

# Trends in Telecommunications and AI

**Vodafone Enterprise Plenum meets  
Vodafone Tech Innovation Center Dresden**

Dresden, June 17th. 2024

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[www.kremling.net](http://www.kremling.net)



# 30 Years of Mobile Communication – from 2G to 6G



**2G – 1992**

- + Data via Voice & SMS
- + slow GPRS



**3G – 2002**

- + Faster Data for web access & email Positioning



**3.5G – 2007**

- + HSDPA
- + iPhone is changing the Telco world



**4G – 2010**

- + Video everything
- + Smartphones everywhere
- + 3D Graphics
- + Streaming



**5G – 2020**

- + 1ms & Tb/s
- + tactile Internet
- + massive M2M/IoT
- + 'carrier grade'
- + safe & secure
- + Industry 4.0
- + Self Driving Car's
- + 5G Open RAN

**6G – 2030**

- + AI
- + Quantum
- + Blockchain



# Traffic forecast 2029 & 2034: a key question for Telco industry

Low (50% p.a.) or high (100% p.a.) expectation - the truth lies in between

- Smartphones, tablets, TV & cars, always connected
- Millions of real time IoT apps, industry 4.0, smart home, healthcare, online gaming, virtual & augmented reality
- cloud solutions, big data & analytics, autonomus driving eh
- Social Media meets 3D/ 360/ 8k video & holograms

➤ We need 5G for AI, capacity, speed & real time IoT!

8 or 32 times more  
than today?



1024-fold

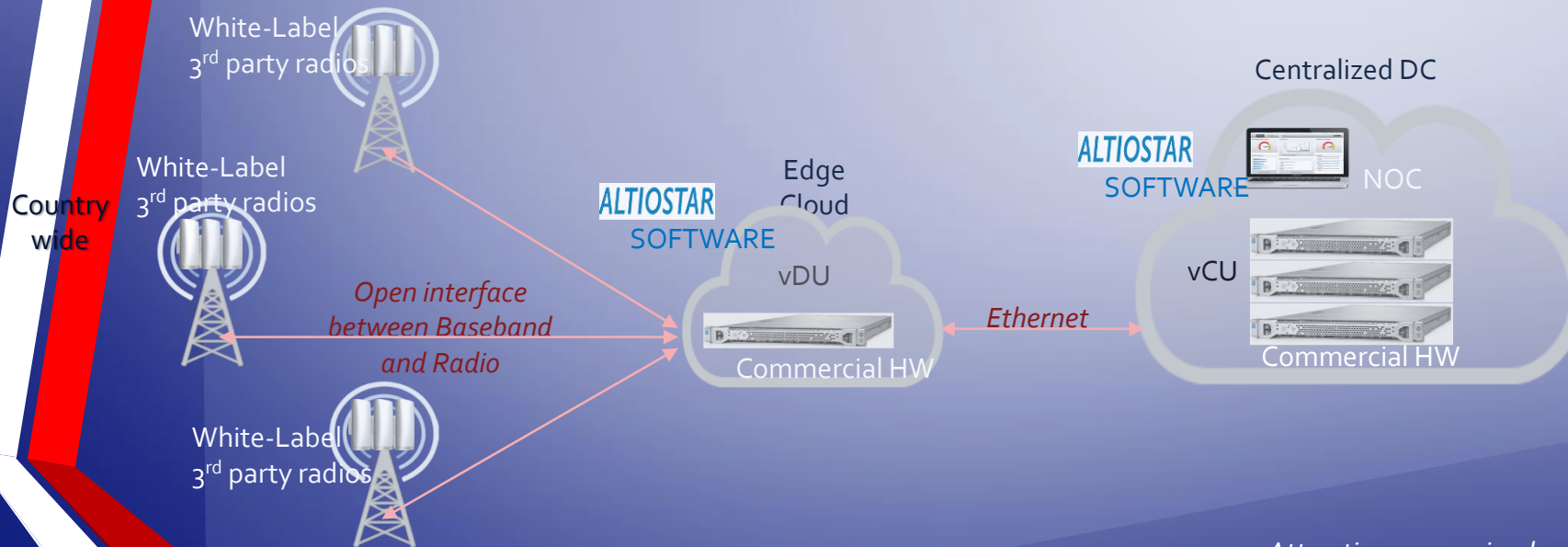
Data Traffic

58-fold

2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034

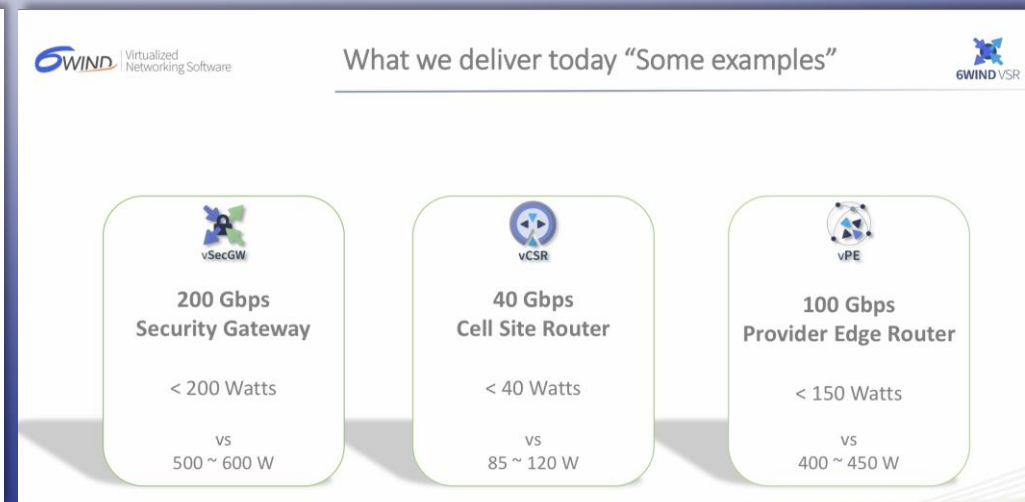
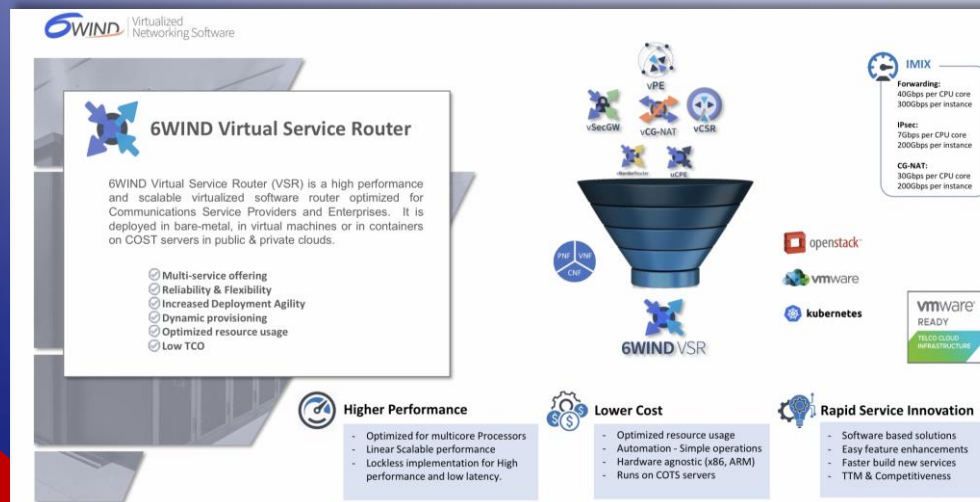
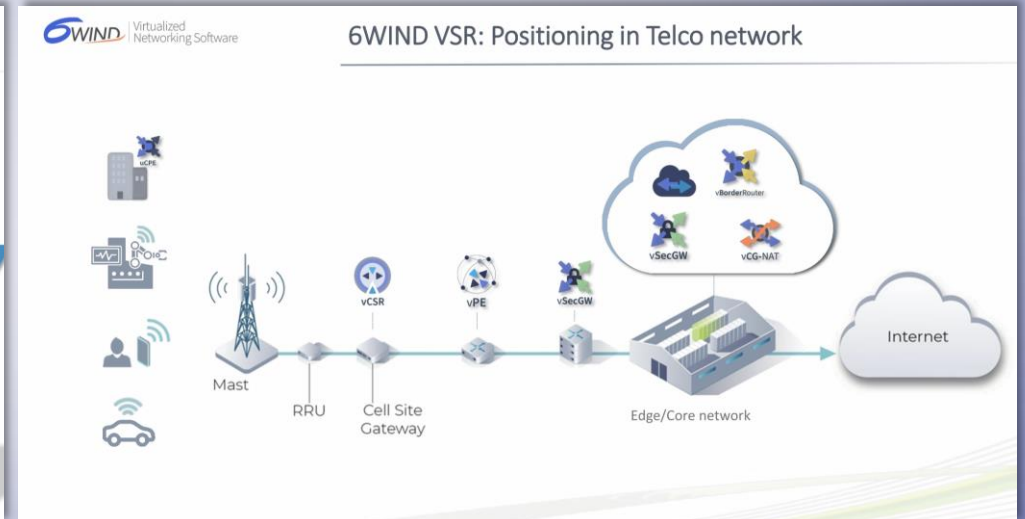
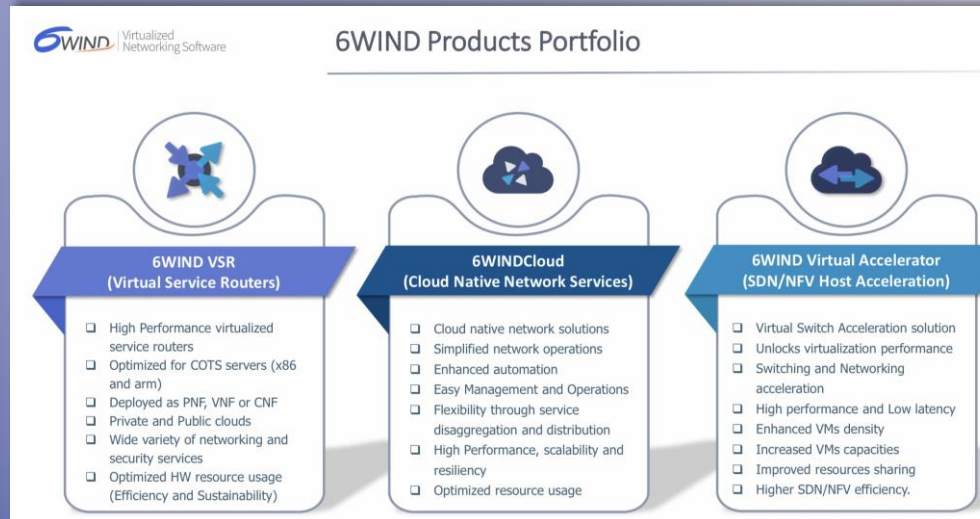
# A new Trend: 5G Open RAN Benefits

- Complex & expensive equipment removed from cell site
- End-to-end software managed network
- Common virtualized software for Macro, small cells, 4G & 5G
- Open sourcing of best-of-breed network elements
- High services' velocity for monetization
- Enhanced security
- Capex & Opex savings with revenue acceleration



- *Attractive economics due to HW/SW disaggregation*
- *SW business*
- *Enable E2E U.S. ecosystem and leapfrog China Inc*

# A new Trend: Cloudification, Softwarisation, Containerisation, example 6WIND

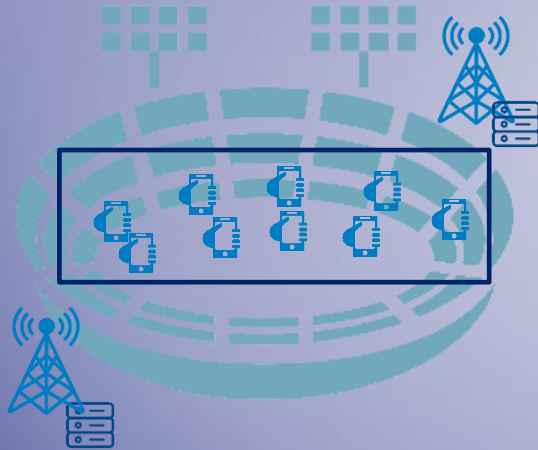




# A new trend - 5G Campus everywhere

## Vodafone Solution with Ericsson, Nokia and Athonet

ILLUSTRATIVE



### Use Cases:

- Airports
- Harbours
- Business Parks

- Enterprise Customers want to use own 5G Networks with own Spectrum
- Large Potential for new entrants in combination with Dark Fiber Business
- In parallel large Potential for new services with MEC Solutions

# Example Cocus: 5G Campus2Go solution at Seaport Wismar



Seaport of Wismar and COCUS as 5G campus network provider implement "PORTABLE 5.0" project on the 66 ha area of the seaport.

The 5G mobile private network at the seaport will enable resident companies to perform real-time dispatching, automated loading of bulk carriers and autonomous driving on in- and outdoor operating areas.

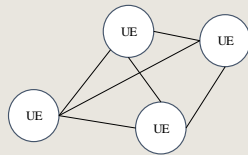


- 70,7 ha, davon 60,7 ha an Land
- Überdachte Lagerflächen: 54.000 m<sup>2</sup>
- Freiflächen: 162.000 m<sup>2</sup>

# Sat.Co + Mesh Networks combined with eSIM and WiFi7

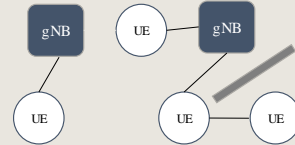
## ORCHRD LATTICE MESH

Lattice Mesh is the technology that will enable the leading edge of tomorrow's cellular networks, providing meaningful connectivity to bridge coverage gaps, reduce infrastructure cost, and enable usage of mmWave and Terahertz frequency spectrum in complex propagation environments.



### Ad-Hoc

- UE within line of sight, without connectivity to the core network establish a connectivity "bubble"
- Used when connectivity with core network is inefficient or impossible with insufficient primary nodes within the bubble.
- Direct UE to UE communication for high throughput coordination. IE Driverless cars coordinating to improve traffic flow on the open highway
- Provision for spectrum allocation in conjunction with network slicing



### Last Mile

- UE with line of sight to gNB act as primary nodes
- UE obstructed from direct communication with gNB establish connections with primary node UE, which then maintains integrity of downstream UE user planes
- UE with multiple visible primary nodes direct traffic towards the node with the lowest latency to the core network, providing for dynamic load balancing in user dense settings.
- Reduced infrastructure cost, higher reliability and greater user satisfaction in mmWave and future Terahertz spectrum deployments

Get in touch

Andrew Reeves  
Founder  
andrew@orchrd.io

### Decentralized operation

The key feature of Wirepas Massive Tracking leads to large scale and high density.

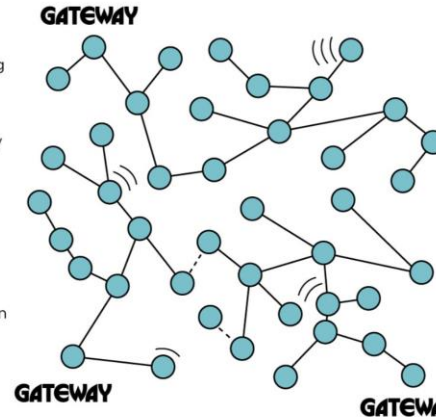
Any device can be a router at any time. Nodes self-organize themselves dynamically and promote other devices to be routers.

The role is dynamic and can change when needed.

### Short time on Air

Use high radio data rate to minimize time on air.

Enable less collisions for high density and high reliability.



### Locally synchronized point to point communication

Nodes connect via locally synchronized channels on a specific timeslot (FDMA + TDMA).

Best channel selection. No collisions. Optimized peer-to-peer local communication.

### Adaptive Transmit Power

Local and automatic transmit power adjustment.

Adjust power to minimize power consumption & maximize spectrum usage for high density.

### Low Energy Network

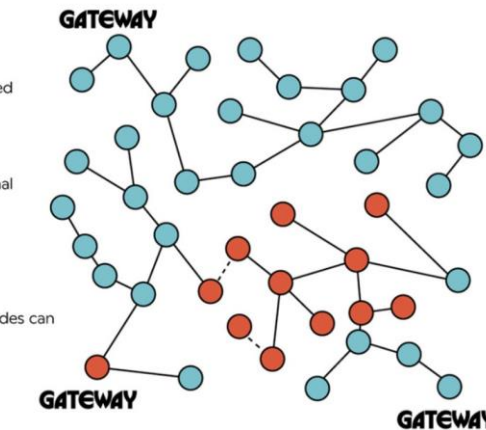
Infrastructureless fully battery-operated network.

Years of battery life.

Automatic load balancing & bidirectional communication.

### Mixed mode network

Low Energy and High-Performance nodes can be mixed in same network.



### High Performance Network

Low latency / high throughput.

Optimized local node to node communication for the lowest latency.

Able to connect with low-energy nodes.

### Multi Gateway Network

Gateways are fully mutualized.

More gateways mean more throughput.

Built-in load balancing.



# Enterprise Plenum @ Intuitive Surgical in 2017



# 5G Use Case for eHealth in China: Remote Surgery Based on 6 mio 5G Base Stations in China !

## 5G enables **robotical remote Surgery** to balance out **Doctor Scarcity** in rural Regions supported by new Business Models

How 5G helps patients due to very low latency to receive surgery from doctor only overseeing remotely surgical robots.

### Offering

Patient receives surgery from doctor that overviews from >100km distance. After 3D surgical positioning on patient, the robot implanted total of 12 pedicle screws into the spines of the patient. Surgery was successfully completed in <2hrs.

### Innovation

5G technology enabled smooth and stable signal transmission throughout operation, displaying seamless coordination between the experts and the Tianji robot. 4K HD videos can be quickly transmitted and remote-control signals of surgery robot applied to remote surgery robot in real-world scenarios.

### Business Value

For the surgery the doctor did not travel to the patients' remote location. This saves immense amount of time and manpower as the surgery was done by the robot. New service models arise and new number of operations can be done in less time.



Beijing, Shandong



Healthcare



Founded 2017



Click [HERE](#) to learn more



China Telecom aims to provide partners like Huawei and customers with new 5G service models that feature **one-stop purchases, one-point deliveries, one-point services, and end-to-end guarantees.**



Accenture China Bridge

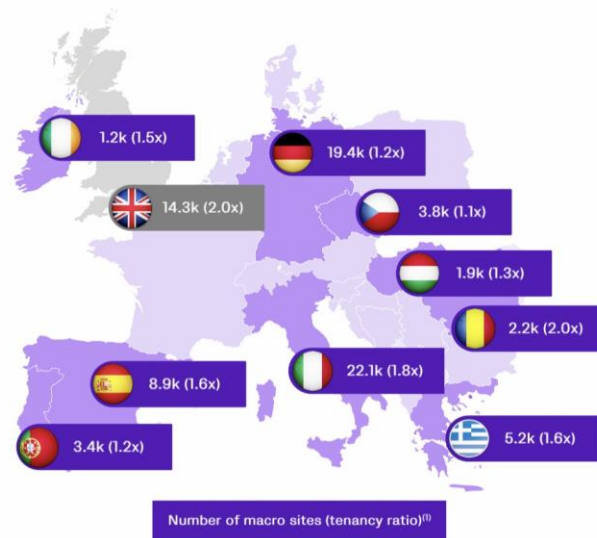
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# Vantage Towers – AI based Network planning

VANTAGE  
TOWERS

## Europe's leading tower company with over 68k towers across 9 markets



- #1 or #2 tower market share in almost all markets
  - Full ownership in 7 markets, including Germany & Spain
  - Controlling 62% shareholding in the combined Greek tower assets of Vodafone and Wind Hellas, with call option to increase to 100%
  - Equity stake with co-control in INWIT (Italy)<sup>(2)</sup>
  - Intention to include Vodafone's 50% equity stake in CTIL (UK)<sup>(3)</sup>
- High quality, top tier MNO tenants on long term contracts
- Strong foundations for multi-layered growth

1. Site number and tenancy ratio as at 31 March 2020. Tenancy ratio represents the total number of tenancies (including both Vodafone and another MNO where there is existing active sharing on a site) of Vantage Towers divided by the total number of towers
2. Vantage Towers will have a 33.2% shareholding in INWIT
3. Inclusion of 50% shareholding in CTIL subject to reaching agreement with our partner

## The “augmented” TowerCo

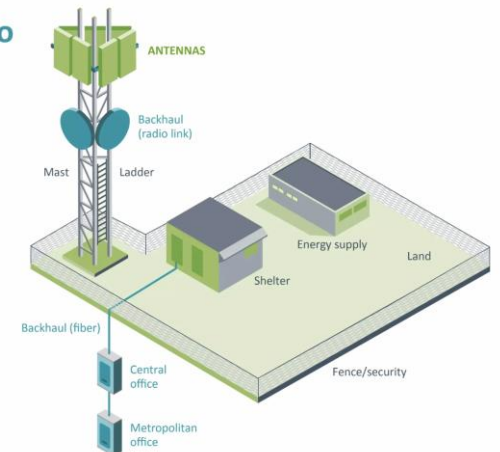
Enabling the 5G mutualisation

Open to all players based on Cellnex' neutrality

Boosting efficiencies for MNOs

Replicable in other markets

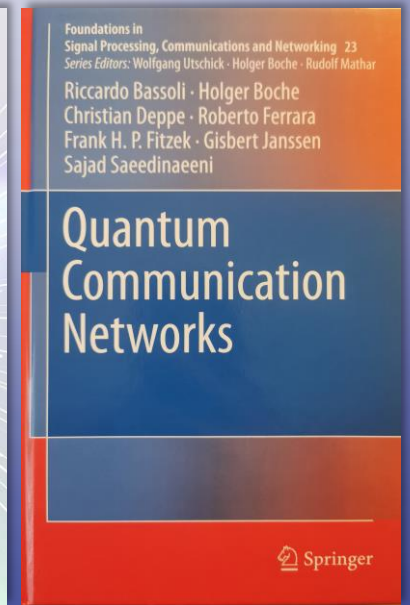
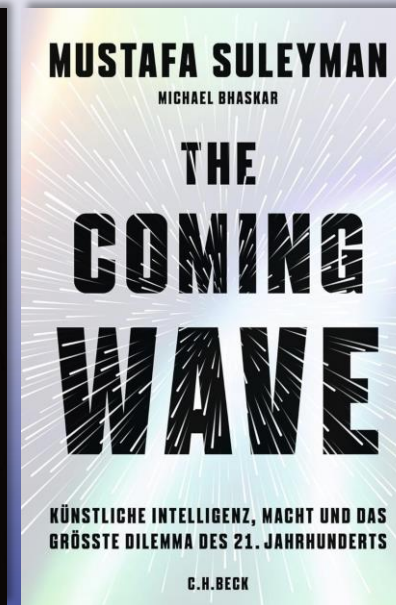
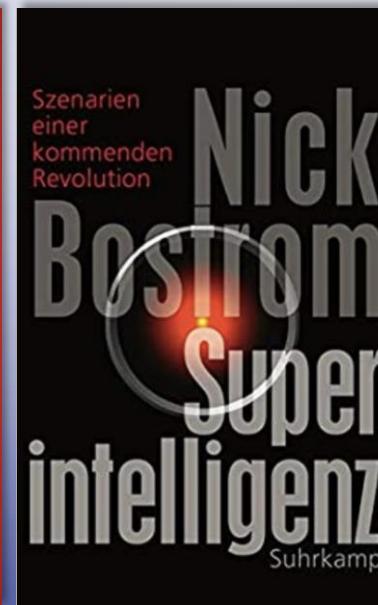
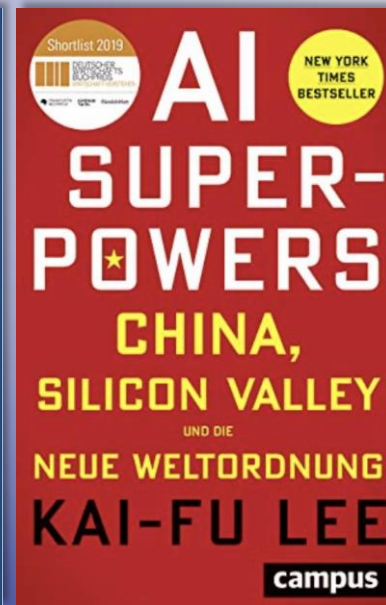
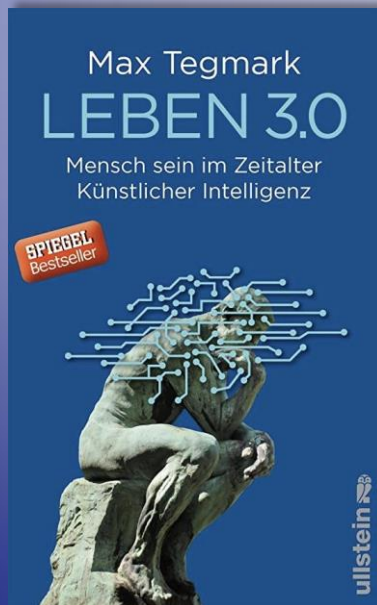
Core Infrastructure → “Augmented” TowerCo



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# Super Intelligence will change the world – What are YOU doing?

- AI is essential for Autonomous Driving, for Network Planning and Operations in Telecommunications, for smart grid & eHealth.
- Quantum Communication will come during the next 10 years.





# The Giant's - Apple, AWS, Google, Meta, Microsoft or Tencent: Who will win the battle for market leadership in GenAI?

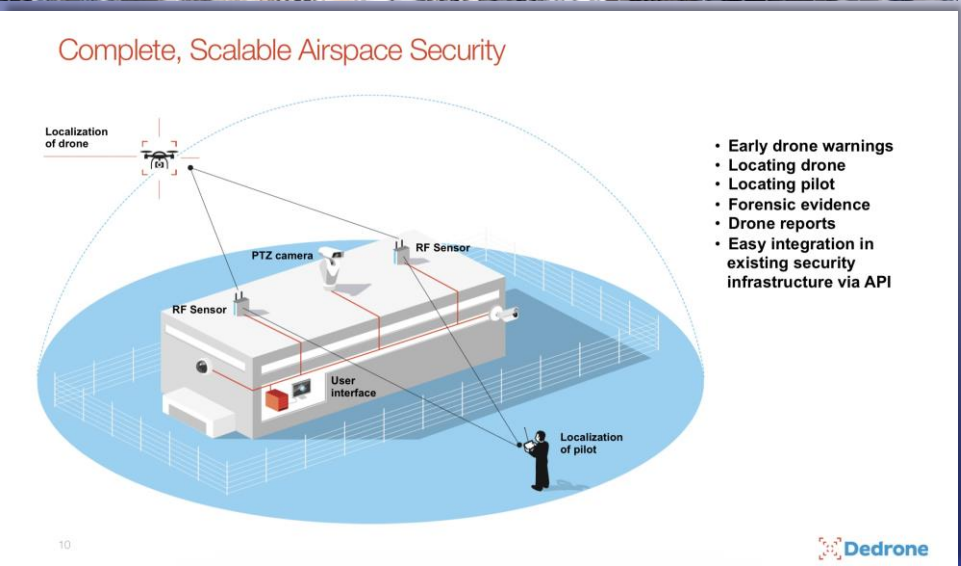
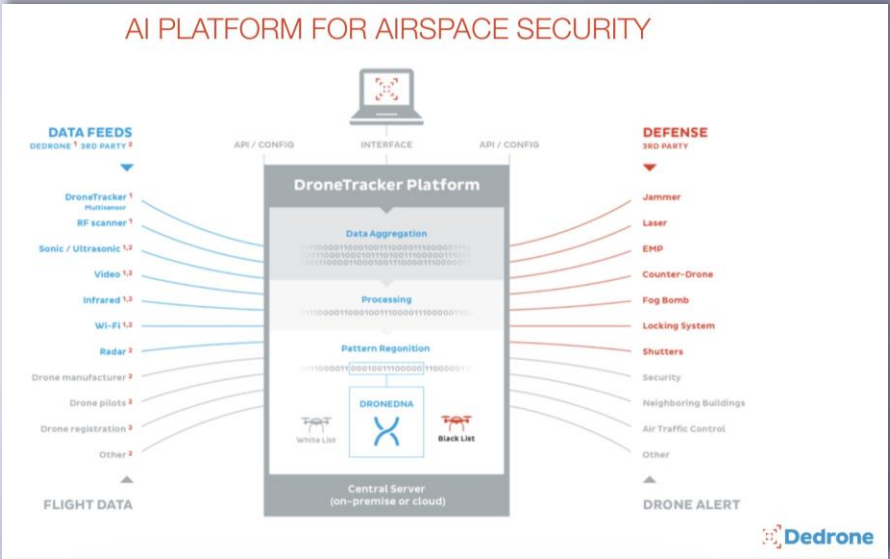


- iPhone16 would come with advanced AI capabilities and the new A18 Chip
- Siri will also integrate with OpenAI's ChatGPT
- Improved Camara System with 48-megapixel Ultra Wide lens
- Thermal and Battery Enhancement (Graphene Thermal system)
- Connectivity Upgrades to WiFi 6E and WiFi7
- Advanced AI Integration with IOS18 "Apple Intelligence"
- Enhanced Privacy and Security

# AI & 5G Use Case – Enterprise Plenum meets Dedrone in 2017



# Dedrone Vision in 2017 - World Market Leader Today



Market and Technology Leader

**Trusted Worldwide to Deliver Comprehensive Solutions**

<b>40</b> Airports	<b>20+</b> Non-US Gov'ts	<b>15+</b> US Federal Entities	<b>120+</b> Public Safety
<b>60+</b> Stadiums	<b>190+</b> Critical Infrastructure	<b>30</b> Countries	<b>5</b> G7 Nations

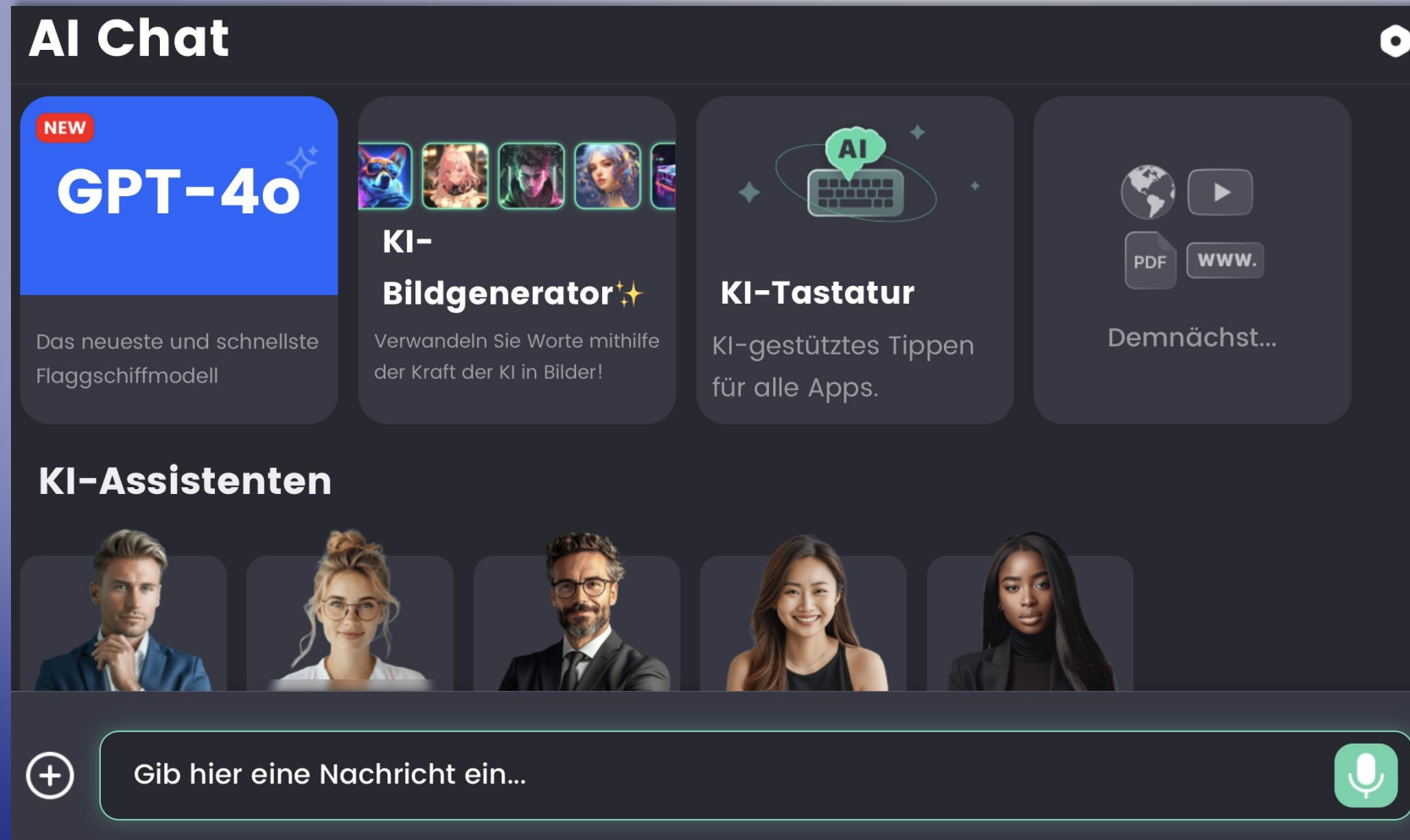


# ChatGPT 4o is producing nice pictures ...





# But AI is much more than a toy!



# Incredible Results of AI/ LLM's in predicting future profits

Artificial intelligence, or AI for short, is increasingly finding its way into our daily lives. As part of a recently conducted study by the University of Chicago, researchers found that large language models (LLMs) like ChatGPT-4 are capable of successfully analyzing financial reports and predicting future profits more accurately than professional human analysts. Alex G. Kim, Maximilian Muhn, and Valeri V. Nikolaev, researchers who conducted this study, highlighted the enormous potential AI has in the field of financial analysis. The results speak for themselves. The study involved evaluating standardized and anonymous financial reports using ChatGPT-4. It is noteworthy that the AI, even without industry-specific information, arrived at more accurate evaluations than human analysts. "The accuracy of our predictions exceeds expectations and shows that LLMs can be more than just tools," explains one of the researchers in this context. Furthermore, it is remarkable that the prediction accuracy of the LLM was comparable to that of a model specifically trained on financial data. This indicates that the predictions are not solely based on the training memory of the AI

# Die Antwort von ChatGPT4o auf die Frage nach der Vodafone Strategie der nächsten 10 Jahre

Für Vodafone, eines der weltweit größten Telekommunikationsunternehmen, gibt es mehrere strategische Ansätze, die in den nächsten 10 Jahren verfolgt werden könnten. Hier sind einige wichtige Strategien, die Vodafone in Betracht ziehen sollte:

## 1. Ausbau des 5G-Netzes und Vorbereitung auf 6G:

1. **Kurzfristig (1-3 Jahre):** Intensive Investitionen in die Infrastruktur für 5G, um die Netzabdeckung und -qualität zu verbessern. Partnerschaften mit Unternehmen und öffentlichen Einrichtungen zur Förderung von 5G-Anwendungen.
2. **Langfristig (4-10 Jahre):** Forschung und Entwicklung im Bereich 6G-Technologie, um frühzeitig in der nächsten Generation der Mobilfunktechnologie führend zu sein.

## 2. Diversifikation der Dienstleistungen:

1. **Internet der Dinge (IoT):** Ausbau der IoT-Dienstleistungen für sowohl private als auch industrielle Anwendungen, wie Smart Homes, vernetzte Fahrzeuge und Industrie 4.0.
2. **Finanzdienstleistungen:** Weiterentwicklung von Mobilzahlungs- und Banking-Dienstleistungen, insbesondere in Regionen mit geringem Zugang zu traditionellen Banken.
3. **Content- und Medienpartnerschaften:** Aufbau von Partnerschaften mit Medienunternehmen zur Bereitstellung exklusiver Inhalte und Streaming-Dienste.

## 3. Nachhaltigkeit und soziale Verantwortung:

1. **Umweltfreundliche Technologien:** Implementierung von grünen Technologien und Initiativen zur Reduzierung des CO<sub>2</sub>-Fußabdrucks. Nutzung erneuerbarer Energien für den Betrieb der Netzwerkinfrastruktur.
2. **Digitale Inklusion:** Förderung der digitalen Inklusion durch den Ausbau von Breitbanddiensten in ländlichen und unterversorgten Gebieten.

## 4. Kundenerfahrung und -bindung:

1. **Personalisierung:** Nutzung von Big Data und KI zur Personalisierung von Dienstleistungen und Angeboten, um die Kundenzufriedenheit und -bindung zu erhöhen.
2. **Kundensupport:** Verbesserter Kundensupport durch die Integration von KI-gesteuerten Chatbots und fortschrittlichen CRM-Systemen.

## 5. Strategische Partnerschaften und Akquisitionen:


1. **Vertikale Integration:** Erwerb oder Partnerschaften mit Technologieunternehmen, um das Serviceangebot zu erweitern und Innovationskraft zu stärken.
2. **Globale Expansion:** Erweiterung der Marktpräsenz in aufstrebenden Märkten durch strategische Allianzen und Übernahmen.

## 6. Cybersecurity:

1. **Schutz der Infrastruktur:** Investitionen in fortschrittliche Cybersicherheitslösungen zum Schutz der Netzwerkinfrastruktur und Kundendaten.
2. **Sicherheitsdienstleistungen:** Angebot von Sicherheitsdienstleistungen für Geschäftskunden, um deren IT-Infrastruktur gegen Cyberbedrohungen zu schützen.

# McKinsey & AWS have identified 150+ GenAI use cases for telcos

Non-exhaustive

Impact potential: Low    High

## Commercial



### B2C Marketing

**Content generation** for marketing materials (e.g., write marketing or social media content of text, images and videos)

**Hyper-personalization** of marketing messages (e.g., auto tuning of the tone to different microsegments)

**Customer sentiment analysis** via social media unstructured data (e.g., twitter, customer feedback)

### Product offering

Generation of the **product description, terms & conditions** (e.g., for tariffs / services)

**Customer sentiment synthesis** (e.g., real-time customer emotions tracking, customer feedback collection and synthesis)

### B2B sales

Generate **hyper-personalized materials** (emails, proposals, onboarding)

**Develop sales insights** (e.g., identify triggers to start a sales discussion)

Real-time **negotiation guidance** (e.g., sales insights)

## Channels



### Digital

**Virtual assistant** - customer experience upgrade with **conversational interface** (smart conversational chatbots in the app to provide an improved, personalized service experience)

**Bespoke invoice creation** (e.g., personalized invoice)

### Stores

**GenAI assistant for store personnel** (e.g., real-time assistance and suggestions for responses while servicing a customer)

### Contact Center

**Customer-facing chatbots** (e.g., chatbot enabling the long tail of more open-ended complex intent, intuitive, empathetic conversation)

**GenAI assistant for agents** (e.g., customer intent summarization, suggested answers)

**Generation of official communication** (e.g., answers about network problems)

**Improve call routing performance** (e.g., improve performance route calls based on client input)

## Network



### Planning, rollout, field services

**Enabling self-healing:** customer **sentiment analysis on network problems** (e.g., synthesis of open-source data to identify problematic locations)

**Network inventory mapping:** Unify multiple existing unstructured data sources to create a unified vision of the inventory mapping

**Network optimization via sentiment:** analyze customer sentiment in customer complaints (e.g., tweets, call transcripts) to suggest optimization (e.g., coverage, capacity planning)

## Support functions



### Finance, HR, Legal, ...

**Internal knowledge management** (e.g., search for internal documents)

**HQ support functions automation** (e.g., draft job descriptions, legal contracts)

**Security** (e.g., chatbots, spam detection, fraud prevention)

### IT

**Application development** (e.g., code generation, application prototype & design)

**Synthetic data generation** for ML models training

**Cost acceleration** for software delivery

**Automatic FAQ generation** (e.g., from employee tickets or call center transcripts)

**Code migration** into tech stack

**Structured data sets** and increased availability



# Telco vision in 2025 – GenAI will accelerate in the next 2 years the telco of the future

## 1 B2B Marketing & Sales

Pre/post sales activities are AI driven, such as creating **hyper-personalized product offering and proposals**

**Negotiation is customized** per customer and co-piloted with GenAI

**Outreach communications** are automatically created leading to ~5-10% cost reduction

## 4 Support Functions

Productivity is improved throughout the E2E value chain

## 2 B2C Marketing & Sales

CX is driven by 1:1 **hyper-personalization**, growing digital interactions as well as **ad hoc product offering** and **communications** considering a **holistic view** of the customer lifecycle

## 3 IT

Tech is re-invented and **productivity is boosted** through AI-assisted tools that can **accelerate tech delivery timelines**

New frontiers of data are reached by **speeding-up value extraction** and insights creation from **unstructured data**

## 6 Customer Servicing

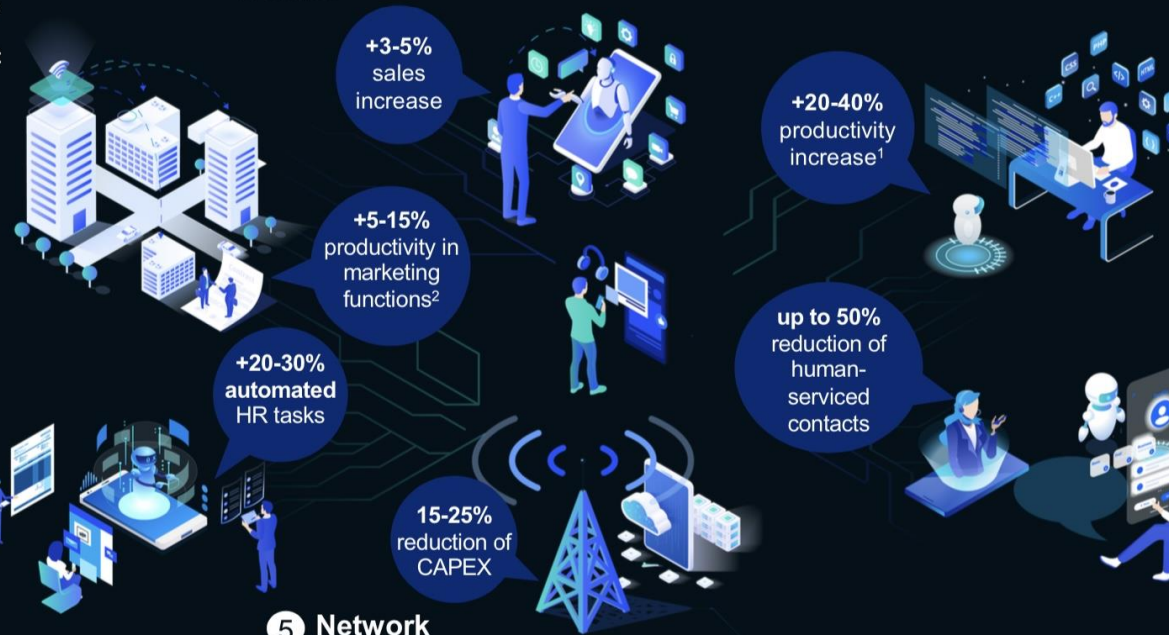
Journeys are re-designed where customer interacts with a **humanlike chatbots**

Agents leverage **AI-developed scripts** and receive **proactive feedback instantly**

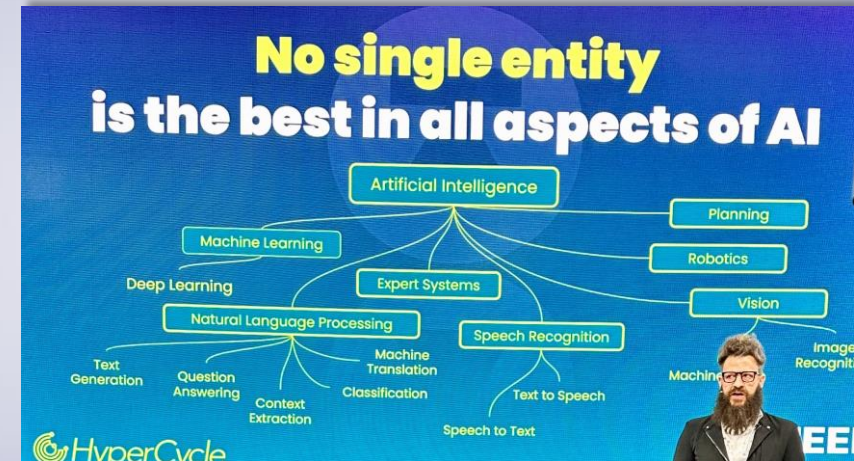
## 5 Network

Decision making across **all stages of network lifecycle**, from plan and build to run and operate is **optimized leveraging AI**

Maintenance is enhanced by **self-healing processes**



# Great Event, amazing Speakers: AI Summit 2bAHEAD in Leipzig



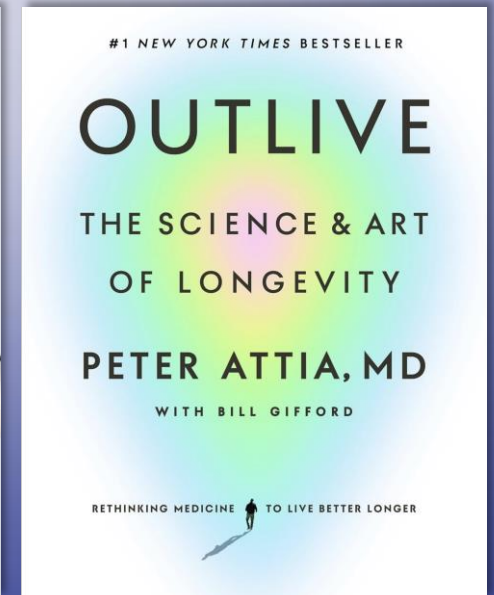
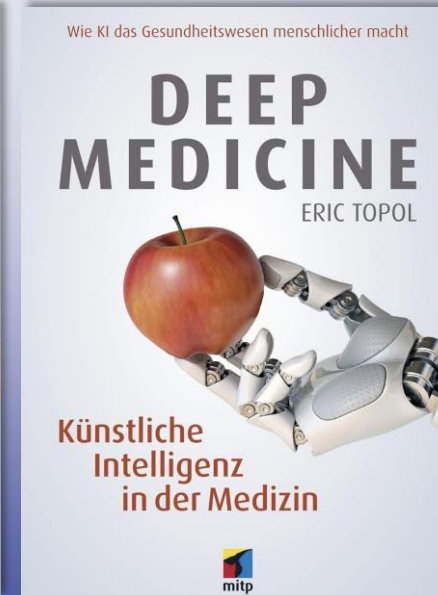
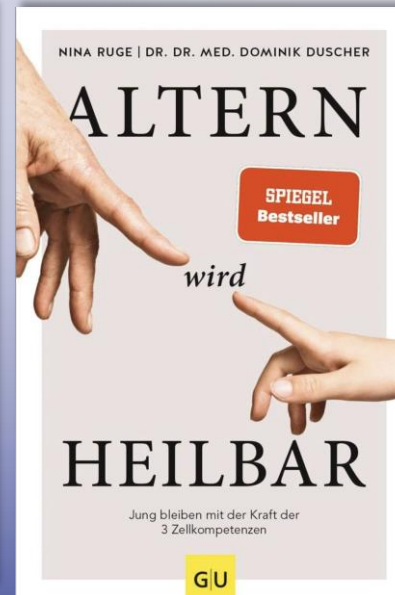
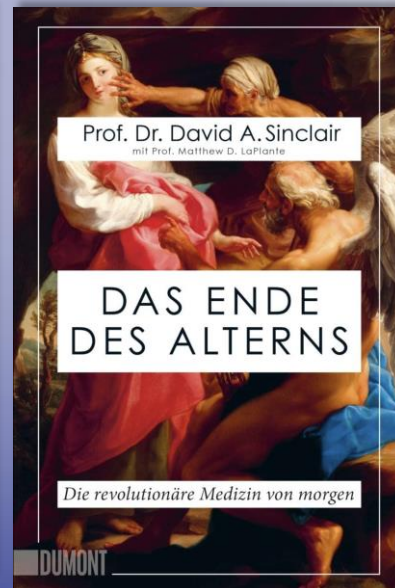
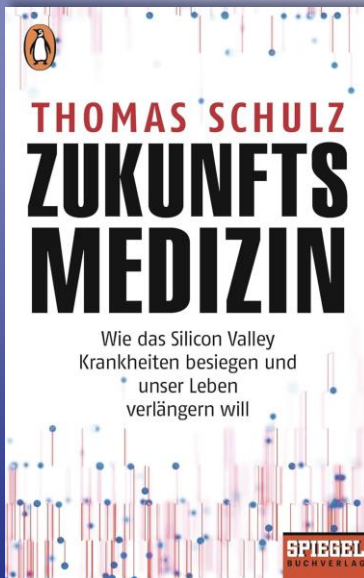
Toufi Saliba, CEO HyperCycle.AI & Global Chair Global Chair IEEE AI Standards, with the best keynote





# One More Thing: AI in Medicine, Digital Biology and Longevity

- Thomas Schulz: Vodafone Enterprise Plenum keynote speaker in 2017
- Major progress in AI based Epigenetic and Digital Biology + Longevity
- Could we live longer than 100 years ?



# Do you use an AI Chat App on your Smartphone or on your Computer? Please enter the following Prompt there:

Welche zukünftigen Herausforderungen kommen mit neuen gesellschaftlichen Trends wie Klimawandel, Energiekrise, virtuellen Arbeitswelten oder Social Media und mit neuen Technologien wie Künstliche Intelligenz, Cloud Computing, Quantenkommunikation, Satelliten-Netzen oder 6G auf die Telekommunikations-Unternehmen zu?

Bitte beschreibe Chancen und Risiken dieser Entwicklung in den nächsten 10 Jahren.  
Was bedeutet das für unsere Kommunikation nach Corona und vor einer möglichen Superintelligenz?  
Wie werden unsere Kinder und Enkel kommunizieren, arbeiten und leben?

Sind Sie mit der Antwort Ihrer KI zufrieden? Bitte checken Sie diese auf eventuelle Fehler.  
Und danach stellen Sie dieselbe Frage an ChatGPT4o.



# Great History – Promising Future

Peter Mihatsch - Jürgen von Kuczkowski - Fritz Jousen - Jens Schulte-Bockum - Hannes Ametsreiter - Marcel de Groot



# THANK YOU!



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