



# Health Institute



**Health Institute**

(one6G)

**NEW NETWORKS FOR THE HEALTH  
VERTICAL**

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# DISCLAIMER

The following views are my own and my own only. It does not reflect the views of Helios. There are no third-party interests to declare.



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# Ongoing Work on 5G

Co-funded by the Government of the State of Saxony

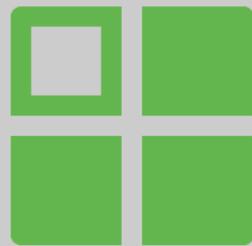
# 5G-eHealthSax\* (Project ends 12/2021) project Lead Helios Park Klinikum Leipzig

- Aims and objectives:
- 1.) Build a Test-Bed for XG Health-Technology in Leipzig
  - 2.) Implement an Indoor and Outdoor XG Campus Network using 3,7/3,8 GHz
  - 3.) Validate the Test-Bed with relevant Use Cases
  - 4.) Expand the Testbed, unfold economic activity, offer impartial information to the public and help to enhance and facilitate economic activities

\*This project is co-funded with taxpayer's money by the State of Saxony



**1.711.000 €  
Budget**



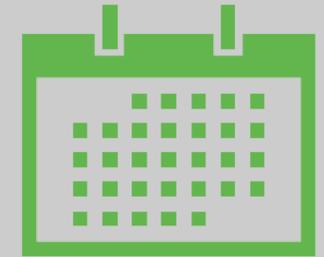
**6  
Use  
Cases**



**2  
Projekt-  
partner**



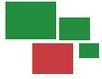
**2  
beteiligte  
Kliniken**



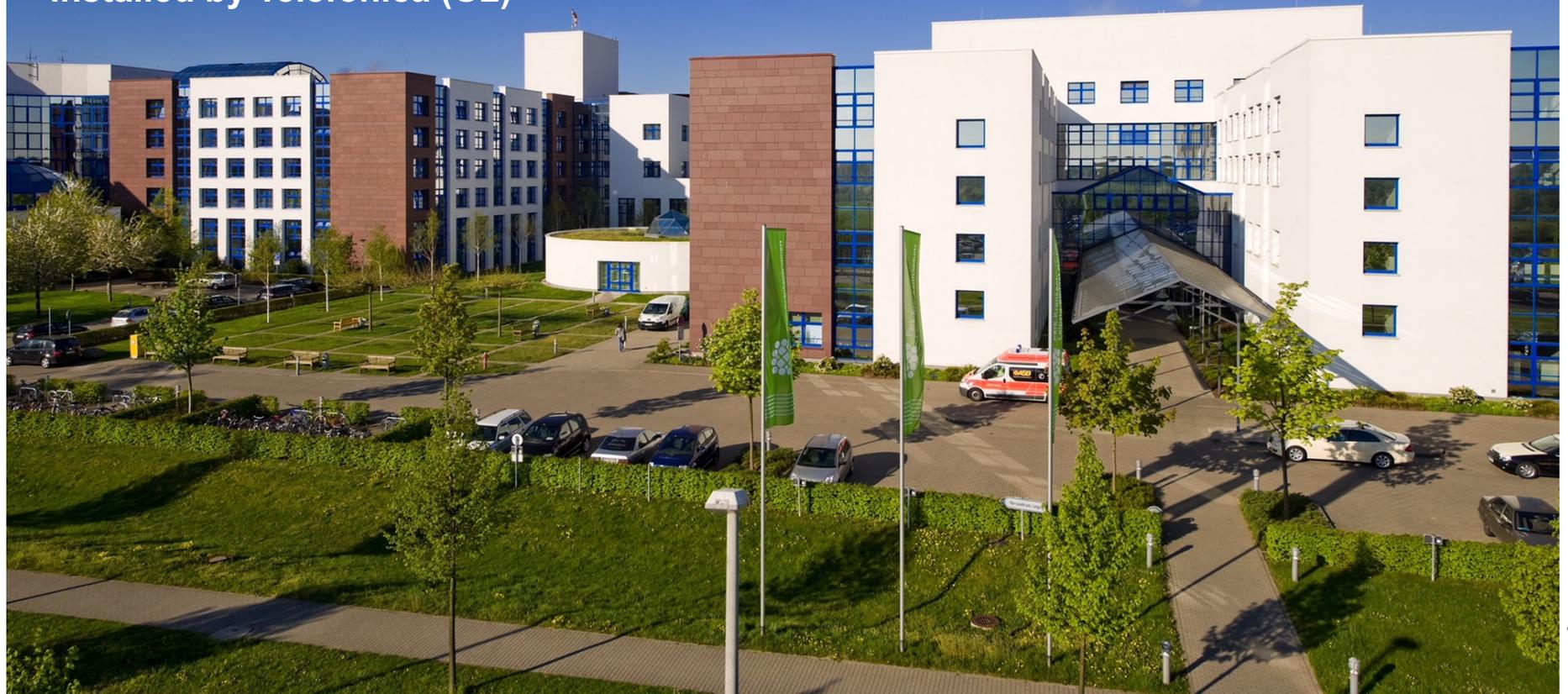
**24  
Monate  
Laufzeit**

# 5G\_eHealthSax - Aims and Objectives

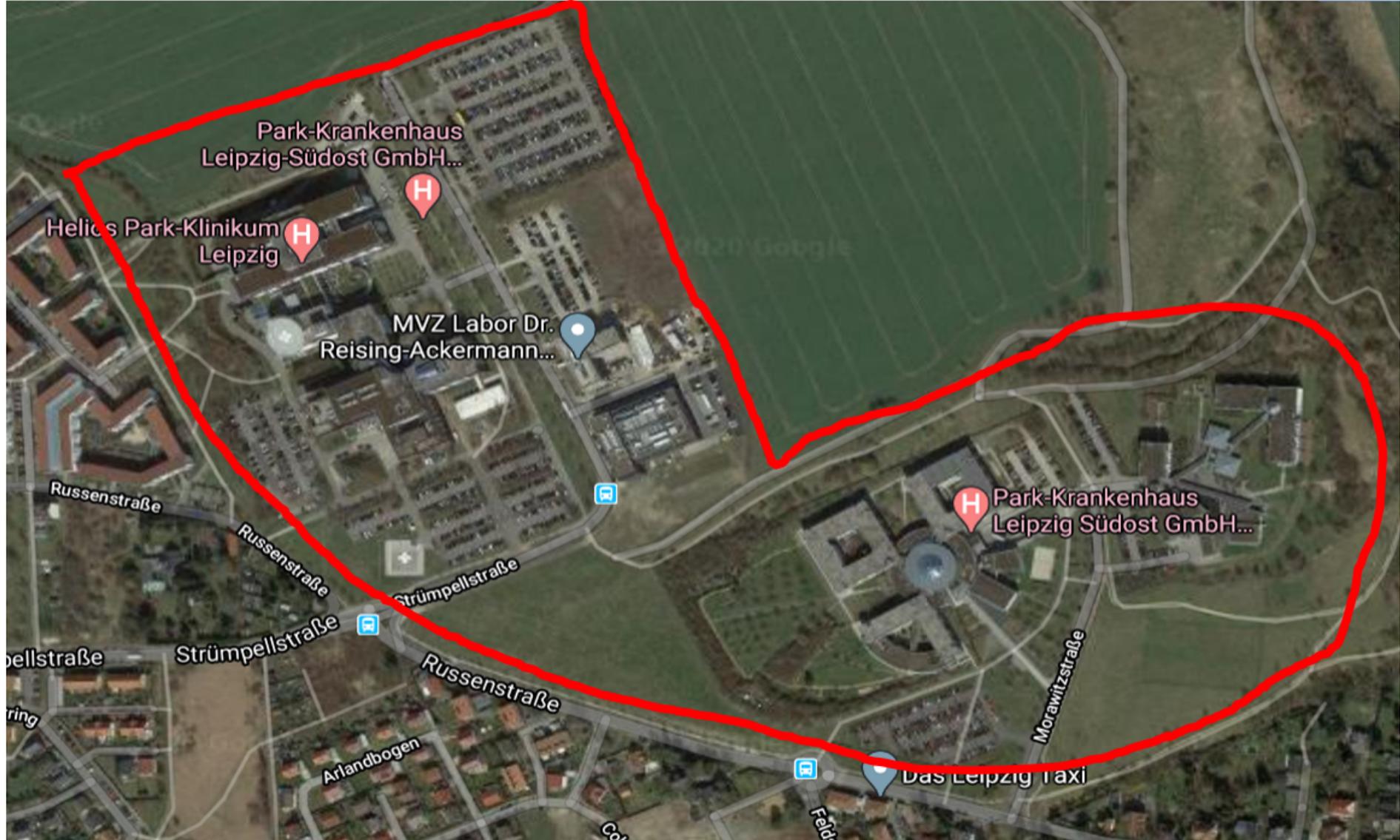
- Establishment of a 5G testbed environment at Helios Campus Leipzig (Park-Klinikum Leipzig, Leipzig Heart Centre, Centre for Mental Health with a total of around 900 beds)
  - Frequency allocation through Bundesnetzagentur (3,7 -3,8 GHz)
  - Indoor and outdoor coverage
  - 5G RAN and Core Implementation
  - Implementation of a set of selected use cases



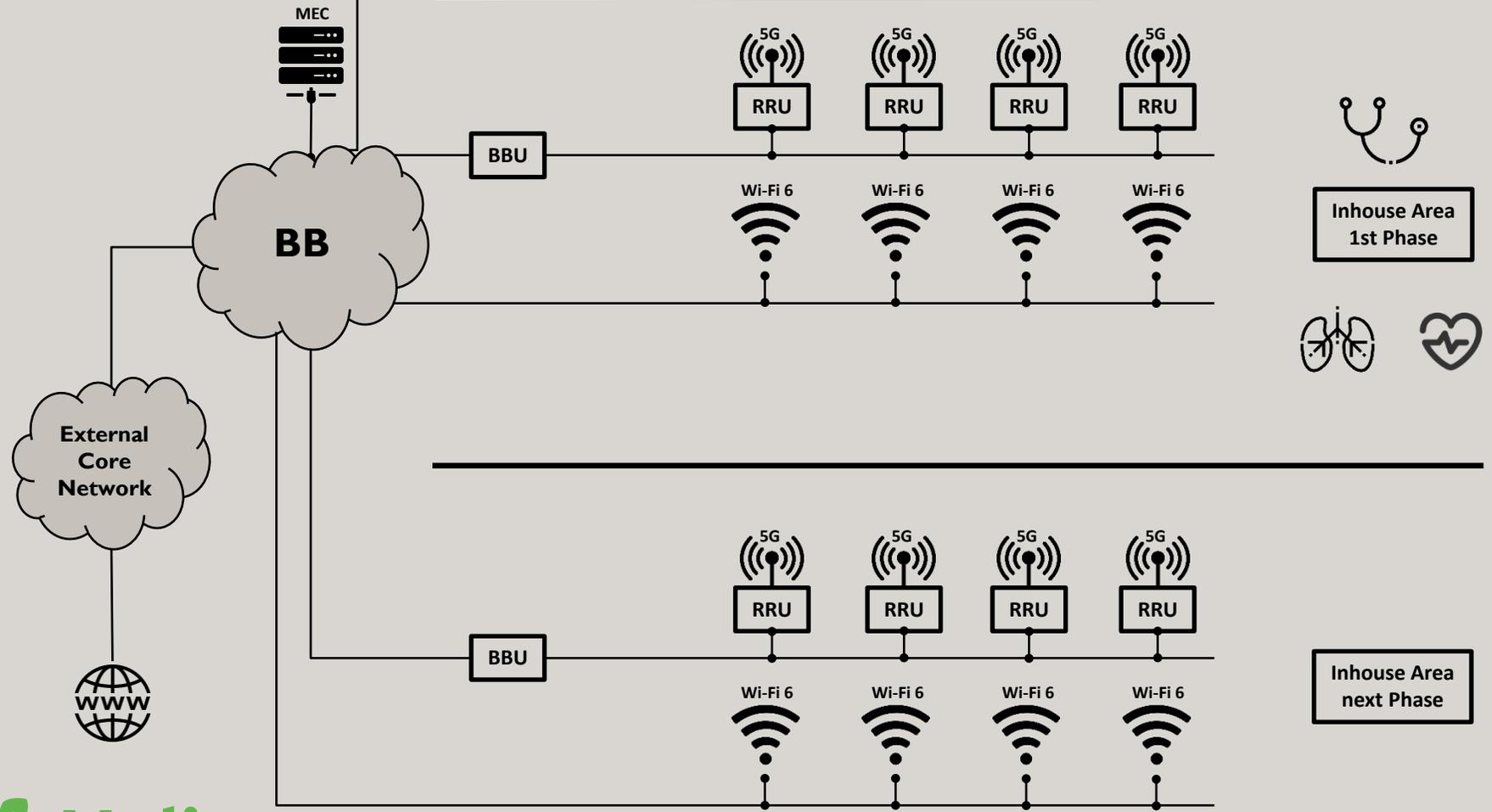
- **5G\_eHealthSax Implementation 2021: Helios Campus Leipzig: 900 beds including Leipzig Heart Centre and Centre for Mental Health**
- **2 5G Rooftop Antennas**
- **38 Indoor hotspots**
- **Huawei Core**
- **Installed by Telefonica (O2)**



# Helios Campus Leipzig -> 900 beds



1st LEIPZIG

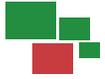


- Rooftop antennas enabling testing of entrance scenarios (emergency arrival)
- Inhouse coverage enabling simulation and testing of health and care scenarios
- Expansion of test and trial areas to test robustness and reliability of 5G and Wi-Fi access as well as accuracy of tracking
- Continuity and connectivity testing in elevators and other areas with demanding coverage deployment
- Core Network Deployment for Test and Development in supplier premises
- Trial and Life Core Network to be deployed in HELIOS premises
- Vertical slicing / separation of Life and Trial network
- Test and Development strictly separated and isolated
- Non-important traffic off-loaded to Wi-Fi (TV, browsing)

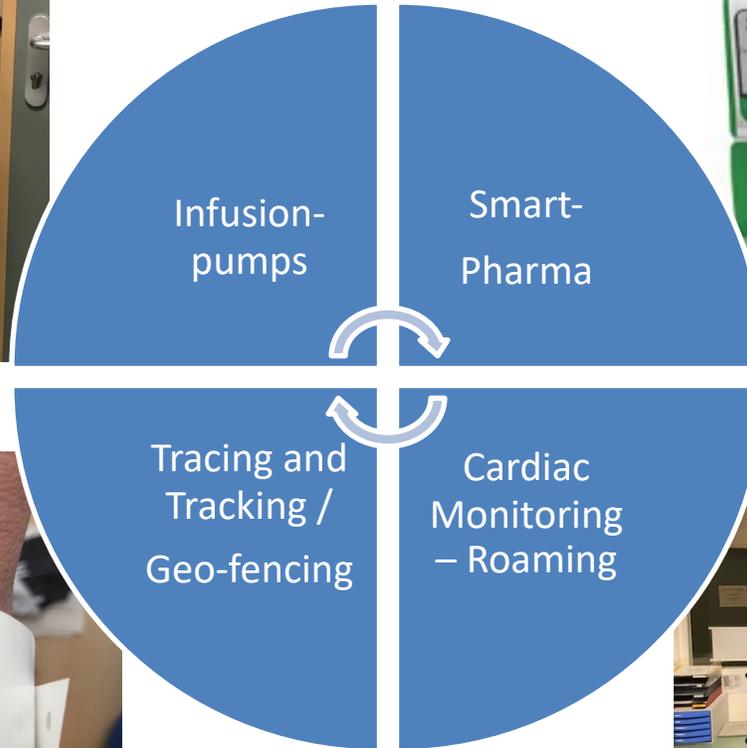
# 5G\_eHealthSax - Aims and Objectives

- Use Cases
  - Connected infusion pumps
  - Connected cardiac monitoring devices with positioning capability
  - Real time patient flow monitoring
  - Real time object flow monitoring (infection control functionality)
  - Remote medical emergency management
  - Seamless WiFi backup
  - QoS management





# Ausbaustufen & Use Cases





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# The 6G Health Institute

Project selected for 4 – 8 year government funding, funding letter immanent / pending

# 6G Health Institute - Specifications



**Health Institute**

- International collaborative industrial application Research
  - Independent Institute
  - International Centre of Excellence, Reference Institute / Reference Lab, Think Tank
  - Areas of activity: Structural development, application research, Translation, standardization
  - Multiprofessional / Interdisciplinary (Engineering, Medicine, Informatics, Social Sciences)
  - Public > Private Funding (80/20) over 10 Years
  - 90% of the work will be focusing on Technology Readiness Level  $\geq$  TRL 4
  - Target size: 50 – 100 employees, global activities

# Challenges



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- Indoor positioning under 5G insufficient
- Safe and secure end-to-end IoT integration (plug and play)
- Deterministic traffic routing
- Intelligent networks
- Device virtualization, digital twinning, transfer of individualized device settings
- 6G Standardization
- Smart pharmaceuticals, precision medicine
- Social technological alignment
- Early Business Case

# BUSINESS MODEL – 6GHI



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## Focus of Operation (TRL)

Services, Products (TRL 9)

Testing and Validation relevant Environment (TRL 8)

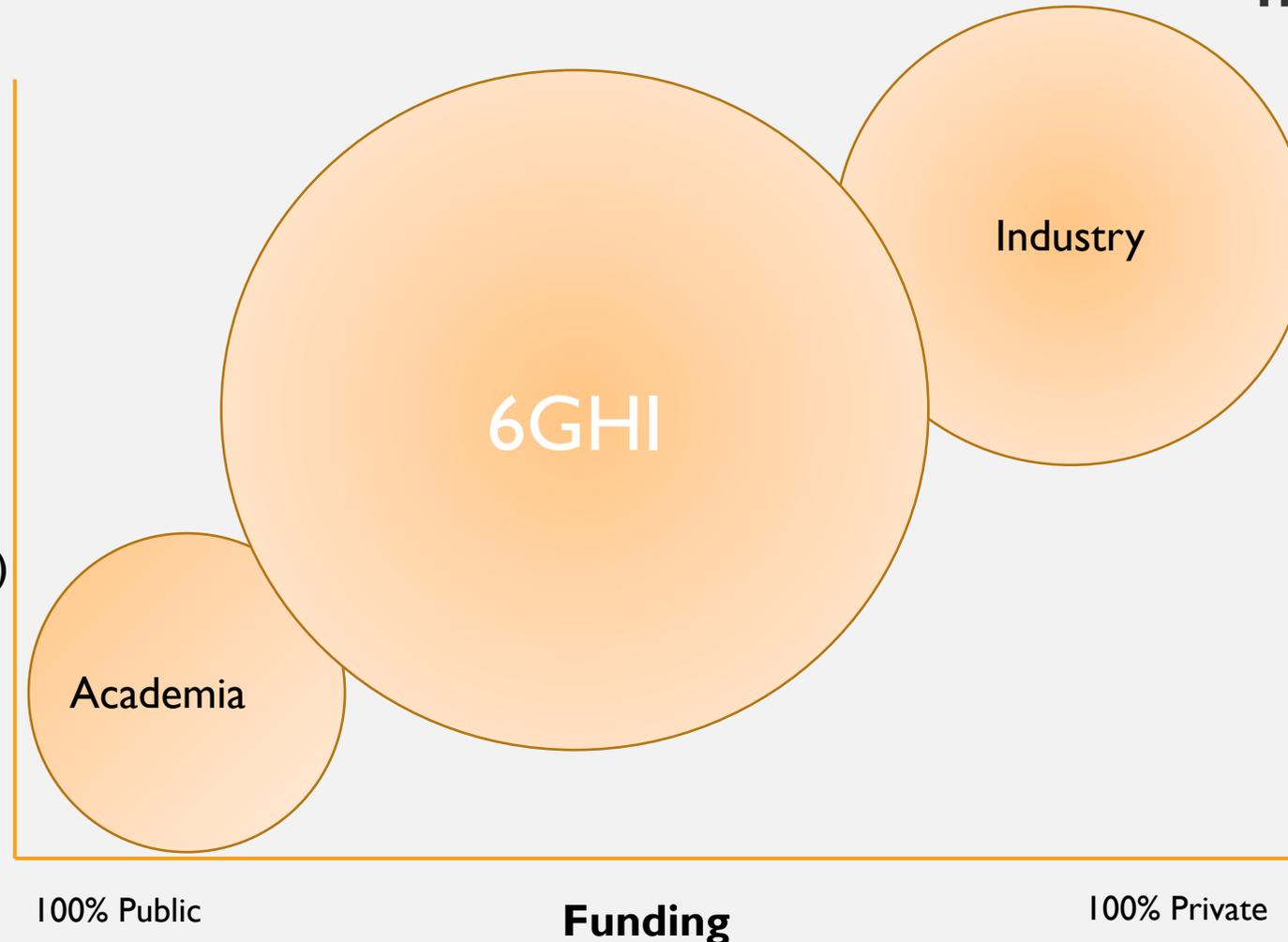
Prototyping, Pilots (TRL 6-7)

Standardization

Application Research (TRL 4-5)

Application oriented basic research (TRL 2-3)

Blue-Sky research (TRL 1)



# 6G Health Institute – Mission



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- Screening of 5G state of the art features and review of the different 5G Releases
- Gap Analysis
- 6G Requirements Assessment
- 6G Prototyping
- 5G and 6G Standardization for Health
- Membership in relevant organizations (ETSI, 3GPP and others)
- Contribution to international 6G research activities (New IP, New Architectures, Modular Architectures, New Services, Beyond Best Effort, High Precision Communication, QoS and QoE Guarantees, ManyNets, Mandate Driven Architectures a.o.)
- 5G / 6G Medical device development support on all levels
- 5G / 6G Service development support on all levels
- Policy development
- Testing, validation, certification

# EVOLUTION OF NETWORK TECHNOLOGY



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Genera tion	Jahr	Geschwindigkeit	Mobile Devices	M2M Connections
2G	1992	53,6 kbit/s – 220 kbit/s		
3G UTML	2001	384 kbit/s – 42 Mbit/s		
4G LTE	2009	theor. 1 Gbit/s, prakt. 50 Mbit/s		
5G	2020	theor. 1-10 Gbit/s	8,8 billion (2018)* 13,1 billion (2023)*	14,7 Billion (2023)
6G	?	?	?	?

\* Cisco Annual Internet Report 2018 – 2023

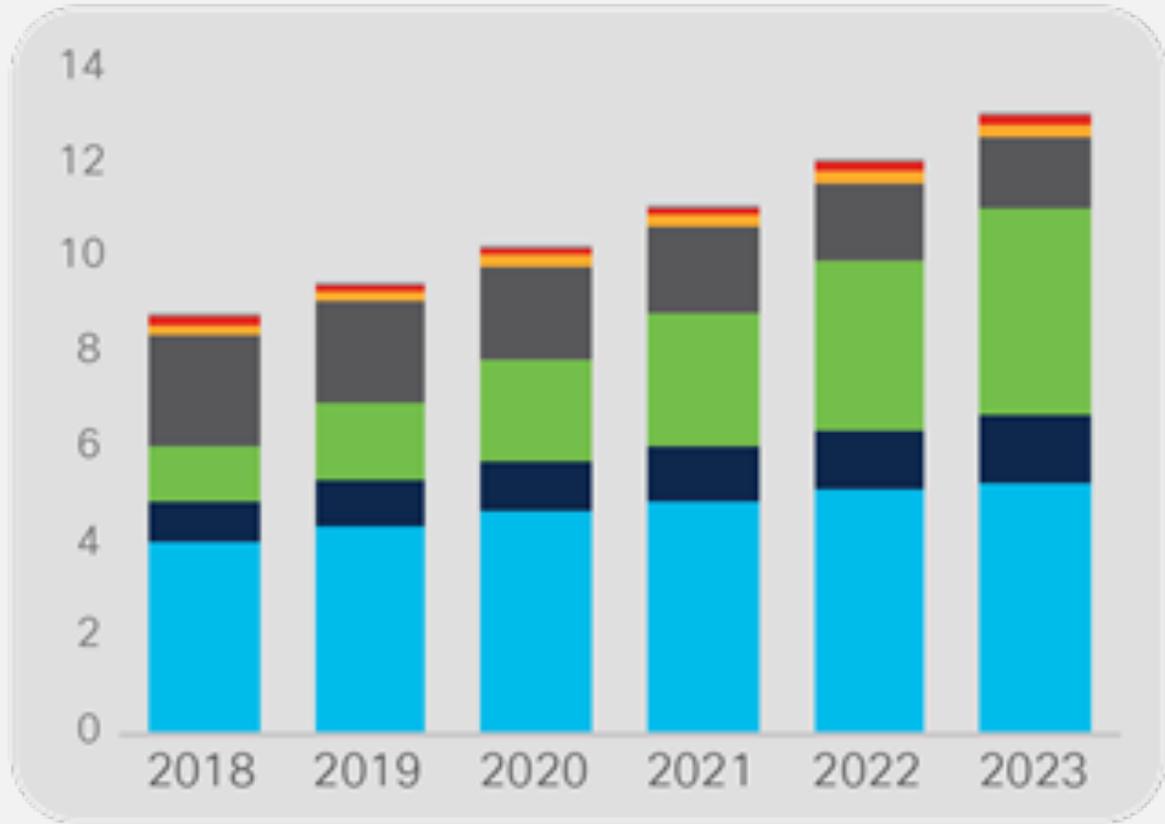
**\*The fastest growing mobile device category is M2M followed by smartphones.**

Within the M2M connections category (which is also referred to as IoT), **connected home applications will have the largest share and connected car will be the fastest growing application type.**

# CONNECTED DEVICES

8% CAGR  
2018-2023

Billions of  
Devices



- Smartphones (46%, 41%)
  - Phablets (9%, 11%)
  - M2M (13%, 34%) ←
  - Nonsmartphones (27%, 11%)
  - Tablets (2%, 2%)
  - PCs (2%, 2%)
  - Other Portable Devices (0.1%, 0.1%)
- \* Smartphone category including phablets  
\* Figures (n) refer to 2018, 2023 device share

# HEALTH M2M SECOND LARGEST GROWTH!

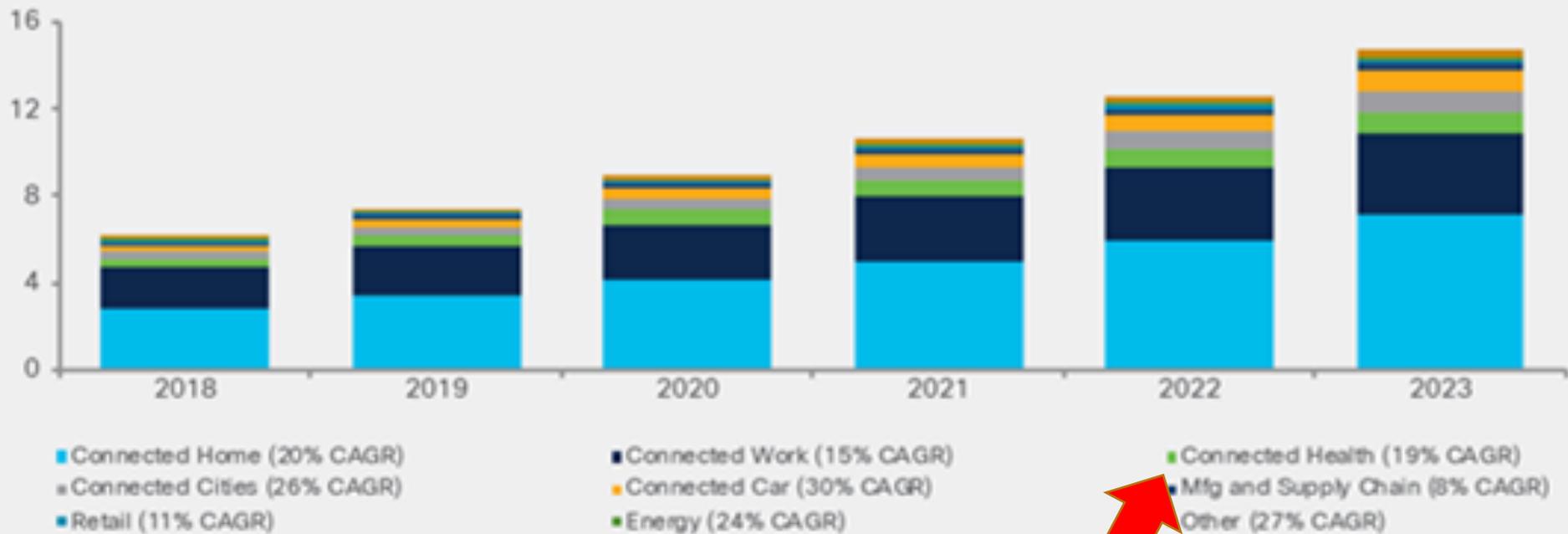


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19% CAGR  
2018-2023

Global M2M connections/IoT growth by vertical  
By 2023, connected home largest, connected car fastest growth

Billions of  
M2M  
Connections



\* Cisco Annual Internet Report, 2018-2023  
Prof. Christoph Theuermer, 6G, 2021

# DELPHI STUDY: 20% BELIEVE 5G WILL DISRUPT HEALTH VERTICAL!



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## Where will 5G cause the most disruption?



Source: Business Performance Innovation (BPI) Network Survey, BNI, 2019

[Percent of respondents: N = 145 global IT leaders and service providers] Respondents selected top three industries.  
Prof. Christoph Thuemmler one6G, 2021



# 6G HI ACTIVITIES

Stream 1 Standardization	Stream 2 5G / 6G Signal Processing	Stream 3 Testing / Validation / Certification	Stream 4 Projects / Partnerships	Stream 5 Social-Technological Alignment
ETSI membership	RAN	Acquisition	Acquisition	Privacy
3GPP membership	Core Network	Participation	Funding	Security
6G Health Association	<u>ManyNets</u>	Project management	Global Partnerships	Policies
5G AP ( <u>BNetzA</u> )	New IP	Study design	Industry relations	Roll-outs
HL7, FIHR	Tiny Instant Communications	Certification	Stakeholder Management	Public-relations
New Protocols, new IP, new architectures	High Precision Communications	Branding	Excellence	Social media
Product legislation	Network Slicing		Networking	Dissemination
				Economic Growth

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**Thank you !**