monitoring

AI ENABLED HUMAN INTERACTION
- AI-enabled conferencing
- Real-time translation
- Intuitive UI
- AI enabled AR
- AI Knowledge & Skill Management
- AI enabled ID Management

MACRO & REGULATORY
- Ethics & AI
- Data protection
- Transparent AI
- Human Machine Replacement
- Data Taxes
- Friendly AI cultural shift

Relevant in…   0-2 Years   3-5 Years

LEGEND:
- IN IMPLEMENTATION
- CONCEPTUAL OR POC PHASE WITHIN TELEKOM
- NEED WITHIN TELEKOM (POTENTIAL WHITESPOT)
- NOT RELEVANT

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AI Trends

BUSINESS SERVICES
DEVICES
PROCESSES
BILLING & CONTRACTS
NETWORK
SALES & MARKETING
AI ENABLED HUMAN INTERACTION
MACRO & REGULATORY

○ Quantum Computing

ROBOTS
○ Collaborative Robots
○ Humanoid
● Autonomous devices

○ AI driven Operations Management
○ Automated integration
○ AI driven Work Optimization

DATA GOVERN-ANCE
○ Data Quality

PROCESS AUTO-MATION

○ Automation of accounting & procurement processes

AI AS A SERVICE
AI-as-a-Service
○ Process design by AI ○

○ Automation of accounting & procurement processes

AI-POWERED PRODUCTS & SERVICES
Predictive maintenance
Logistics
Smart Building
Smart Traffic Management
Smart energy management

DIGITAL ASSISTANT
○ Digital smart assistant
○ Voice Assistants
● Smart Speaker
● Smart Home

○ DevOps for AI

Process Mining ●

FRAUD
○ Customer credit risk
○ Digital Fraud Detection
● Fraud Detection /Prevention

● Dialogue Marketing
○ Real-time Offers
● Next gen video experience

CYBER SECURITY
AI threat defense/Self learning Systems

RPA ●

MARKETING
Product clustering
Customer Engagement
Automation of Churn management

● Staff-less stores

AI 5G
AI for 5G ○
Edge Computing

HR Analytics & Forecasting

Customer Behavior Prediction

NETWORK OPERATIONS
The autonomous cellular network
AI Network Robot Planning
Anomaly
AI-based automation in network operations
Self organizing networks
Customer network quality monitoring
● Automated Connectivity

AI POWERED CUSTOMER SERVICES
Automated Ticket Handling
customer service
Customer Handling
Automated customer routing

● AI-enabled conferencing
● Real-time translation

● Picture Anonymization
○ Predictive Policing

Relevant in…   0-2 Years   3-5 Years

INTUITIVE UI
Intuitive UI ○
● AI enabled AR

AI Knowledge & Skill Mgmt

Ethics & AI ●
○ Data protection
Transparent AI ○
● Human Machine Replacement

● AI enabled ID Management

● Data Taxes

● Friendly AI cultural shift

LEGEND:
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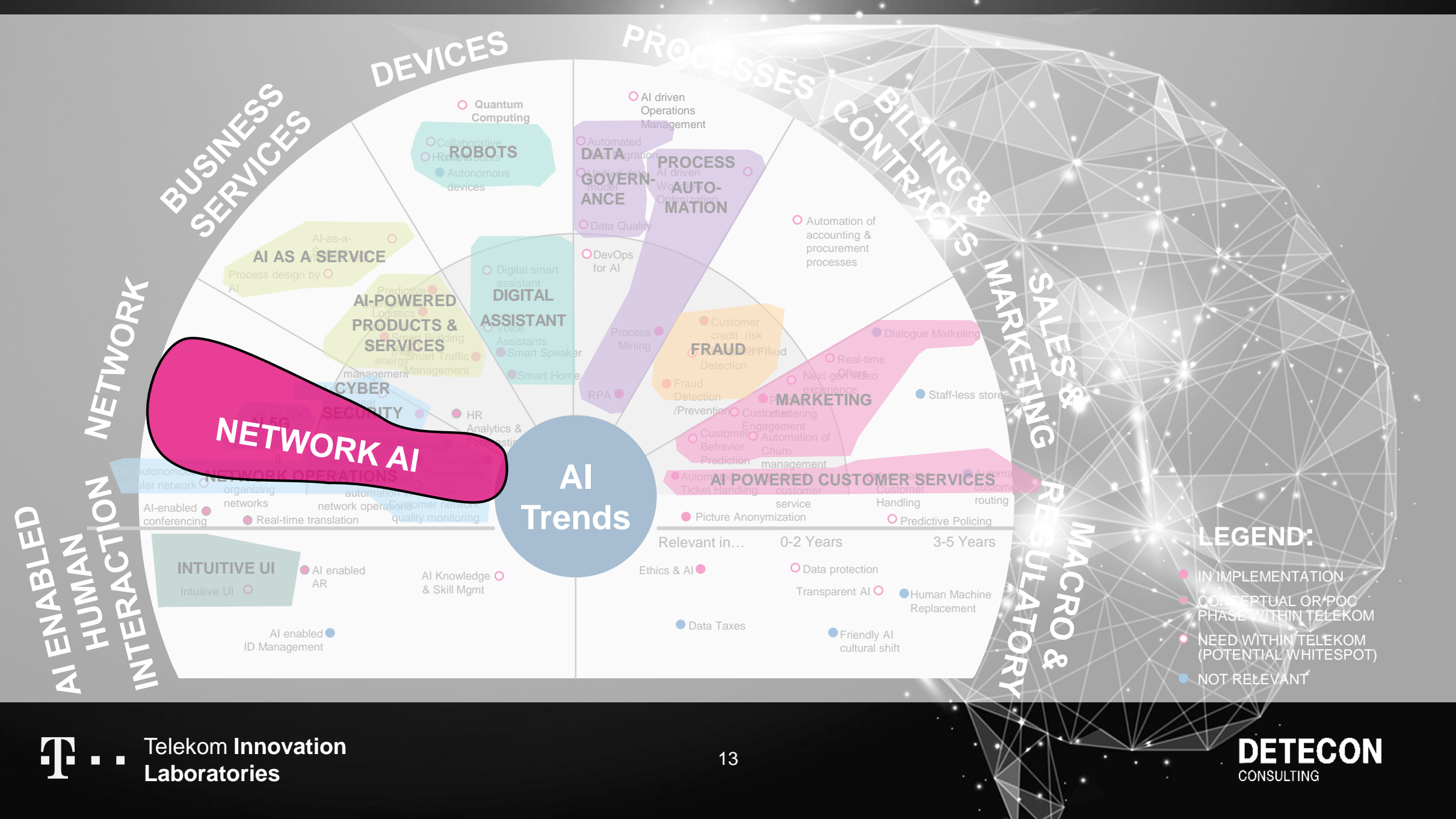
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HOW CAN WE OPTIMIZE THE EXPANSION OF FIBER OPTIC NETWORKS USING AI?

A **special vehicle** gathers precise data about the environment via various **sensors and laser-scanning technology.**

The so-collected data will be translated into georeferenced 3D image data and the system learns to recognize landscape features, e.g. houses, grass, trees, etc., in terms of their planning relevance. Reference data such as street maps can also be incorporated.

As a result, the system can rapidly produce precise proposals for ideal routes for subterranean cables.

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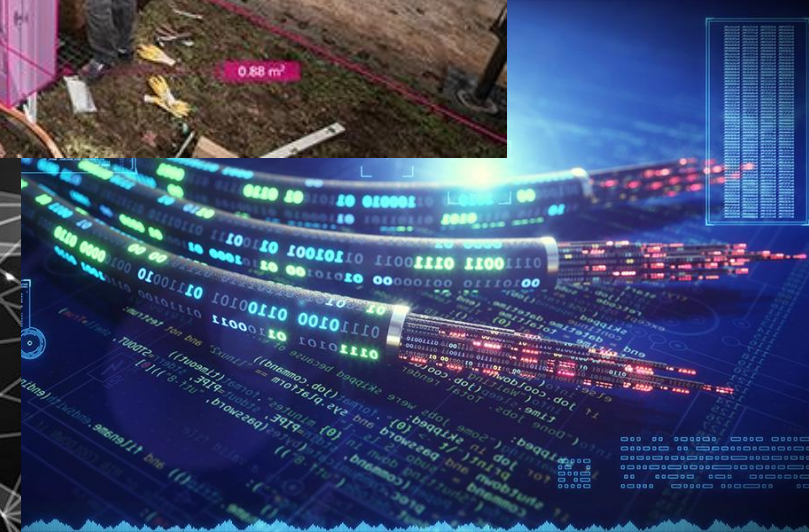
HOW DO WE OPTIMIZE NETWORK CAPACITY AUTOMATICALLY?

Auto-Planner: IP Traffic forecast to enable automated network capacity planning process in the core network including automated capacity upgrade alerts.

Data: IP traffic flows (capacities, source-destination traffic)

Method: Machine learning forecasting

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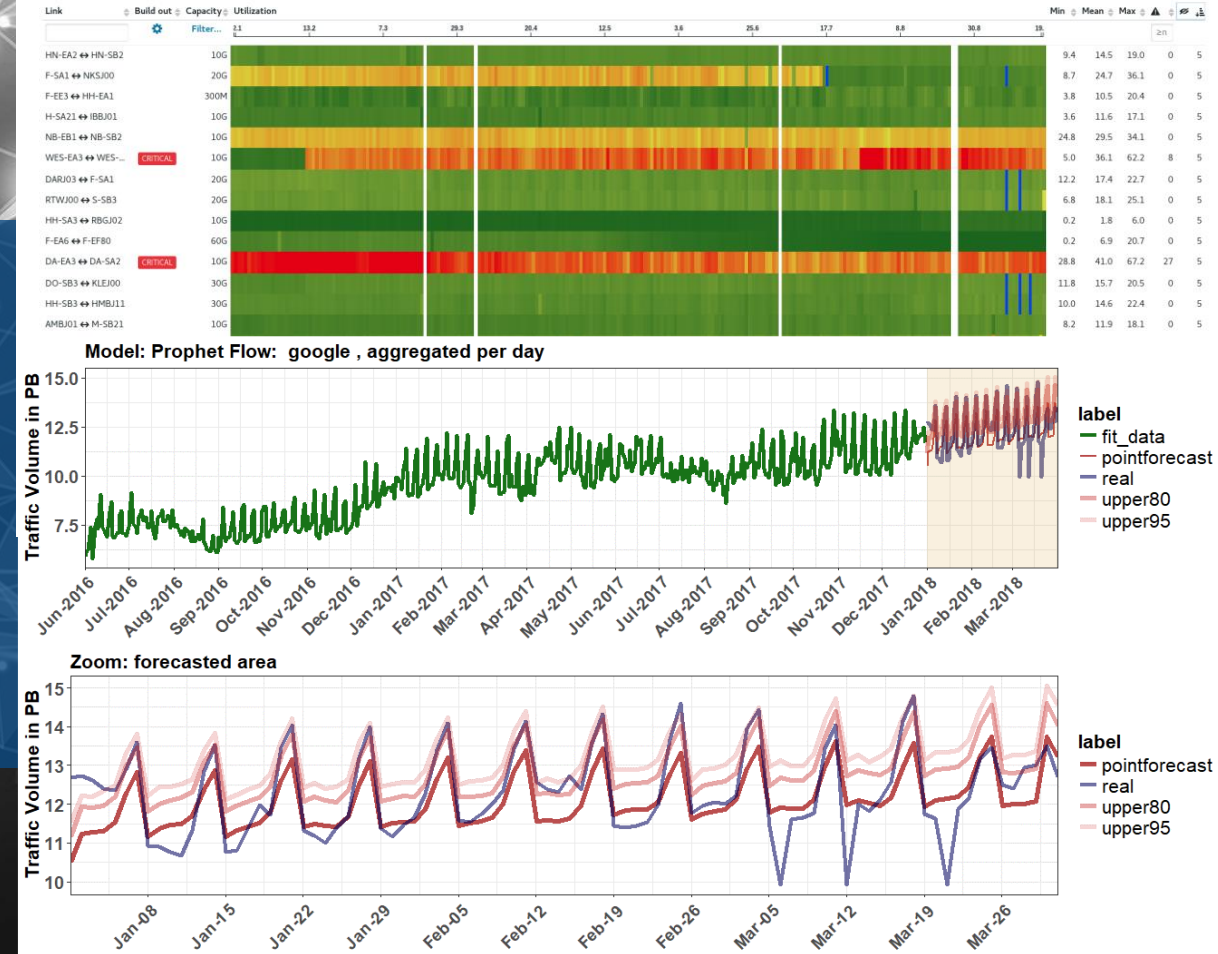
HOW DO WE DETECT CYBER ATTACKS EVEN BEFORE THEY HIT DEVICES?

PREEMPT: AI-based Preemptive Services scan the internet for tell-tale signs of imminent attacks to harden Deutsche Telekom infrastructure and protect our customers against Attacks.

Data: IP traffic data
Method: Anomaly detection

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AI Trends
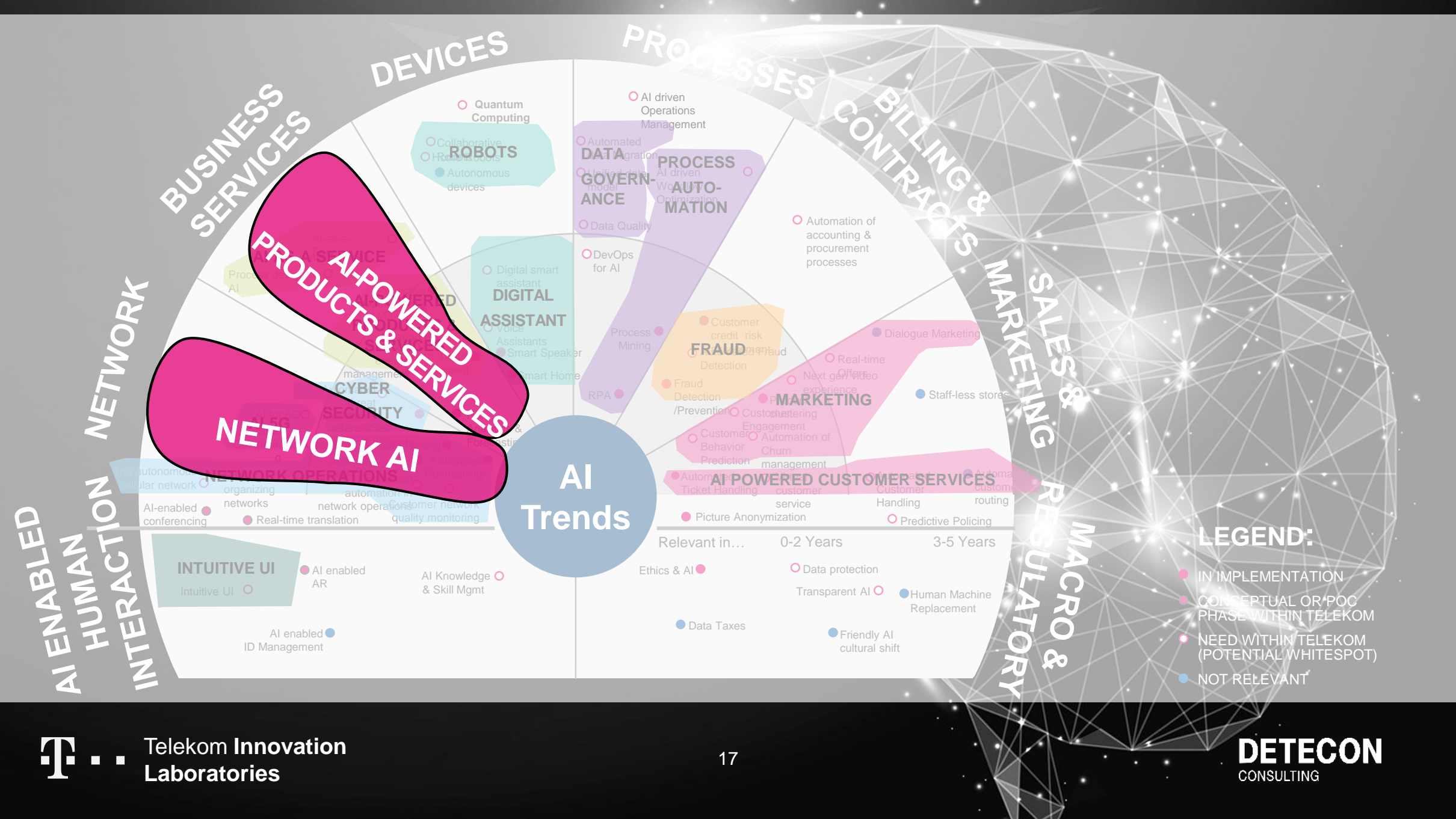
HOW CAN AI TURN A SMARTPHONE INTO AN EARLY WARNING SYSTEM?

MyShake App: Of all natural disasters earthquakes cost the most human lives and cause the greatest damage. Seconds can mean the difference between life and death in an earthquake.
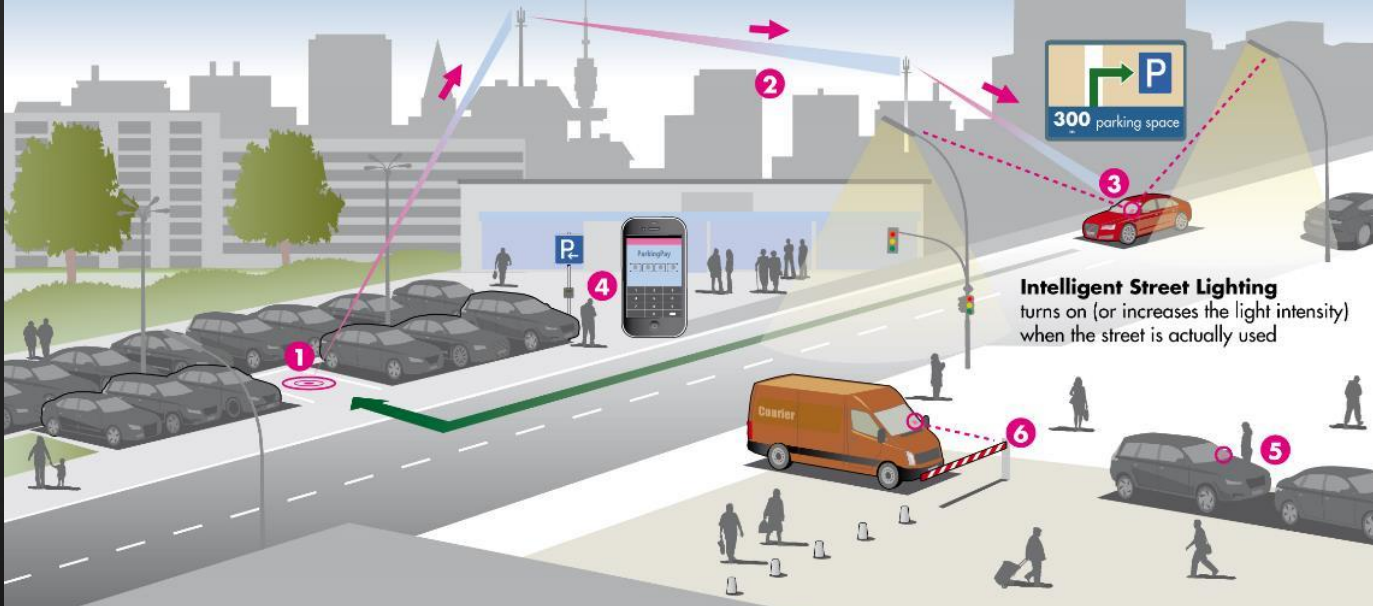
Developed by T-Labs and UC Berkely, the app pools Android smartphones to build a network of seismic sensors that can warn phone owners of earthquakes seconds before it occurs.

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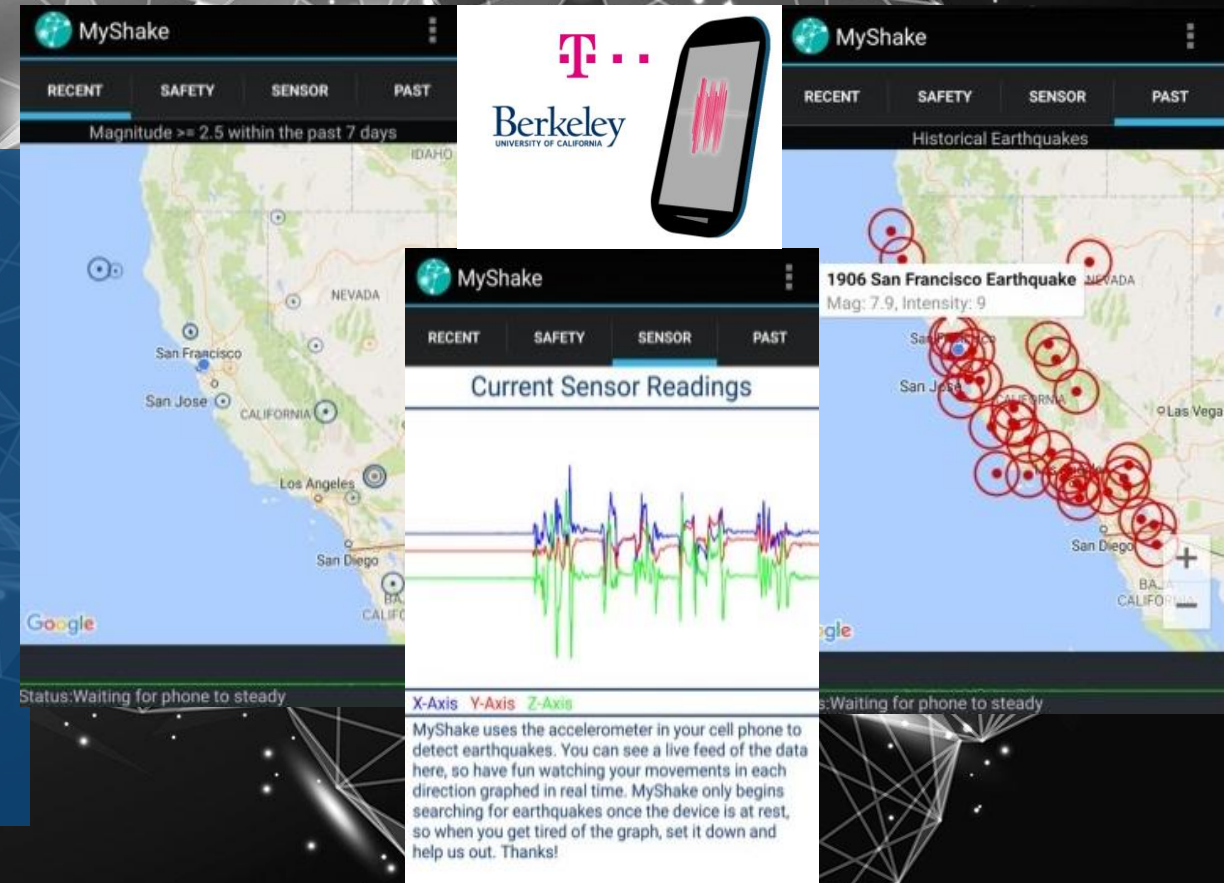
SMART CITY APPLICATIONS CAN BE ENABLED BY AI

Help with finding a parking space

30 percent of drivers in cities are looking for a parking space.
Intelligent machine-to-machine (M2M) solutions make life easier in the city.

300 parking space

Intelligent Street Lighting turns on (or increases the light intensity) when the street is actually used

1. **Sensors "detect"** whether a parking space is occupied or vacant and...
2. ... transmit **data to** the central **server**
3. **Smartphone app** "requests" a parking space and guides drivers to the free space
4. **Parking fee** is paid directly through the app
5. **Special permit** Administration of
   - parking and local resident IDs
   - permits for taxis, coaches, deliveries
6. **Legitimation** Access control to restricted traffic areas such as loading zones, residential parking

Source: Deutsche Telekom

Traffic Steering	City Dashboard	Predictive Policing
Smart Parking	Route Optimization Delay Forecasts	Smart EV charge
Connected Health	Smart Waste Management	Smart Lightning
Intelligent Rescue Services	Public Windows	City planning

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SMART PORT LOGISTICS CAN BE ENHANCED BY AI

Terminal operator

Centralized overview of traffic levels at port

Port Authority

The port authority provides an ecosystem that enhances all port processes as part of the Smart Port Logistics project

Gain new insight and KPIs on traffic and transportation data in real time.

Forwarding agent

Drivers receive orders and destination on their smart devices

Parking lot operator

Integration of data on vehicle movements and the container transportation chain (e.g. estimated time of arrival)

TelematicOne
for Hamburg Port Authority

Cloud solution
collects all relevant real-time information in one place

Drivers receive overview of traffic

Zero Distance
Information – Customers – Employees

Smart Port Logistics
developed by T-Systems, Deutsche Telekom Innovation Laboratories, SAP Research and Hamburg Port Authority

Only location-based information
sent to driver, thanks to geo-fencing

Portal provides transparency
for all stakeholders, with role-based access

Stakeholder integration
Incl. port authority, forwarding agents, terminal and parking lot operators, others as required (sea shipping companies etc.)

Precise communications
thanks to real-time data and smart devices

5-10 minutes saved per tour
means one more pick-up per day

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AI Trends

BUSINESS SERVICES

DEVICES

PROCESSES

BILLING & CONTRACTS

SALES & MARKETING

NETWORK

AI ENABLED HUMAN INTERACTION

MACRO & REGULATORY

NETWORK AI

AI-POWERED PRODUCTS & SERVICES

AI ASSISTANTS

Quantum Computing

ROBOTS

DATA GOVERN-ANCE

PROCESS AUTO-MATION

AI driven Operations Management

Automated Integration

AI driven Workflow Optimization

Data Quality

DevOps for AI

Automation of accounting & procurement processes

Process Mining

FRAUD Detection

Customer credit risk

Fraud Detection /Prevention

Real-time Offers

Next gen video experience

Dialogue Marketing

Staff-less stores

RPA

MARKETING

Customer Engagement

Customer Behavior Prediction

Automation of Churn management

Automated Ticket Handling

AI POWERED CUSTOMER SERVICES

AI-as-a-Service

AI-POWERED PRODUCTS & SERVICES

DIGITAL ASSISTANT

CYBER SECURITY

NETWORK OPERATIONS

Self organizing networks

network operations

Customer network quality monitoring

AI-enabled conferencing

Real-time translation

Picture Anonymization

Predictive Policing

customer service

Customer Handling

customer routing

Autonomous cellular network

Relevant in...   **0-2 Years**   **3-5 Years**

INTUITIVE UI

Intuitive UI

AI enabled AR

AI Knowledge & Skill Mgmt

Ethics & AI

Data protection

Transparent AI

Human Machine Replacement

AI enabled ID Management

Data Taxes

Friendly AI cultural shift

LEGEND:

IN IMPLEMENTATION

CONCEPTUAL OR POC PHASE WITHIN TELEKOM

NEED WITHIN TELEKOM (POTENTIAL WHITESPOT)

NOT RELEVANT

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HELLO MAGENTA

Smart Speakers: In addition to Amazon Alexa, DT created its own ecosystem for voice control, integrated it into its first smart speaker. "Hello Magenta" controls not only services of Telekom but also several (Smart Home) apps frequently used by customers.

Controls: Smart Home, Information (Weather, Traffic), Entertainment (TV, Music)
Data Privacy: EU Servers, GDPR Compliant, Physical Microphone On/Off Switch

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Dedicated AI hardware
Several new and recent phones have hardware "optimized for AI".

Their chips are called "neural processing unit", "bionic" or a "neural engine".

They are designed for the fast processing especially of rapidly changing image data, which would use more processor bandwidth and power in a conventional chip.

Face ID

- Face Identification (offline, on-device)
- Camera scene and object recognition
- AI-assisted night shooting
- Reduced power usage, more efficiency

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Leading search engines like Google and Baidu are also investing into AI applications.

Deep Voice Technology is aiming to have a lasting impact on natural language processing, the underlying technology behind voice search and voice pattern recognition systems.

Other applications of this technology could e.g. be real time translation, biometric security or voice-assisted customer service.

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AI Trends

Radial categories: BUSINESS SERVICES, DEVICES, PROCESSES, BILLING & CONTRACTS, SALES & MARKETING, MACRO & REGULATORY, AI ENABLED HUMAN INTERACTION, NETWORK

Highlighted segments: NETWORK AI, AI-POWERED PRODUCTS & SERVICES, AI ASSISTANTS, AI-ENHANCED PROCESSES

Inner labels: ROBOTS, Quantum Computing, DATA GOVERNANCE & ANALYTICS, PROCESS AUTOMATION, DATA-AS-A-SERVICE, AI-POWERED PRODUCTS & SERVICES, DIGITAL ASSISTANT, CYBER SECURITY, NETWORK OPERATIONS, FRAUD, MARKETING, AI POWERED CUSTOMER SERVICES, INTUITIVE UI

Labels: Automation of accounting & procurement processes; Customer credit risk; Fraud Detection; Fraud Detection/Prevention; Dialogue Marketing; Real-time Offers; Next gen video experience; Staff-less stores; Customer Engagement; Customer clustering; Automation of Churn management; Customer Behavior Prediction; Automated Ticket Handling; customer service; Customer Handling; Automated customer routing; Picture Anonymization; Predictive Policing; AI-enabled conferencing; Self organizing networks; Real-time translation; network operations automation; Customer network quality monitoring; AI enabled AR; Intuitive UI; AI Knowledge & Skill Mgmt; Ethics & AI; Data protection; Transparent AI; Human Machine Replacement; AI enabled ID Management; Data Taxes; Friendly AI cultural shift

Relevant in… | 0-2 Years | 3-5 Years

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INDUSTRY 4.0 USE CASES OFTEN LEVERAGE AI, IOT AND ROBOTICS FOR PRODUCTION & SUPPLY CHAIN SYSTEMS.

Need for enhanced production processes

◆ Competition will intensify in context of globalization and digitalization towards Industry 4.0

◆ Need to adapt to challenging market environment

◆ To remain competitive, all potentials for improved productivity and process efficiency must be leveraged:

  – Need to further optimize logistics & supply chains

  – Need to enable OT / IT convergence

  – Need for agility and shorter time-to-market

  – Need for deeper insights, more information transparency of value chain

Demand for new services

IoT / Comms. Infrastructure

Campus-wide network availability

Augmented Maintenance

Safety Monitoring

Factory Floor

Production Automation

Virtual Optimization

Remote Control & Maintenance

Intralogistics

AGV Transport Systems

Asset Tracking

Supply Chain Integration

Office

Virtual Conferencing

Wireless Office

Directly AI-related

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Predictive Maintenance for Telcos
Operators can use data-driven insights to monitor the state of equipment, anticipate failure based on patterns, and proactively fix problems with communications hardware, e.g. cell towers, power lines, data center servers, and even set-top boxes in customers' homes.

In the short term, **network automation and intelligence** will enable better root cause analysis and prediction of issues.

Long term, these technologies will underpin more strategic goals, such as creating new customer experiences and dealing efficiently with emerging business needs.

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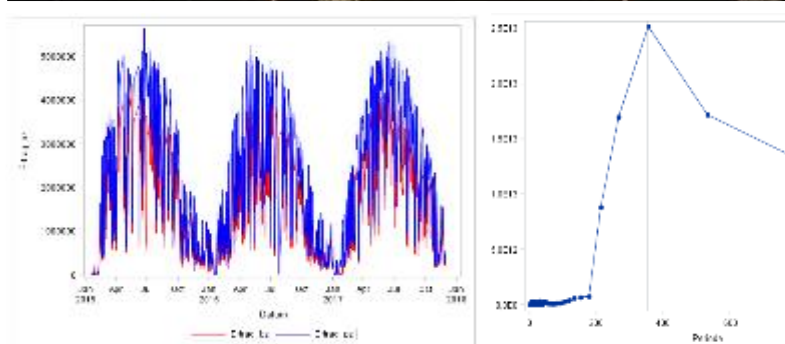
Analytical Intelligence

PREDICTIVE MAINTENANCE FOR PHOTOVOLTAIC SYSTEMS

Maintenance is cost-intensive, however, non-maintenance will eventually be more cost-intensive.

The optimal time for cleansing of photovoltaic systems depends on many aspects (weather conditions: sun, rain, snow, wind, …) and hence deviates from the maintenance advice of the producer. The Detecon Engineering Center applied a generic algorithm to generate optimized cleansing time slots for photovoltaic systems distributed across Europe.

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CELONIS: AI-ENHANCED PROCESS MINING FOR VENDOR CONTRACT MANAGEMENT, INVOICE PAYMENTS, ETC.

Video available here:
www.youtube.com/watch?v=k7ldNIRz99A

AI Trends

Categories (outer ring): BUSINESS SERVICES · DEVICES · PROCESSES · BILLING & CONTRACTS · SALES & MARKETING · MACRO & REGULATORY · AI ENABLED HUMAN INTERACTION · NETWORK

Highlighted petals: NETWORK AI · AI-POWERED PRODUCTS & SERVICES · AI ASSISTANTS · AI-ENHANCED PROCESSES · FRAUD DETECTION

Relevant in… | 0-2 Years | 3-5 Years

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Travel Insurance

Home Insurance

Life Insurance

Car Insurance

Health Insurance

Analytical Intelligence

INSURANCE FRAUD

CRM within insurance companies faces various challenges, from purchase propensities (to offer interesting products) to fraud detection, from customer orientation to friendliness of service and innovative use cases.

By building up a data science team, programming ML-algorithms in a Hadoop stack environment and handing over a ready-to-use data science toolkit, the Detecon Engineering Center supported a client to enter the next generation fraud identification and prevention.

Schadenmeldung

Wann ist der Schaden eingetreten?

Um welche Schadenart handelt es sich?

Überspannung

Schadenerfassung

Um welches Gerät handelt es sich?

WLAN/Router

Um welchen Hersteller handelt es sich?

Um welches Modell handelt es sich?

Schadenabwicklung

Die ermittelte Schadenhöhe liegt bei

175€

Wollen Sie sich diesen Betrag sofort auf Ihr Konto xxxxx überweisen Lassen und damit die Bearbeitung abschließen?

Nein   Ja

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Analytical Intelligence
FRAUDULENT DATA

Analogue to false information in insurance claims, AI algorithms can also identify fraudulent user data, e.g. with regard to billing information from post-paid customers of mobile operators.

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NUMBER OF FRAUD PACKAGES

FRAUD DETECTION
Analysis of person & package information

WEIGHT DISTRIBUTION FRAUD & NORMAL PACKAGES
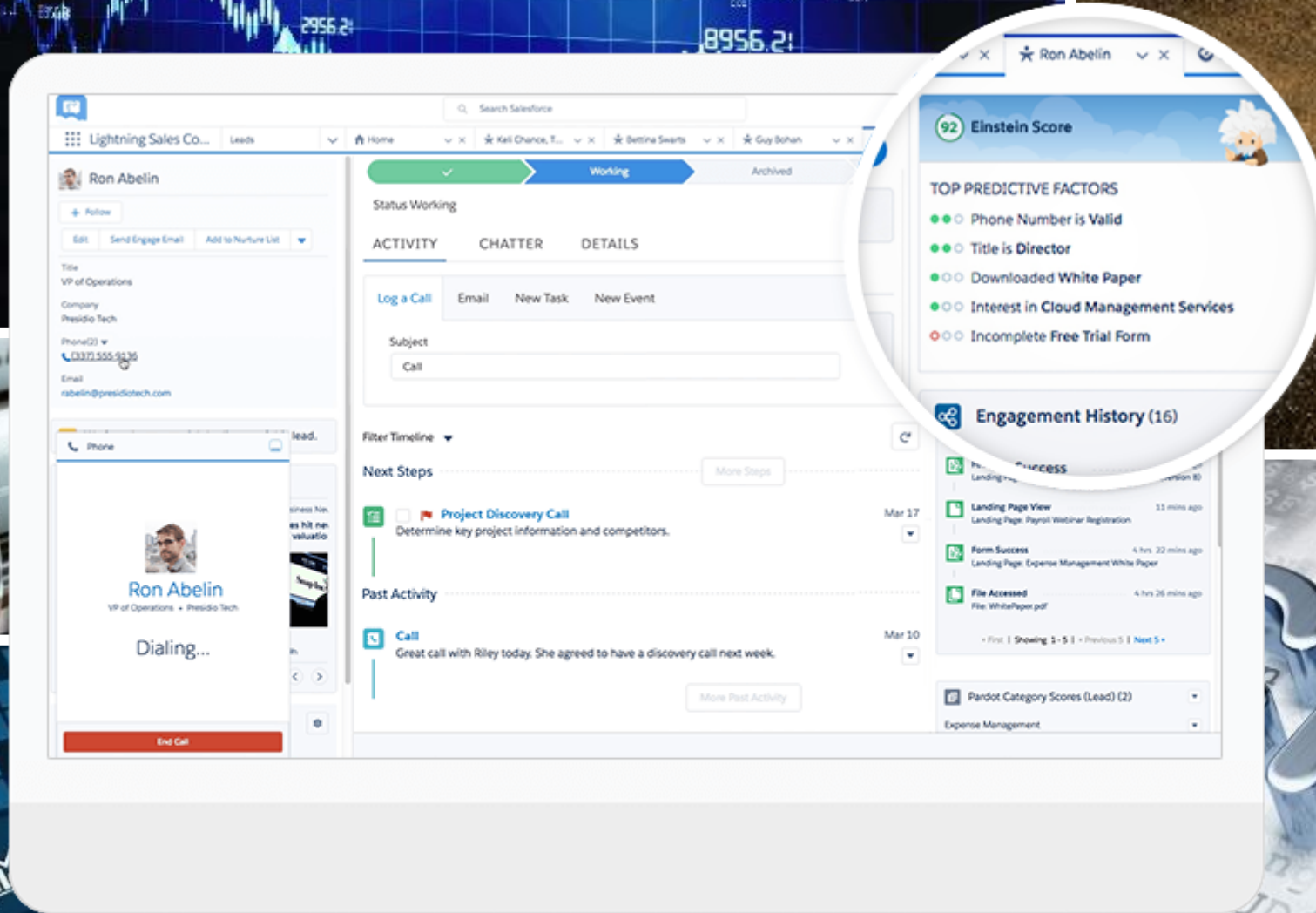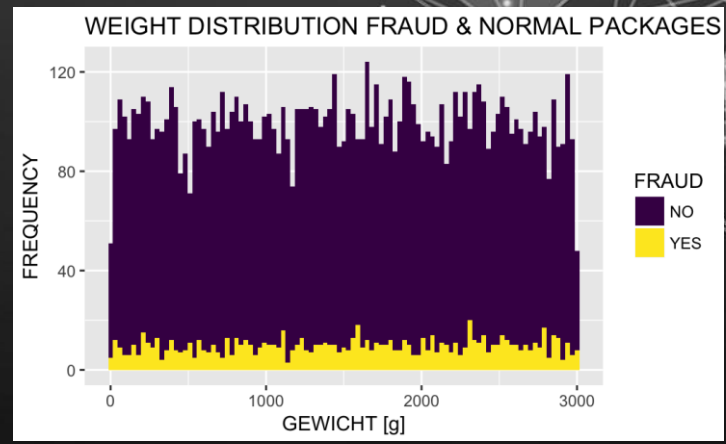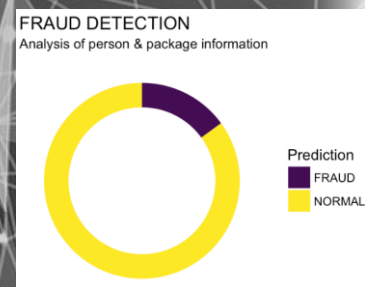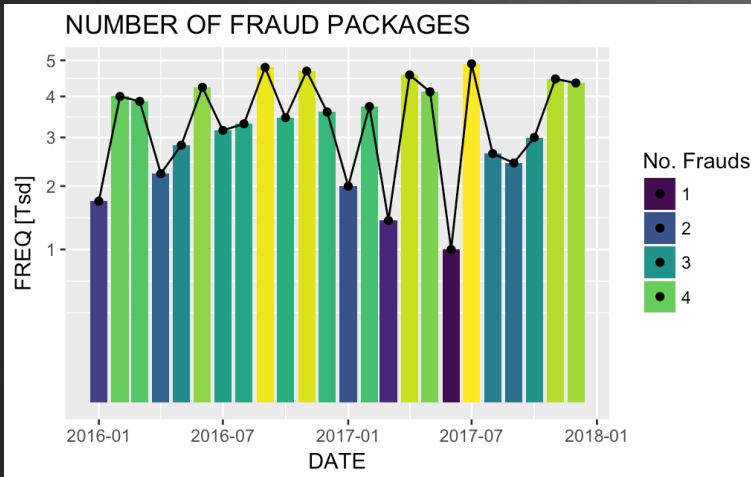
Analytical Intelligence

PARCEL FRAUD DETECTION

Early detection and prevention of parcel fraud in the area of postal delivery.

Initial understanding of data structure and situation with explorative data analysis and visualization build the basis for integrating machine learning in later step. Integration of diverse and complex data sets to identify cases of fraud. Objective is the creation of new services for the consignor to reduce financial losses due to non paid delivery.

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SALESFORCE AI

AI-Enhanced CRM Solutions, e.g. Salesforce Einstein, are also used by Telecom companies across the globe.

Use cases: Customer Churn Prediction & Prevention, Workforce Optimization, Sales Agent Support and more...

SMART / AI-ENHANCED CRM MODULES

Sales Cloud Einstein

Predictive Lead Scoring
Opportunity Insights
Automated Activity Capture

Service Cloud Einstein

Recommended Case Classification
Recommended Responses
Predictive Close Time

Commerce Cloud Einstein

Product Recommendations
Predictive Sorting
Commerce Insights

Marketing Cloud Einstein

Predictive Scoring
Predictive Audiences
Automated Send-time Optimization

App Cloud Einstein

Heroku + PredictionIO
Predictive Vision Services
Predictive Sentiment Services
Predictive Modeling Services

Community Cloud Einstein

Recommended Experts, Articles
Automated Service Escalation
Newsfeed Insights

IoT Cloud Einstein

Predictive Device Scoring
Recommended Best Next Action
Automated IoT Rules Optimization

Analytics Cloud Einstein

Predictive Wave Apps
Smart Data Discovery
Automated Analytics & Storytelling

salesforce

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SENTIMENT ANALYSIS

Outward Looking

A good reputation
takes years to build and seconds to destroy

Talkwalker adds sentiment information to all results, enabling you to manage risks with a technology that flags high risk posts in real time.

John Doe @12345
Wow, ProductX is a great example of what you shouldn't buy #fail
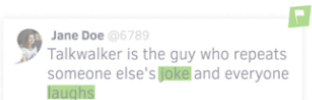
Jane Doe @6789
Talkwalker is the guy who repeats someone else's joke and everyone laughs

People love sharing sarcastic thoughts
about your brand

Talkwalker's AI powered sentiment technology helps you find negative or snarky comments earlier. It can even detect basic forms of sarcasm, so your team can immediately react to all relevant posts.

Jane Doe @6789
Talkwalker is the guy who repeats someone else's joke and everyone laughs

AI can help to:
- Optimize the impact of content and brand messaging
- Define customer engagement strategies
- Identify trending topics and influencers
- Support proactive engagement to grow brand awareness
- Reveal specific insights into the market and competitors
- Improve customer approach & service

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SENTIMENT ANALYSIS

AI can assist customer service agents with:
- Predictive insights and analytics
(Help prioritize customer inquiries / tickets, correct categorization of requests, etc.)

- Sentiment and behavioral assessment
(Assess the level of desperation in customer responses, help agent to de-escalate early)

- Recommend the best next actions
(Automated responses to low priority tickets, suggest pre-written responses to a particular ticket, provide guidance in the next steps)

Inward Looking

SENTIMENT ANALYSIS

NEGATIVE	NEUTRAL	POSITIVE
Totally dissatisfied with the service. Worst customer care ever.	Good Job but I will expect a lot more in future.	Brilliant effort guys! Loved Your Work.

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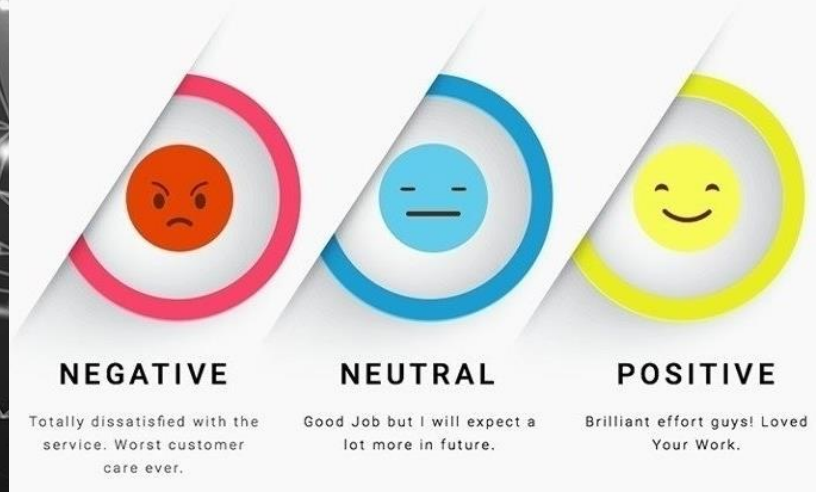
CHATBOTS

[CHATBOT]
Interacts through instant messaging, artificially replicating the patterns of human interactions.

[MACHINE LEARNING]
Allows computers to learn by themselves without programming.

[NATURAL LANGUAGE]
A computer's ability to understand human speech or text.

Video available here:
https://www.youtube.com/watch?v=38sL6pADCog

Tinka Chatbot: Since almost five years, T-Mobile.at has been offering the digital assistant Tinka on its website and later also integrated into Facebook messenger. Tinka helps customers with questions about products, prices, and contracts, solving many issues directly in a chat-like dialogue..

If a problem cannot (yet) be solved fully automatically, the chat session is seamlessly transferred to a customer service employee.

HI! I AM TINKA!
Your virtual assistent with Artificial Intelligence!

Name	Tinka
Age	459 Years (27 Years on Earth)
IQ	18.456
Birthplace	Satellite City Arkayn, Planet Gliese
Equipped with AI	April 2017

MAY I INTRODUCE MYSELF?
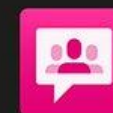
- 24/7 assistant
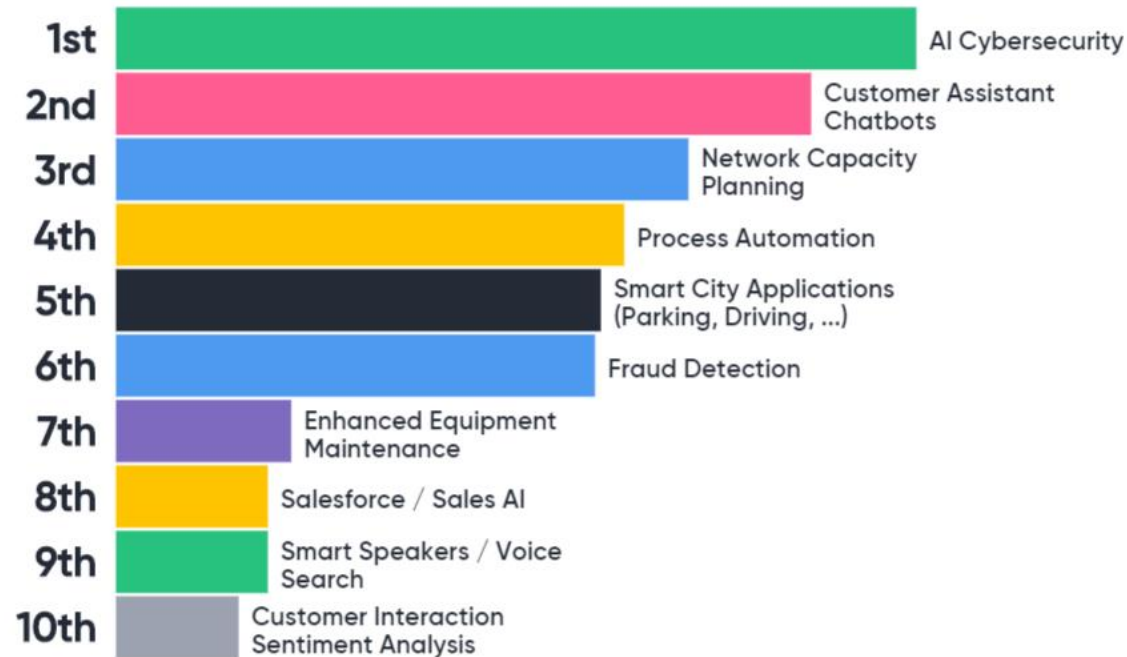- > 270 customers per day
- 120,000 questions per month
- 4 of 10 customers already prefer chatbots in customer dialogue
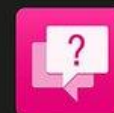
Favourite Questions: HomeNet installation, billing details and the best mobile settings

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Q&A SESSION

Presented by:

Detecon Asia-Pacific

179 Bangkok City Tower, 27th Floor South
Sathorn Road, Thungmahamek Sathorn,
Bangkok 10120 Thailand

Phone: +66 2634 9000
Fax: +66 2634 9095

www.detecon.asia

Your contact person:

Thomas Wehr
Managing Director
Phone: +66 2 6349001
Mobile: +66 81 8335373
Email: Thomas.Wehr@detecon.com

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