

Information & Communication Security (WS 2020/2021)

Introduction

Prof. Dr. Kai Rannenberg,

Dr. Sebastian Pape

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

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

Chair of Mobile Business & Multilateral Security

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

Phone: +49 69 798 34701

Fax: +49 69 798 35004

e-mail: info@m-chair.de

www.m-chair.de





Kai Rannenberg



Sebastian
Pape



Narges
Arastouei



Welderufael
Tesfay



Frédéric
Tronnier



Ahad
Niknia



Sascha
Löbner



Ann-Kristin
Lieberknecht



Christopher
Schmitz



David
Harborth



Peter
Hamm

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



Majid
Hatamian



Tim
Schiller



Niels
Johannsen



Stephan
Heim



Marvin
Hegen



Michael
Schmid

Office:

Diana Weiß

Office Hours: Mo.-Fr. 09:00-15:00

RuW Building, Office 2.257

Email: diana.weiss@m-chair.de



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

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

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

	WS 2020/2021	SS 2021
Bachelor	<i>Seminar</i> Towards Central Bank Digital Currency (CBDC)	<i>Course</i> Business Informatics 2 (PWIN)
Master	<i>Course</i> Information & Communication Security: Infrastructures, Technologies and Business Models <i>Course</i> Mobile Business I: Application Design, Applications, Infrastructures and Security	<i>Seminar</i> Privacy Preserving Machine Learning <i>Course</i> Mobile Business II: Application Design, Applications, Infrastructures and Security <i>Course</i> Privacy vs. Data: Business Models in the digital, mobile Economy

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

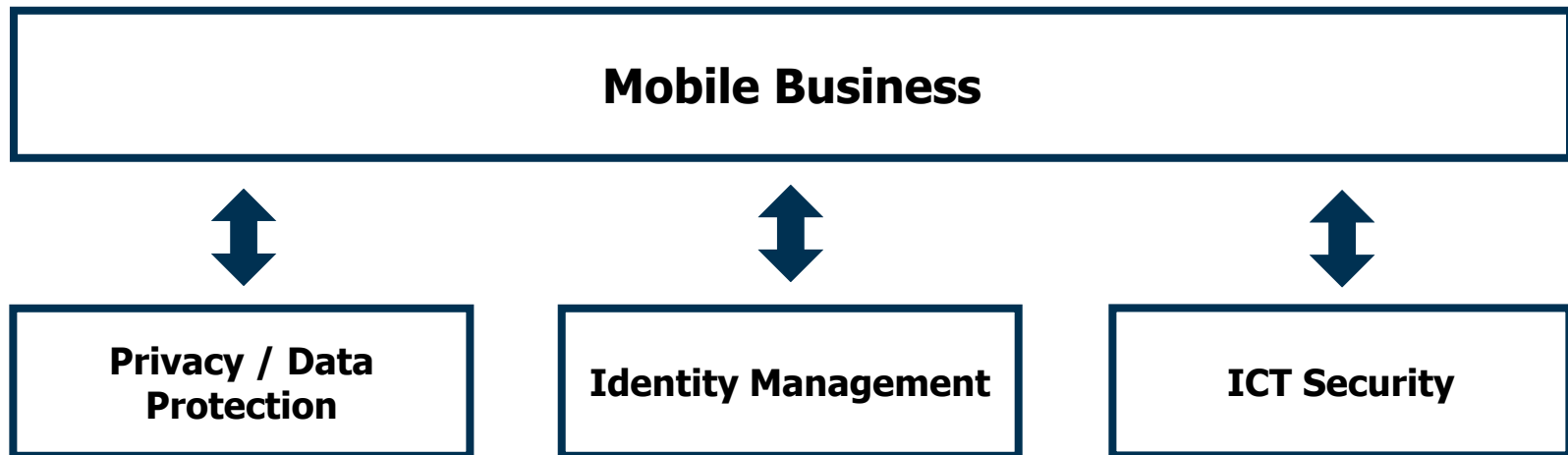
Lectures

Business Informatics 2

Seminars

Bachelor Thesis

M-Chair Research Statement



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

Standardization & Regulation

M

*Mobile
Business II*

Business Models

ICT Security

Mobile Business

Multilateral Security

Social Media/Marketing

Privacy/Data Protection

M

*Mobile
Business I*

Applications & Services

Identity Management

*Information &
Communication
Security*

M

Online/Mobile Economy

Information & Communication Technology

B

Bachelor

M

Master

B

*Wirtschaftsinformatik 2
(Business Informatics 2)*

- **Multilateral Security**
 - Security, Trust, Identity Management, and Privacy
 - Security and Privacy Management
 - Personal Security Devices
- **Mobile Life, Work, and Business**
 - Location-based Services
 - Mobile Communities
- **M-Infrastructures**
 - Combination, Integration, Innovation
 - Standardization, Regulation

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



Ahad Niknia, M.Sc.

RuW Building, Office 2.231

Email: ahad.niknia@m-chair.de



Sascha Löbner, M.Sc.

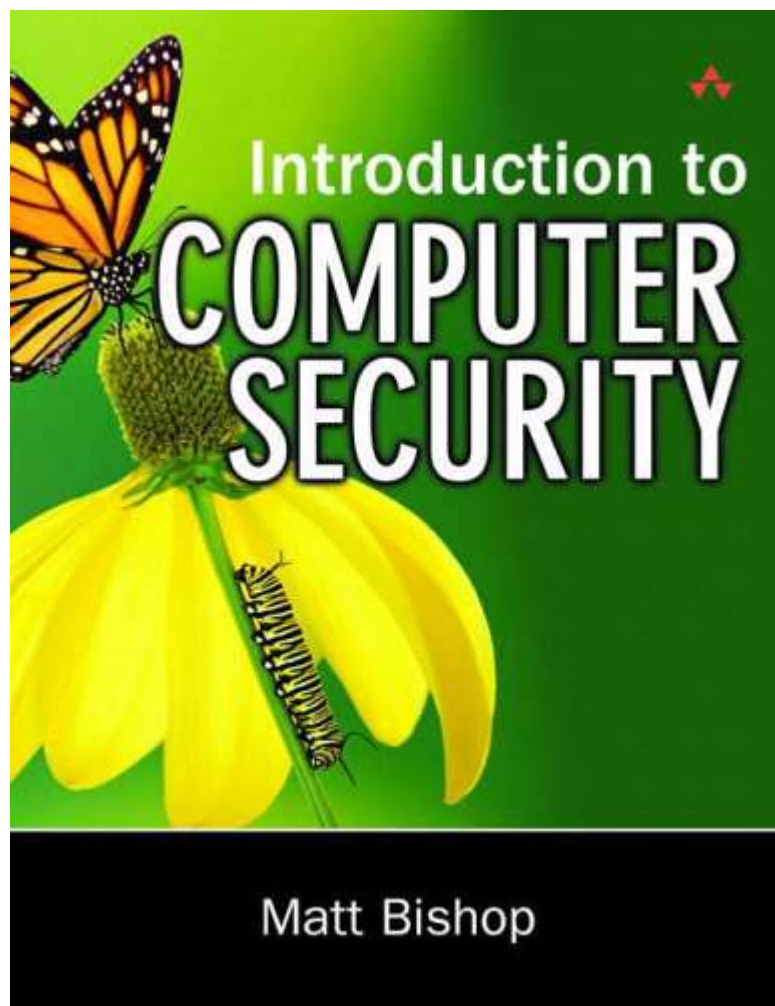
RuW Building, Office 2.236

Email: sascha.loebner@m-chair.de

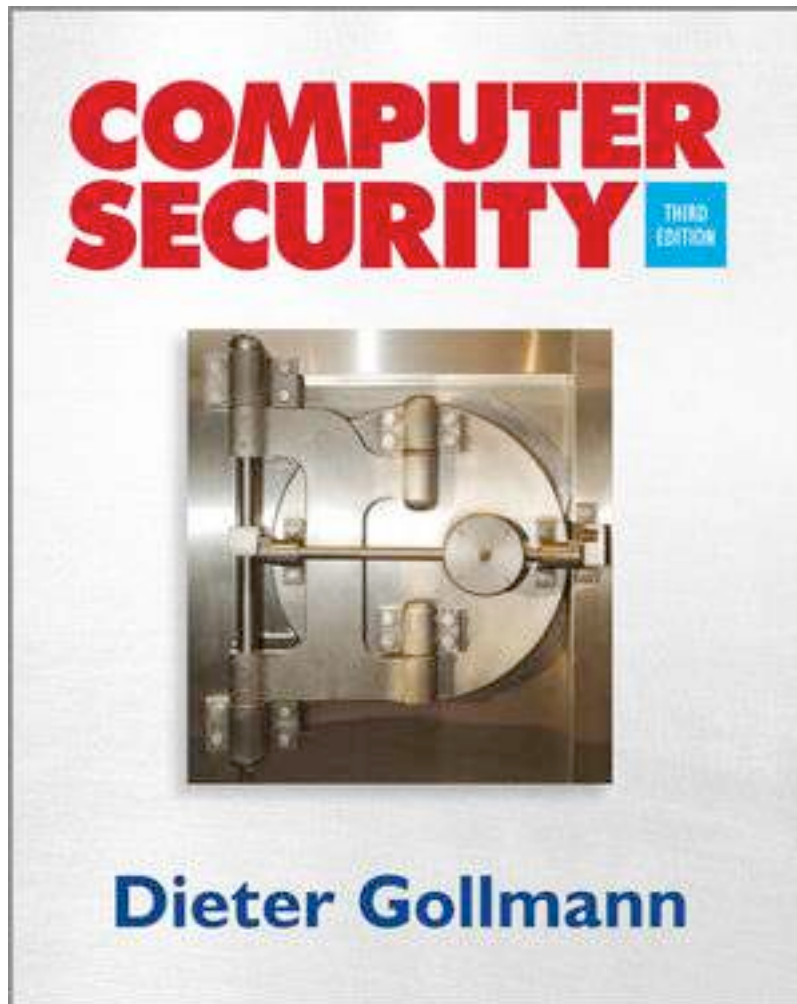
twitter.com/mchair



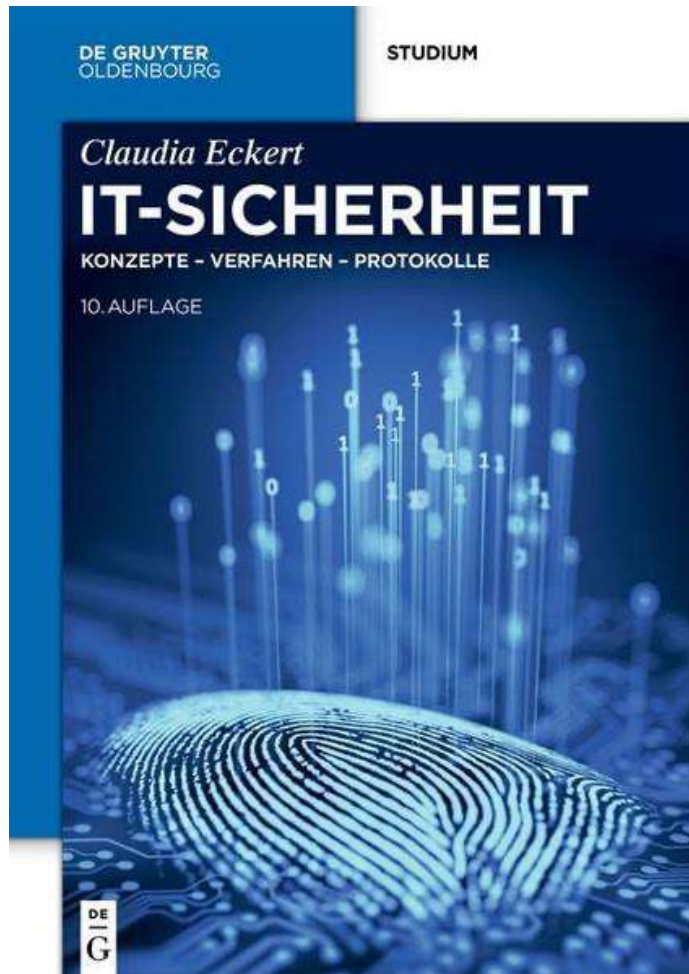
security@m-chair.de



Matt Bishop:
Introduction to
Computer Security
Addison Wesley
ISBN: 0-321-24744-2



Dieter Gollmann:
Computer Security
John Wiley & Sons
ISBN: 0-470-74115-5



In German:

Claudia Eckert:

IT-Sicherheit

Oldenbourg

ISBN: 978-3-11-055158-7

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



Research
Databases

Internet search engines:

scholar.google.com



On the dates and the agenda

- **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>
- **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=58

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

The New York Times

Facebook Security Breach Exposes Accounts of 50 Million Users

Sept. 28, 2018

February 15, 2012, 2:14PM

Anonymous-Linked Attacks Hit US Stock Exchanges

(Distributed) „Denial of Service“-Attacks on e-auctioneers/broker/betting office

March 5, 2012, 3:40PM

Hacker Group Breaches Library of Congress Site, Publishes Passwords

Bloomberg

Our Company | Professional | Anywhere | **QUEUE** Microsoft

HOME QUICK **NEWS** OPINION MARKETS PERSONAL FINANCE TECH SUSTAINABILITY

Related News: Law · Asia · Japan · U.S. · Retail · Technology · Media

Sony Data Breach Exposes Users to Years of Identity-Theft Risk

theguardian

News Sport Comment Culture Business Money Life & style

News World news Edward Snowden

Everyone is under surveillance now, says whistleblower Edward Snowden

People's privacy is violated without any suspicion of wrongdoing, former National Security Agency contractor claims

The New York Times

Security Gap Leaves 885 Million Mortgage Documents Exposed

May 24, 2019

BBC

Sign in

News Sport Reel Worklife Travel Future More

NEWS

Facebook's Twitter and Instagram accounts hacked

🕒 8 February 2020

Risks of Unprotected Market Activities

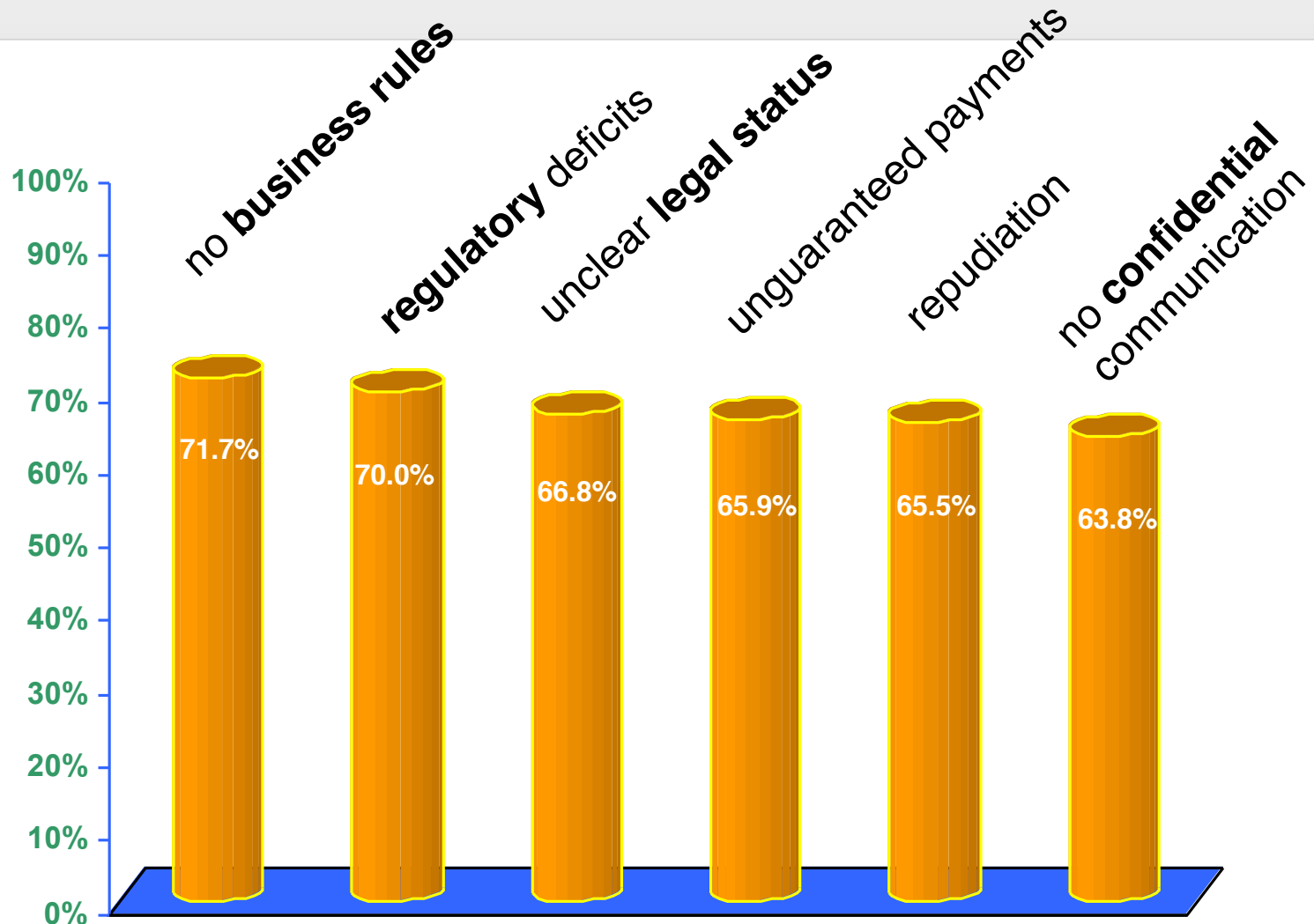
Provider

- No payment - debtor cannot be captured
- Wrong or fake orders
- Copyright violations
- www attacks
- Internal server intrusion
- ...

Consumer

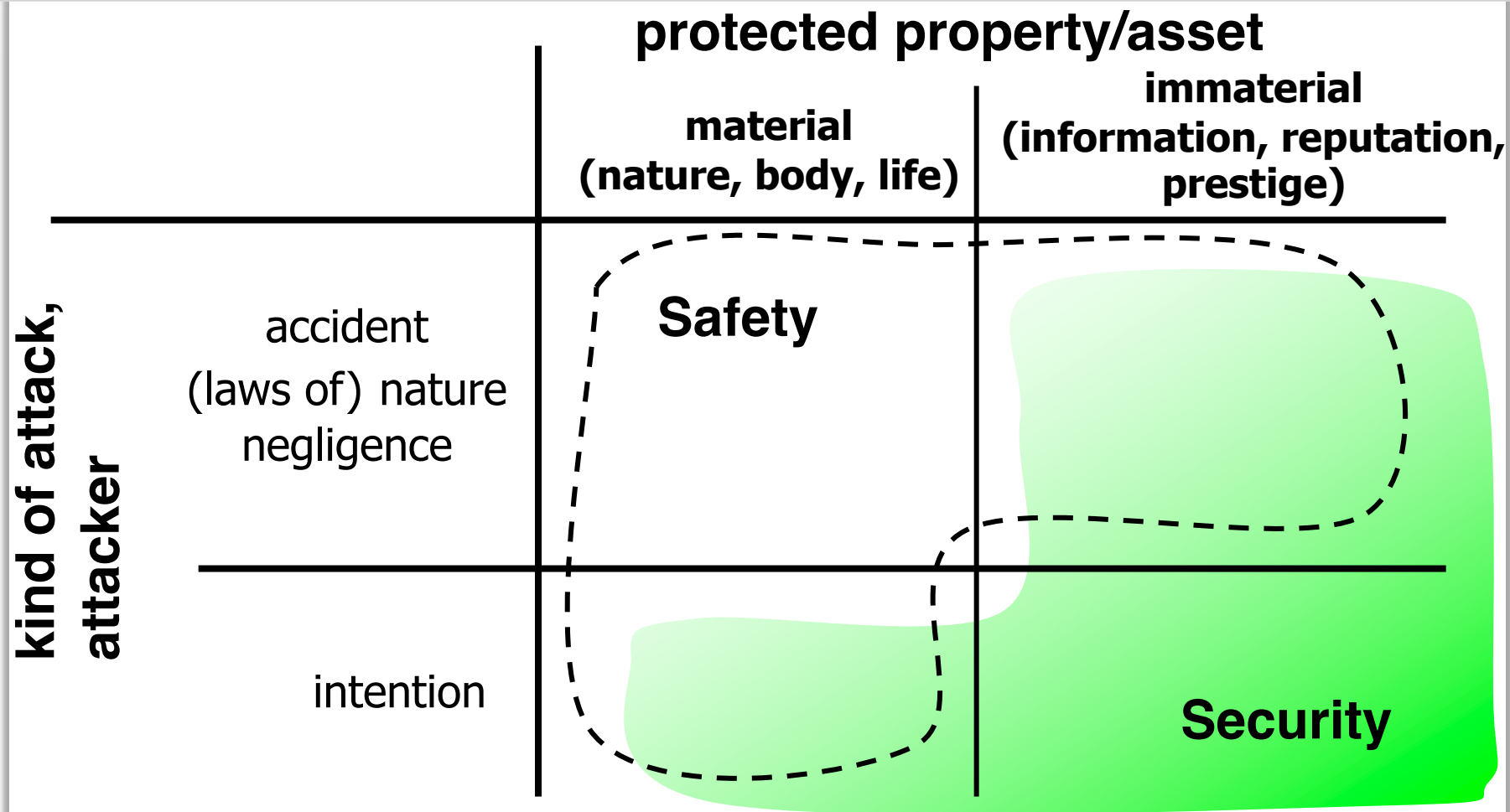
- Unwanted deliveries (false, not ordered, ...)
- Unauthorized / unexpected direct debt of money, e.g. from a credit card account
- Unwanted advertising mail (“spamming”)
- Transparent consumers
- ...

E-Commerce Requires Security



Source: Electronic Commerce Enquête, Universität Freiburg, 1998 [Schoder, Müller 1999]
(32 options + free text for choice, 6 options with highest agreement listed)

Security vs. Safety



A very human discrepancy

- **Privacy**
Protect the own sphere and the own values/assets
- **Binding**
Gain trust (of partners), transfer values

A technical arrangement

- **Confidentiality**
Information delivery just to whom it is intended
- **Integrity**
No faking of information
- **Availability**
No system failures / no loss of data
- **Accountability**
Actions always accountable to responsible parties

A combination of technical, organizational and legal methods is necessary. [Rannenberg 2000a]

- *Unauthorized acquisition of information* = loss of **confidentiality**:
- Patient data (for example
 - information of physical examinations, diagnoses or therapy attempts, but also
 - content of meetings on patient cases which is stored in databases)
- shall not accessible to unauthorized persons (e.g.
 - other patients,
 - hospital employees, or
 - employees of the network operator whose (mobile) network is used to transfer the data from hospital to hospital).
- Citizens (in smart cities) should not be monitored or tracked by default.

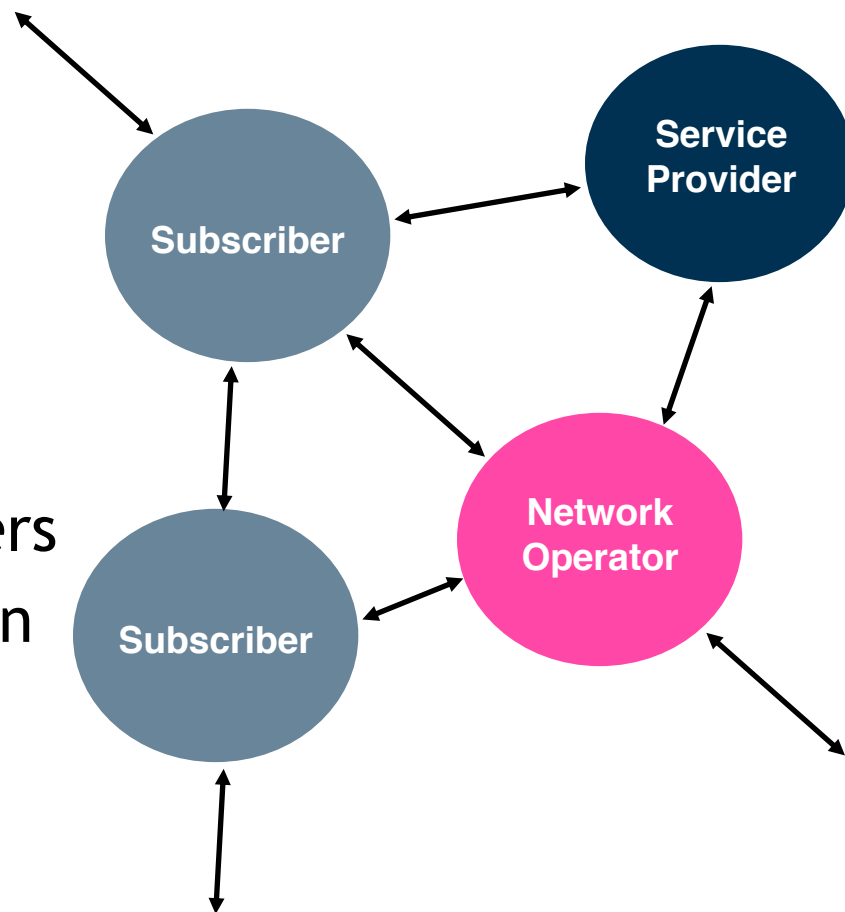
- *Unauthorized modification* of information = loss of **integrity**:
- Unauthorized and unobserved data modifications (e.g. a prescription, a medicament ordering or a dosage instruction) may lead to life-threatening consequences.
- Forging of electronic records can creates chaos in society - often discussed as informational warfare.
- Manipulation of traffic regulation and control in (smart) cities is a nuisance and can even be life-threatening.

- *Unauthorized impair of functionality* = loss of **availability**:
- If a patient's medical record is accessible solely via one network and this network fails, when patient data is needed, this may be life-threatening for the patient.
- (Smart) cities have a major problem, if critical infrastructures for e.g. electricity distribution are not available anymore.

- *No responsible parties for actions* = loss of **accountability**:
- If the persons liable for procedures in medical ICT systems (e.g. for the delivery of diagnoses, therapy instructions or billings) cannot be identified, irresponsible actions may occur.
- The consequences of a mistake may be worse for the injured party since it is unclear whom to ask for compensation.
- If (restrictive) measures (e.g. traffic suspension) taken in smart cities cannot be attributed to responsible parties (“the computer has decided”) citizens lose trust.

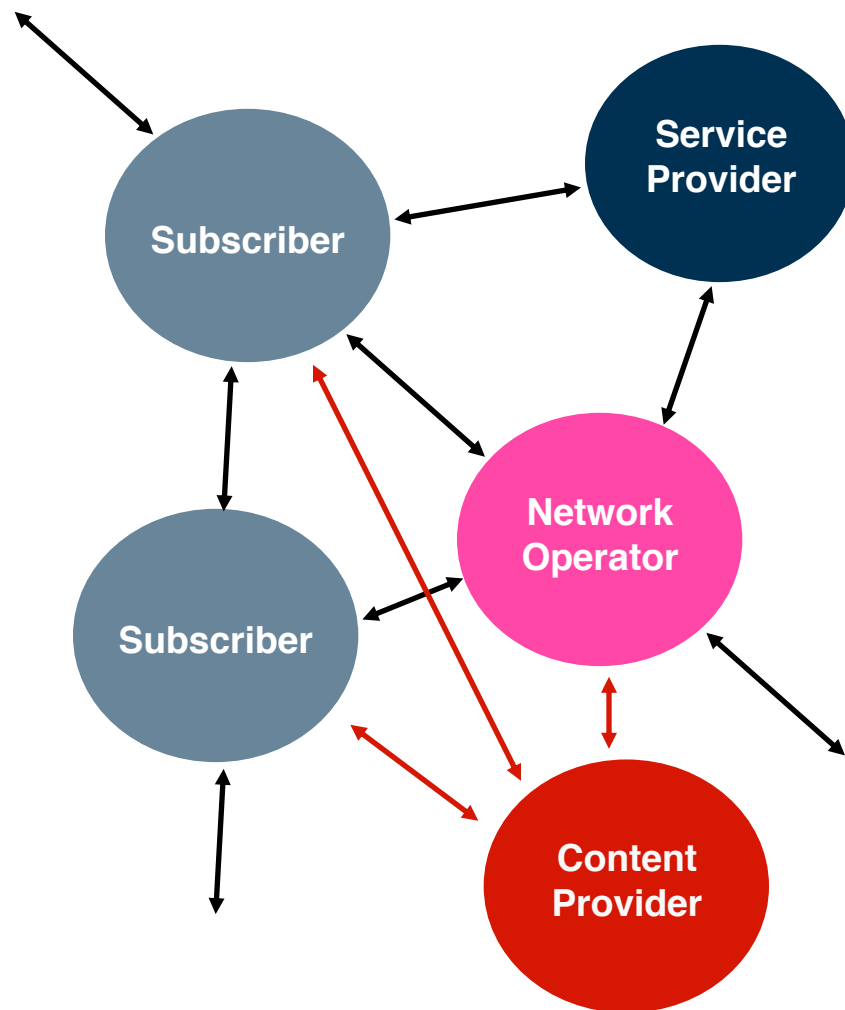
Different Parties with different Interests

- Customers/Merchants
- Communication partners
- Citizens/Administration

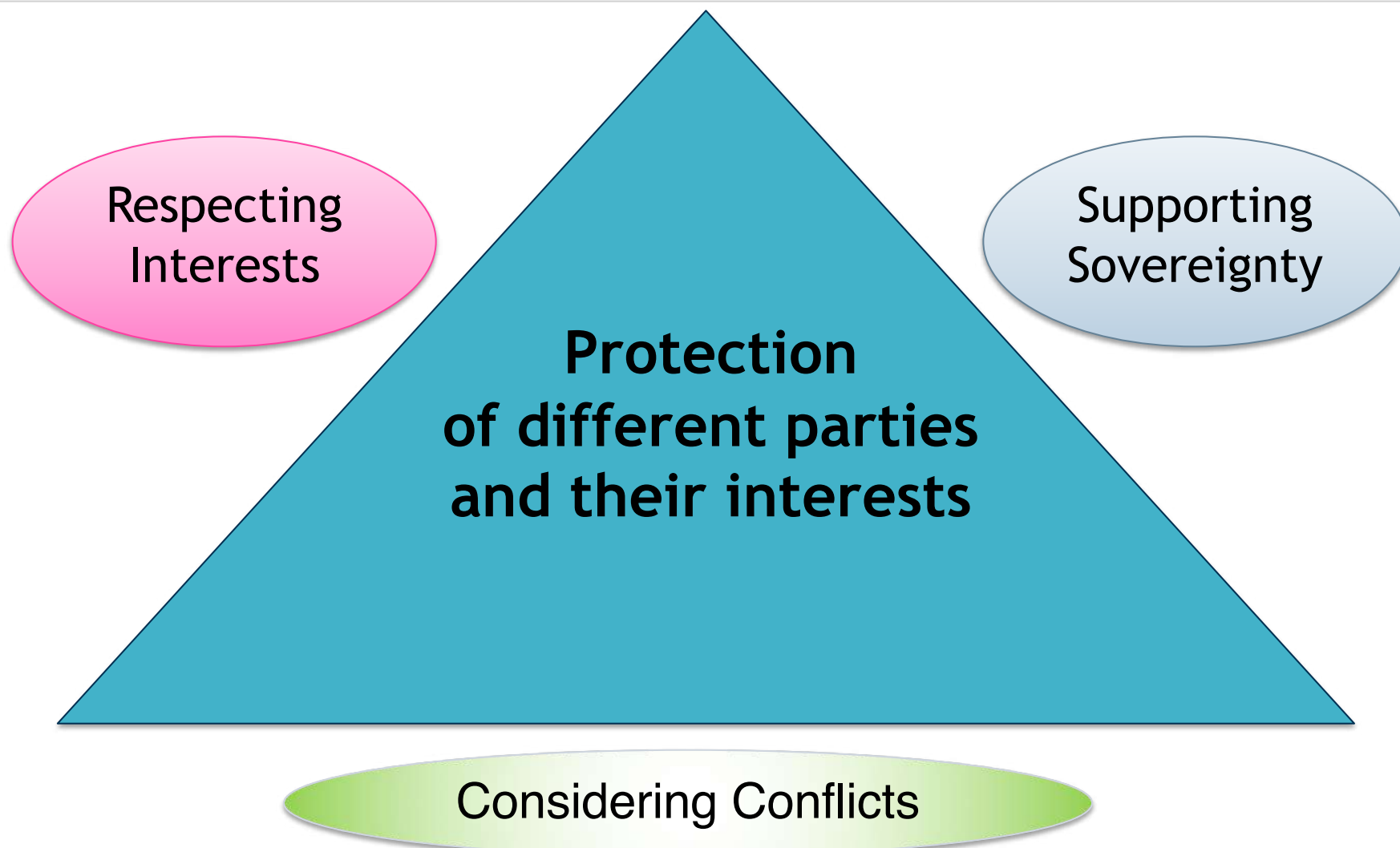


... in a world of consortia

- more partners
- more complex relations



Multilateral Security



Respecting Interests

- Parties can define their own **interests**.
- Conflicts can be **recognized** and **negotiated**.
- Negotiated **results** can be **reliably enforced**.

Supporting Sovereignty

- Requiring each party to **only minimally trust** in the honesty of **others**
- Requiring **only minimal or no trust in technology** of others

Protection of **different parties** and their **interests**

Multilateral Security in daily communication

The Challenge

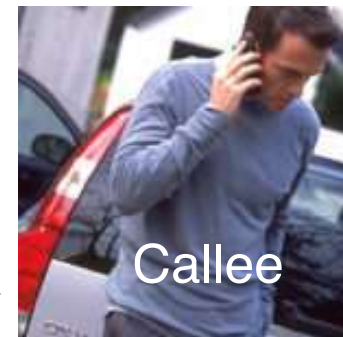
- Increased reachability due to new communication services
- Annoying calls
- Shortage of time
- Caller-ID conflict

→ Reachability Management (RM)

[Rannenbergh 2000b,c]



accept



or

deny



The Features

- Automatic call filtering under user control
- Privacy protection for both caller and callee
- Choice of different ways to express urgency
- Choice of different reactions for different situations



Call →



Call →

Negotiation



Topics of Negotiation

- Urgency of the call
- Extent of identification
- 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](#)

Why should your call go through?

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)

Cancel Answer

RMS Question

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

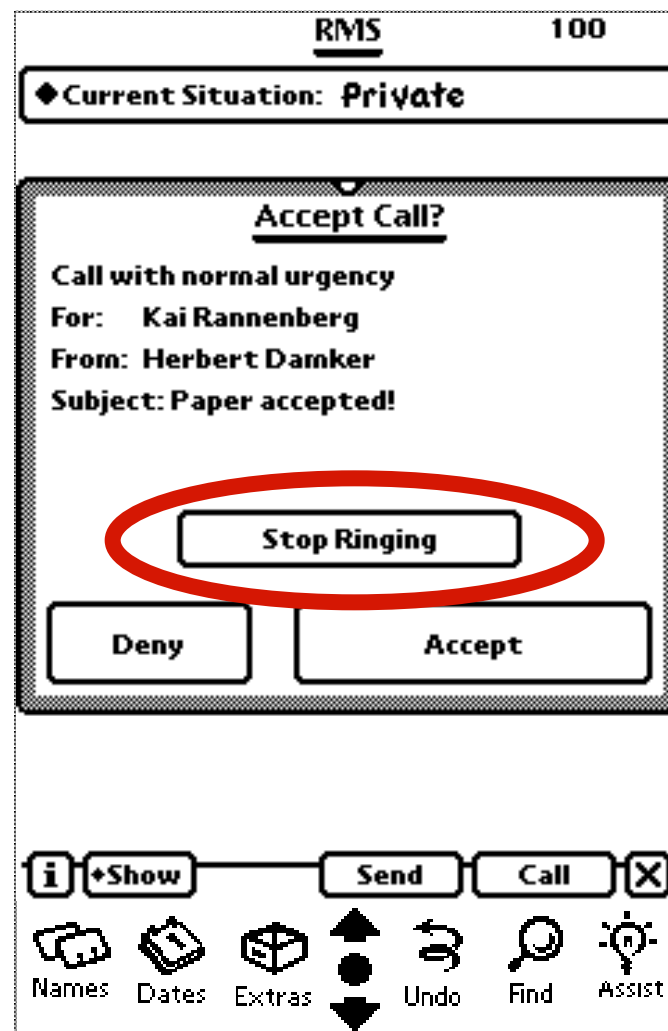
Katrin Rannenberg's RMS requires an answer to the request above:

☒ 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 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

Configuring your RMS

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

Respecting Interests

- Parties can define their own **interests**.
- Conflicts can be **recognized** and **negotiated**.
- Negotiated **results** can be **reliably enforced**.

Supporting Sovereignty

- Requiring each party to **only minimally trust** in the honesty of **others**
- Requiring **only minimal or no trust in technology** of others

Protection of **different parties** and their **interests**

- Protection of **callers and callees**
- **Balance** of security requirements
- Processing and storage of **sensitive data**
in a **personal environment**

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

Outline of this course

Date	Time	Session	Title
03.11.20	10:00-12:00	Lecture	Introduction
10.11.20	10:00-12:00	Lecture	Authentication
10.11.20	16:00-18:00	Lecture	Cryptography I
17.11.20	10:00-12:00	Lecture	Cryptography II
24.11.20	10:00-12:00	Exercise	Authentication
24.11.20	16:00-18:00	Exercise	Cryptography
01.12.20	10:00-12:00	Lecture	Access Control
08.12.20	10:00-12:00	Lecture	Electronic Signatures
08.12.20	16:00-18:00	Exercise	Access Control
15.12.20	10:00-12:00	Lecture	Identity Management
12.01.21	10:00-12:00	Lecture	Privacy Protection I
19.01.21	10:00-12:00	GL1	Guest Lecture I
19.01.21	16:00-18:00	Exercise	Security Management (Michael Schmid)
26.01.21	10:00-12:00	Lecture	Privacy Protection II
02.02.21	10:00-12:00	Lecture	Computer System Security
02.02.21	16:00-18:00	GL2	Guest Lecture II
09.02.21	10:00-12:00	Lecture	Network Security I
16.02.21	10:00-12:00	Lecture	Network Security II
16.02.21	16:00-18:00	Lecture	Exam Prep and Wrap Up

- [FGGKMMRS 2014] Felix Freiling, Rüdiger Grimm, Karl-Erwin Großpietsch, Hubert B. Keller, Jürgen Mottok, Isabel Münch, Kai Rannenberg & Francesca Saglietti: Technische Sicherheit und Informationssicherheit, Unterschiede und Gemeinsamkeiten; Informatik-Spektrum, February 2014, Vol. 37, Issue 1, February 2014, pp. 14-24, DOI: 10.1007/s00287-013-0748-2; <https://fb-sicherheit.gi.de/fileadmin/FB/SICHERHEIT/AKBegriffsbildungIS-1-2014.pdf>
- [Rannenberg 2000a] Kai Rannenberg: Mehrseitige Sicherheit - Schutz für Unternehmen und ihre Partner im Internet; Wirtschaftsinformatik Volume 42, pp. 489-497 (2000), <https://link.springer.com/article/10.1007/BF03250765>
- [Rannenberg 2000b] Kai Rannenberg: Multilateral Security – A concept and examples for balanced security, pp. 151-162 in Proceedings of the 9th ACM New Security Paradigms Workshop 2000, September 19-21, 2000 Cork, Ireland; ACM Press; ISBN 1-58113-260-3, <https://m-chair.de/images/documents/publications/Rannenberg/p151-rannenberg.pdf>
- [Rannenberg 2000c] Kai Rannenberg: How much negotiation and detail can users handle?, pp. 37-54 in Frédéric Cuppens et al.: Computer security: Proceedings of the 6th European Symposium on Research in Computer Security; October 4-6, 2000, Toulouse, France; Lecture Notes in Computer Science 1895, Springer-Verlag; ISBN 3-540-41031-7, <https://m-chair.de/images/documents/publications/Rannenberg/ESORICS-f-1.7.mh.pdf>
- [Schoder, Müller 1999] Detlef Schoder, Günter Müller: Potentiale und Hürden des Electronic Commerce – Eine Momentaufnahme, Informatik-Spektrum Volume 22, pp. 252–260 (1999), <https://link.springer.com/article/10.1007/s002870050142>