mobile business

Lecture 1

Introduction to Mobile Business II
Application Design, Applications,
Infrastructures, and Security

Mobile Business II (SS 2020)

Prof. Dr. Kai Rannenberg

Chair of Mobile Business & Multilateral Security
Goethe University Frankfurt a. M.

- **The Chair of M-Business and Multilateral Security**

- **Teaching and Research Agenda**

- **Introduction into Mobile Business** – History of Mobile Business & Mobile Telecommunication Systems

- **Outline of this Course**

Business Informatics @ Goethe University Frankfurt

E-Finance Prof. Dr. Peter Gomber	Business Informatics (Informatics) Prof. Dr. Mirjam Minor	Information Systems Engineering Prof. Dr. Roland Holten
Business Education (associated) Prof. Dr. Gerhard Minnameier	**Mobile Business & Multilateral Security** Prof. Dr. Kai Rannenberg	**Business Education** (associated) Prof. Dr. Eveline Wuttke
Information Systems & Information Management Prof. Dr. Wolfgang König	**Business Informatics & Microeconomics** Prof. Dr. Lukas Wiewiorra	**Business Informatics & Information Management** Prof. Dr. Oliver Hinz

Chair of Business Administration, especially Business Informatics, Mobile Business and Multilateral Security

Deutsche Telekom Chair of Mobile Business & Multilateral Security

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Vita of Kai Rannenberg

Einbeck, Göttingen, Eystrup, Wolfsburg, ...
TU Berlin (Dipl.-Inform.)
Uni Freiburg (Dr. rer. pol.)

Dissertation on "**Kriterien und Zertifizierung mehrseitiger IT-Sicherheit**"
Standardization at ISO/IEC JTC 1/SC 27 and DIN NI-27

Kolleg "Sicherheit in der Kommunikationstechnik"
Gottlieb Daimler- and Karl Benz-Foundation

Multilateral Security:
"Empowering Users, Enabling Applications", 1993 – 1999

Recent History
1999-09 till 2002-08
        Microsoft Research Cambridge UK
        www.research.microsoft.com
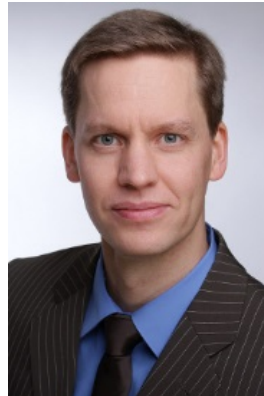   Responsible for "Personal Security Devices and Privacy Technologies"

2001-10 Call for this chair
2001-12 till 2002-07 Stand-in for the chair
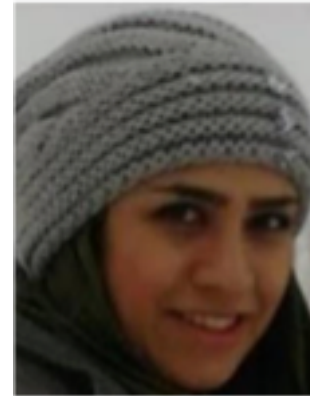
Since 2002-07 Professor

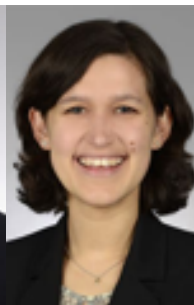**mobile business**

Kai Rannenberg

Sebastian Pape

Narges Arastouei

Welderufael Tesfay

Frédéric Tronnier

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David Harborth

Majid Hatamian

Peter Hamm

Markus Tschersich

Jetzabel Serna-Olvera

Mike Radmacher
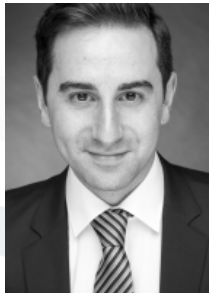
Andreas Albers

Stefan Weiss

Shuzhe Yang

André Deuker

Christian Kahl

Gökhan Bal

Ahmad Sabouri
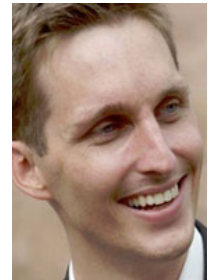
Fatbardh Veseli
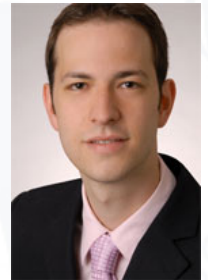
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On the dates and the agenda

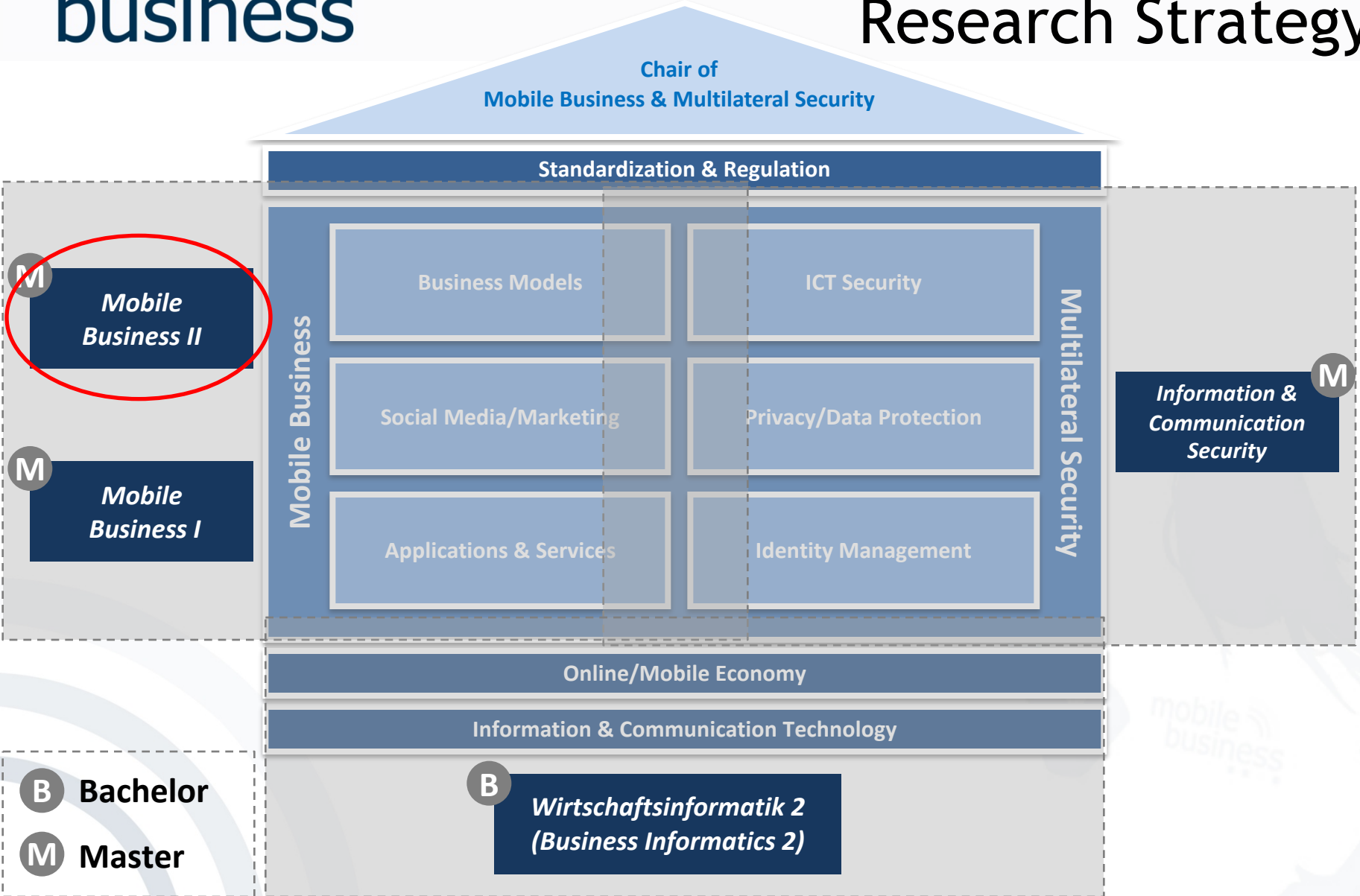- **COVID-19: Beginning the Summer 2020 semester as exceptional semester**
  - Check the website:

  https://www.goethe-university-frankfurt.de/86886482/Corona__english?locale=en

- **Exam date and regulations not fixed yet.**
  - Please keep yourself updated!
  - Check the website of the examination office:

  https://www.wiwi.uni-frankfurt.de/en/study/services/examination-office/service-and-contact.html

- **OLAT as a platform to ask questions.**
  - Use OLAT during the live streams of the lectures
  - Access via the following link:
  - https://olat-ce.server.uni-frankfurt.de/olat/auth/RepositoryEntry/8230764580
- **Course agenda is online.**
  - Please keep yourself updated!
  - Check the website of the course:
  - https://www.m-chair.de/index.php?option=com_teaching&view=lecture&id=53

- The Chair of M-Business and Multilateral Security

- Teaching and Research Agenda

- Introduction into Mobile Business – History of Mobile Business & Mobile Telecommunication Systems

- Outline of this Course

SS 2020	SS 2020
Bachelor	

| **Master** | *Course*
 Information & Communication Security: Infrastructures, Technologies and Business Models

 Course
 Mobile Business II:
 Application Design, Applications, Infrastructures and Security

 Course
 Privacy vs. Data:
 Business Models in the digital, mobile Economy

 Seminar
 User Privacy in New Technologies | *Course*
 Information & Communication Security: Infrastructures, Technologies and Business Models

 Course
 Mobile Business II:
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 Course
 Privacy vs. Data:
 Business Models in the digital, mobile Economy

 Seminar
 User Privacy in New Technologies |

mobile business

Chair of
Mobile Business & Multilateral Security

Standardization & Regulation

Mobile Business

Multilateral Security

Business Models	ICT Security
Social Media/Marketing	Privacy/Data Protection
Applications & Services	Identity Management

M *Mobile Business II*

M *Mobile Business I*

M *Information & Communication Security*

Online/Mobile Economy

Information & Communication Technology

B *Wirtschaftsinformatik 2 (Business Informatics 2)*

B Bachelor

M Master

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- **Usage and trial** of "Mobile Services & Devices"
- **Experience** "M-Business" **life**
- **Experience security issues**
- **Compare** with state of the discussion in research
- **Feedback** to designer and developers
- **Influence** future work environments

- **Multilateral Security**
  - Security, Trust and Privacy
  - Mobile Signatures
  - Personal Security Devices
- **Mobile Life, Work, and Business**
  - Location Based Services
  - Mobile Communities
- **M-Infrastructures**
  - Combination, Integration, Innovation
  - Standardisation, Regulation

The features

- User specified automatic call filtering
- Higher protection for caller and callee
- Range of possibilities to signal urgency
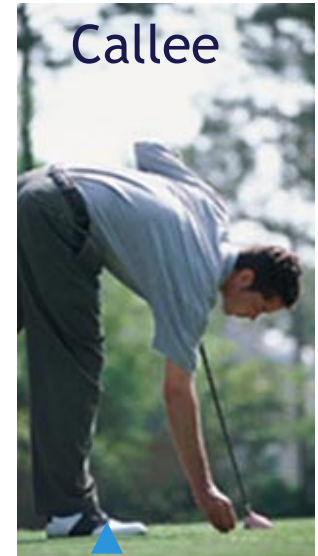- Range of reaction possibilities

Callee

Caller
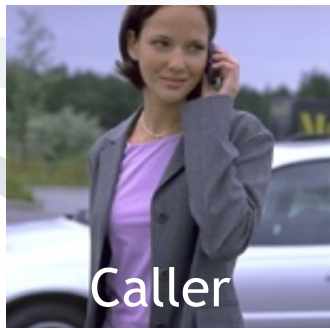
Call

Call

Negotiation

- Extent of identification
- Urgency of the call
- Security requirements
  - authentication
  - confidentiality
  - non-repudiation

RMS Call

Who   Rannenberg, Katrin
◆My ID: none

◆Subject: Meeting?

Urgency:
● Normal   ○ High   ○ Emergency

Security Settings: [View Details]
◆Confidentiality: Important
◆Authentication Don't care

[Cancel]   [Call]

Statement of urgency
> **"It is really urgent!"**

Specification of a **function**
> **"I am your boss!"**

Specification of a **subject**
> **"Let's have a party tonight."**

Presentation of a **voucher**
> **"I welcome you calling back."**
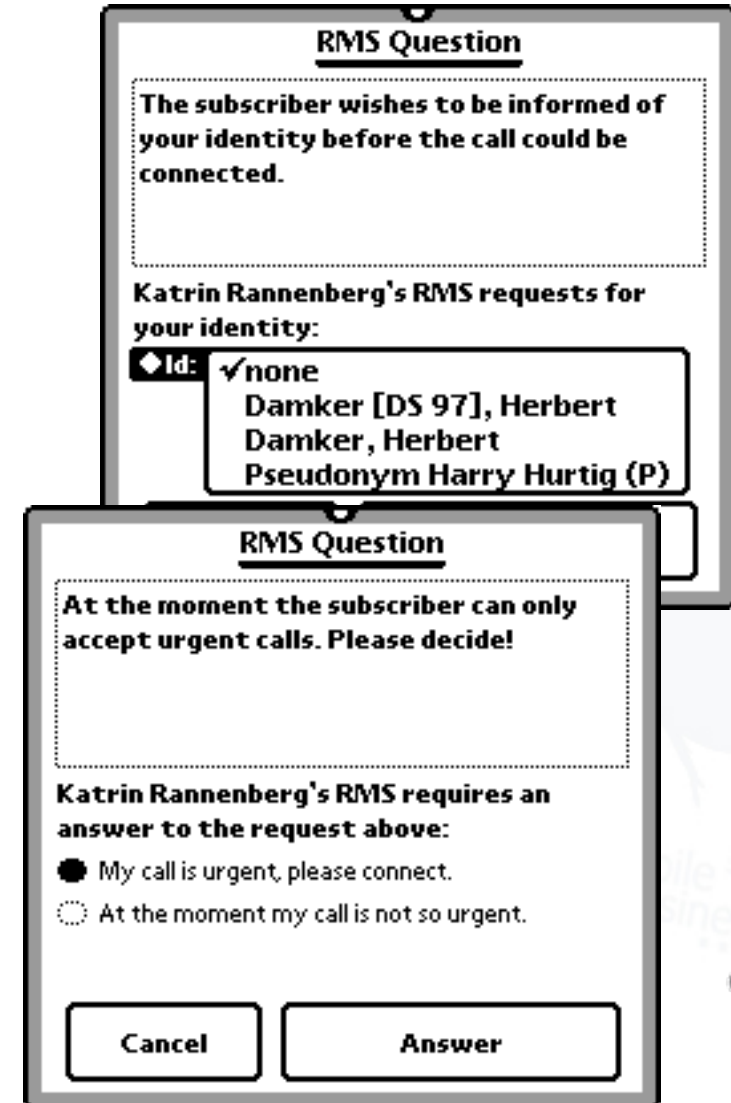
Provision of a **reference**
> **"My friends are your friends!"**

Offering a **surety**
> **"Satisfaction guaranteed
> or this money is yours!"**

RMS Question

The subscriber wishes to be informed of your identity before the call could be connected.

Katrin Rannenberg's RMS requests for your identity:

◆ **Id:** ✓none
Damker [DS 97], Herbert
Damker, Herbert
Pseudonym Harry Hurtig (P)

RMS Question

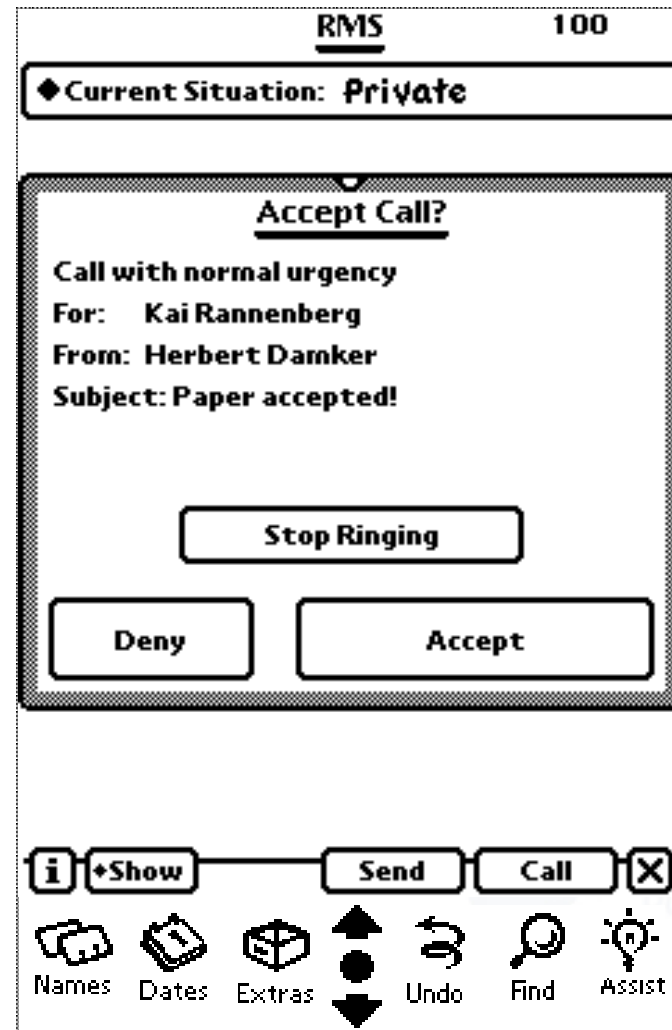At the moment the subscriber can only accept urgent calls. Please decide!

Katrin Rannenberg's RMS requires an answer to the request above:

● My call is urgent, please connect.
○ At the moment my call is not so urgent.

Cancel   Answer

- Bell is ringing!
- Callee notified
- Callee can still decide to accept or deny the call.

- Call not connected
- Caller gets information (configured by callee)
- Caller can leave a message or request a call back.

RMS: Call denied

Unfortunately the subscriber can not accept the call at the moment.

Leave with Katrin Rannenberg:

● Text message
○ Request for callback (with voucher)
○ No message

| Cancel | OK |

Situations

Set of *rules* how to deal with an incoming call

Rules

Combination of features

Users can reconfigure initial rules and situations as they like.

Define Situation 'Meeting'

- Emergency
  -> connect
- Callback voucher
  -> connect
- Caller in group Colleagues
  -> let caller decide
     Text: 'Request decision'
- Else
  -> deny
     Text: 'Not available'

Define Rule

In the situation 'Meeting'
my RMS should for ...
- all calls
- business calls
- ◆ calls of class:
- private calls

... and ...
- no caller ID
- caller want to be anonymous
- callback voucher
- ◆ caller in group:
- ◆ caller is:
- every caller
- Emergency

... do the following:
- connect
- deny
- ◆ divert to:
- require surety of $10 and connect
- require subject and connect
- let caller decide
- require caller ID

Text to send: –

Cancel OK

- **Fictitious**, **but** **realistic** cases

- **Real users:**
  ca 40 doctors, nurses, admin people, etc.

- 1 week **"Playtime"**

- 18 months **preparation and analysis:**
  workflow analysis usability tests, script writing, attack planning

- Reachability manager

- Negotiating security

- Identities and pseudonyms

- Signing device

- Medical information (patient records and knowledge base)
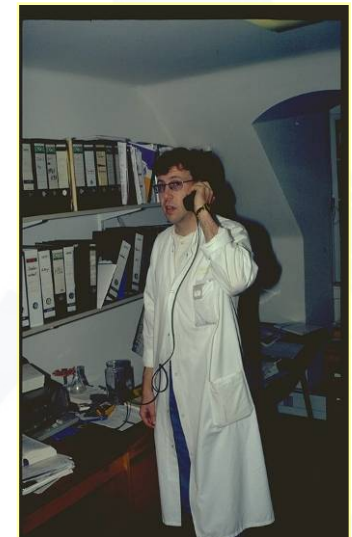
- Hospital communication

Overall results

- High benefit for everyday tasks
- Increasing awareness of security
- Integration of asynchronous messages very useful
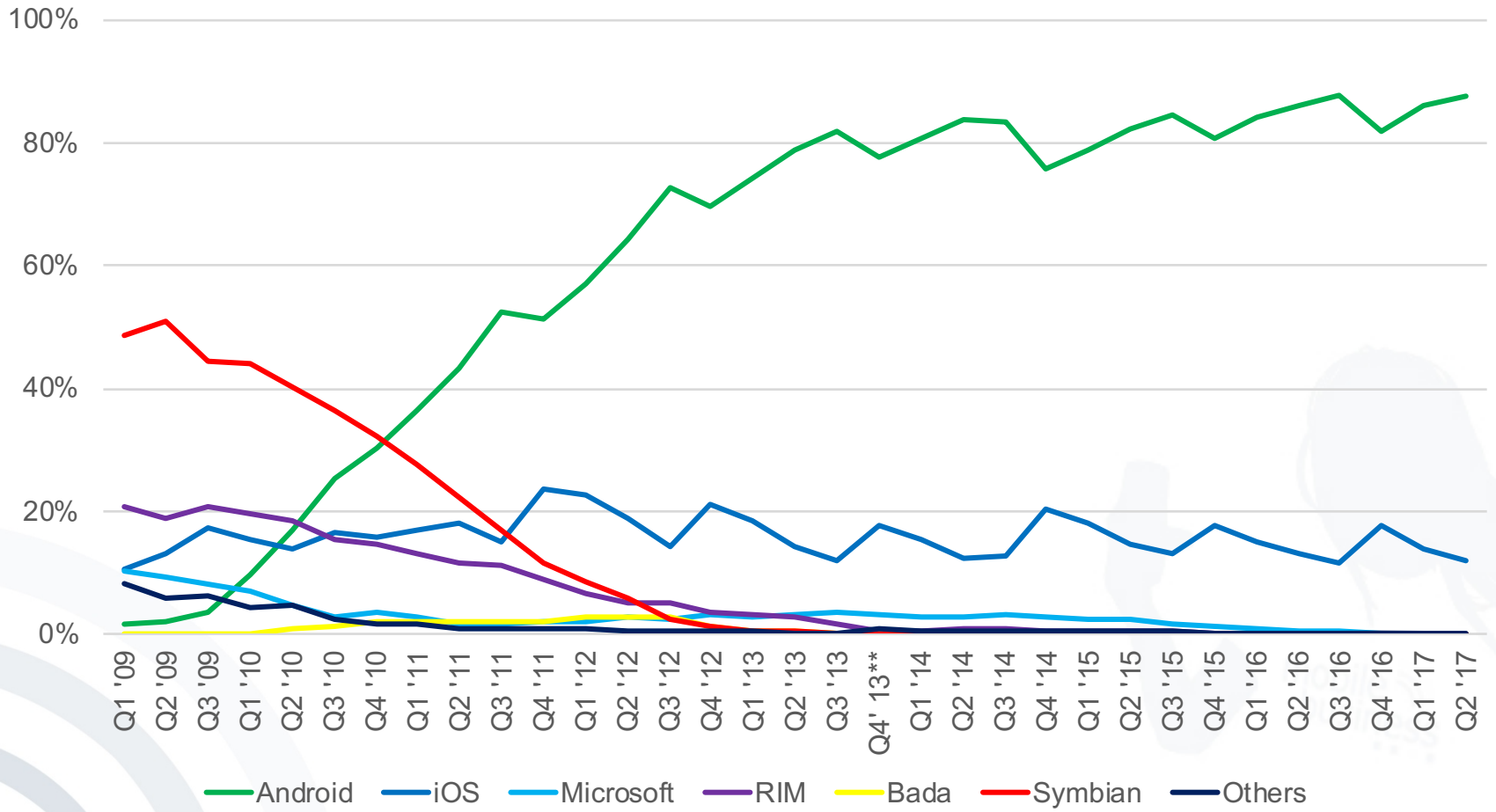- Manual filtering of calls often used

User demands

- Smaller device – RMS functionality in mobile phone
- Integration of full-flavour email
- Authentication also during a call

Many more *design* hints

Worldwide Smartphone Sales to End Users by Operating System (2009-2017)

mobile business

OS

[Statista2017a]

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Mobile Applications are getting more and more popular

- Over 1.500.000 Applications in Apple's App-Store in July 2015 (over 725.000 native iPad Apps)
- Centralised marketplace for software
- Several (dis)advantages compared with websites like
  - Access to hardware resources (like GPS)
  - Offline functionalities
  - Has to be developed for each OS individually
  - Mobile Native Apps vs. Mobile Web Apps
- HTML5 may integrate the advantages of Apps and mobile websites

- **The Chair of M-Business and Multilateral Security**

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- There are as many definitions as interested parties.

- "Ask again in 5 years at best, then we will have further information …"

- A multitude of related notions: E/C/V-Business, Mobile Commerce, Mobile…

- Hypes and myths

  - "Mobile Business is THE future!"

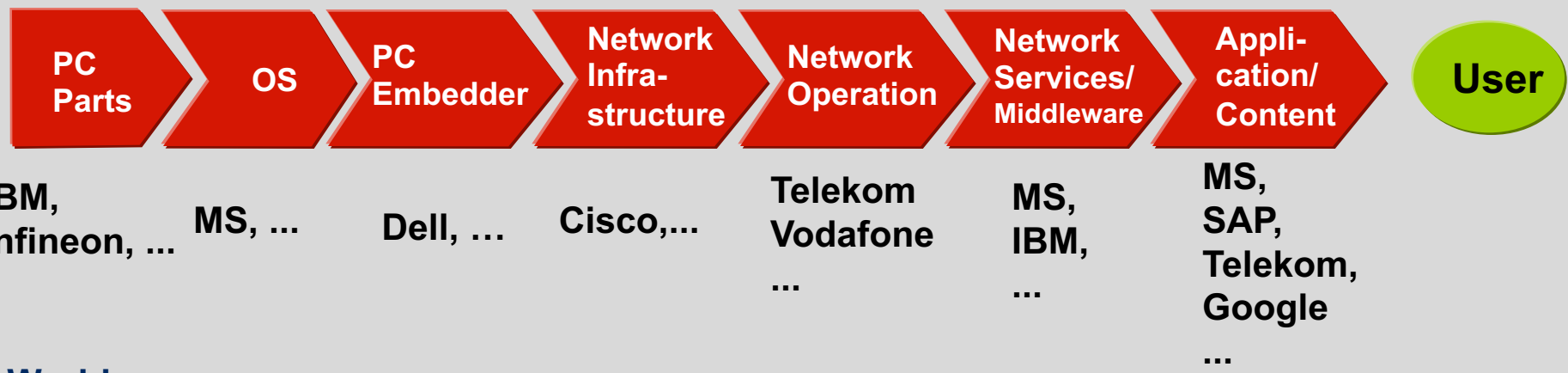 - "Mobile Business is just a hype!"

We chose a definition that (hopefully) lets us do interesting things:

"The usage of
***mobile devices**, **infrastructure**,*
communication and interaction
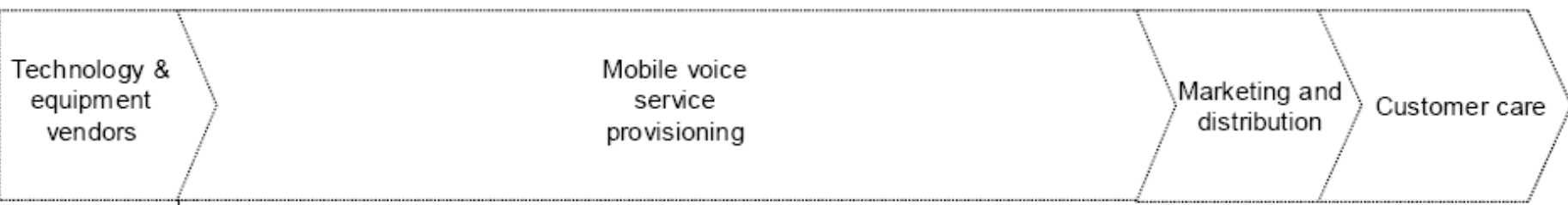*for*
***mobile applications** and*
transactions."

- Workplaces and private life will change thoroughly through mobile technologies and services.

- This implies extraordinary challenges and chances.

- The development will be strongly affected by international factors.

GSM World

Equipment Manufacturers
(Apple, Samsung, Microsoft, Nokia, Lenovo/Motorola, Huawei, …)

Telcos
(Telekom, Vodafone, Telefónica…)

User's Equipment → Network Equipment → Network Operation → Value Added Services → Application/Content → **User**

PC Parts → OS → PC Embedder → Network Infra-structure → Network Operation → Network Services/Middleware → Application/Content → **User**

IBM, Infineon, ...

MS, ...

Dell, …

Cisco,...

Telekom Vodafone ...

MS, IBM, ...

MS, SAP, Telekom, Google ...

IT World (Based on: SAP)

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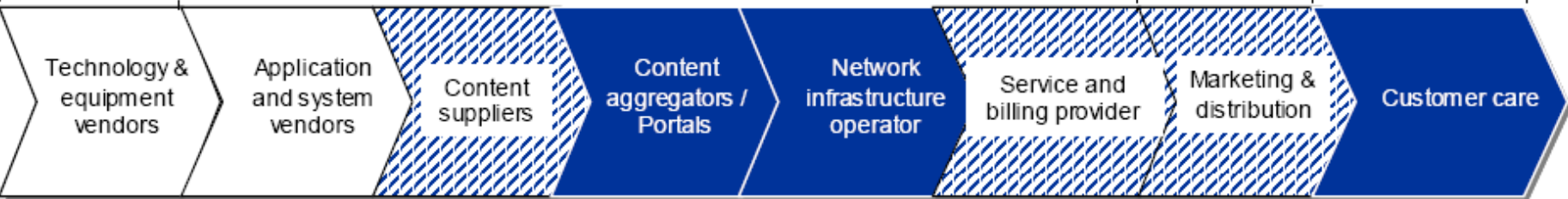**TRADITIONAL VALUE CHAIN OF MOBILE SERVICE DELIVERY**

Technology & equipment vendors | Mobile voice service provisioning | Marketing and distribution | Customer care

EMERGING MOBILE OPERATOR VALUE CHAIN

Technology & equipment vendors | Application and system vendors | Content suppliers | Content aggregators / Portals | Network infrastructure operator | Service and billing provider | Marketing & distribution | Customer care

- Primary opportunity for operator
- Some opportunity
- Opportunity through alliances

[Passerini et al. 2004]

What makes Mobile Business mobile?

- Customers?
- Terminals?
- Service provisioning?
- Means of payment?
- Possibilities of interaction?
- Business cases for Mobile Operators (and others)?

➲ One instrument for analysing are scenarios & visions.

- Not every country's scenario (e.g. health care) can simply be transferred to another country.

- Mobile Business does not only relate to mobile phones. Other platforms are important, too.

- **Classification of videos**
  - Videos are useful because they convey visions.
  - Visions have to be benchmarked by reality.
  - Which aspects of visions are reasonable / useful?
  - What is necessary for their realization?
  - Can a business model emerge from this?
  - For whom?
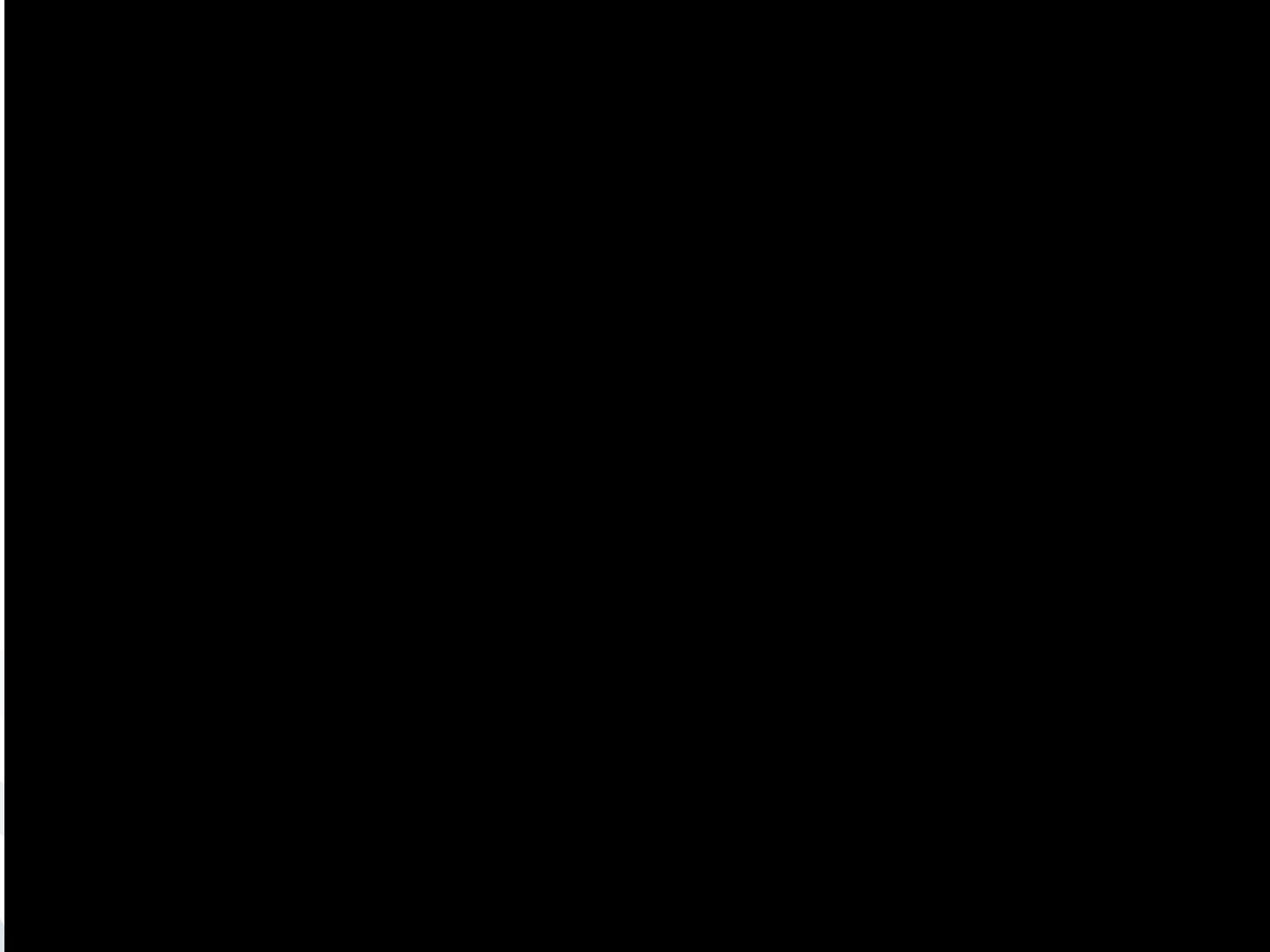
video

[Source: Microsoft 2000]

Steve

Dr. Walu's Hospital

Dr. Andrae

Medical Results Corp.

Healthinsurance Corp.
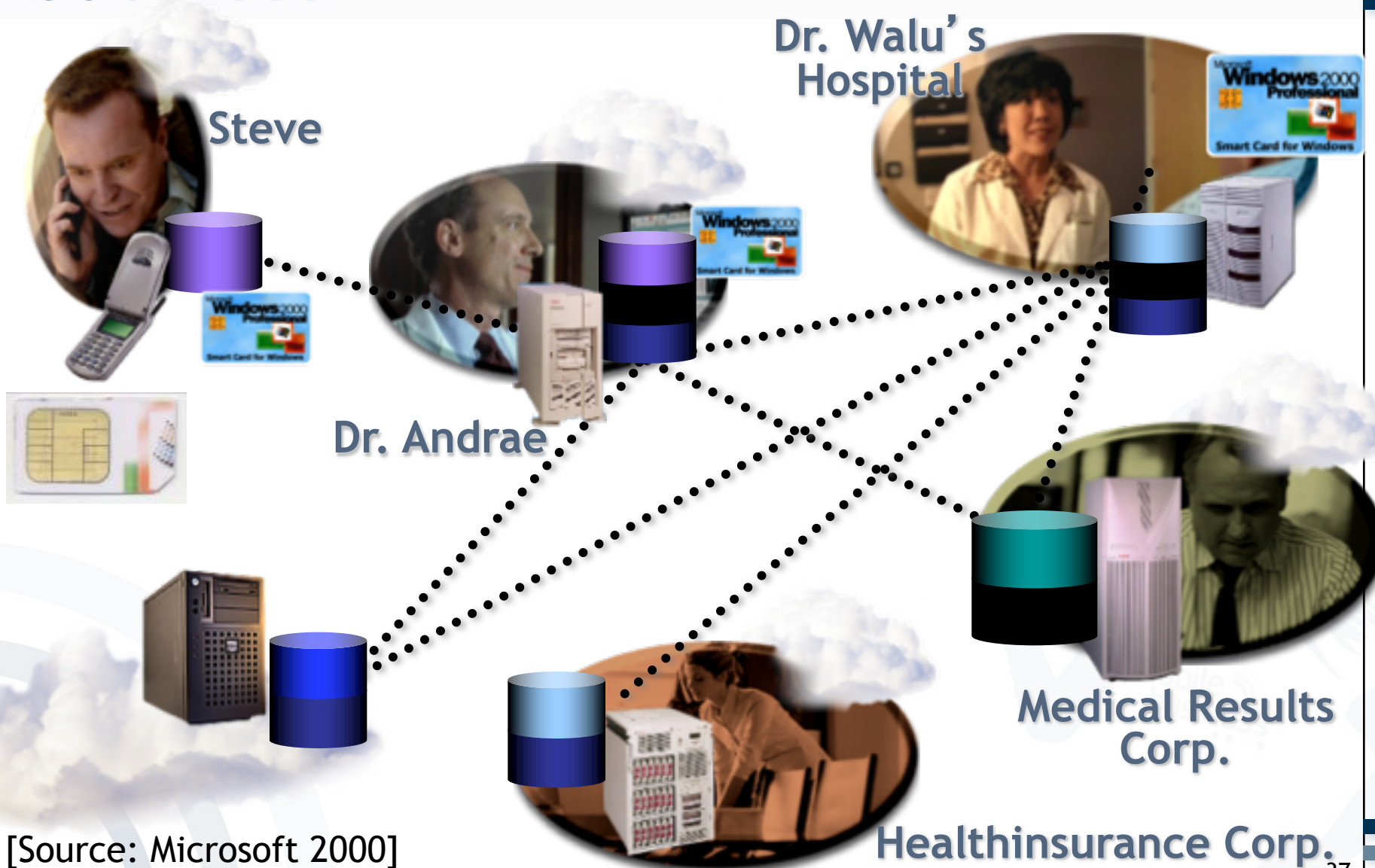
[Source: Microsoft 2000]

- February 14, 1876. Alexander Graham Bell, a Scotch deaf-mute teacher, patents his telephone (no. 174.465).

- June 17, 1946. AT&T and Southwestern Bell introduce MTS (mobile radio telephone service) in St. Louis, Missouri.

GE DTD/DTO Mobile Telephone

DIAL CONTROL UNIT   MANUAL CONTROL UNIT

POWER/CONTROL CABLE   POWER/CONTROL CONNECTOR   ANTENNA CONNECTOR   ANTENNA

BELL SYSTEM
MOBILE RADIOTELEPHONE
SERVICE
ST. LOUIS, MO.

RECEIVER

TRANSMITTER AND RECEIVER
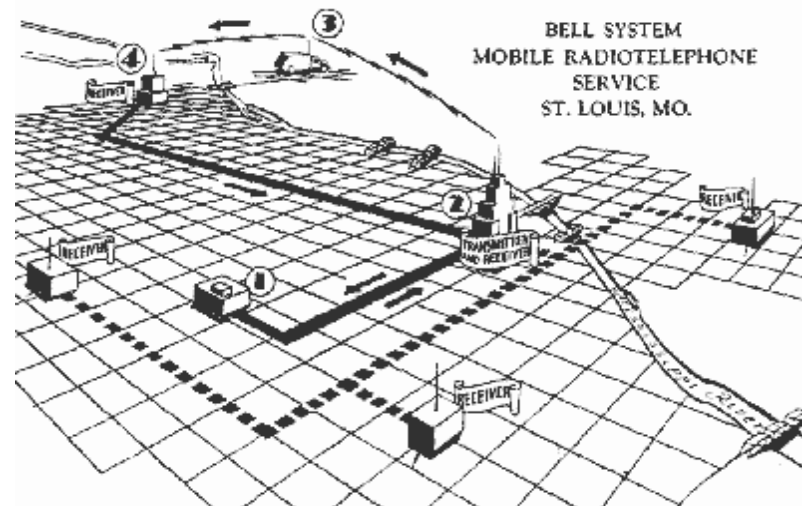
- 1958 A-Net (till 1977)
- 1972 B-Net (till 1994)
- 1986 C-Net (till 2000)

- Since 1981 NMT-450 (Nordic Mobile Telephone) in Norway, Sweden, Saudi Arabia, Denmark, Finland, ...

- First GSM trials 1991

- Commercial usage since 1992

- First digital mobile radio network with high voice quality and reliability (roaming).

- Global diffusion in more than 212 countries with more than 1 billion users.

- In February 2004 the first commercial mobile radio network (based on GSM) was launched in Iraq.

- GSM is the basis of data services like GPRS and EGDE.

1960	1970	1980	1990	2000	2010	2020

| 1958 A-Network | 1972 B-Network | 1985 C-Network | 1992 GSM | 1999 WAP | 2005 UMTS HSPA | 2020 5G |

2000 GPRS

2002 UMTS

2009 UMTS Evolved HSPA (HSPA+)

2001/2 EDGE (EGPRS)

2009 Long Term Evolution (LTE)
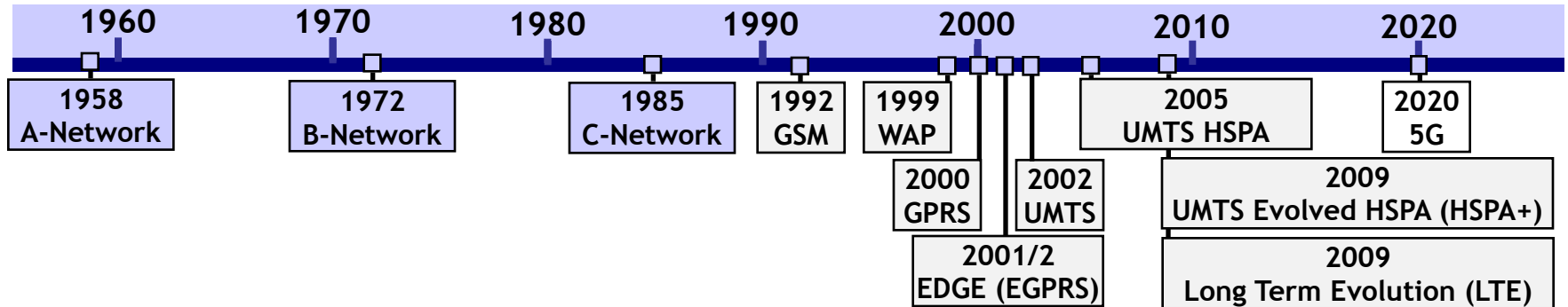
A-Network (1958 - 1977)
Switching was done manually by operators (switchboard clerks). To call one needed to know the location area of the mobile station.
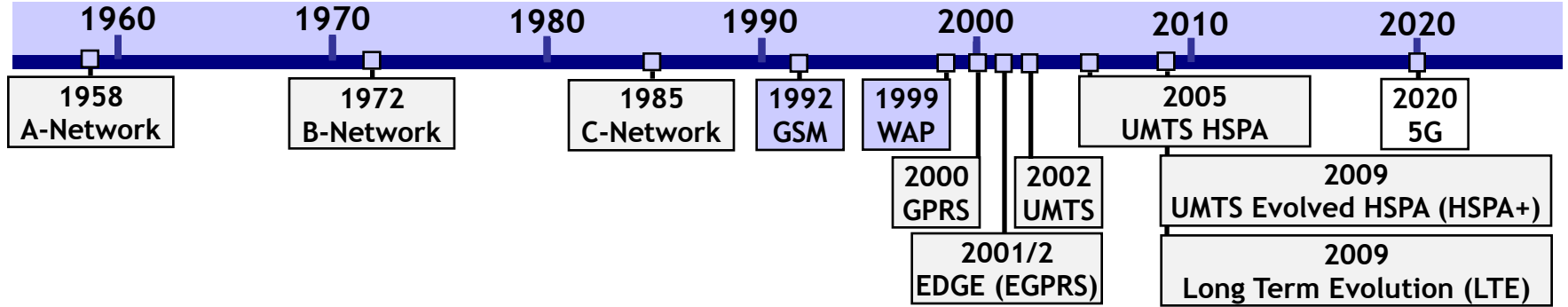
B-Network (1972 - 1994-12-31)
Callers could call mobile stations directly, but needed to know the current mobile station's area and use the respective area code.

C-Network (1985 - 2000-12-31)
First German cellular mobile radio network with centralized management of the mobile station's location

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1960	1970	1980	1990	2000	2010	2020

| 1958 A-Network | 1972 B-Network | 1985 C-Network | 1992 GSM | 1999 WAP | | 2005 UMTS HSPA | 2020 5G |

| 2000 GPRS | 2002 UMTS | 2009 UMTS Evolved HSPA (HSPA+) |

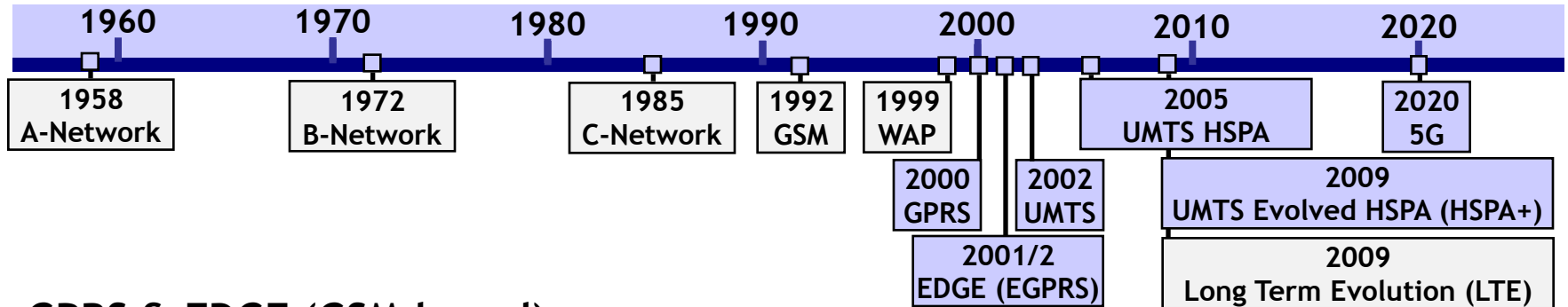| 2001/2 EDGE (EGPRS) | 2009 Long Term Evolution (LTE) |

GSM
The technical standard for digital mobile radio networks in more than 100 countries; GSM includes data transfer services.

WAP
The WAP standard describes a protocol suite. With special mobile phones certain mobile contents (pages) are accessible using WAP-enabled mobile phones.

[Source: WAP 2010]

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1960	1970	1980	1990	2000	2010	2020

1958 A-Network | **1972 B-Network** | **1985 C-Network** | **1992 GSM** | **1999 WAP** | **2005 UMTS HSPA** | **2020 5G**

2000 GPRS | **2002 UMTS**

2009 UMTS Evolved HSPA (HSPA+)

2001/2 EDGE (EGPRS)

2009 Long Term Evolution (LTE)

GPRS & EDGE (GSM-based)
Further development of the GSM standard: Data is transferred in packets. EDGE is an enhancement to GPRS and provides increased data transmission rates (3 to 4 times faster than GPRS).

UMTS (3G) network
Third mobile radio standard and the successor of GSM for mobile multimedia incl. video and audio transmissions

UMTS High Speed Packet Access (HSPA), UMTS Evolved HSPA (HSPA+)
HSPA and Evolved HSPA (HSPA+) provide enhanced performance in speed and latency.

Long Term Evolution (LTE)
LTE is the first all-IP mobile network technology. It provides significantly higher data rates, capacity and lower latency than HSPA and HSPA+.

Fifth generation cellular network technology (5G)
5G offers higher data rates (up to 10 Gbit/s), lower latency and use of higher frequency spectrums. 44

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- Outline of this Course

- ## Interest …
  - … in new topics
  - … in the interaction of technology, business, economy and society
  - … in experiments

- ## Other Business Informatics lectures help but are not mandatory.

Please keep yourself updated

1. Schedule:

https://www.m-chair.de/index.php?option=com_teaching&view=lecture&id=43

2. OLAT (for questions):

https://olat-ce.server.uni-frankfurt.de/olat/auth/RepositoryEntry/8230764580

3. Exam:

http://www.wiwi.uni-frankfurt.de/mein-wiwi-studium/pruefungsamt.html

Please Note:

Electronic library of Journals, access to more than 2000 Journals

http://www.ub.uni-frankfurt.de/online/emedien.html

Available only for University members via HRZ account (141.2.XXX.XXX IP-addresses; PC Pool) or via University Library login:
www.ub.uni-frankfurt.de/login.html

search.epnet.com/login.asp
www.jstor.org

Online search engines:

scholar.google.com
academic.live.com

Microsoft (2000) Materials for the Introduction of .Net

Passerini, K.; Gagnon, S. Cakici, K. (2004) Opportunities in the Digital Economy: A New Value Chain and Services for Mobile Telecom Operators, in: C. Bullen and E. Stohr (Eds.) *Proceedings of the 10th American Conference on Information Systems*, New York, NY, USA, pp.2530-2535.

Statista2014a,
http://de.statista.com/statistik/daten/studie/73662/umfrage/marktanteil-der-smartphone-betriebssysteme-nach-quartalen/

Statista2016a, Marktanteile der führenden Betriebssysteme am Absatz von Smartphones weltweit vom 1. Quartal 2009 bis zum 3. Quartal 2016.
https://de.statista.com/statistik/daten/studie/73662/umfrage/marktanteil-der-smartphone-betriebssysteme-nach-quartalen/