Challenges of Health Care in Germany – What health economic tools do we apply?

Riga 20.08.2018

Dr. Olav Goetz, M.Sc.

Agenda

1. Health Care System in Germany
2. Challenges in Health Care
3. Simulation as a solution tool (?)

Overview

Germany

- **Area: 357,168 km²**
- **Population: 82,521,653 (2016, destatis.de);**
- **GDP (PPP): - total: $3,685 trillion (2017,)**

- per capita: $44,550 (2017)

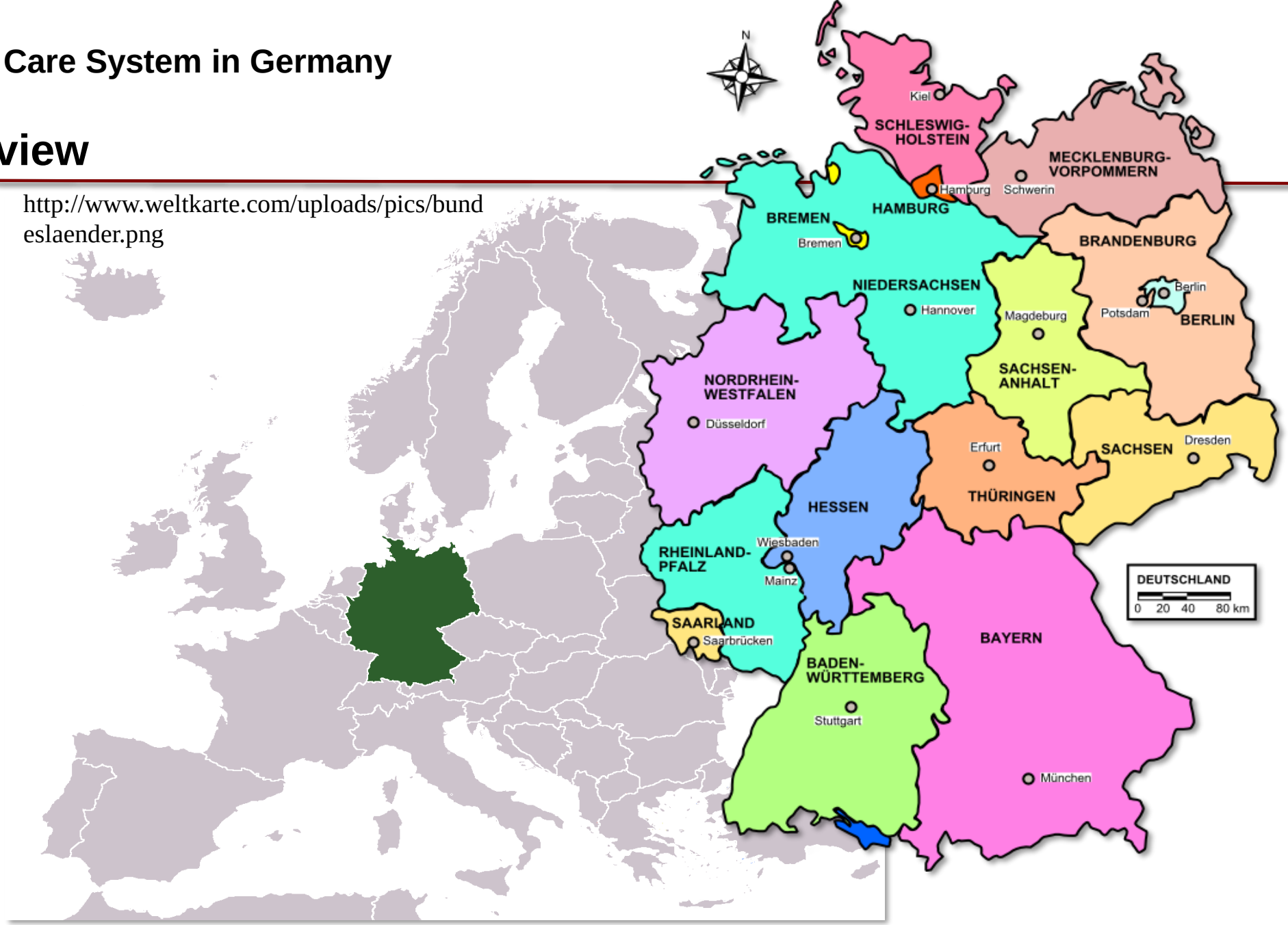
- **Capital: Berlin**

- population: 3,592,059 (Dec. 2017)

http://www.mygeo.info/landkarten/deutschland/Deutschland_in_Europa.png

Overview

http://www.weltkarte.com/uploads/pics/bundeslaender.png



Overview

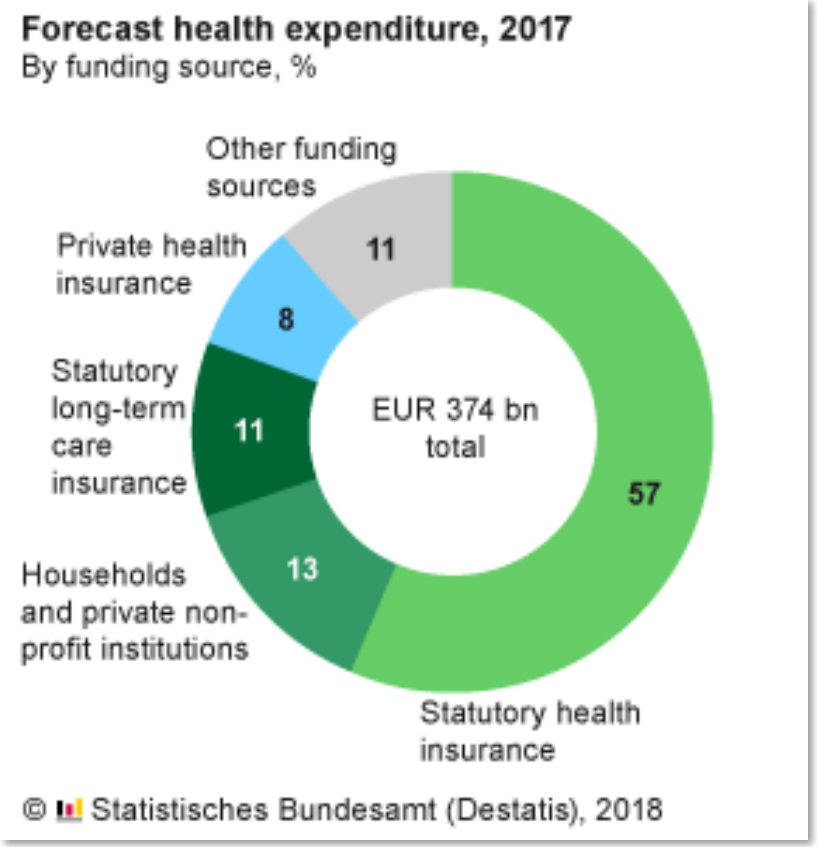
A lot of important aspects, data, information regarding Health Care Systems available – let´s focus …

- Health Care Expenditure
- Health Personnel
- Hospitals
- Cost of Illness
- Financing
- …

Health Care Expenditure

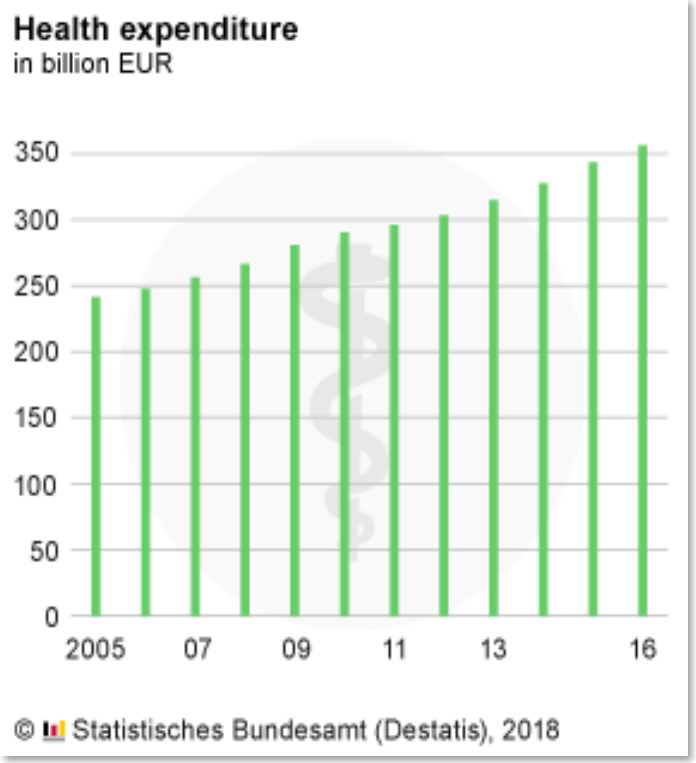
KEY FIGURES

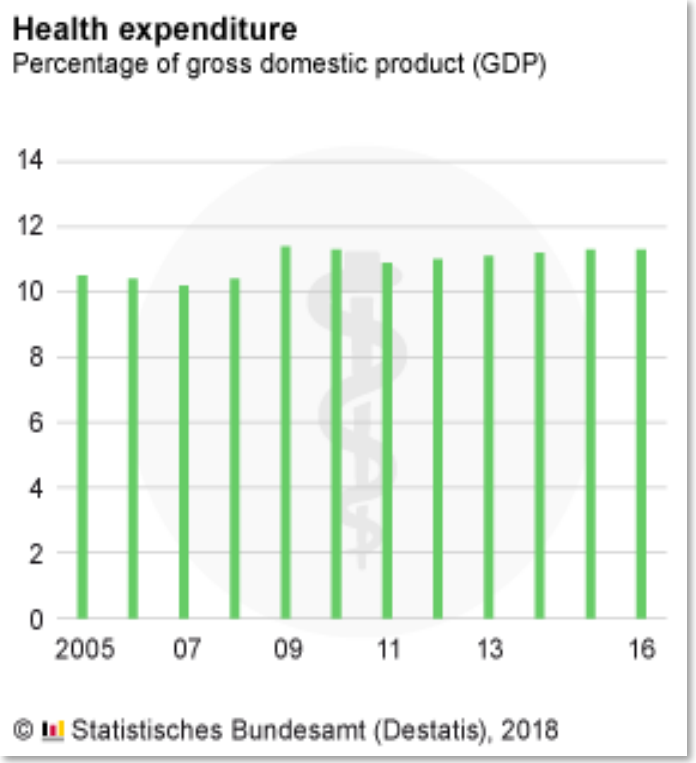
Health expenditure 2016	EUR 356.5 bn
By selected sources of funding	
Statutory health insurance	58.1%
Private health insurance	8.7%
By selected facilities	
Hospitals	25.9%
Offices of physicians	14.9%
By selected types of services	
Medical services	26.8%
Nursing and therapeutic services	26.6%

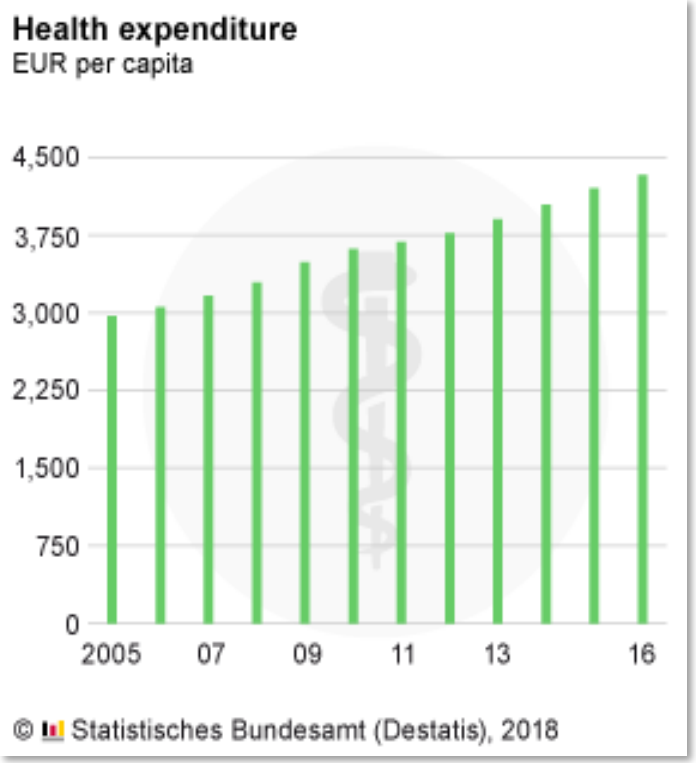


Source:
https://www.destatis.de/EN/FactsFigures/SocietyState/Health/HealthExpenditure/HealthExpenditure.html;jsessionid=E47F96803D59008566A915BAC2814F7A.InternetLive1

Health Care Expenditure





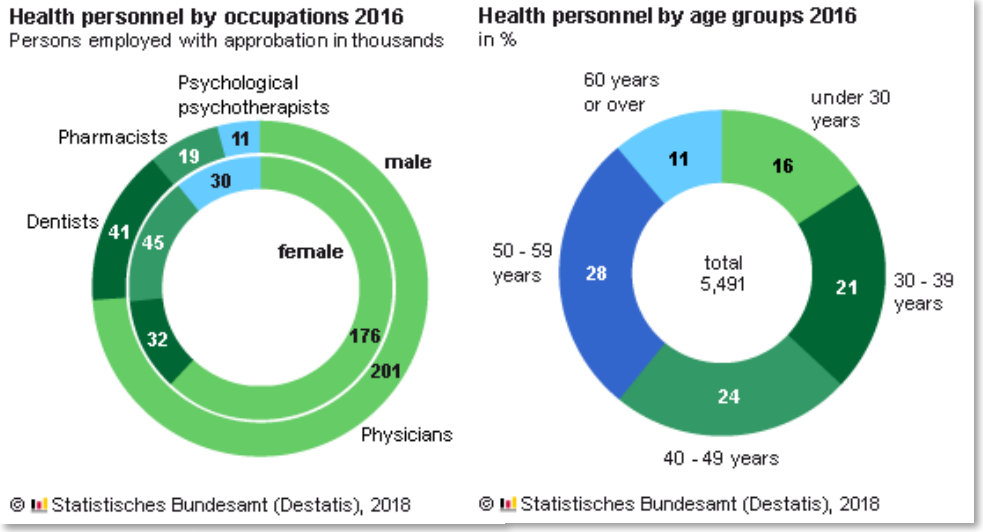


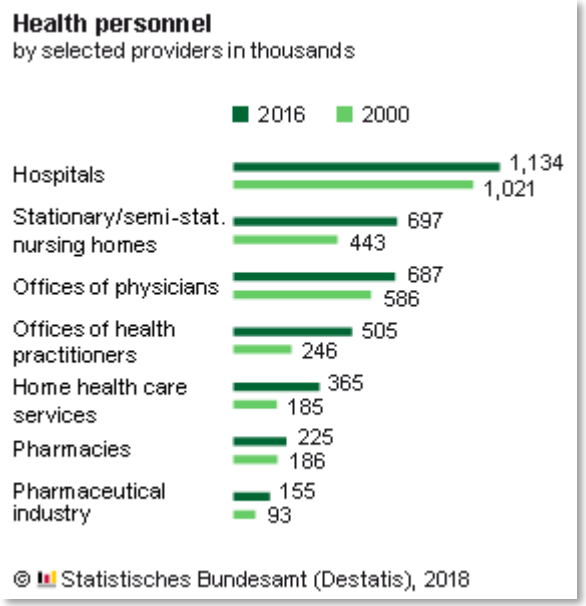
Source:
https://www.destatis.de/EN/FactsFigures/SocietyState/Health/HealthExpenditure/HealthExpenditure.html;jsessionid=E47F96803D59008566A915BAC2814F7A.InternetLive1

Health Personnel

KEY FIGURES

Health personnel 2016	5.5 mn
Men	24.2%
Women	75.8%
By selected facilities	
Hospitals	20.7%
Medical practices	12.5%
Out-patient care	6.6%
By selected professions	
Physicians	377,000
Dentists	74,000



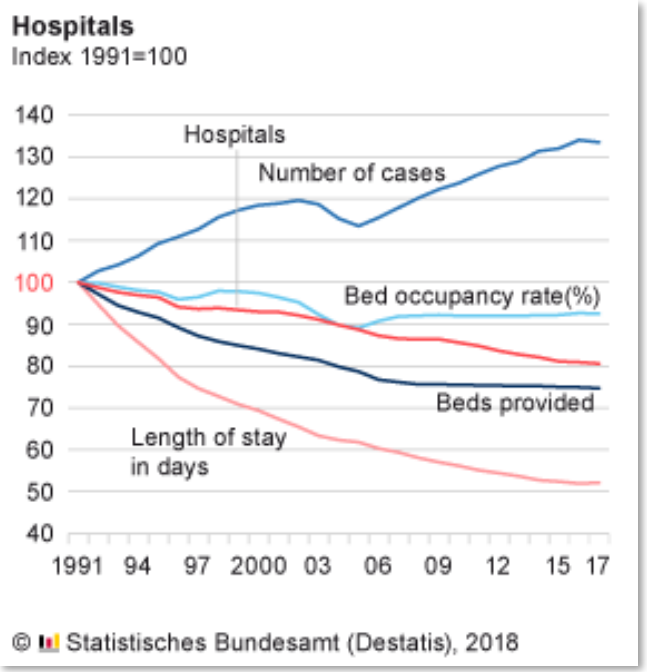


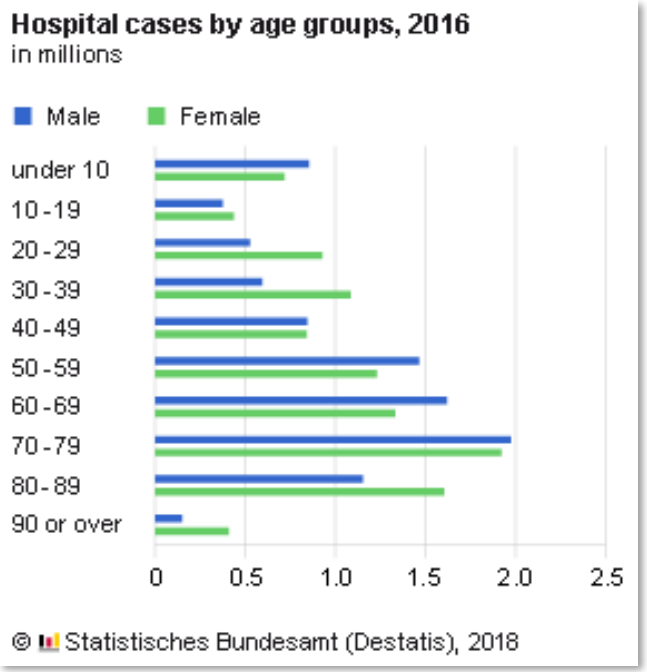
Source:
https://www.destatis.de/EN/FactsFigures/SocietyState/Health/HealthPersonnel/HealthPersonnel.html

Hospitals

KEY FIGURES

Hospitals, 2016	1,951
Patients (number of cases)	19.5 mn
Average length of stay	7.3 days
Bed occupancy rate	77.9%
Hospital costs (2016)	€ 101.7 bn
Reference value for hospitals (2017)	2.11%
Hospital stays in 2016 due to	
heart failure	455,680
acute alcohol intoxication	113,456
atrial fibrillation and flutter	304,755



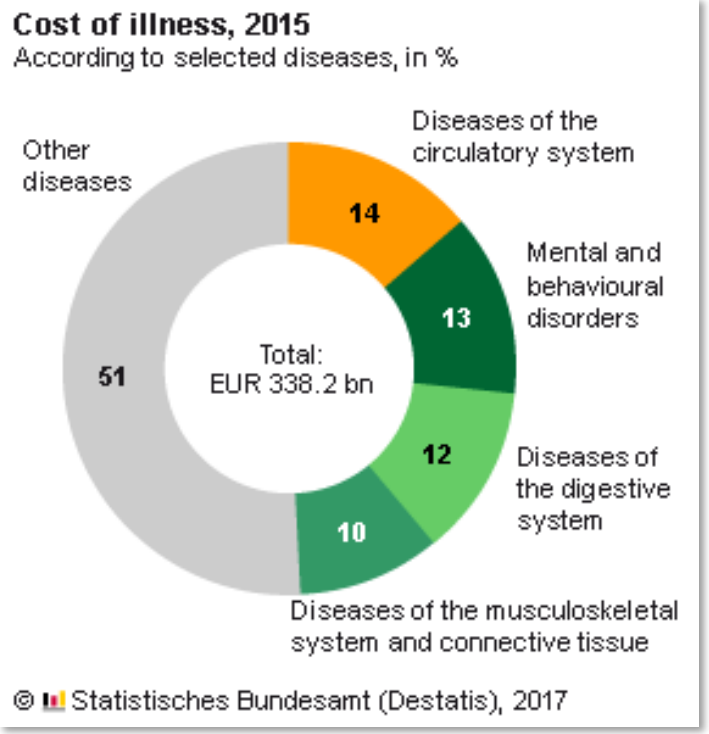


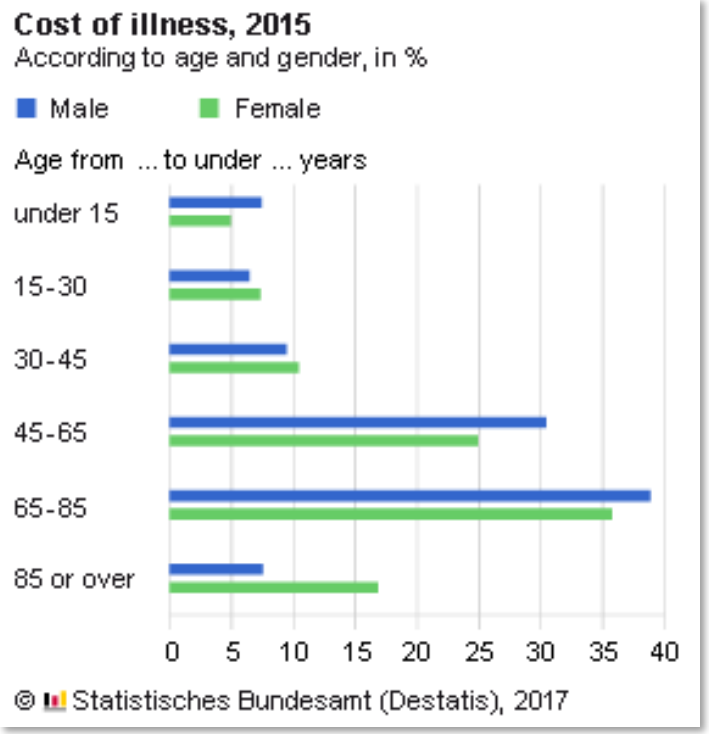
Source: https://www.destatis.de/EN/FactsFigures/SocietyState/Health/Hospitals/Hospitals.html

Cost of Illness

KEY FIGURES

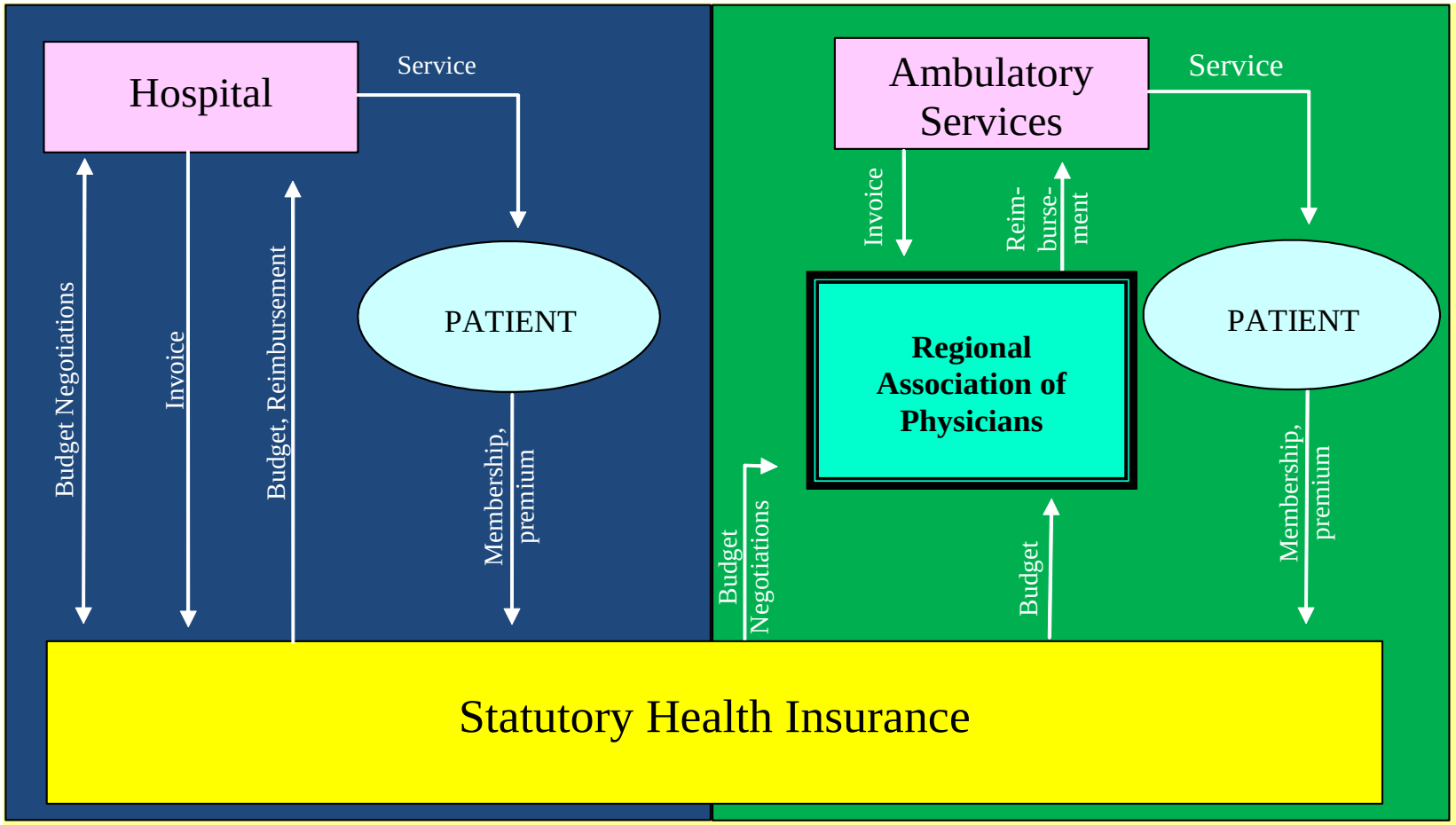
Costs of illness 2015	338.2 bn €
Male	44.0%
Female	56.0%
By selected disease categories	
Diseases of the circulatory system	13.7%
Mental and behavioural disorders	13.1%
Diseases of the musculoskeletal system	10.1%





Source: https://www.destatis.de/EN/FactsFigures/SocietyState/Health/CostIllness/CostIllness.html

Financing



In- and out-patient services

Source: Based on Flessa (2013), p. 127.

Challenges

What do you think are the biggest (future) challenges in health care?

Challenges in Health Care

- Medical-technical progress
- Demographic development
- Staff requirements and availability
- Multimorbidity
- Social change
- Scope of Treatment
- Processes
- …

Fig.: Challenges in Health Care (Selection).
Source: Own.

Challenges in Health Care

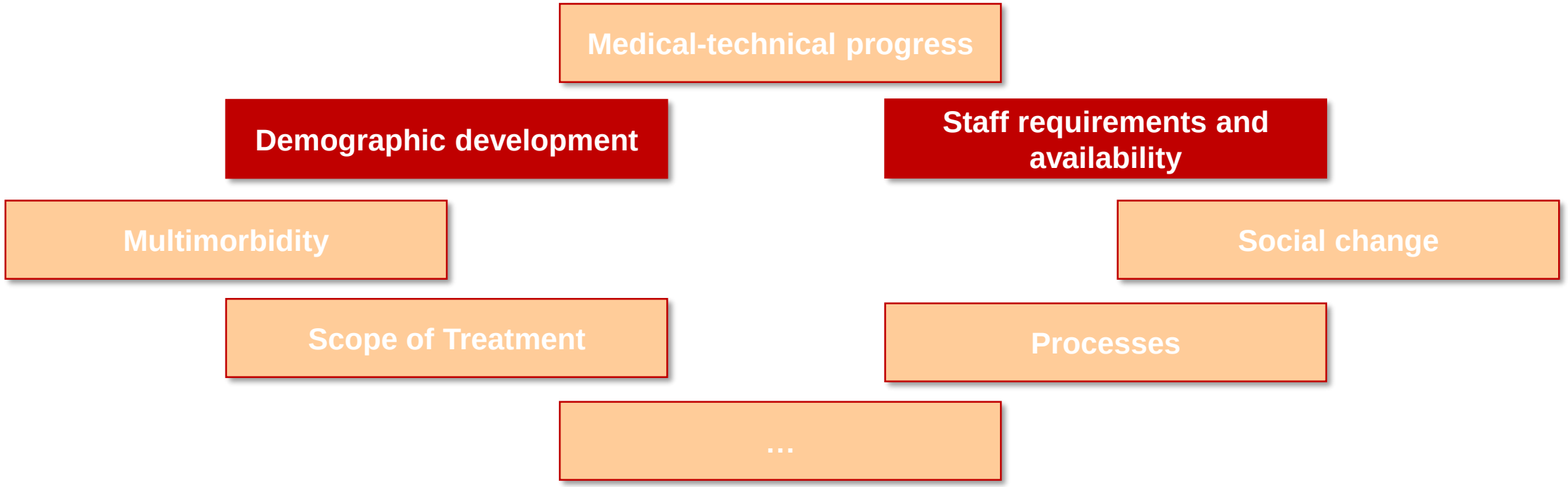
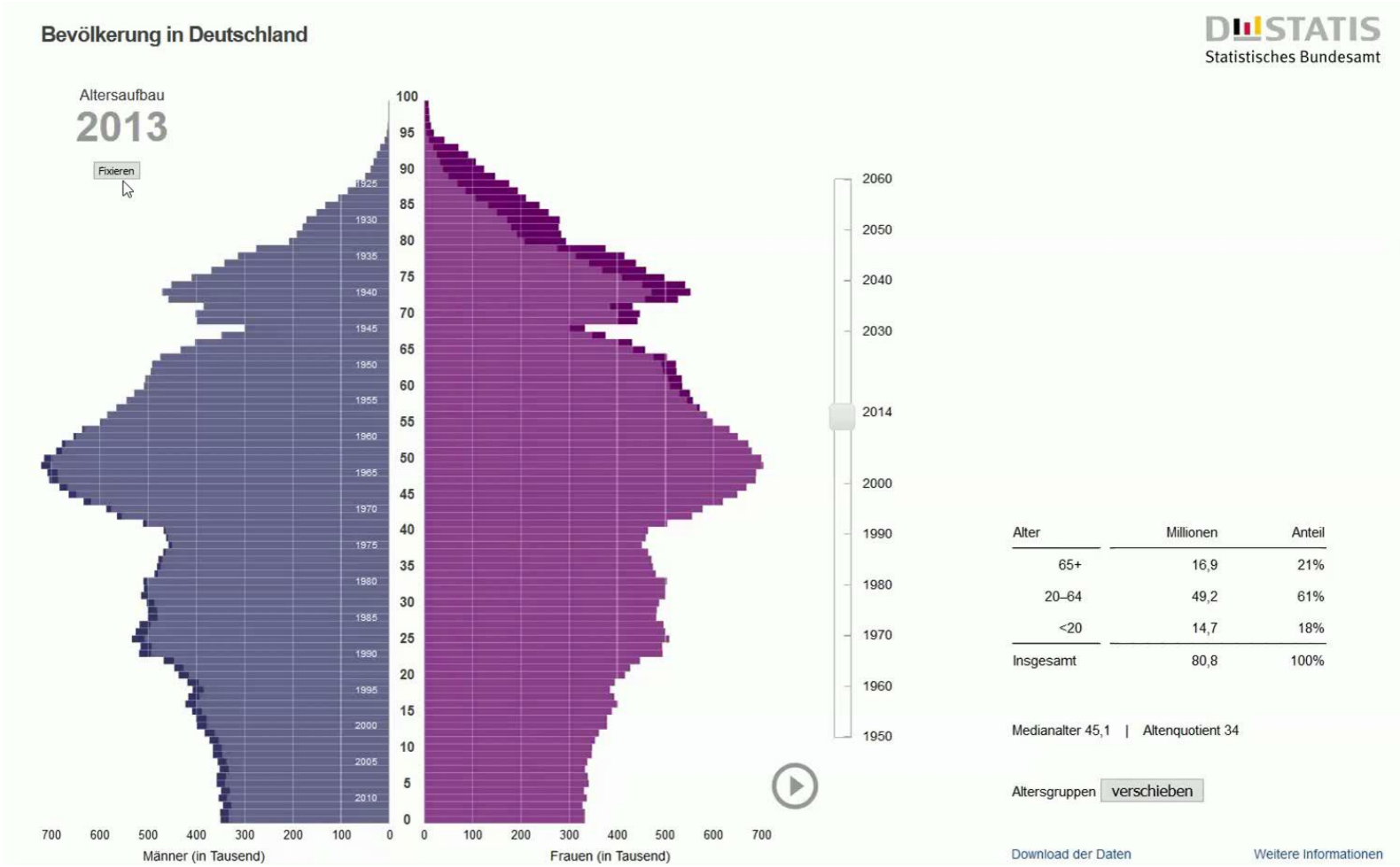


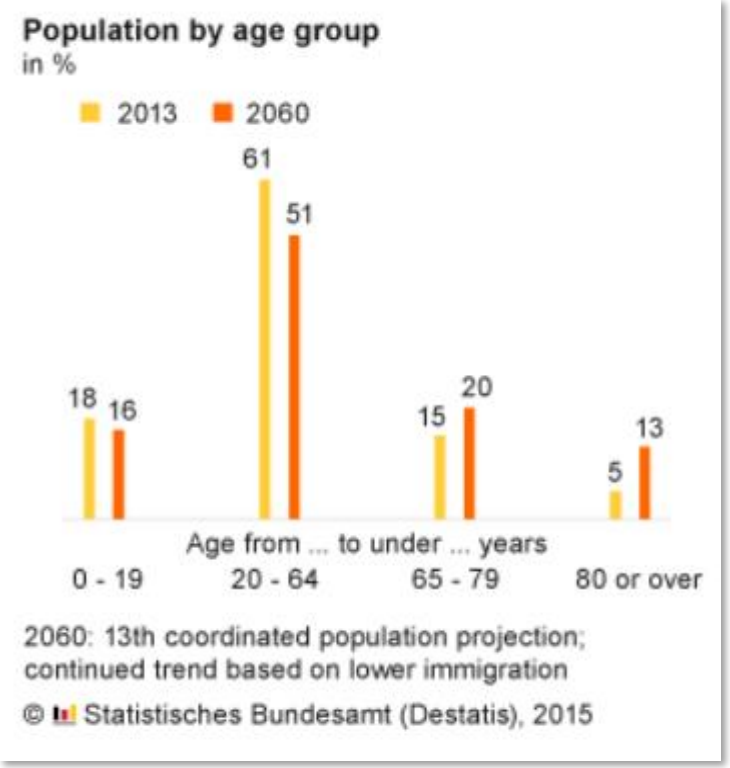
Fig.: Challenges in Health Care (Selection).
Source: Own.

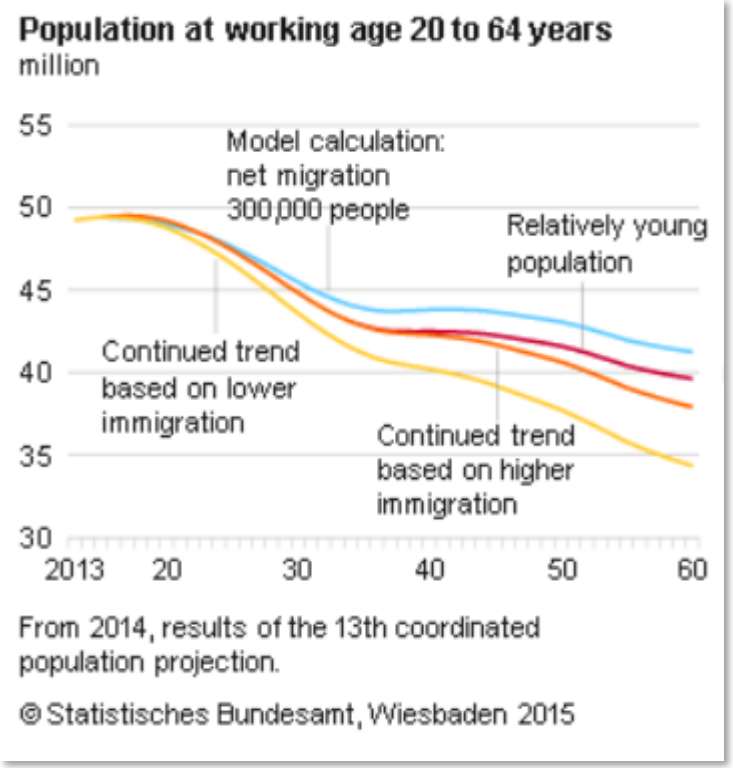
Challenges in Health Care

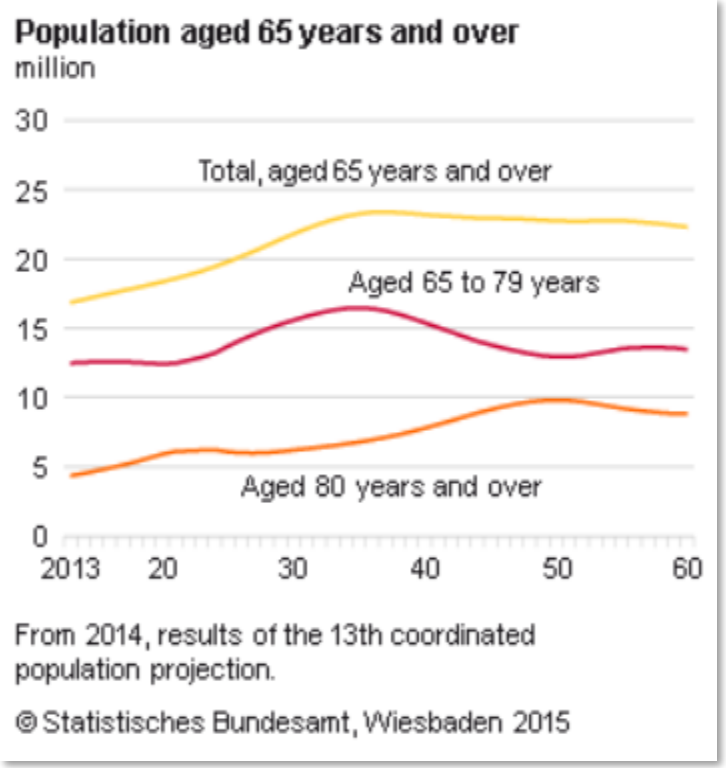


Source: https://service.destatis.de/bevoelkerungspyramide/.

Challenges in Health Care







Source: www.destatis.de.

Challenges in Health Care

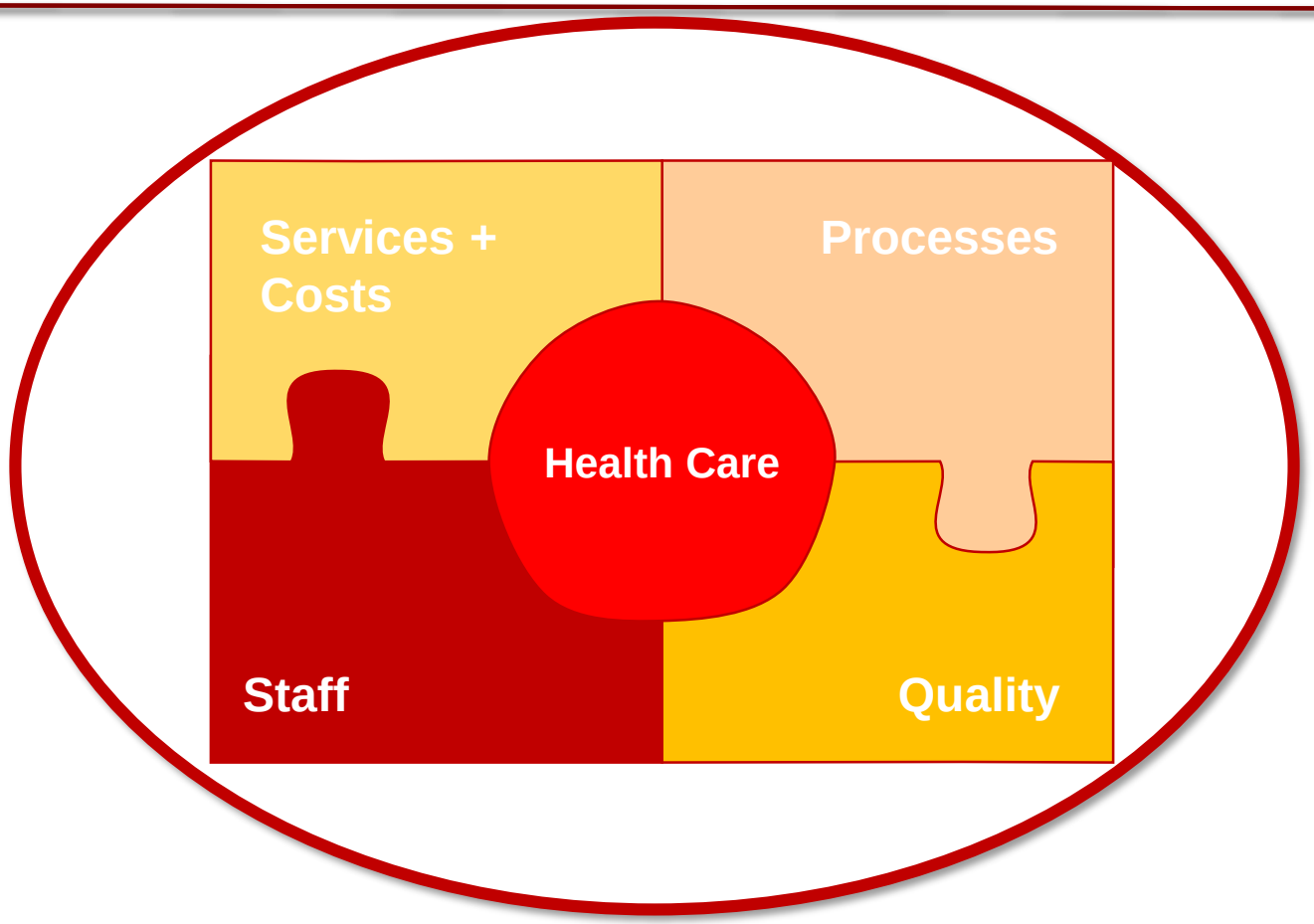


Fig.: Health management and economics. A field of tension?
Source: Own based on Welk (2006), p. 140.

Challenges

What kind of (Health-) Economic Modelling can be distinguished?

Markov Modelling	**Decision Trees**	**System Dynamics**
Agend-Based Modelling	**Discrete Event Simulation**	**…**

Is Simulation and DES an appropriate tool to solve the challenges in Health Care?

Several Challenges, Focus and Tools for Hosptials

Health Care and Health Care Facilities

Challenges:

- Financial aspects
- High utilization rate
  - Resources
  - Locations
- Clients
- Quali

Focus:

- Economic analyses
- Processes
- Utilization of resources
- workflow
- Patient flow, Clinical

Tools:

- Process Management
  - Process Analysis
  - Process Optimization
- Simulation
- OR Management

Discrete-Event-Simulation (DES)

Processes in Hospitals, Outpatient Departments OR, ED, ICU

What is Simulation and what is DES?

Simulation

- Method for anal)
- Replication of
- Conductin s on the real system
- Analyzing

Discrete-Eve

- Modeling dyna can be described by state
- nts of time vents

Why Simulation?

- Investigation of the real system is to expensive, time consuming, ethical inacceptable, dangerous
- Real system doesn´t exist yet
- A direct or indirect observation of the real system isn´t possible
- Modification of the model
- Educational reasons
- Reproduction of experiments

Discrete-Event-Simulation (DES)

Case Study
Operational processes in OR

Different methods required for gathering the data for Modelling and Simulation

Methods	Modelling and Simulation
Data Analysis (Hospital information system) Time Study Interviews Questionnaire Observation	Basic Model: **Objectives** - Representation - … …narios: …es …zing different …ies …lf? …How to achieve?

- **Process Management**
- **HR Management**
- **Accounting**
- **Planning**
- **Decision Making**
- **…**

Case Study

Simulation based analysis of operational processes of a general hospital

Case Study – What was the Examination Question?

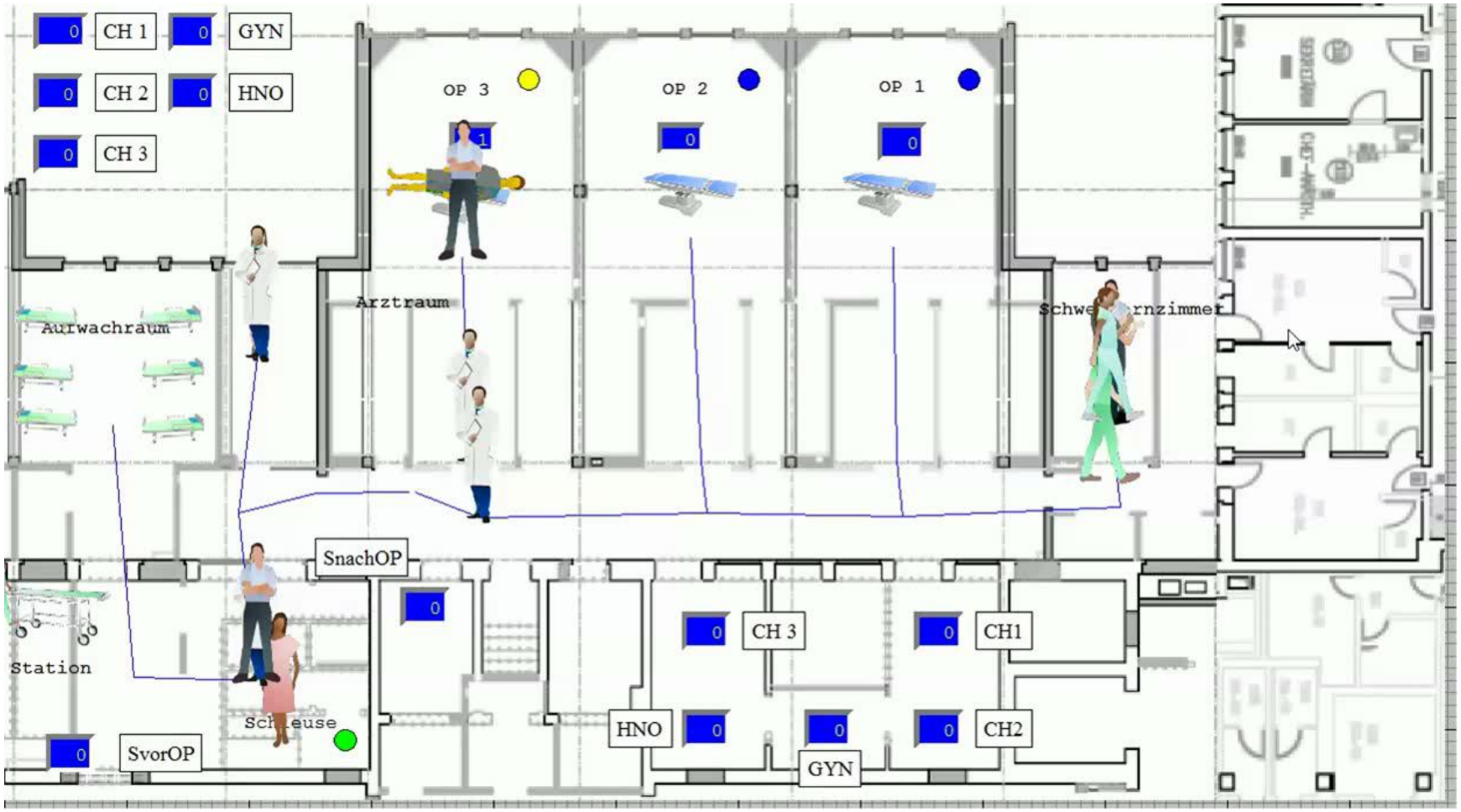
Examination Question

Illustration and investigation of the performance of a surgical department with a special focus on an alternative use of the surgical capacity and the potential impact of a redesign of operational processes on selected key process indicators and costs.

Simulation

Discrete-Event-Simulation (DES)

Case Study – How does such a Simulation look like?



Case Study – What kind of Scenarios were investigated?

Objectives (Scenarios):

Can the operations be done in two Operating Rooms?

→ „Less Resource Usage?“

How many days a third Operating Room would be necessary to provide that the operating time of the OR is max. 15.30 o‘clock?

→ „Alternative Ressource Usage?“

Key Indicators

Costs

Case Study – What were the main Results?

- Reduction of Operating Rooms possible (3 → 2)
- Effects on
  - OR utilization
  - Process Indicators
  - Human Resource Usage
  - Costs
- Alternative usage of OR Resources important

Conclusions

• Is Simulation a tool to solve problems in Health Care Management?	✓	Modelling complex scenarios, reducing complexity, supporting decisions
• Can Simulation be used to increase efficiency in hospitals?	✓	Increasing utilization (OR, HR), reducing costs, providing information
• Is DES a powerful tool to provide substantial support in Health Care Management?	✓	Modelling and Simulation of processes, developments, scenarios, “What-If”, “How-to-achieve”
• Can Simulation and DES be a tool to solve problems and help decision makers in Health Care Management?	✓	Process Management, providing information for decisions, projects with Health Care Organizations
• Is Simulation a useful instrument to be included in a Summer School?	✓	(Clinical) Process Management, Service Operations Management, Strategic and Operational Hospital Management, etc.

Liels paldies par jūsu uzmanību.

OLAV
GÖTZ

Health Care Simulation
& Consulting

Olav Goetz, PhD

Healthcare Consultant

Bothestr. 14
D-04155 Leipzig
Phone: +49 341 – 97454851
Mobile: +49 174 – 3071506
E-Mail: olavgoetz@gmx.de
www.goetz-simulation-consulting.de

Are there any questions?

Literature

- Amberg, M., Bodendorf, F., Möslein, K. M. (2011), Wertschöpfungsorientierte Wirtschaftsinformatik, Berlin, Heidelberg, Springer.
- Balci, O. 1997. “Verification, validation and accreditation of simulation models.” Proceedings of the 1997 Winter Simulation Conference:135-141.
- Banks, J. 2005. Discrete-event system simulation. 4th ed. Prentice-Hall international series in industrial and systems engineering, Pearson Prentice Hall, Upper Saddle River, NJ.
- Baer, T., Günther, U. (2011), Der teuerste Bereich im Krankenhaus: Erfolgreiches Einführen eines OP-Managements, in: KU - Gesundheitsmanagement, 2011b, Vol. 80, Nr. 6, S. 44-46.
- Becker, J., Kahn, D. (2012), Der Prozess im Fokus, in: Becker, J., Kugeler, M., Rosemann, M. (Hrsg.), Prozessmanagement: Ein Leitfaden zur prozessorientierten Organisationsgestaltung, 7. Auflage, Berlin, Heidelberg, Springer, S. 3-16.
- Brailsford, S.C., Harper, P.R., Patel, B., Pitt, M. 2009. “An analysis of the academic literature on simulation and modelling in health care.” J of Sim 3 (3):130-140.
- Cardoen, B., Demeulemeester, E., Beliën, J. 2010. “Operating room planning and scheduling: A literature review.” European journal of operational research 201 (3):921-932.
- Eichhorn, S. (1997), Integratives Qualitätsmanagement im Krankenhaus: Konzeption und Methoden eines qualitäts- und kostenintegrierten Krankenhausmanagements Stuttgart u.a.O., Kohlhammer.

Literature

- Ellebracht, H., Lenz, G., Osterhold, G. (2009), Systemische Organisations- und Unternehmensberatung: Praxishandbuch für Berater und Führungskräfte, Wiesbaden, Gabler-Verlag.
- Fleßa, S., Greiner, w. 2013. Grundlagen der Gesundheitsökonomie,3. Auflage. Wiesbaden.
- Fleßa, S. 2013. Grundzüge der Krankenhausbetriebslehre. Band 1. 3. Aufl. München.
- Fleßa, S. 2010. Grundzüge der Krankenhausbetriebslehre. München.
- Fleßa, S. 2007. Grundzüge der Krankenhausbetriebslehre. München.
- Fone, D., Hollinghurst, S., Temple, M., Round, A., Lester, N., Weightman, A., Roberts, K., Coyle, E., Bevan, G., Palmer, S. 2003. “Systematic review of the use and value of computer simulation modelling in population health and health care delivery.” J Public Health Med 25 (4):325-335.
- Geer Mountain Software Corporation. 2006. Stat::Fit, Version 2.
- Greiling, M. (2004), Einführung in das Klinische Prozessmanagement, in: Greiling, M. (Hrsg.), Pfade durch das Klinische Prozessmanagement : Methodik und aktuelle Diskussionen, Stuttgart, Kohlhammer, S. 15-26.
- Goetz, O.; Bullmann, C.; Zach, M.; Tost, F.; Flessa, S. (2013), Using Discrete-Event Simulation to analyze the process of cataract intervention at a university hospital outpatient department. in: Flessa, S. (Hrsg.), Recent Research on Health Care Management. Wirtschaftswissenschaftliche Diskussionspapiere, 2013, Nr. 1, S. 29-41.
- Götz, O. (2013), Simulationsbasierte Analyse von Operationsprozessen am Beispiel eines Grund- und Regelversorgers, Greifswald.

Literature

- Harrell, C., Ghosh, B.K., Bowden, R. 2000. Simulation using ProModel. McGraw-Hill series in industrial engineering and management science, 3rd edn. McGraw-Hill, Boston.
- Harrell, C.R., Price, R.N. 2003.” Simulation modeling using PROMODEL technology.” Proceedings of the 2003 Winter Simulation Conference, Vols 1 and 2:175-181.
- Jun, J.B., Jacobson, S.H., Swisher, J.R. 1999. “Application of discrete-event simulation in health care clinics: A survey.” Journal of the Operational Research Society 50 (2):109-123.
- Law, A.M. 2007. Simulation modeling and analysis. McGraw-Hill series in industrial engineering and management science, 4th edn. McGraw-Hill, Boston.
- Laroque (2011) Einführung in die Angewandte Informatik. Modellierung und Simulation, Fakultät für Informatik, Institut für Angewandte Informatik, Professur Modellierung und Simulation, Technische Universität Dresden, Online im Internet: http://www.inf.tu-dresden/ content/institutes/iai/ms/lehre/webdateien_informatik/Einfuehrung.pdf [Stand: 12.06.2013].
- ProModel Corporation. 2008. MedModel User Guide. Orem.
- ProModel (2008) Simulation Essentials - Training Manual.
- Reindl, S., Mönch. L., Mönch M., Scheider A. 2009. „Modeling and simulation of cataract surgery processes.” In Winter Simulation Conference (WSC '09). Winter Simulation Conference 1937-1945.
- Robinson, S. 2005. “Discrete-event simulation: from the pioneers to the present, what next?” Journal of the Operational Research Society 56 (6):619-629.

Literature

- Robinson, S. 2005. “Discrete-event simulation: from the pioneers to the present, what next?” Journal of the Operational Research Society 56 (6):619-629.
- Sargent, R.G. 2005. “Verification and validation of simulation models.” Proceedings of the 2005 Winter Simulation Conference, Vols 1-4:130-143.
- Shannon, R.E. 1998. “Introduction to the art and science of simulation.” Winter Simulation Conference Proceedings, Vols 1 and 2:7-14.
- Winter Simulation Conference –(http://www.wintersim.org/)
- Zapp, W. (2010), Prozessgestaltung in Gesundheitseinrichtungen: von der Analyse zum Controlling, 2. Auflage, Heidelberg, Economica-Verl.
- https://www.destatis.de