

Lecture 1

Introduction to Mobile Business II

Application Design, Applications,
Infrastructures, and Security

Mobile Business II (SS 2024)

Dr. Ahad Niknia

Prof. Dr. Kai Rannenber

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

<p>E-Finance</p> <p>Prof. Dr. Peter Gomber</p>	<p>Business Informatics (Informatics)</p> <p>Prof. Dr. Mirjam Minor</p>	<p>Business Informatics & Information Management</p> <p>Prof. Dr. Oliver Hinz</p>
<p>Business Ethics & Business Education (associated)</p> <p>Prof. Dr. Gerhard Minnameier</p>	<p>Business Informatics</p> <p>Hon. Prof. Dr. Matthias Zieschang</p>	<p>Economic and Business Education (associated)</p> <p>Prof. Dr. Eveline Wuttke</p>
<p>Business Education</p> <p>Prof. Dr. Helmut Niegemann</p>	<p>Information Systems & Information Management</p> <p>Prof. Dr. Wolfgang König</p>	<p>...</p>
<p>Information Systems Engineering</p> <p>Prof. Dr. Roland Holten</p>	<p>Business Informatics & Microeconomics</p> <p>Prof. Dr. Lukas Wiewiorra</p>	<p>Mobile Business & Multilateral Security</p> <p>Prof. Dr. Kai Rannenber</p>

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

Chair of Mobile Business & Multilateral Security

Theodor-W.-Adorno-Platz 4
Campus Westend
RuW Building, 2nd Floor

Phone: +49 69 798 34701

Email: info@m-chair.de

URL: www.m-chair.de



Team & External PhD Students



**Kai
Rannenberg**



**Narges
Arastouei**



**Diana
Weiss**



**Sascha
Löbner**



**Atiyeh
Sadeghi**



**Ann-Kristin
Lieberknecht**



**Frédéric
Tronnier**



**Ahad
Niknia**



**Peter
Hamm**



**Tim
Schiller**



**Michael
Schmid**



**Christopher
Schmitz**

Selected Alumni



Prof. Dr. Jan Muntermann
Göttingen University



Dr. Stefan Figge
BuyIn (Deutsche Telekom / Orange)



Dr. Mike Radmacher
Deutsche Telekom



Dr. Andreas Albers
Deutsche Telekom



Dr. Stefan Weiss
Swiss Re



Prof. Dr. Denis Royer
Ostfalia – Hochschule für angewandte Wissenschaften



Dr. Markus Tschersich
Continental



Dr. Ahmad Sabouri
Continental



Dr. Falk Wagner
EE



Dr. Christian Kahl
CyberSolutions GmbH



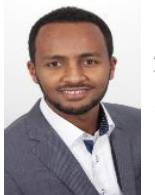
Dr. Gökhan Bal
Deutsche Bahn



Dr. André Deuker
KfW



Dr. Shuzhe Yang
GLS



Dr. Ahmed Yesuf
FARO



Dr. Welderufael Tesfay
Deutsche Telekom



Dr. Fatbardh Veseli
Capgemini Germany



Dr. Majid Hatamian
Google



Dr. habil. Sebastian Pape
Continental



Dr. David Harborth
Capgemini Invent

Office:

Diana Weiß

Email: diana.weiss@m-chair.de

Office Hours: On appointment



Vita of Prof. Dr. Kai Rannenberg

Einbeck, Göttingen, Eystруп, 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 at Goethe University Frankfurt

Since 2012-04 Visiting Professor at the National Institute for Informatics (Tokyo, Japan)





Dr. Ahad Niknia,

RuW Building, Office 2.232

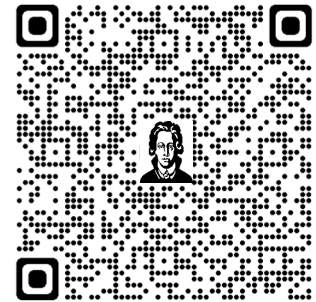
Phone: 069 / 798 - 34705

Email: [ahad\[dot\]niknia\[at\]m-chair\[dot\]de](mailto:ahad[niknia@m-chair.de])

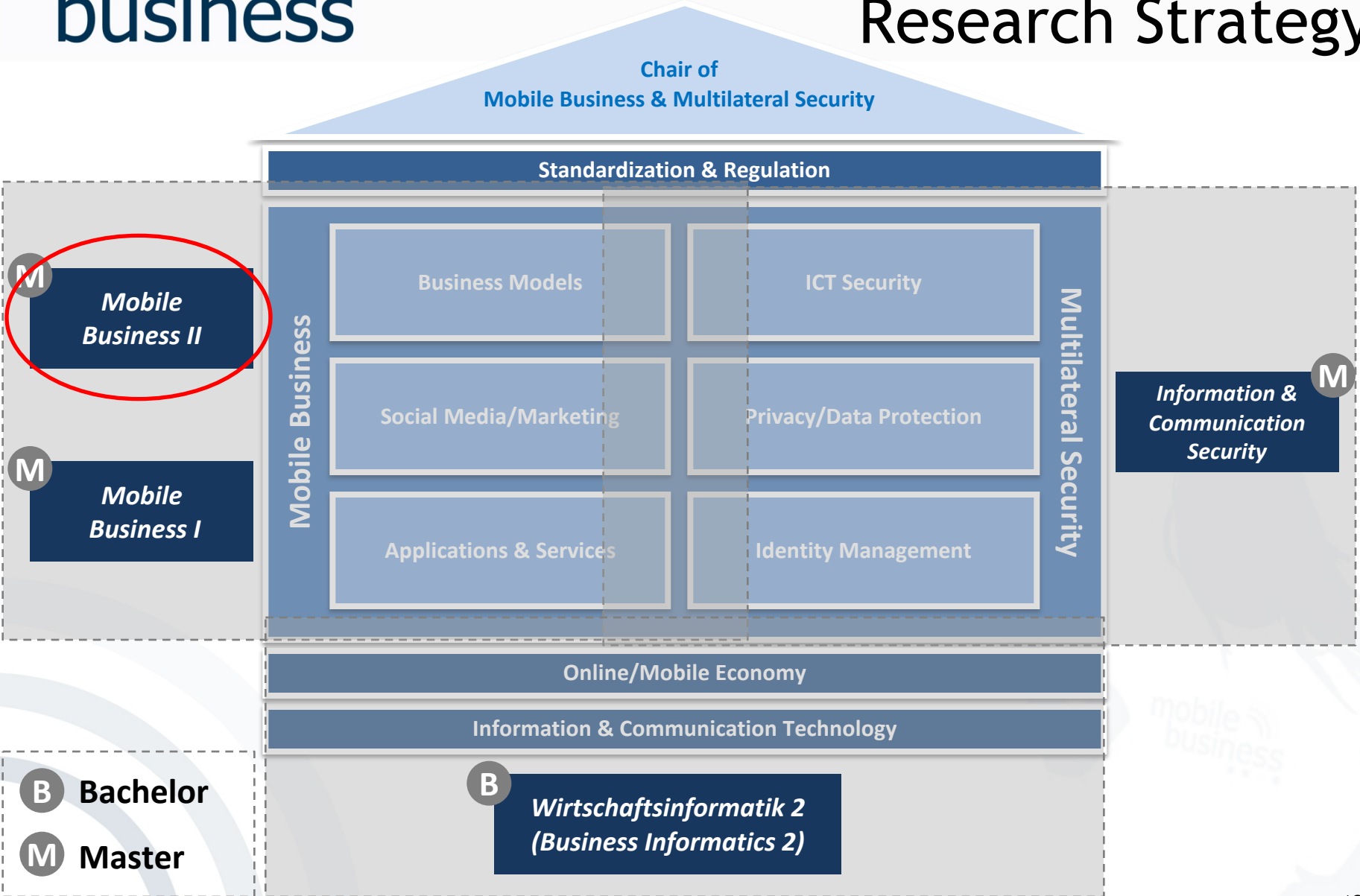
Contact address: [mob2\[at\]m-chair\[dot\]de](mailto:mob2@m-chair.de)



- **Course agenda is online.**
 - Please keep yourself updated!
 - Check the website of the course:
 - <https://www.m-chair.de/teaching?view=article&id=269:mobile-business-ii-application-design-applications-infrastructures-and-security&catid=15:lectures>
- Exam:
 - <https://www.wiwi.uni-frankfurt.de/en/faculty/deans-office/operational-divisions/examination-office.html>

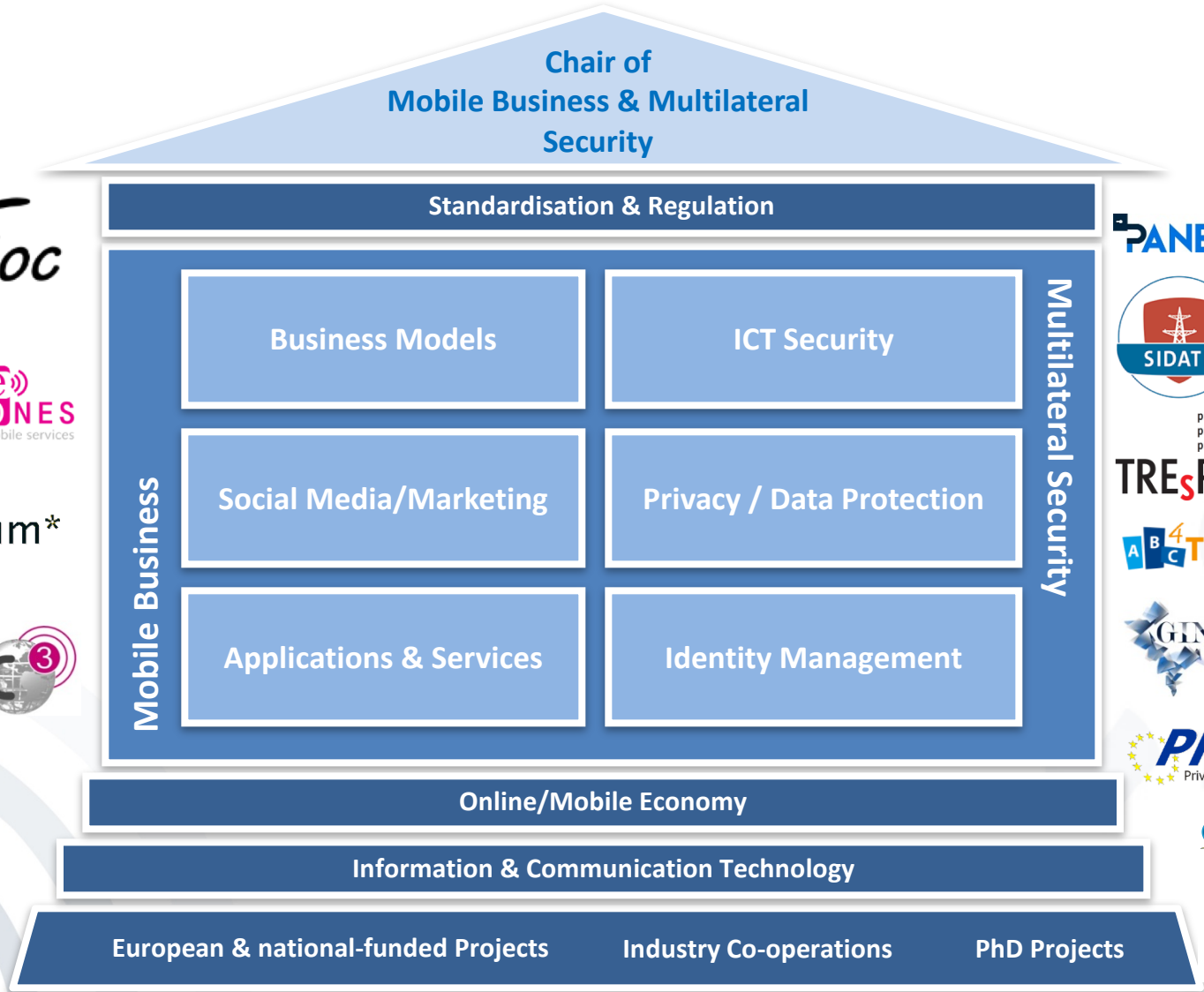


- The Chair of M-Business and Multilateral Security
- Teaching and Research Agenda
- Introduction into Mobile Business - History of Mobile Business & Mobile Telecommunication Systems
- Outline of this Course



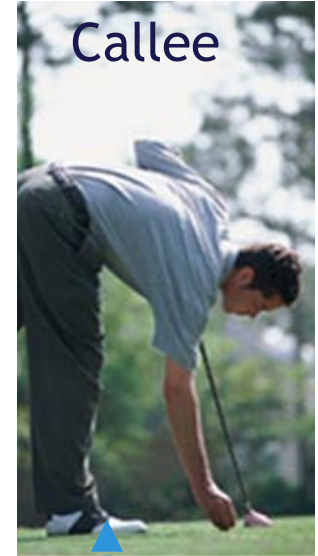
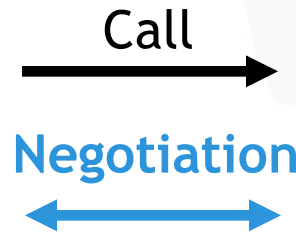
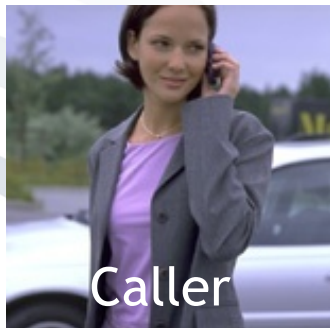
	SS 2024	WS 2024/2025
Bachelor		<p><i>Course</i> Business Informatics 2 (PWIN)</p> <p><i>Seminar</i> Machine Learning: Privacy, Regulations and Ethical Issues</p>
Master	<p><i>Course</i> Mobile Business II: Application Design, Applications, Infrastructures and Security</p> <p><i>Course</i> Information and Communication Security: Infrastructures, Technologies and Business Models</p> <p><i>Course</i> Privacy vs. Data: Business Models in the digital, mobile Economy</p> <p><i>Seminar</i> The Future is Now: Topics with and about ChatGPT and AI</p>	<p><i>Course</i> Mobile Business I: Application Design, Applications, Infrastructures and Security</p> <p><i>Course</i> Information and Communication Security: Infrastructures, Technologies and Business Models</p> <p><i>Seminar</i></p>

- **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



- 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

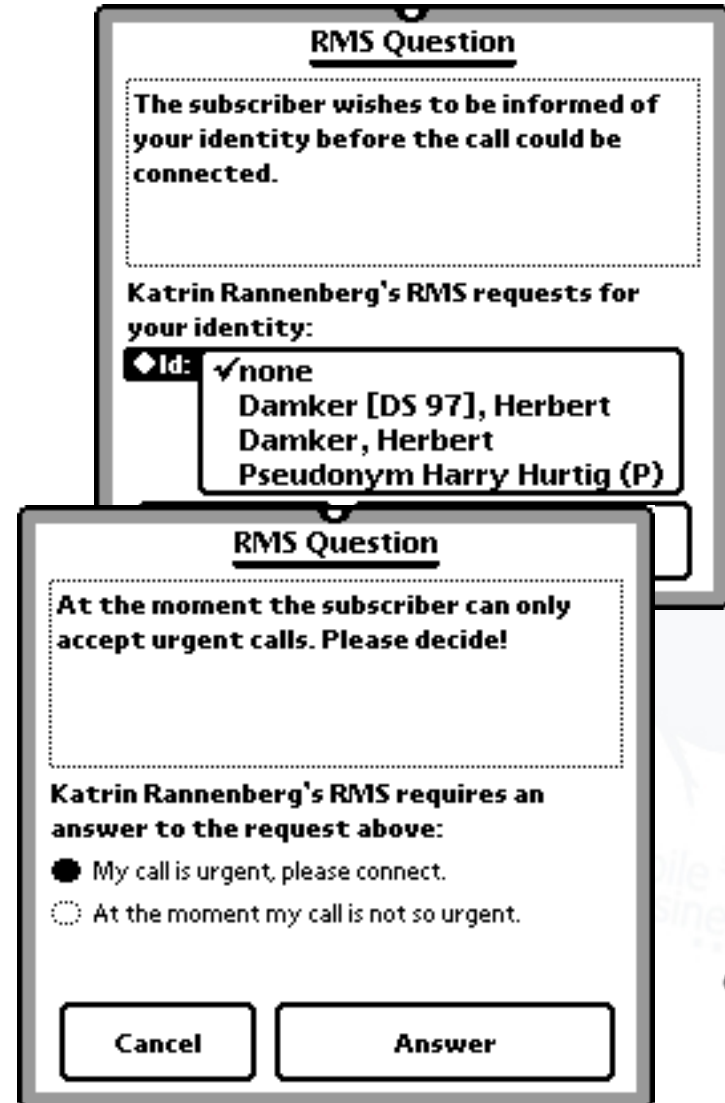
“I welcome you calling back.”

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!

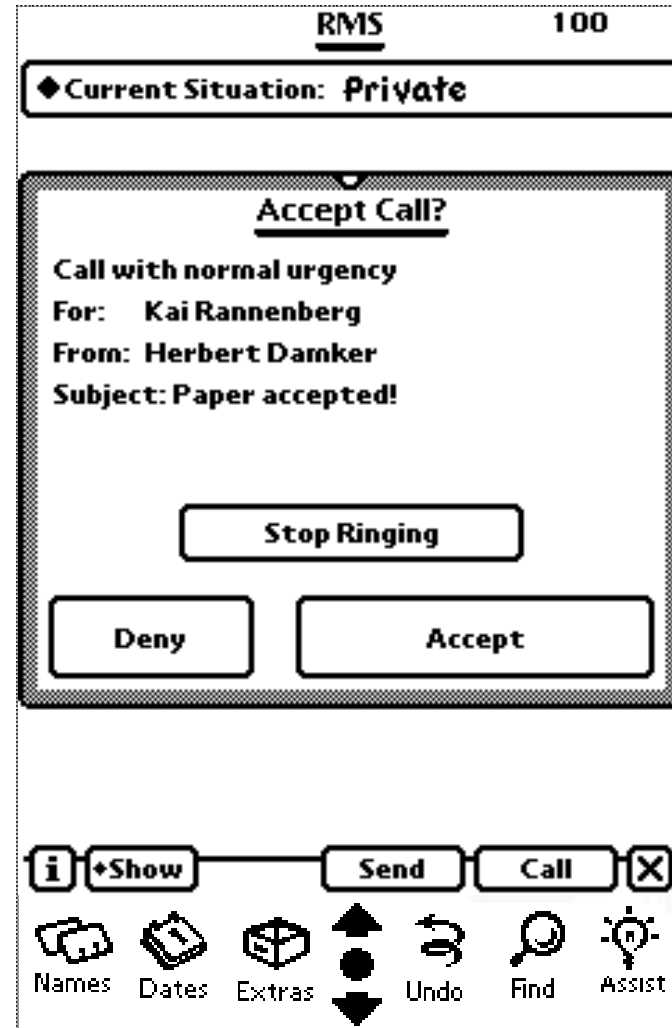
Katrin Rannenberg's RMS requires an answer to the request above:

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 calls of class:
 business calls 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: -



- **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

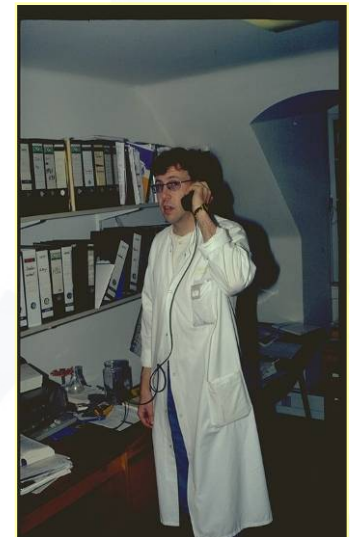
Overall results

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

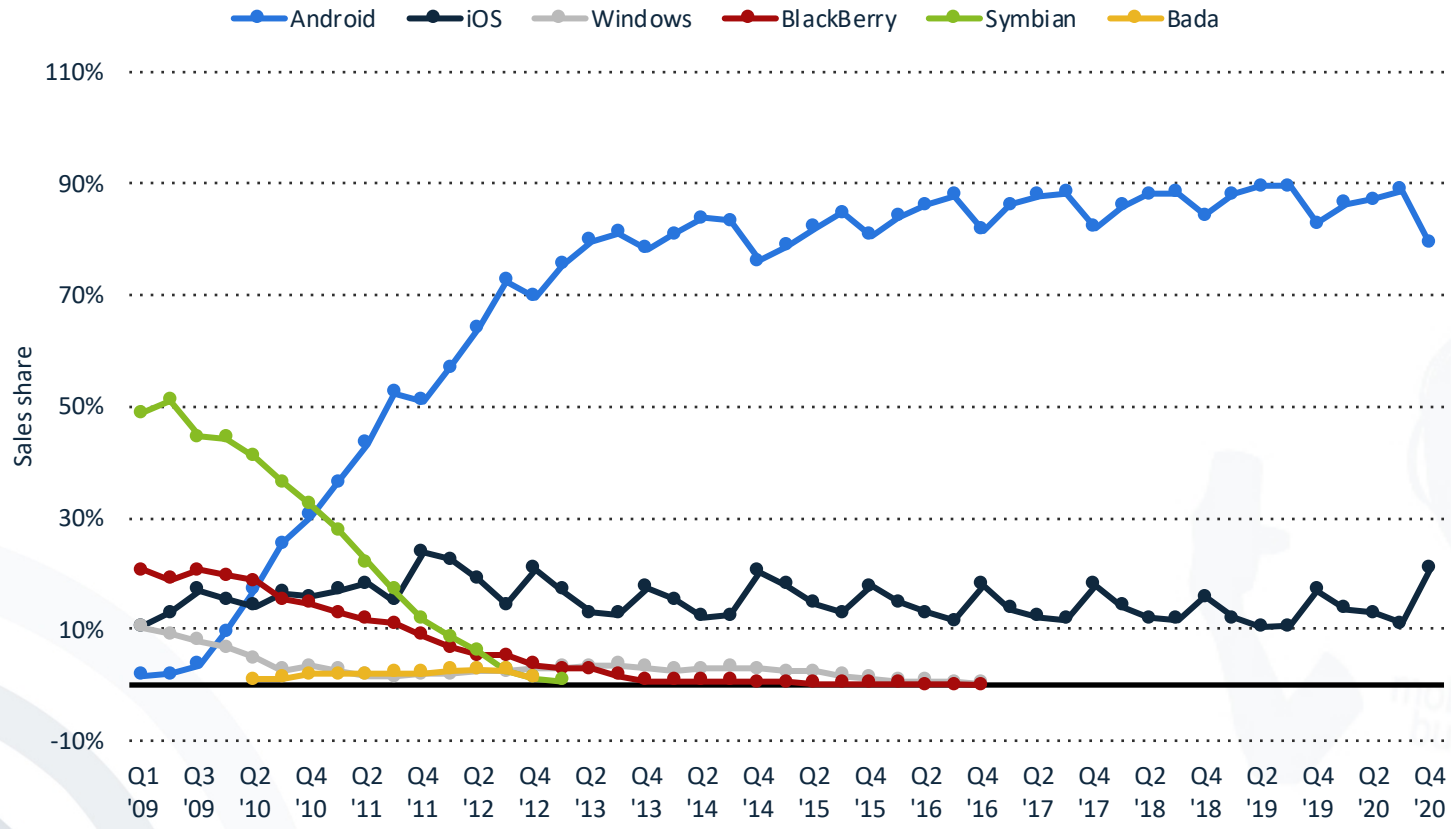
User demands

- 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 (2009-2020)



Mobile Applications are getting more and more popular

- Over 1.6 milion Applications in Apple's App Store in Q3-2022
- 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 enables mobile webpages to be an alternative to apps.



- 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

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 ?

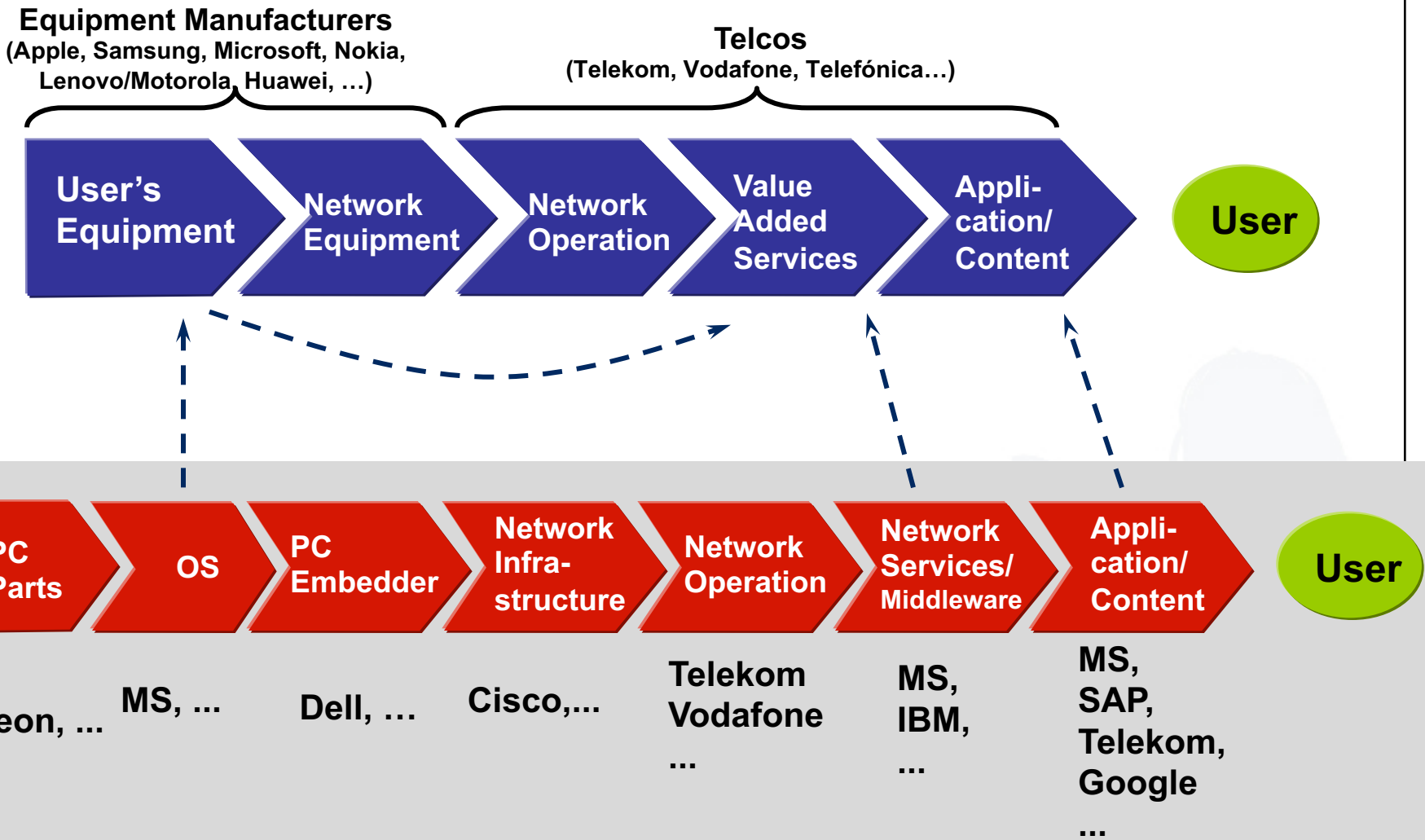
We chose a definition that (hopefully) lets us do interesting things:

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

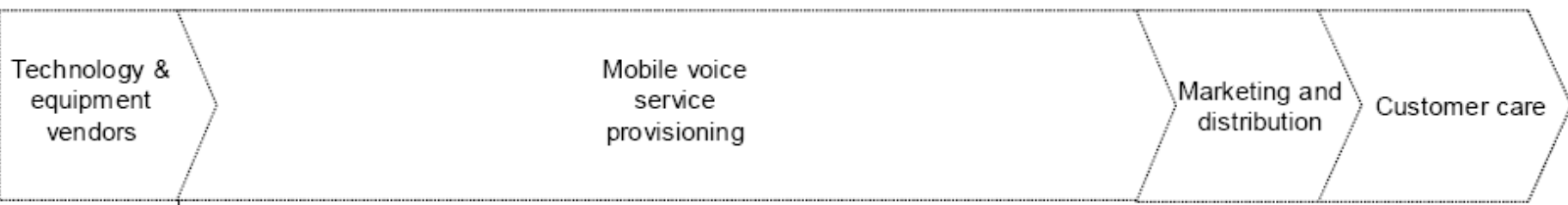
- Workplaces and private life will change thoroughly through mobile technologies and services.
- This implies extraordinary challenges and chances.
- The development will be strongly affected by international factors.



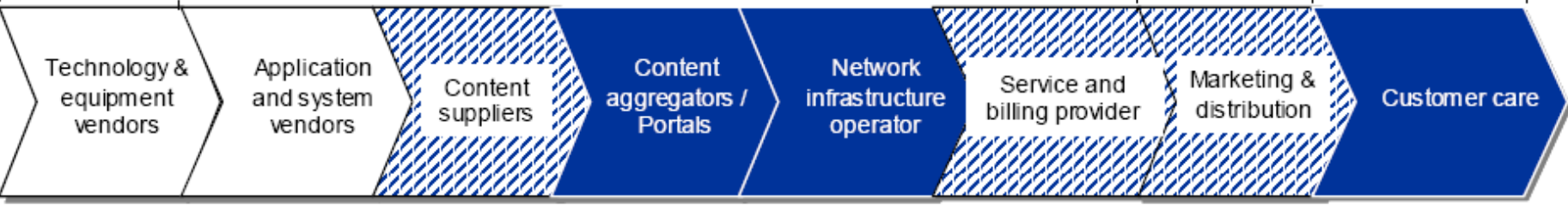
GSM World






TRADITIONAL VALUE CHAIN OF MOBILE SERVICE DELIVERY



EMERGING MOBILE OPERATOR VALUE CHAIN



	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.

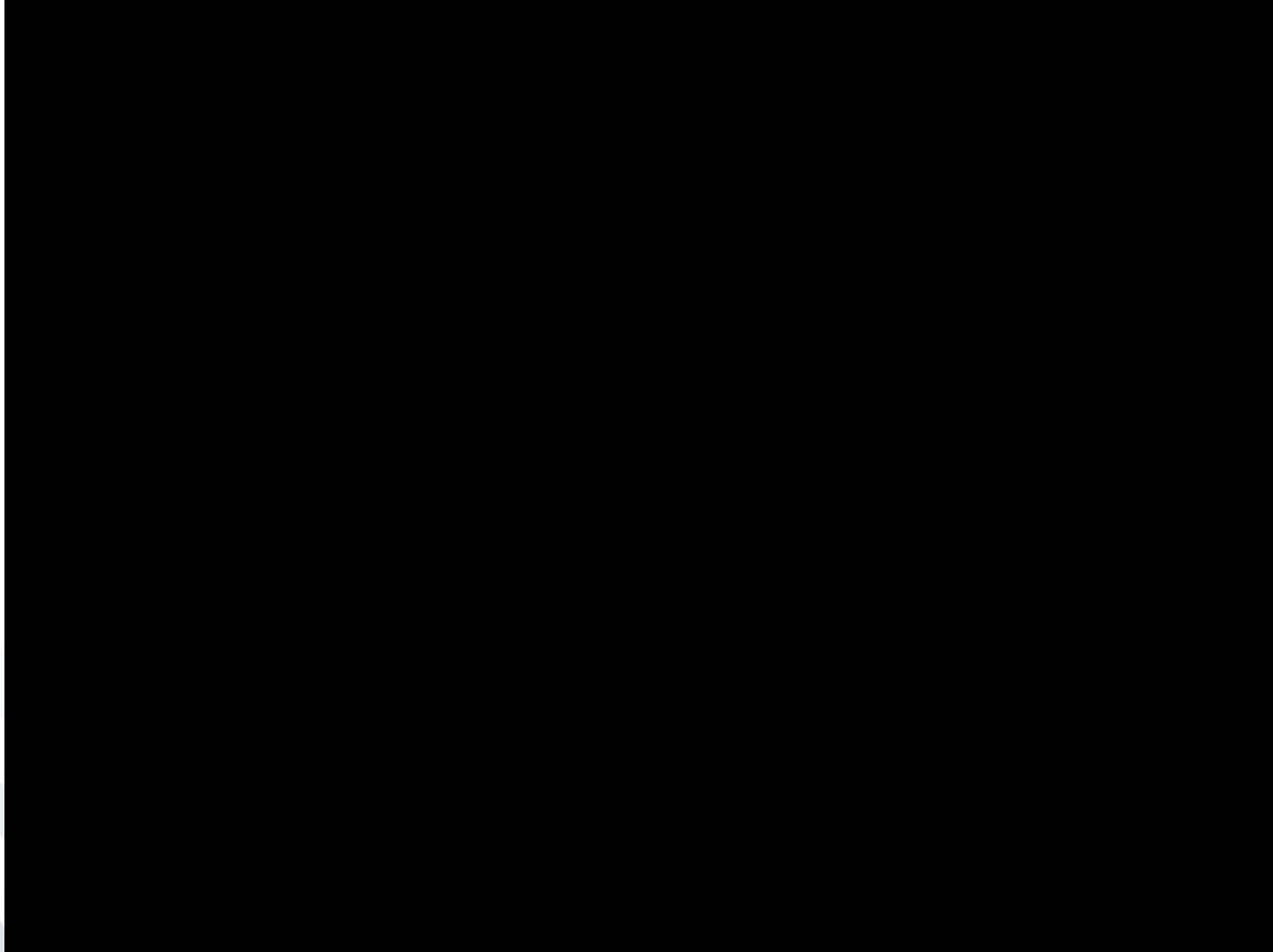
- Not every country's scenario (e.g. health care) can simply be transferred to another country.
- Mobile Business does not only relate to mobile phones. Other platforms are important, too.



- 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?

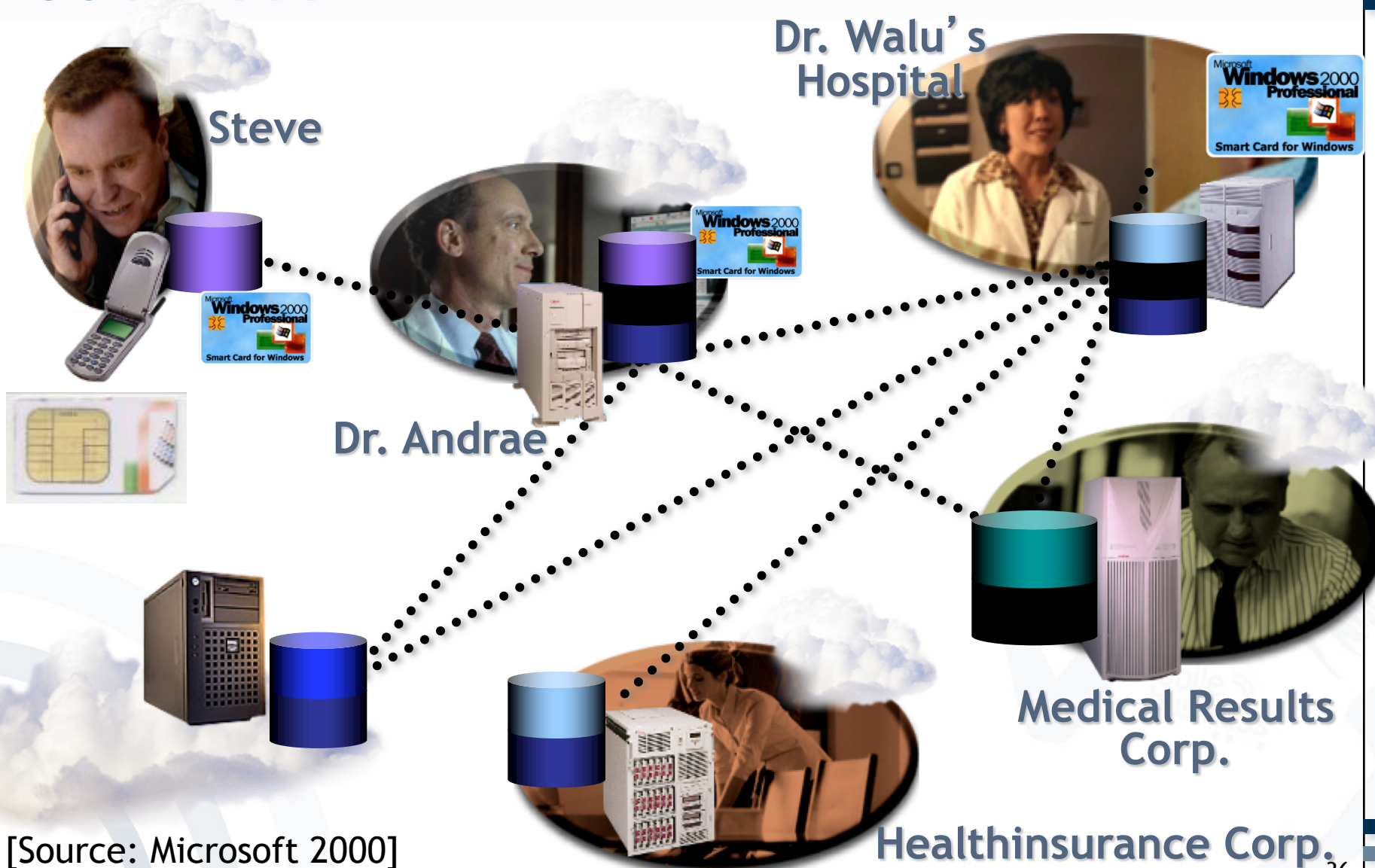


Illustrative Microsoft Video



mobile business

Parties Involved



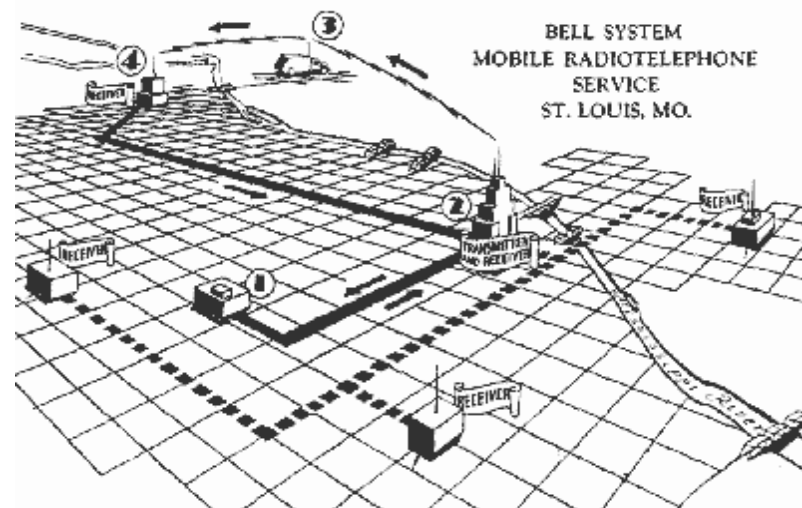
[Source: Microsoft 2000]

Healthinsurance Corp.

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.



History of Mobile Business

Early German Mobile Networks

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

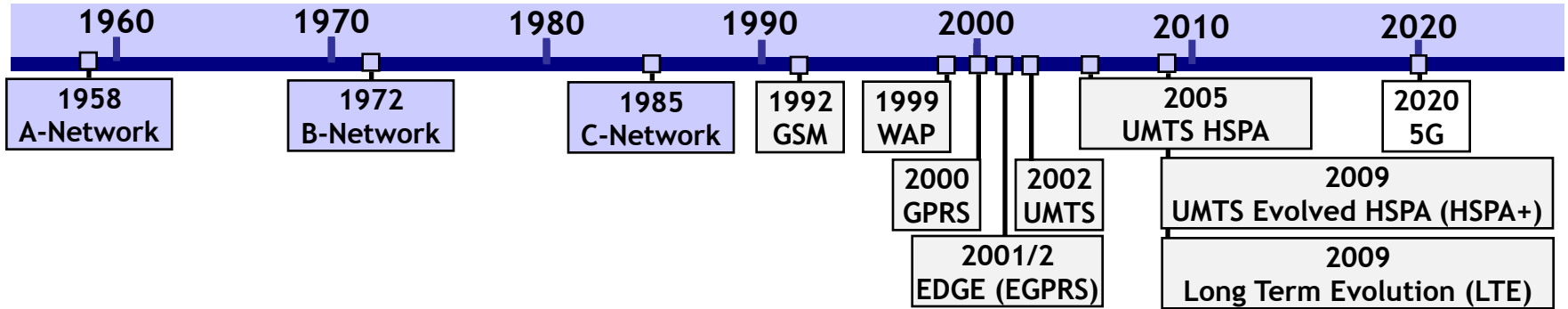


- Since 1981 NMT-450 (Nordic Mobile Telephone) in Norway, Sweden, Saudi Arabia, Denmark, Finland, ...



- 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 EDGE.





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.



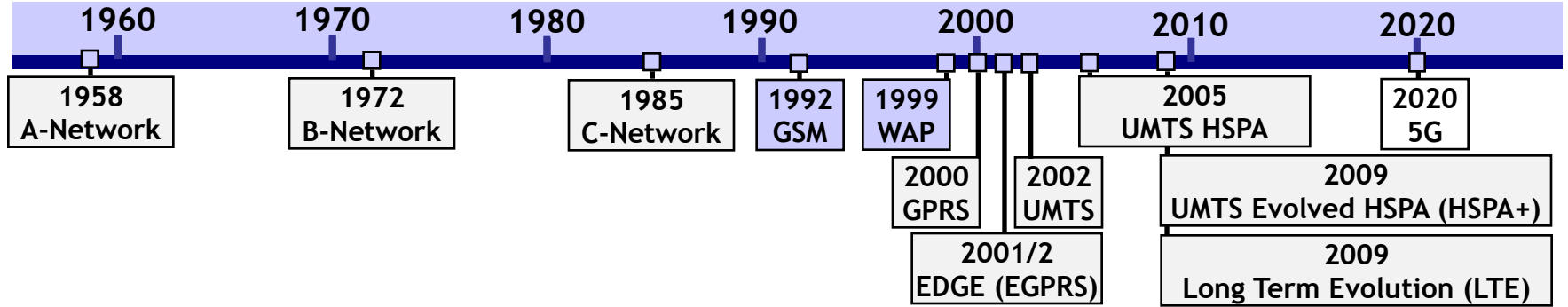
B-Network (1972 - 1994-12-31)

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

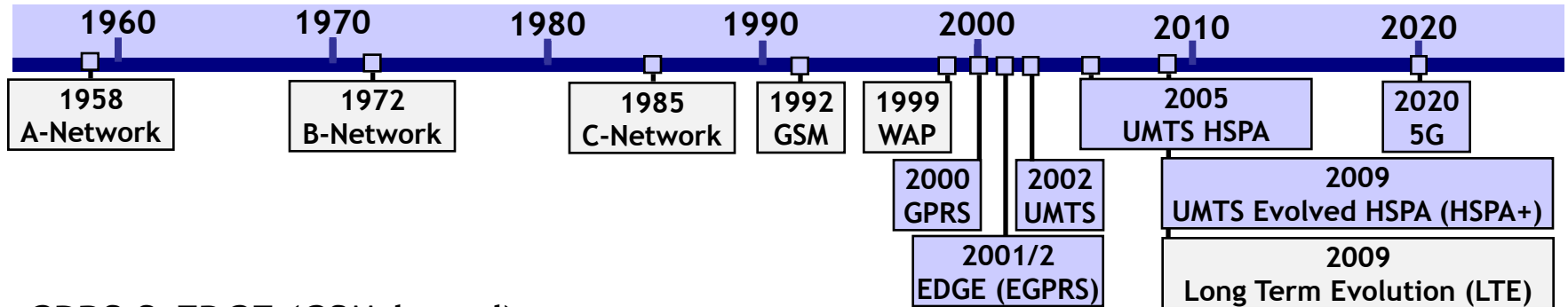
The technical standard for digital mobile radio networks in more than 100 countries; GSM includes data transfer services.

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+.

Fifth generation cellular network technology (5G)

5G offers higher data rates (up to 10 Gbit/s), lower latency and use of higher frequency spectrums.

Sixth generation cellular network technology (6G)

Research on 6G started in 2017, data rates up to 400 Gbit/s.

- 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

- 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
2. Positioning Methods for Location-based Services (LBS)
3. LBS Business Models
4. Cryptography
5. Electronic Signatures
6. Mobile Payment I
7. Mobile Payment II
8. Data Protection / IdM
9. Regulation of Mobile Telecommunication
10. Regulation by Licensing
11. HCI Issues
12. Design Evaluation
13. Current Research
14. Q&A

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

[Apple 2023]

<https://www.apple.com/app-store/> visited 2023.04.06

[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.

[Statista2020] Marktanteile der führenden Betriebssysteme am Absatz von Smartphones weltweit vom 1. Quartal 2009 bis zum 4. Quartal 2020.

<https://de.statista.com/statistik/daten/studie/73662/umfrage/marktanteil-der-smartphone-betriebssysteme-nach-quartalen/>

[Statista 2022] Number of apps available in leading app stores as of 3rd quarter 2022

<https://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/>

[WAP 2010]

www.wapforum.org/what/technical.htm, accessed 01-10-2010.

<https://www.wapforum.org/what/index.htm>, accessed 01-10-2022