

## ***Lecture 1***

Introduction to Mobile Business I:  
Technology, Markets, Platforms,  
and Business Models

**Mobile Business I (WS 2018/19)**

Prof. Dr. Kai Rannenberg

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



- Chair of Mobile 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

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

- **The Chair of M-Business and Multilateral Security**
- **Teaching & Research Agenda**
- **Organizational Issues**
- **Introduction into information and communication security**
- **Outline of this course**

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

Chair of Mobile Business & Multilateral Security

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Campus Westend  
RuW Building, 2<sup>nd</sup> Floor

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**Kai Rannenberg**



**Sebastian  
Pape**



**David Harborth**



**Majid  
Hatamian**



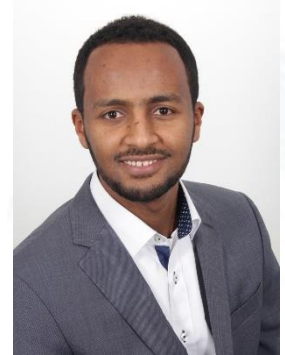
**Peter Hamm**



**Christopher  
Schmitz**



**Welderufael  
Tesfay**



**Ahmed Yesuf**



# Research Fellows & External PhD Students



Markus  
Tschersich



Jetzabel  
Serna-  
Olvera



Mike  
Radmacher



Andreas  
Albers



Stefan  
Weiss



Shuzhe  
Yang



André  
Deuker



Christian  
Kahl



Gökhan  
Bal



Ahmad  
Sabouri



Fatbardh  
Veseli



Tim  
Schiller



Niels  
Johannsen



Stephan  
Heim



Marvin  
Hegen



Michael  
Schmid

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## Vita of Kai Rannenberg

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



Dissertation  
**“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 of Kai Rannenberg

1999-09 till 2002-08

Microsoft Research Cambridge UK

[www.research.microsoft.com](http://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



## M.Sc. Peter Hamm

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	WS 2018/19	SS 2019
Bachelor	<i>Seminar</i> <b>Innovations in Information Systems,            Augmented Reality and the Role of            Digital Platforms</b>	<i>Course</i> <b>Business Informatics 2 (PWIN)</b>
Master	<i>Course</i> <b>Mobile Business I:            Technology, Markets, Platforms and            Business Models</b>  <i>Course</i> <b>Information &amp; Communication Security:            Infrastructures, Technologies and            Business Models</b>	<i>Course</i> <b>Mobile Business II:            Application Design, Applications,            Infrastructures and Security</b>  <i>Seminar</i> <b>Applications of Blockchain Technology</b>

## Teaching Topics

Identity Management

Privacy

ICT Security

Mobile Business

Business Informatics

## Master Courses

### Lectures

Mobile Business 1

Privacy vs. Data

Seminars

Mobile Business 2

Master Thesis

I & C Security

## Bachelor Courses

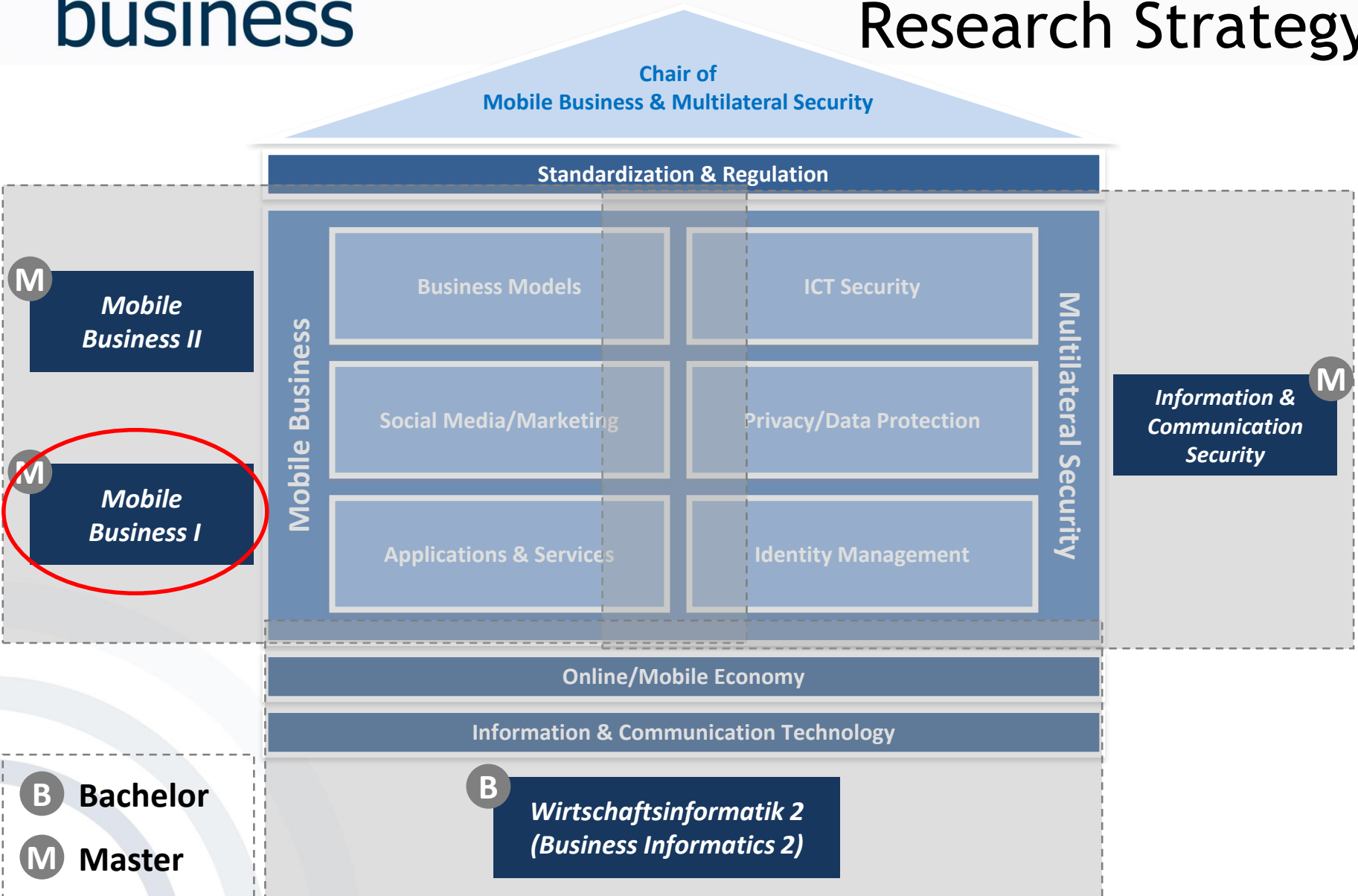
### Lectures

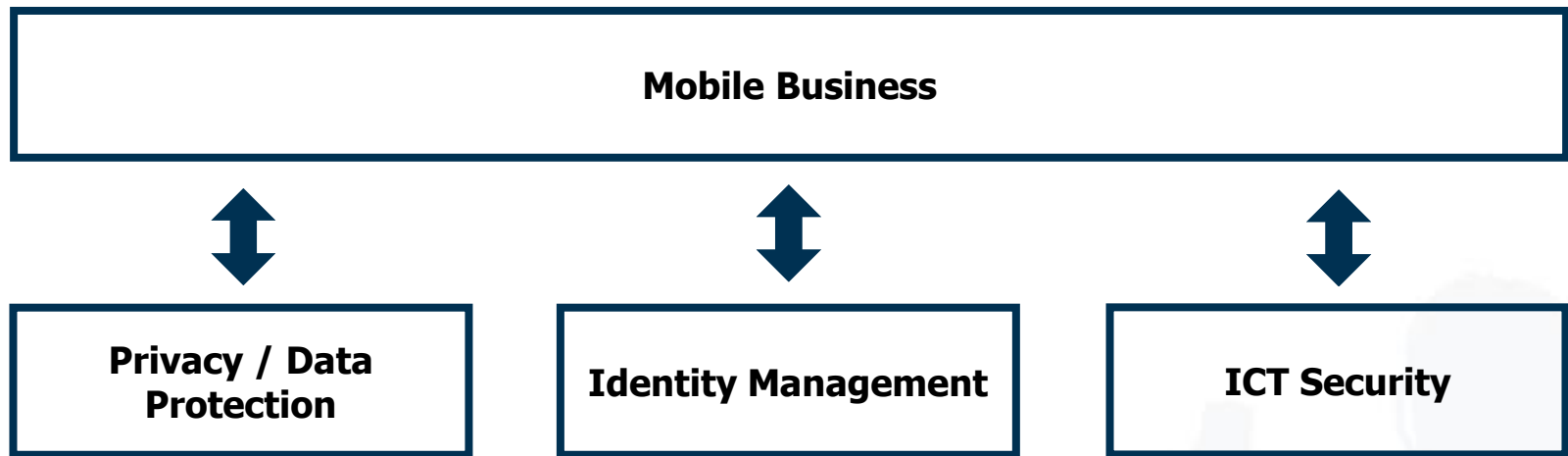
Business Informatics  
2

Seminars

Bachelor Thesis







Advancing *Mobile Business* while enabling individuals to be in control of their personal data by providing *Identity Management*, *Privacy Protection*, and *ICT Security* within the Digital Economy

Chair of  
Mobile Business & Multilateral  
Security

Standardisation & Regulation

Business Models

ICT Security

Social Media/Marketing

Privacy / Data Protection

Applications & Services

Identity Management

Mobile Business

Multilateral Security

Online/Mobile Economy

Information & Communication Technology

European & national-funded Projects

Industry Co-operations

PhD Projects

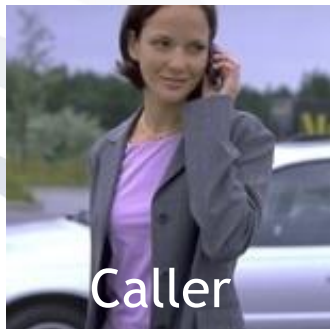


Premium\*



### The features

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



# Topics of Negotiation

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




**RMS Call**

**Who** Rannenberg, Katrin

◆ **My ID:** none

◆ **Subject:** Meeting? A

 .....

**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





# RMS Accepted Call (Callee Display)

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

RMS 100

♦ Current Situation: **Private**

Accept Call?

Call with normal urgency  
 For: Kai Rannenberg  
 From: Herbert Damker  
 Subject: Paper accepted!

Names

Dates

Extras

Undo

Find

Assist



# RMS Denied Call (Caller Display)

- 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'

<input type="checkbox"/>	Emergency	-> connect
<input type="checkbox"/>	Callback voucher	-> connect
<input type="checkbox"/>	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 ...

<input checked="" type="radio"/> all calls	<input type="radio"/> calls of class:
<input type="radio"/> business calls	<input type="radio"/> private calls

... and ...

<input type="radio"/> no caller ID
<input type="radio"/> caller want to be anonymous
<input checked="" type="radio"/> callback voucher
<input checked="" type="radio"/> caller in group:
<input type="radio"/> caller is:
<input type="radio"/> every caller
<input type="radio"/> Emergency

... do the following:

<input checked="" type="radio"/> connect
<input type="radio"/> deny
<input type="radio"/> divert to:
<input type="radio"/> require surety of \$10 and connect
<input type="radio"/> require subject and connect
<input type="radio"/> let caller decide
<input type="radio"/> 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



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# What is Mobile Business ?

- 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!”

# What is Mobile Business ?

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,  
Google/Motorola, Huawei, ...)

**Telcos**  
(Telekom, Vodafone, Telefónica...)



IBM,  
Infineon, ...

MS, ...

Dell, ...

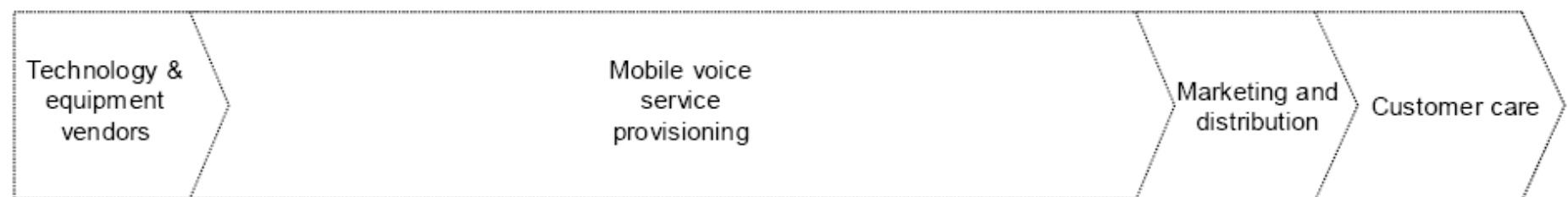
Cisco, ...

Telekom  
Vodafone  
...

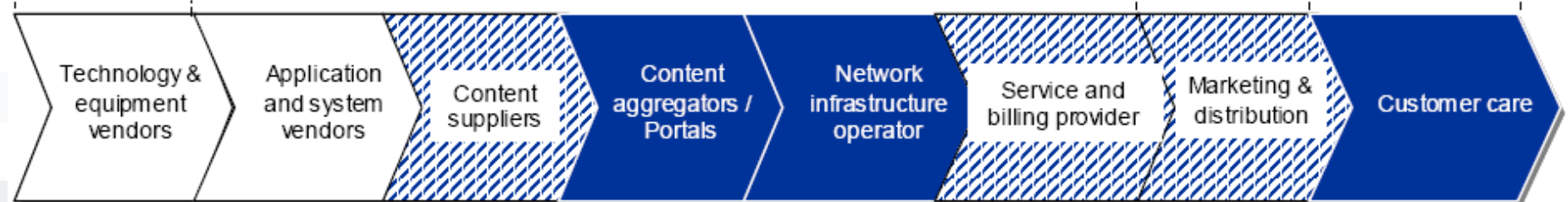
MS,  
IBM,  
...

MS,  
SAP,  
Telekom,  
Google  
...

## TRADITIONAL VALUE CHAIN OF MOBILE SERVICE DELIVERY



## EMERGING MOBILE OPERATOR VALUE CHAIN



Primary opportunity for operator
  Some opportunity
  Opportunity through alliances

## 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.



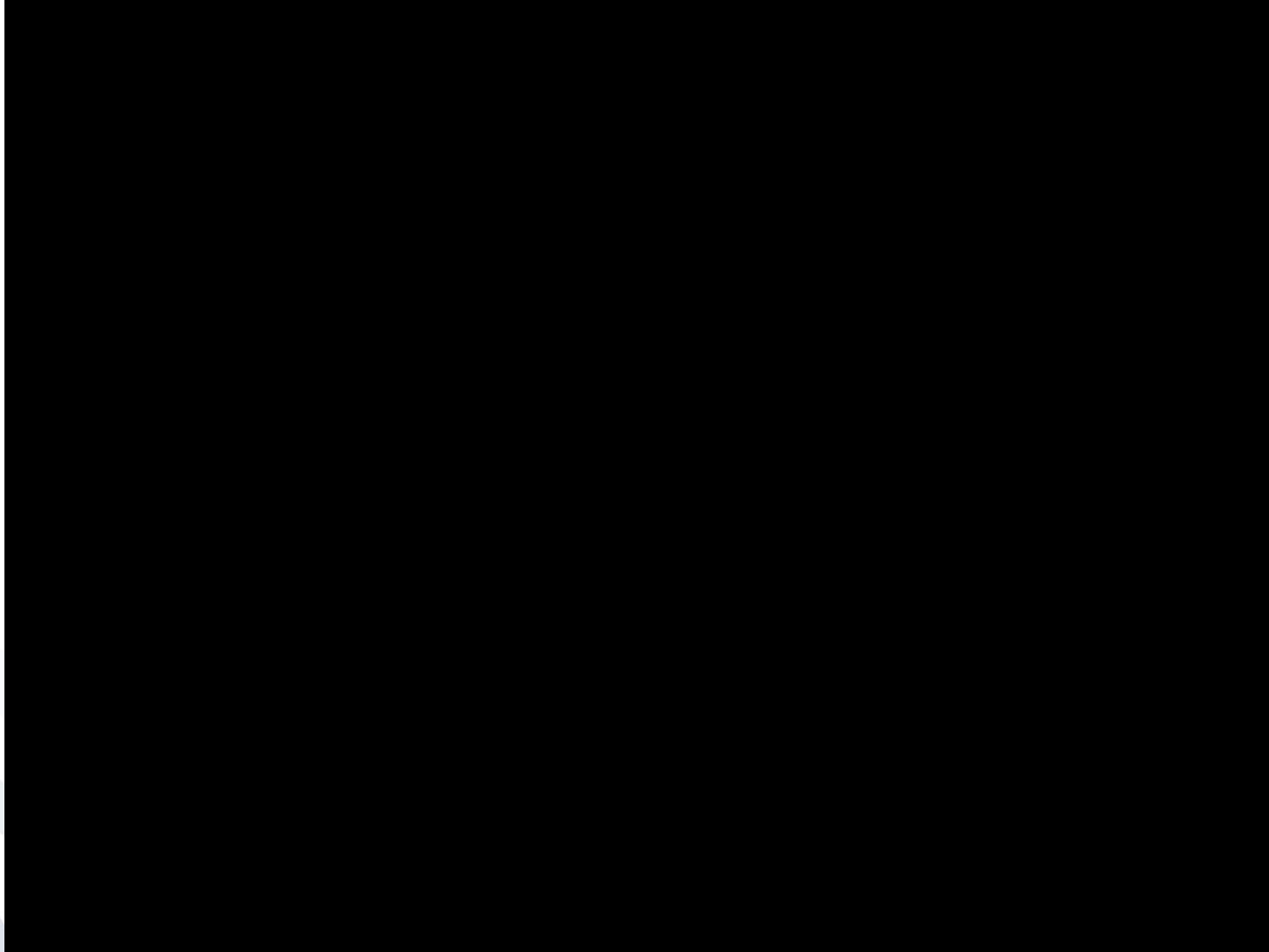
- Not every country's scenario (e.g. health care) can simply be transferred to another country.
- Mobile Business does not only relate to mobile phones. Other platforms are important, too.



- 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?

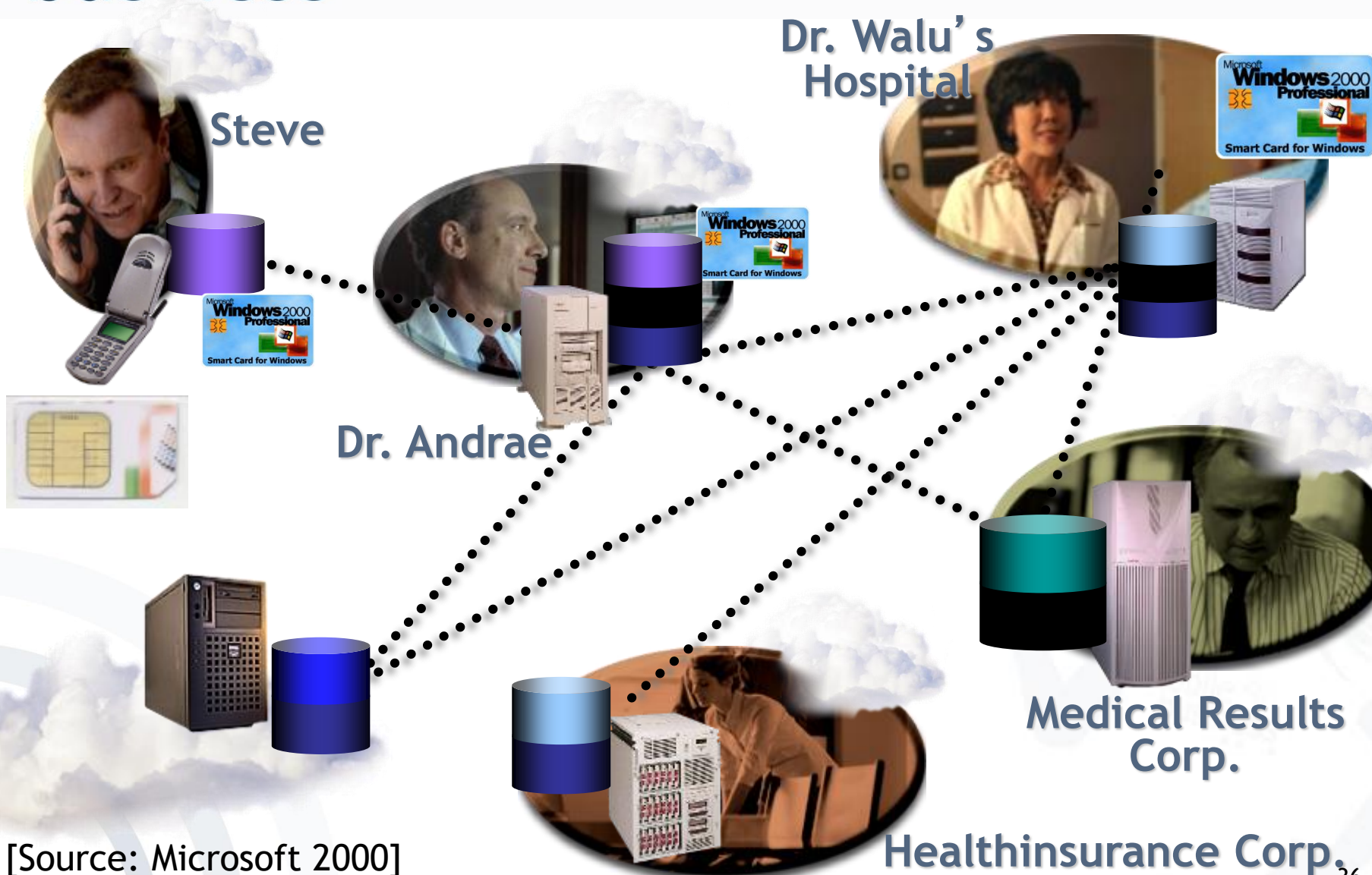


# Illustrative Microsoft Video



# mobile business

## Parties Involved



[Source: Microsoft 2000]

## History of Mobile Business Early Approaches



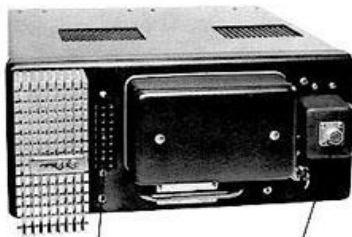
- February 14, 1876. Alexander Graham Bell, a Scotch deaf-mute teacher, patents his telephone (no. 174.465).
- June 17, 1946. AT&T and Southwestern Bell introduce MTS (mobile radio telephone service) in St. Louis, Missouri.



GE DTD/DTO Mobile Telephone  
DIAL CONTROL UNIT



GE DTD/DTO Mobile Telephone  
MANUAL CONTROL UNIT

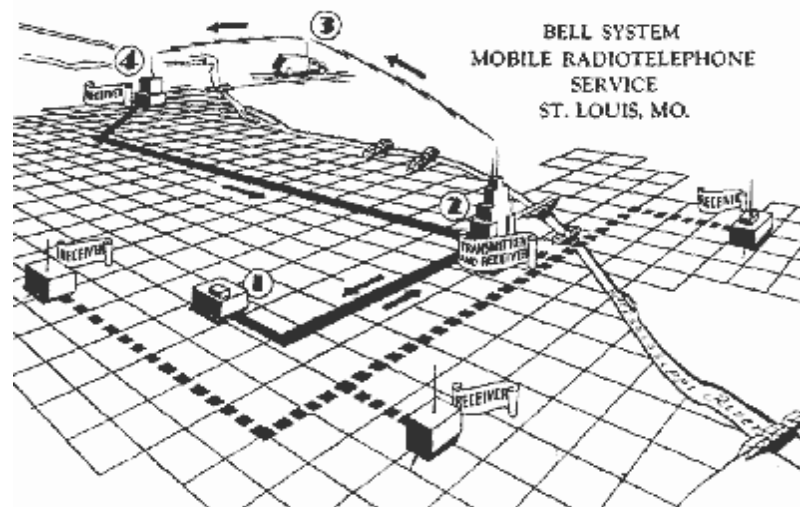


POWER/CONTROL CABLE  
POWER/CONTROL CONNECTOR



ANTENNA CONNECTOR

ANTENNA





# History of Mobile Business

## Early German Mobile Networks

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



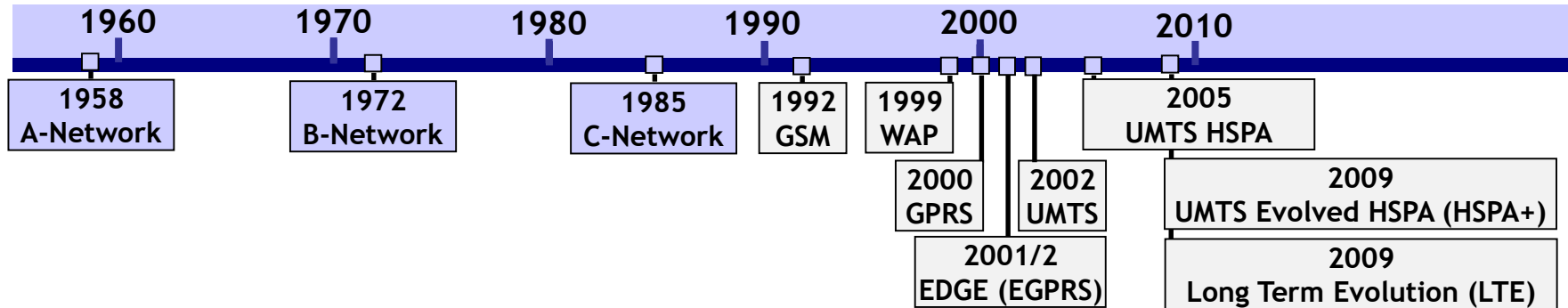
- Since 1981 NMT-450 (Nordic Mobile Telephone) in Norway, Sweden, Saudi Arabia, Denmark, Finland, ...





- 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.





### 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.



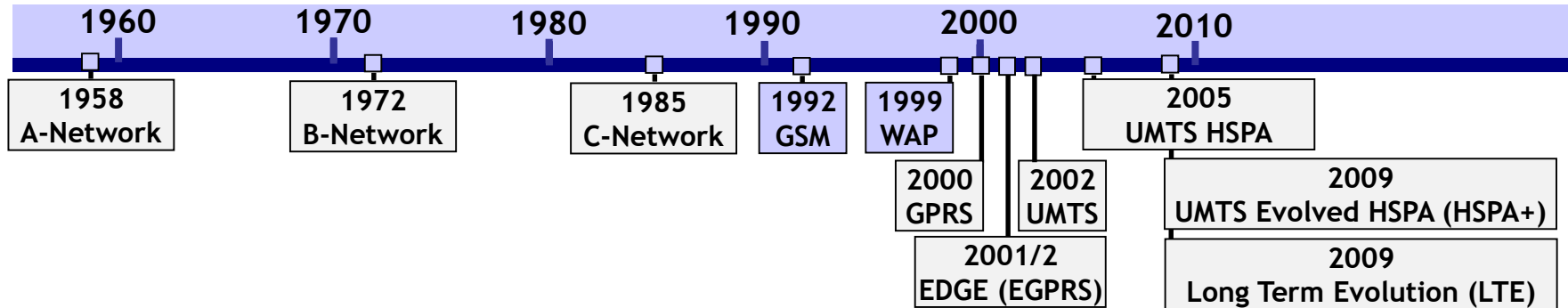
### B-Network (1972 - 1994-12-31)

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.



### GSM

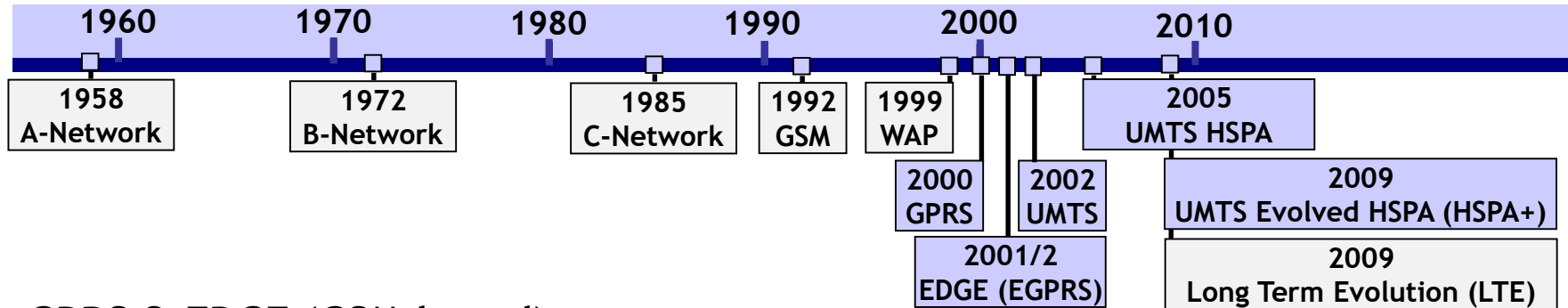
The technical standard for digital mobile radio networks in more than 100 countries; GSM includes data transfer services.

### 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]





## 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+.

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- Interest ...
  - ... in new topics
  - ... in the interaction of technology, business, economy and society
  - ... in experiments
- Other Business Informatics lectures help but are not mandatory.



## *Lectures*

1. Introduction to Mobile Business I
2. Basic Communication Paradigms and Mobile Telecommunication Infrastructures
3. Wireless Internet-oriented Infrastructures and Protocols
4. Mobile Communication Services
5. Electronic Business vs. Mobile Business
6. Market Structure and Value Chain
7. Business Models
8. Smartcards and Infrastructures
9. Mobile Devices
10. Concepts of Mobile OS
11. Mobile OS and Security Aspects - Examples
12. Trusted Devices
13. Acceptance and Success Factors in Mobile Business



*Please keep yourself updated*

1. Schedule:

[https://m-chair.de/index.php?option=com\\_teaching&view=lecture&id=41](https://m-chair.de/index.php?option=com_teaching&view=lecture&id=41)

2. 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](http://www.ub.uni-frankfurt.de/login.html)



[search.epnet.com/login.asp](http://search.epnet.com/login.asp)  
[www.jstor.org](http://www.jstor.org)



### Internet search engines:

[scholar.google.com](http://scholar.google.com)  
[academic.live.com](http://academic.live.com)



[Microsoft 2000]

Microsoft (2000) Materials for the Introduction of .net

[Passerini et al. 2004]

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.

[Sauter 2008]

Sauter, M. (2008): Grundkurs Mobile Kommunikationssysteme (3. erweiterte Auflage), Vieweg, Wiesbaden.

[WAP 2010]

WAP Forum Releases: What Is WAP?

[www.wapforum.org/what/technical.htm](http://www.wapforum.org/what/technical.htm), accessed 01-10-2010.