

27.09.2018

Is 4G enough for Smart Healthcare ?

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Professor Dr. Christoph Thümmel 5G Techritory – Riga – Latvia - 2018

The First Mobile Phone Call

Martin Cooper made the first Mobile phone call on 3. April 1973.

Stood near a 900 MHz base station on Sixth Avenue between 53rd and 54th Street in lower Manhattan

The phone had a weight of 1.15 kg

He called his competitor Dr. Joel S. Engel of Bell Labs



Steve Jobs launching the Iphone in 2007. The total weight of the phone was 135g



What had happened?

- The new device was in shape and size not much different from other contemporary products
- It was not using any new technology

.....**but!!!!**

The Iphone for the first time offered the merger of two popular devices into one technology platform, namely the

Ipod and a Mobile Phone!

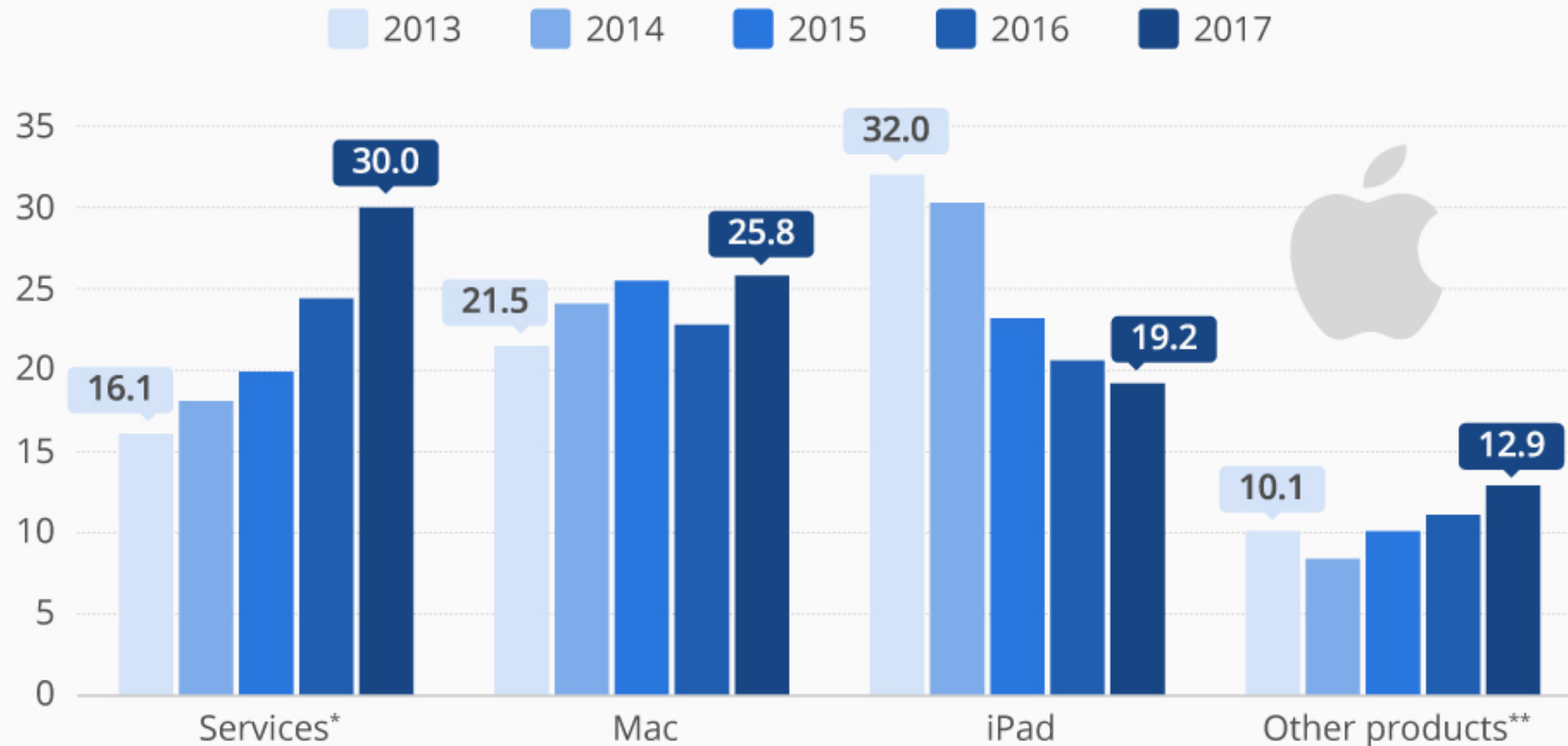
Ipod + Phone => iPhone

From Manufacturing to Service Provision

- Steve Jobs wanted to sell iPhones – but not only for the sake of selling iPhones
- Jobs had understood timely the dawn of the age of service provision
- Transition from Manufacturing to Service Provision
- Today Apple achieves by far more turnaround with their iTunes and Cloud platforms and their App store than from the sales of any of their Products apart from iPhones

Services Are the Rising Star at Apple

Apple's non-iPhone revenue by product group (in billion U.S. dollars)



* includes revenue from Digital Content and Services, e.g. Apple Music, AppleCare, Apple Pay, licensing and other services

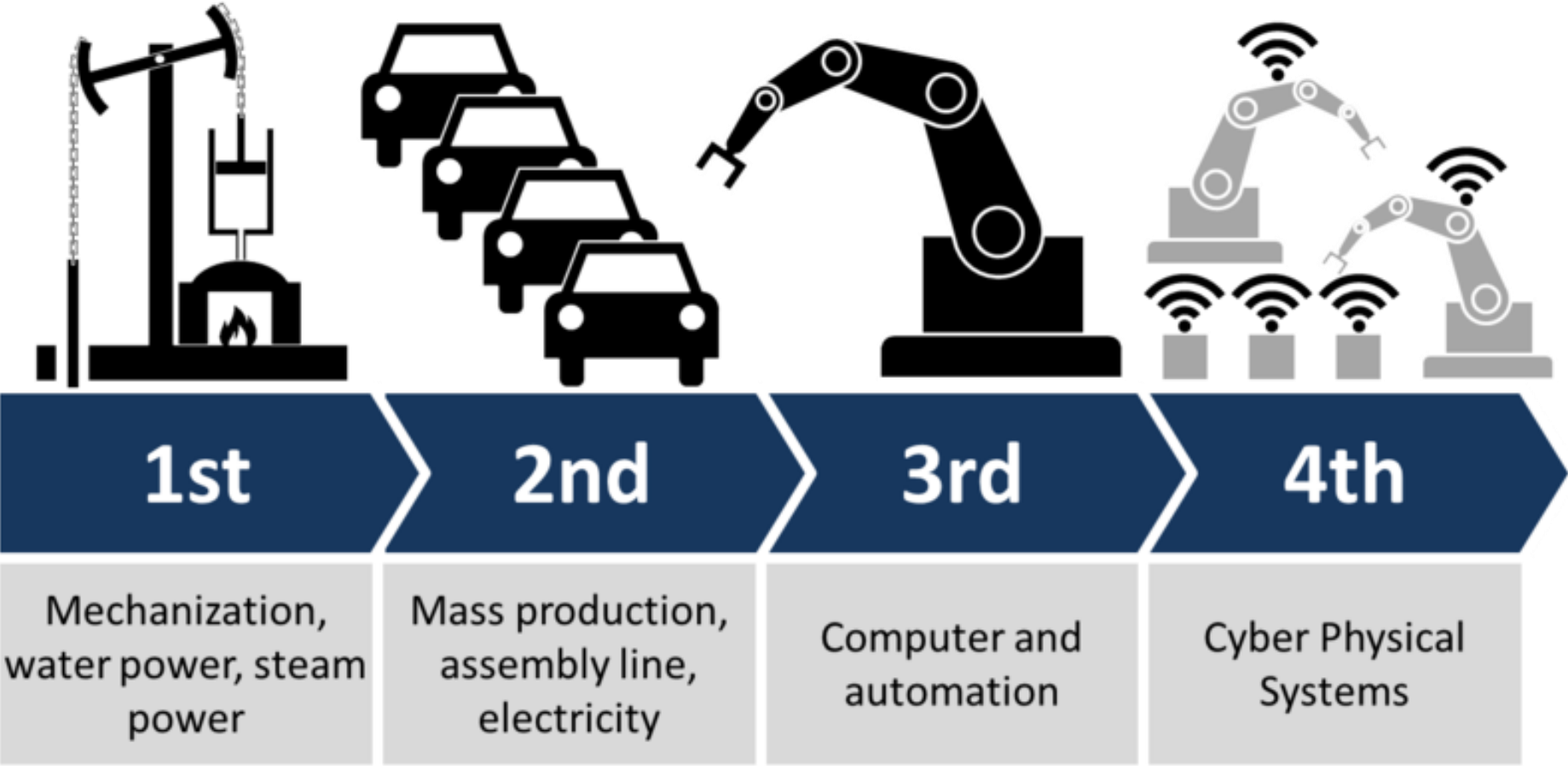
** includes sales of Apple TV, Apple Watch, Beats products, iPod and Apple-branded and third-party accessories



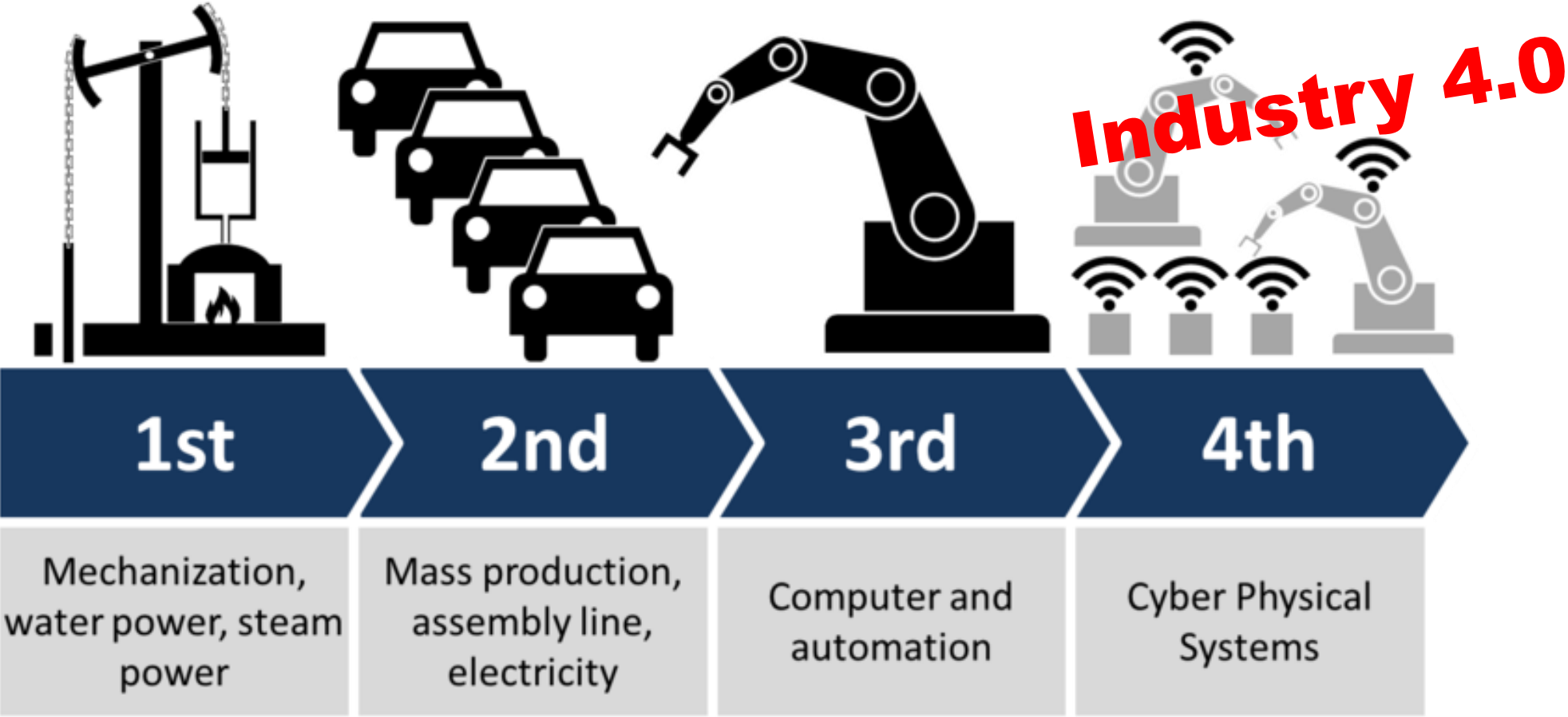
@StatistaCharts

Source: Apple

Four Stages of Industrialization



Four Stages of Industrialization



Cyber-physical Systems

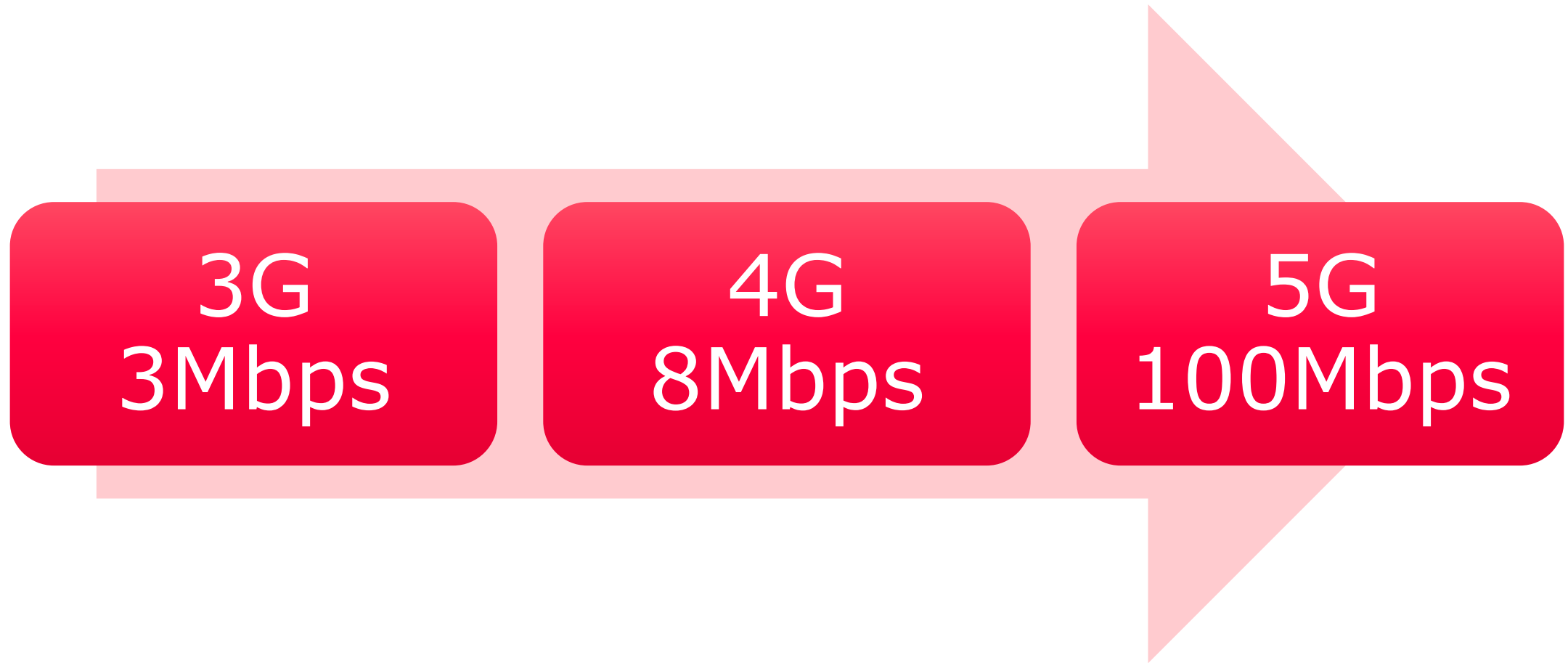
...are integrations of computation, networking and physical processes in

- Smart Factories – for example automotive manufacturing
- Fintec – banking technology
- Autonomous driving

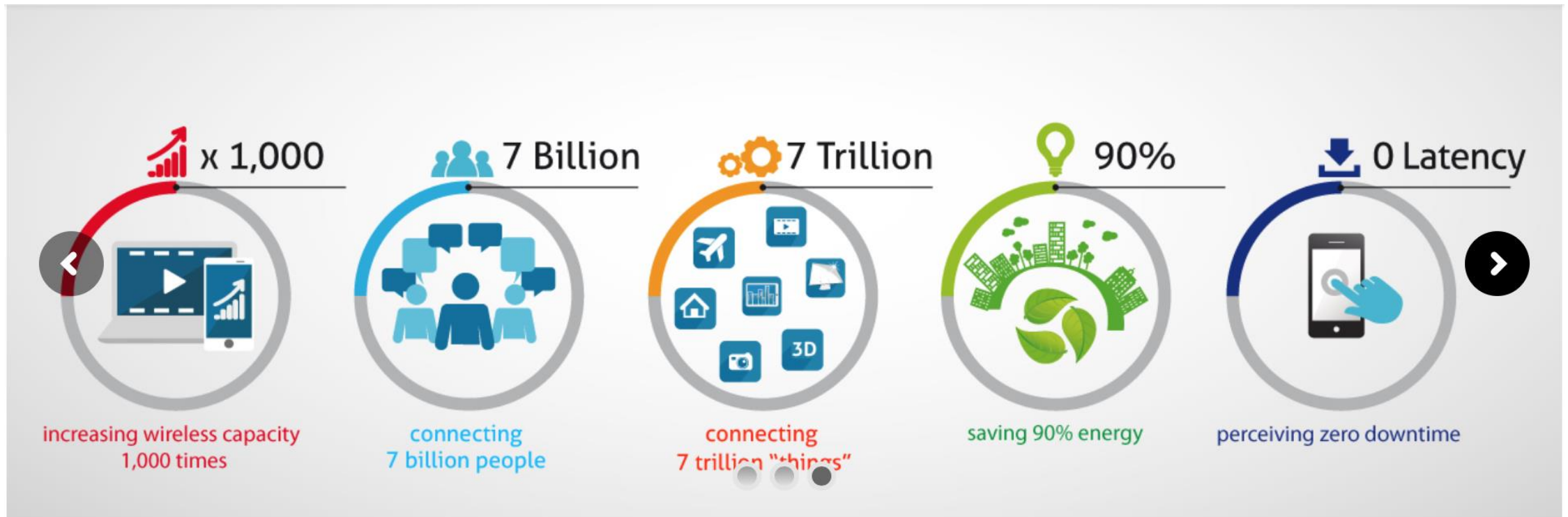
but also and not exclusively

- Medical devices monitoring
- Artificial organs
- Smart pharmaceuticals
- Robotic surgery and Augmented reality
- Homecare – for example home dialysis
- Precision Medicine

Typical Mobile Network Real World Download Speed



The 5G Infrastructure Public Private Partnership 5GPPP



5G Core Technology – Key to Innovation and Individualization

- Network Slicing
- Service Orchestration
- QoS Monitoring
- Network Function Virtualization (NFV)
- Software Defined Networks (SDN)

Morbidity in selected conditions

- Diabetes: World Wide 422 Million in 2017, 600 Million in 2035
- Asthma: World Wide 300 Million in 2014
- COPD: World Wide 210 Million in 2014

Plus

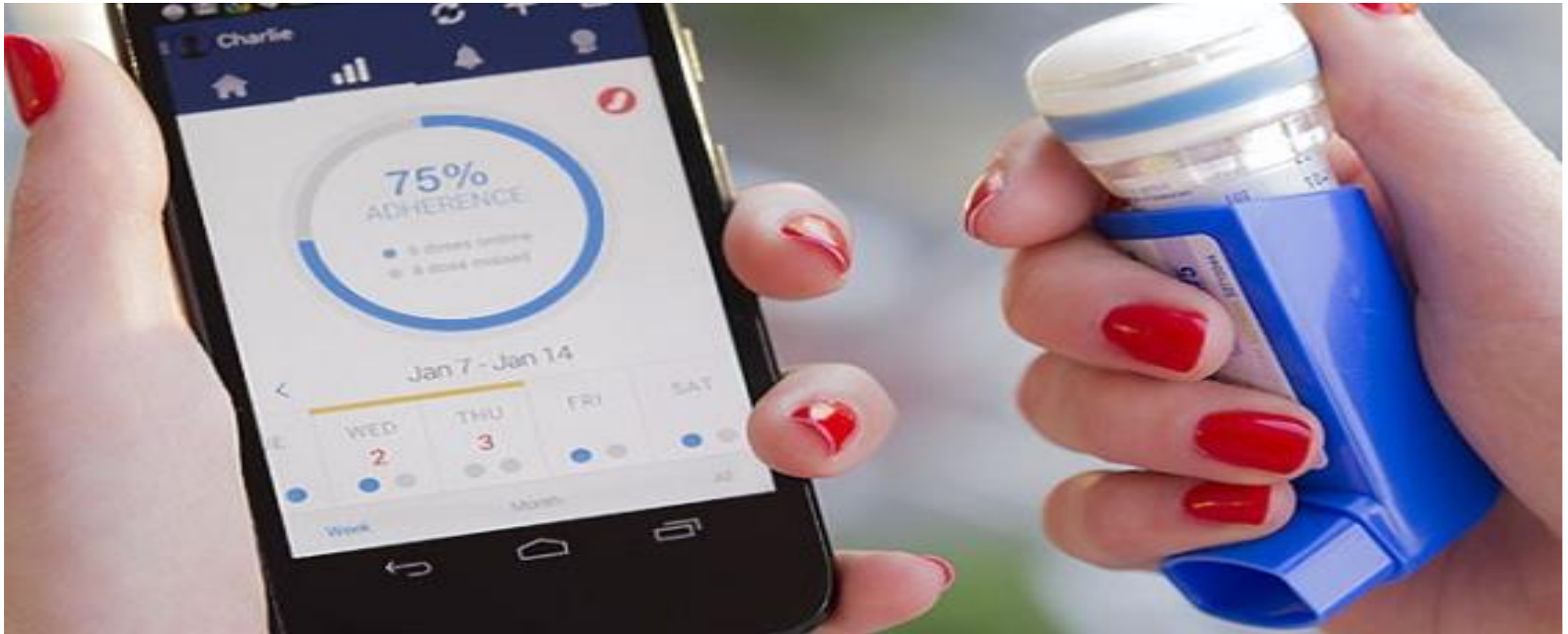
- Mental Health
- Back Pain
- MS
- Obesity
- Malnutrition

Smart Pharmaceuticals will not require Smart Phones as gateways in the future



3M Inhalers with display to be market ready by 2019

Teva / Gecko Smart Asthma Inhaler



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TECH

Google Parent and Sanofi Name Diabetes Joint Venture Onduo

Joint venture will develop tools for managing the disease expected to affect 592 million people world-wide by 2035



Joshua Riff, who was a senior executive at UnitedHealth Group's Optum, will be chief executive of the new unit. PHOTO: EUROPEAN

Saxon One



Tutima
GLASHÜTTE/SA

©Thümmler, 5G Technology, 2018

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ESYSTA Bluetooth Insulin Pen



Virtualization of Hospital Services

- Functional Re-organization of Treatment Areas
- Infusion Pumps
- Cardiac Monitors
- Ventilators
- Blood Glucose Measuring Devices
- Hospital beds
- Wheel Chairs
- Feeding pumps
- Cooling devices
- Auto-Identification
- Positioning
- Supply-Chain-Management

Conclusions

- Faster, Further, Quicker (3G =>4G) is not enough. 5G has to exceed current 4G offerings and must meet the qualitative requirements of Industry/Health 4.0
- 3G/4G "Best Effort" strategies are not sufficient for critical applications such as "Autonomous Driving", "Augmented Reality in Surgery" or Medical Device Monitoring in clinical settings
- A two class Medical System is as unacceptable as inconsistencies in the network coverage for autonomous driving
- 4G might be sufficient for the provision of certain features or services, but is not enough to deliver Health 4.0 in a digital single market

Thank you

“ As for the future your task is not to foresee it, but to enable it”

Antoine de Saint-Exupery

