WORLD HEALTH ORGANIZATION

Study Guide for Zurich Model United Nations

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Zurich, Switzerland

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Delegates are requested to submit a position paper
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Saturday 29th of April 2017

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who@zumun.ch

YOUR CHAIRS

Simon Boris Rössinger

Since September 2016 I have been studying at the University of Mannheim with a major in Political Science and a minor in Economics. Government simulations, both MEPs and MUNs have been a staple in my academic life for the past 4 years. I had the privilege to participate at conferences as a delegate and as a head of fraction in the past. What had me coming back again and again though was the opportunity to meet new, interesting and amazing people at each and every conference. I am confident that ZuMUN will be no exception to this.

Anne-Cathérine Stolz

I have been studying Political Science and History of the Modern Ages for the last three and a half years at the University of Zurich. During the last one and a half year I have also been a member of the MUN Team of the University of Zurich and took part in several conferences as a delegate. I like being involved in the MUN community because it provides you with opportunities to exchange ideas and get to know new people.

INTRODUCTION TO THE COMMITTEE

What is the WHO?

The World Health Organization (WHO) was not the first international effort to address global health problems and challenges. The predecessor organization was named the Health Committee and Health Section and was established in 1922 as part of the League of Nations.[1] After the demise of the League of Nations, the organization was replaced by The World Health Organization (WHO), which was founded on the 7 April in 1948 by the UN General Assembly.[2] Today the World Health Organization has 194 Member States and more than 7000 people working in 150 countries.[3] The WHO's headquarters are situated in Geneva.

Mandate

The WHO's goal is to build a better, healthier future for people all over the world and help people reach the highest attainable standard of health possible.[4] To achieve this goal the WHO is taking a wide range of actions:

- promoting universal health coverage and the right to health
- monitoring the health situation and assessing health trends
- battling noncommunicable diseases (e.g. cancer, heart disease, stroke)
- increase and sustain access to prevention, treatment and care of communicable diseases (e.g. HIV, tuberculosis, malaria)
- helps countries to strengthen their national core capacities for emergency risk management to prevent, prepare for, respond to, and recover from emergencies
- providing leadership on matters critical to health
- shaping the research agenda and stimulating the generation, translation and dissemination of valuable knowledge
- setting norms and standards and promoting and monitoring their implementation
- articulating ethical and evidence-based policy options
- providing technical support

[1] WHO (2017): Archives of WHO.

[2] WHO (2017): Archives of WHO.

[3] WHO (2017): Alphabetical List of WHO Member States.

[4] WHO (2017): About WHO.

Structure

The World Health Organization is composed of three bodies: The World Health Assembly, the Executive Board and the Secretariat. The World Health Assembly is the decision-making body and is holding annually sessions, that are attended by delegates from all member states.[5] The Executive Board consists of 34 members and decides on implementation of proposed policies and sets the agenda.[6] One of the main tasks of the WHO secretariat is to translate the most up-to-date knowledge and evidence into advice, norms and guidelines.[7] The current Secretary-General of the WHO Dr. Margaret Chan was elected for a second five-year term in 2012 and will serve until the 30th June of 2017.[8]

[5] WHO (2017): World Health Assembly.

[6] WHO (2017): Executive Board.

[7] WHO (2010): WHO's role and responsibilities in health research.

[8] WHO (2017): Director-General's Office.

TOPIC A: USING BIG DATA TO ALLEVIATE EPIDEMICS

Introduction to big data in health care

Most healthcare organizations today are using two sets of data: retrospective data, meaning information collected from medical records, and real-time clinical data, the information captured and presented at the point of care (e.g. imaging, blood pressure, oxygen saturation, heart rate).[9] In the last few decades, however, more health data have been assimilated from electronic medical records, mobile phone and purchase records, geographical positioning systems, social media and more.[10] This collecting and pooling of massive amounts of digital information is termed big data. The unique properties of big data are defined by four dimensions: volume, variety, velocity and veracity. As more information is accumulated at an accelerating pace, both volume and velocity are increasing. Further big data is characterized by a shift from direct data collection to information that is assimilated from multiple sources.[11] The veracity dimension refers to the uncertainty around data and their collection, standardization and validation.[12]

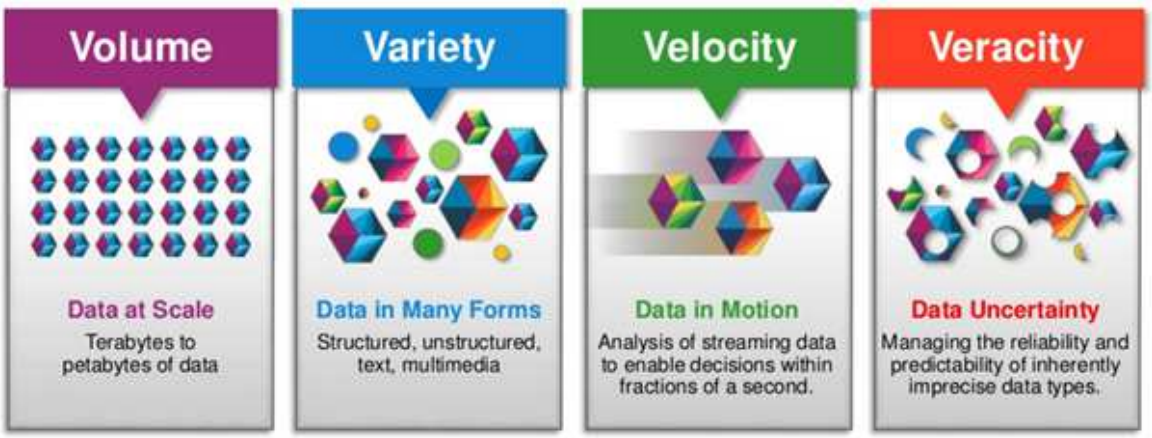

Image 1: The 4 V's of Big Data

[9] The Guardian (2014): Big data enabling future healthcare.

[10] WHO (2015): Big data in global health: improving health in low- and middle-income countries.

[11] WHO (2015): Big data in global health: improving health in low- and middle-income countries.

[12] WHO (2015): Big data in global health: improving health in low- and middle-income countries.

The collection and analysis of data of good quality are critical to improvements in the effectiveness and efficiency of health-care delivery. The challenges of generating, analyzing and applying clinical data are particularly acute in low- and middle-income countries.[13]

Cases of big data used to alleviate epidemics

Big data can be used in different aspects of health care, however in the battle against epidemics big data has been successfully applied to contain their spread. Epidemics are defined by the WHO as: "The occurrence in a community or region of cases of an illness, specific health-related behavior, or other health-related events clearly in excess of normal expectancy. The community or region and the period in which the cases occur are specified precisely [...]."[14] Simplified an epidemic is characterized by a disproportional accumulation of people infected with e.g. a virus but contained in a specific area or region, in contrast to a pandemic, which occurs worldwide.

Until recently the standard way to model the spread of a disease relied on extrapolating trends from census data and surveys and estimating the movement of people.[15] However, this kind of data is static and mobility patterns tend to change during the outbreak of an epidemic. Developments in technology enable to track movements of people in real-time through the use of digital information and don't have to rely on best guess.[16] The most widely used digital information in battling the spread of epidemics is phone data. Mobile phone data is particularly useful because they are widely owned in even the poorest countries in Africa and are therefore a rich source of data in a region where other reliable sources are sorely lacking.[17] The data collected consists of anonymized texts and voice data (static data) or phone mast activity data from mobile operators registering calls to helplines (real-time data).[18] When people make mobile-phone calls, the network generates a call data record (CDR) containing such information as the phone numbers of the caller and receiver, the time of the call and the tower that handled it which gives a rough indication of the device's location.[19] The level of activity at each mobile phone mast gives a kind of heatmap of where people are and crucially, where and how far they are moving.[20]

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[13] WHO (2015): Big data in global health: improving health in low- and middle-income countries.

[14] WHO (2017): Humanitarian Health Action: Definitions: emergencies.

[15] The Economist (2014): Ebola And Big Data: A Call For Help.

[16] The Economist (2014): Ebola And Big Data: A Call For Help.

[17] BBC (2014): Ebola: Can big data analytics help contain its spread?

[18] BBC (2014): Ebola: Can big data analytics help contain its spread?

[19] The Economist (2014): Ebola And Big Data: A Call For Help.

[20] BBC (2014): Ebola: Can big data analytics help contain its spread?

Thus, helping to predict the spread of epidemics. Further, the information on movement patterns gives insight into the best areas to provide treatment centers and allows movement restrictions to be put in place when necessary.[21]

In several cases of epidemic outbreaks the phone data has successfully been applied.[22] Researchers have used them to map malaria outbreaks in Kenya and Namibia and to monitor the public response to government health warnings during Mexico's swine-flu epidemic in 2009.[23] Another example represents the cholera outbreak in Haiti in 2010, after the earthquake, which was battled with the help of big data. A joint research team from Karolinska Institute in Sweden and the Columbia University in the US analyzed calling data from two million mobile phones on the Digicel Haiti network.[24] This enabled the United Nations and other humanitarian agencies to understand population movements during the relief operations, meaning they could allocate resources more efficiently and identify areas at increased risk of new cholera outbreaks.[25]

Phone data however is only one possible source of information under the umbrella of big data. Big data is precisely about bringing together many different information sources and mining them to find patterns.[26] Other possible sources are comprised of health clinic and physician reports, media reports, comment on social media, information from public health workers on the ground, transactional data from retailers and pharmacies, travel ticket purchases, helpline data, as well as geo-spatial tracking.[27] In the case of Zika virus for example weather, population movement, models of mosquito prevalence and registered cases of a disease are combined to map the likely pattern of spread. [28] An especially difficult aspect of epidemics is to predict and stop cross-border spread. In this area too digitalization is facilitating the task of analysts. Port, train and flight data, as well as number plate recognition, can all help track potentially infected people and identify who they may have come into contact with the virus.[29]

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[21] Forbes (2015): How Big Data Is Changing Healthcare.

[22] The Economist (2014): Ebola And Big Data: A Call For Help.

[23] The Economist (2014): Ebola And Big Data: A Call For Help.

[24] BBC (2014): Ebola: Can big data analytics help contain its spread?

[25] BBC (2014): Ebola: Can big data analytics help contain its spread?

[26] BBC (2014): Ebola: Can big data analytics help contain its spread?

[27] BBC (2014): Ebola: Can big data analytics help contain its spread?

[28] UNICEF (2016): Can big data be used as a social good in the fight against disease epidemics.

[29] BBC (2014): Ebola: Can big data analytics help contain its spread?

Another way big data can be used to alleviate epidemics is through monitoring health and social data through which dramatic improvements in the planning and delivery of public health interventions could be achieved.[30] This procedure is already running in some parts of the world, for example in India. Since 2010 the government of India has been issuing *Aadhaar* cards and unique identifying numbers to all 1.2 billion of its citizens. The cards, numbers and associated biometric identification offer the possibility of generating and monitoring health and social data. [31]

Case study: Ebola and Big Data

The Ebola outbreak 2014 tested the limits of the use of big data to prevent the spread of the virus, because the affected region in West Africa is one of the poorest and even mobile phone data is imperfect. [32] The Ebola virus disease (EVD), formerly known as Ebola hemorrhagic fever, is a severe, often fatal illness.[33] The first case was detected in March 2014 and will turn out to be the largest and most complex Ebola outbreak since the Ebola virus was first discovered in 1976. [34] There have been more cases and deaths in this outbreak than all others combined.[35] It has also spread between countries starting in Guinea, then across land borders to Sierra Leone and Liberia, by air to Nigeria and USA, and by land to Senegal and Mali.[36]

The most severely affected countries, Guinea, Liberia and Sierra Leone, have very weak health systems, lack human and infrastructural resources, and have only recently emerged from long periods of conflict and instability. [37] On August 8 2014, the WHO Director-General declared the West Africa outbreak a Public Health Emergency of International Concern under the International Health Regulations.[38] The Public Health Emergency of International Concern (PHEIC) related to Ebola in West Africa was lifted on 29 March 2016. A total of 28 616 confirmed, probable and suspected cases have been reported in Guinea, Liberia and Sierra Leone, with 11 310 deaths.[39]

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[30] WHO (2015): Big data in global health: improving health in low- and middle-income countries.

[31] WHO (2016): Ebola virus disease: Fact sheet.

[32] The Economist (2014): Ebola And Big Data: A Call For Help.

[33] WHO (2016): Ebola virus disease: Fact sheet.

[34] WHO (2016): Ebola virus disease: Fact sheet.

[35] WHO (2016): Ebola virus disease: Fact sheet.

[36] WHO (2016): Ebola virus disease: Fact sheet.

[37] WHO (2016): Ebola virus disease: Fact sheet.

[38] WHO (2016): Ebola virus disease: Fact sheet.

[39] WHO (2016): Situation Report: Ebola Virus Disease 10 June 2016.

In the case of Ebola even though several researchers and helpers on site agreed on the usefulness of big data in the fight against the virus, nevertheless it took a long time before the first models based on big data were applied.

The problem were privacy concerns but more importantly inactivity of local governments to put pressure on telecom companies to release anonymized phone data.[40]

Researchers at Flowminder, a non-profit group of epidemiologists, have tried early into the crisis to get access to the phone companies' records, to build detailed maps of where people are, where they are travelling to, and the effects of government health warnings and travel advisories on the public's movements.[41] If researchers could track population flows from an area where an outbreak had occurred, they could see where it would be likeliest to break out next and therefore where they should deploy their limited resources.[42]

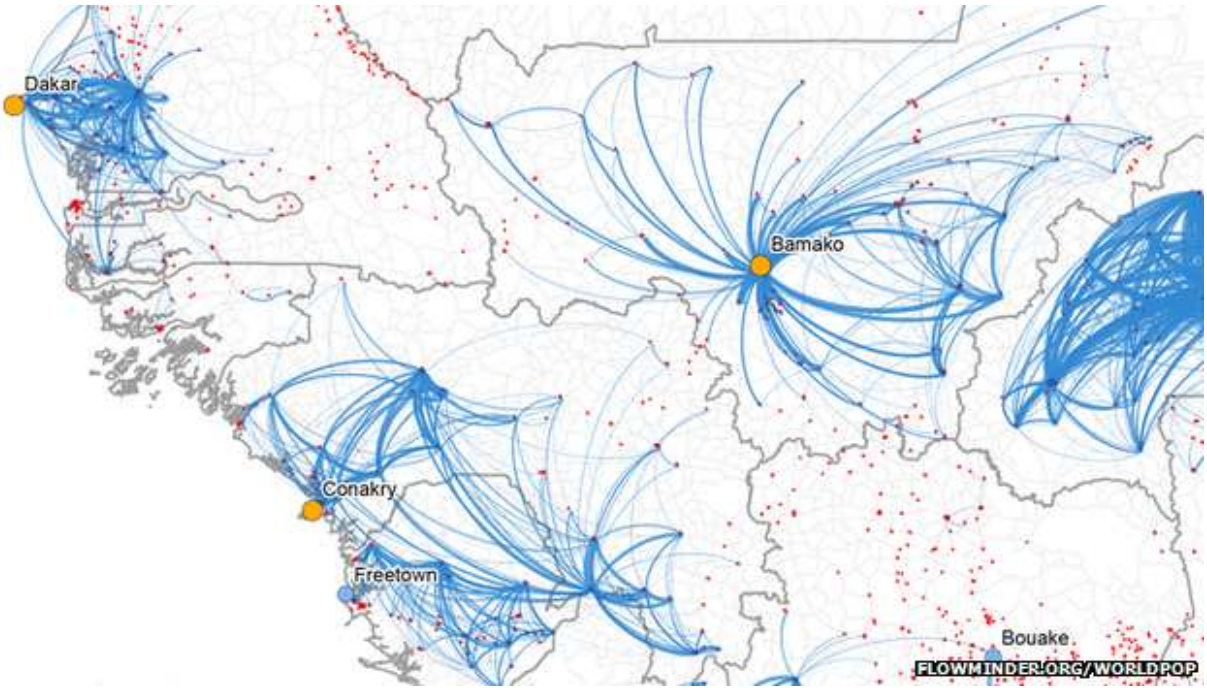

Image 2: Mobile phone data from West Africa is being used to map population movements and predict how the Ebola virus might spread

[40] The Economist (2014): Ebola and big data: Waiting on hold.

[41] The Economist (2014): Ebola and big data: Waiting on hold.

[42] The Economist (2014): Ebola And Big Data: A Call For Help.

Orange Telecom in Senegal handed over anonymized voice and text data from 150,000 mobile phones to Flowminder, which was then able to draw up detailed maps of typical population movements in the region.[43] Flowminder researcher Andy Tatem explains: "With network operators serving substantial proportions of the population across entire nations, the movements of millions of people at fine spatial and temporal scales can be measured in near real-time. This provides a window into regional population movements that could help predict the spread of Ebola.

The data provide us with an understanding of how people react to travel restrictions and what effect they have on the mobility of resources and healthcare workers," Tatem adds.[44]

In Sierra Leone, IBM has partnered with NGOs and telecommunications companies to develop a system that lets people report Ebola-related issues via phone and SMS. IBM is using the data to create opinion-based heat maps which correlate public sentiment to location, so officials know where supplies and other assistance are most needed.[45]

Problems and concerns with the use of big data in health care

A 2016 UNCTAD report found that differing notions of privacy and a variety of different stakeholder interests creates tensions: individuals are concerned about their right to privacy and being able to safely and confidently use online services; governments are concerned about national security and safety; and businesses are concerned with compliance burdens and regulations that may hamper innovation and trade.[46]

The collection of information from individuals is a requirement for any big data approach, which raises issues about privacy and data security.[47] Ensuring personal data protection becomes more challenging as information is multiplied and shared ever more widely around the world.[48] Basic health data for example on ethnicity, reproductive health, sexually transmitted infections, diseases with a genetic basis and risk exposures for disease, could be publicized, raising concerns about profiling, discrimination, exclusion and loss of control.[49] For example, insurance companies could start questioning coverage to consumers based on these sorts of big-data profiles.[50] This concern is amplified when the information relates

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[43] BBC (2014): Ebola: Can big data analytics help contain its spread?

[44] SciDev.Net (2014): Ebola virus epidemic: Mobile phone data 'could help locate Ebola cases'.

[45] World Economic Forum (2014): From SARS to Ebola, how big data fights disease.

[46] UNCTAD (2016): Data protection frameworks must be compatible with international dataflows for developing countries to benefit from the global digital economy.

[47] WHO (2015): Big data in global health: improving health in low- and middle-income countries.

[48] European Commission (2016): The EU Data Protection Reform and Big Data: Factsheet.

[49] WHO (2015): Big data in global health: improving health in low- and middle-income countries.

[50] The Conversation (2016): Big data security problems threaten consumers' privacy.

to individuals in vulnerable populations and communities that could potentially reduce personal safety.[51]

Another concern is data security. Cyber thieves routinely target medical records, and reportedly earn more money from stolen health data than by pilfering credit card details.[52] In February 2015, the largest ever healthcare-related data theft took place, when hackers stole records relating to 80 million patients from Anthem, the second largest US health insurer.[53] Fortunately, they only took identity information such as names and addresses, and details on illnesses and treatments were not exposed. However, there is a fear that it is only a matter of time until a security breach on that scale takes place in which patient records are lost.[54]

Further as noted in the case study on Ebola getting phone companies to release CDR data can be complicated. Releasing the data is not just a matter for firms, since people's privacy is involved. It requires government action as well. Regulators in each affected country would have to order operators to make their records accessible to selected researchers, who would have to sign legal agreements specifying how the data may be used. Technically, this is fairly straightforward: the standards are well established, as are examples of legal terms. Orange, a big mobile operator, has made millions of CDRs from Senegal and Ivory Coast available for research use for years, under its Data for Development initiative.[55]

Another concern for phone companies is the risk of disclosing commercial information to rivals.[56] A bigger problem is institutional inertia. Big data is a new field. The people who grasp the benefits of examining mobile-phone usage tend to be young, and lack the clout to free them for research use.[57] It is hard to bring the parties together at a high-enough political or management level to make decisions.[58]

Existing regulations of Big Data

The International Covenant on Civil and Political Rights, to date ratified by 167 States, provides that no one shall be subjected to arbitrary or unlawful interference with his or her privacy, family, home or correspondence, nor to unlawful attacks on his or her honor and repu-

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[51] WHO (2015): Big data in global health: improving health in low- and middle-income countries.

[52] Forbes (2015): How Big Data Is Changing Healthcare.

[53] Forbes (2015): How Big Data Is Changing Healthcare.

[54] Forbes (2015): How Big Data Is Changing Healthcare.

[55] The Economist (2014): Ebola and big data: Waiting on hold.

[56] The Economist (2014): Ebola and big data: Waiting on hold.

[57] The Economist (2014): Ebola And Big Data: A Call For Help.

[58] The Economist (2014): Ebola and big data: Waiting on hold.

tation. [59] It further states that "Everyone has the right to the protection of the law against such interference or attacks."[60]

In the period 2013-2015, the United Nations strengthened its role in privacy protection through two high profile measures. The first was the publication of a statement on Digital Rights. [61] In December 2013, the United Nations General Assembly adopted resolution 68/167, which affirmed that the rights held by people offline must also be protected online, and it called upon all States to respect and protect the right to privacy in digital communication. The General Assembly called on all States to review their procedures, practices and legislation related to communications surveillance, interception and collection of personal data and emphasized the need for States to ensure the full and effective implementation of their obligations under international human rights law.[62] The second measure to protect privacy was the appointment of a Special Rapporteur on the right to privacy.[63] In July 2015, the Human Rights Council appointed Professor Joseph Cannataci (from Malta) as the first ever Special Rapporteur on the right to privacy. The appointment is for three years.[64]

Further the International Telecommunication Union (ITU) members approved on the 18 December 2015 the first ITU standard on Big Data. The international standard details the requirements, capabilities and use cases of cloud-based Big Data.[65]

On the regional level the EU's Charter of Fundamental Rights says that everyone has the right to personal data protection in all aspects of life: at home, at work, whilst shopping, when receiving medical treatment, at a police station or on the Internet. Big Data is no different.[66] In addition, the EU appointed the first Supervisor and Assistant Supervisor (EDPS) in December 2014, which is an independent institution of the EU. [67] The Supervisor is responsible for ensuring that the fundamental rights and freedoms of natural persons, and in

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[59] UNCTAD (2016): Data protection regulations and international data flows: Implications for trade and development.

[60] UNCTAD (2016): Data protection regulations and international data flows: Implications for trade and development.

[61] UNCTAD (2016): Data protection regulations and international data flows: Implications for trade and development.

[62] UNCTAD (2016): Data protection regulations and international data flows: Implications for trade and development.

[63] UNCTAD (2016): Data protection regulations and international data flows: Implications for trade and development.

[64] UNCTAD (2016): Data protection regulations and international data flows: Implications for trade and development.

[65] ITU (2015): ITU members agree international standard for Big Data.

[66] European Commission (2016): The EU Data Protection Reform and Big Data: Factsheet.

[67] European Data Protection Supervisor (2015): Opinion 7/2015: Meeting the challenges of big data. A call for transparency, user control, data protection by design and accountability.

particular their right to privacy, are respected by the Community institutions and bodies", and for advising Community institutions and bodies and data subjects on all matters concerning the processing of personal data'.[68]

On the state level, according to UNCTAD's Cyberlaw Tracker, as of April 2016, only 108 countries have data protection laws and 35 have draft laws. Around 60 developing countries have no data protection laws at all.[69] Existing national and regional regimes, such as those in the United States and the European Union, often contain similar principles but even they diverge in their approaches to dealing with cross-border data flows.[70]

Questions a resolution needs to answer

- How can privacy and safety of health data be ensured?
- How can be ensured that companies (e.g. people with preexisting conditions) and governments (e.g. minorities) don't discriminate using big data?
- How can the different concerns of individuals, companies and governments regarding big data be reconciled?
- How should storage and accessibility of big data be organized?
- Who bears the costs of big data collection, storage and analysis?
- What kind of data (phone data, health records etc.) should be made available to battle epidemics?
- Under which circumstances should different kinds of data be available?
- How can the international community solve the problem of the low quality of data (incomplete data, lack of standardization)?

[68] European Data Protection Supervisor (2015): Opinion 7/2015: Meeting the challenges of big data. A call for transparency, user control, data protection by design and accountability.

[69] UNCTAD (2016): Data protection frameworks must be compatible with international dataflows for developing countries to benefit from the global digital economy.

[70] UNCTAD (2016): Data protection frameworks must be compatible with international dataflows for developing countries to benefit from the global digital economy.

Bibliography

- BBC (2014): Ebola: Can big data analytics help contain its spread? (http://www.bbc.com/news/business-29617831 [Retrieved: 29.01.2017]).
- European Data Protection Supervisor (2015): Opinion 7/2015: Meeting the challenges of big data. A call for transparency, user control, data protection by design and accountability. (https://secure.edps.europa.eu/EDPSWEB/webdav/site/mySite/shared/Documents/Consultation/Opinions/2015/15-11-19_Big_Data_EN.pdf [Retrieved: 02.02.2017]).
- European Commission (2016): The EU Data Protection Reform and Big Data: Factsheet. (http://ec.europa.eu/justice/data-protection/files/data-protection-big-data_factsheet_web_en.pdf [Retrieved: 02.02.2017]).
- Forbes (2015): How Big Data Is Changing Healthcare. (http://www.forbes.com/sites/bernardmarr/2015/04/21/how-big-data-is-changing-healthcare/2/#8065e7b5b7af [Retrieved: 03.03.2017]).
- ITU (2015): ITU members agree international standard for Big Data. (http://www.itu.int/net/pressoffice/press_releases/2015/66.aspx#.WJNZ34WcEmY [Retrieved: 05.02.2017]).
- SciDev.Net (2014): Ebola virus epidemic: Mobile phone data 'could help locate Ebola cases'. (http://www.scidev.net/sub-saharan-africa/icts/news/mobile-phone-data-locate-ebola.html [Retrieved: 02.02.2017]).
- The Conversation (2016): Big data security problems threaten consumers' privacy. (http://theconversation.com/big-data-security-problems-threaten-consumers-privacy-54798 [Retrieved: 05.02.2017]).
- The Economist (2014): Ebola and big data: Waiting on hold. (http://www.economist.com/news/science-and-technology/21627557-mobile-phone-records-would-help-combat-ebola-epidemic-getting-look [Retrieved: 01.02.2017]).
- The Economist (2014): Ebola and big data: Call for help. (http://www.economist.com/news/leaders/21627623-mobile-phone-records-are-invaluable-tool-combat-ebola-they-should-be-made-available [Retrieved: 01.02.2017]).
- The Guardian (2014): Big data enabling future healthcare. (https://www.theguardian.com/healthcare-network/2014/nov/04/big-data-enabling-future-healthcare [Retrieved: 29.01.2017]).
- UNCTAD (2016): Data protection frameworks must be compatible with international dataflows for developing countries to benefit from the global digital economy. (http://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1237&Sitemap_x0020_Taxonomy=UNCTAD%20Home; [Retrieved: 02.02.2017]).
- UNCTAD (2016): Data protection regulations and international data flows: Implications for trade and development. (http://unctad.org/en/PublicationsLibrary/dtlstict2016d1_en.pdf [Retrieved: 05.02.2017]).
- UNICEF (2016): Can big data be used as a social good in the fight against disease epidemics. (http://unicefstories.org/2016/09/16/can-big-data-be-used-as-a-social-good-in-the-fight-against-disease-epidemics/ [Retrieved: 29.01.2017]).

- WHO (2015): Big data in global health: improving health in low- and middle-income countries. (http://www.who.int/bulletin/volumes/93/3/14-139022/en/ [Retrieved: 29.01.2016]).
- WHO (2016): Ebola virus disease: Fact sheet. (http://www.who.int/mediacentre/factsheets/fs103/en/ [Retrieved: 01.02.2017]).
- WHO (2016): Situation Report: Ebola Virus Disease 10 June 2016. (http://apps.who.int/iris/bitstream/10665/208883/1/ebolasitrep_10Jun2016_eng.pdf?ua=1 [Retrieved: 01.02.2017]).
- WHO (2017): Humanitarian Health Action: Definitions: emergencies. (http://www.who.int/hac/about/definitions/en/ [Retrieved: 29.01.2017]).
- World Economic Forum (2014): From SARS to Ebola, how big data fights disease. (https://www.weforum.org/agenda/2014/12/from-sars-to-ebola-how-big-data-fights-disease/ [Retrieved: 02.02.2017]).

TOPIC B: THE POTENTIAL OF ICT IN ENSURING PUBLIC HEALTH

Introduction to ICT in health care

The term ICT refers to Information and Communications Technology.[71] It is a field, which ranges from the 100 year old telephones to satellites and encompasses the simple storing of data as well as sending and manipulating it. While there is no official definition of ICT, it is ICT, that connects the world.[72]

As of the past few years ICT has also found its way into healthcare, this is often referred to as eHealth.[73] Contrary to the macro-level, at which big data seeks to identify trends, ICT is primarily used at the micro and meso levels of public health care. Furthermore, eHealth also seeks to, in the best case, prevent, rather than treat illnesses. Utilizing ICT to optimize processes in hospitals and by insurers are only two of the more prominent fields of usage.

ICT is a highly versatile tool for the future of health care. The reason for this is its relevance to the modern age of information. Few things are more valuable as readily available, interconnected data.[74] It is, what drives economic progress today. To this, ICT is key.[75]

ICT stresses not just the amassing and existence of data, but allowing data to be collected, stored and manipulated via one unified system. Unification can also be referred to a physical unification of data transmission in one system, internet telephony or internet TV would be one example of this.[76]

Public health is one of the great beneficiaries of ICT, as it opens new possibilities for doctors, nurses, patients and administrators alike. Similar to the economy and the beginning of industry 4.0, ICT could well be the basis of profound changes to the way the health of the public is provided. Managing these changes will require coordination across country borders, as ICTs make use of economies of scale. Similar levels of development in regard to ICT infrastructure, compatibility of systems and the controlling of the potential fallout from changes in public health need to be addressed by the international community.

The United Nations General Assembly sought to ensure the achievement of the Millennium Development Goals through the usage of ICT in its resolution 56/183.[77]

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[71] Wikipedia (2017): Information and Communications Technology

[72] BBC (2017): Networks and communications – Network types and topologies

[73] University of Windesheim (2016): ICT Innovations in Health Care - Windesheim

[74] BNAmericas (2014): "Data is the natural resource of the 21st century", says IBM chief

[75] OECD (2004): The Economic Impact of ICT

[76] Wikipedia (2017): Wikipedia: Information and Communications Technology

[77] International Telecommunications Union (2002): United Nations General Assembly Resolution 56/183

With the beginning of an approach to eHealth standardization by the International Telecommunications Union in 2003, ICT in ensuring public health has reached the international community as a constant issue.[78]

Making sure, that deployment of ICT in healthcare is done swiftly and comprehensively can fundamentally change the way public health is ensured.

Cases of ICT in ensuring public health

Since the dawn of the information age in the 1970s and 1980s the usage of ICT has become ever more diverse and has profoundly changed most aspects of the economy and society. The health sector has been no exception to this.[79]

In recent years though the pace of development has been increasing steadily. The fields of utilization of ICT are nearing an all-encompassing state in health care. Companion technology allows elderly, invalids and convalescents to be largely self-reliant when it comes to daily chores like shopping and others, that involve heavy lifting. This is only the beginning though. Projects such as LIREC[80], Accompany[81], CORBYS[82] and ICT for Health[83] have sought after ways allowing companions to be educated in regards to basic social competencies, self-learning Artificial Intelligence, or AI for short, support in rehabilitation[84] and further solutions preparing health care for the consequences of demographic change.[85] With the demographic change due to declining birth rates, industrial nations will most likely have to look into utilizing Companions for care of the elderly and some have even done so already.[86]

With regards to hospitals ICT allows to interconnect and streamline the data of patients and physicians alike.[87] Physicians could be made aware by their peers as to more effective drugs, than the ones they are prescribing at the moment. On the administrative side of heath care patients' data could be stored centrally with their provider of coverage or general practitioner and the data needed could then be passed on when needed to ensure the best individual treatment. Additionally, ICT would open the possibility of intelligent queue man-

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[78] ITU (2017): ITU e-Health

[79] Face Entrepreneurship (2016): How ICT is changing the world: e-health

[80] LIREC (2012): LIREC

[81] ACCOMPANY(2015): ACCOMPANY

[82] CORBYS (2017): CORBYS

[83] ICT for Health (2013): ICT for Health

[84] University of Herdfordshire (2017) ICT for Healthcare – Technology to support ageing

[85] ICT for Health (2013): ICT for Health – Project

[86] Wall Street Journal (2016): Toyota to Sell 'Cuddly Companion' Robot in Japan

[87] NWHS: Improving Care through ICT

agement, leaving patients with less waiting time and freeing up additional resources for cheaper health care or investments in better equipment and better trained personnel.[88]

ICT also provides relief to regions of the world where trained physicians are hard to find. This can be regarded as beneficial to rural areas. The introduction of telehealth or telemed would allow patients the possibilities to self-monitor suspected illnesses or the healing of broken bones, thus reducing the amount of travel time needed for routine check-ups, which then could be done by transferring the data from home to the doctor and if necessary a video chat consultation. Given an adequate ICT infrastructure this would allow doctors working in remote regions of the world to reach many more patients than today.

Case study: Utilizing IBM Watson in hospitals

With great fanfare IBM and the MD Anderson Cancer Centre announced in October 2013 a partnership to use the, Jeopardy-winning, AI IBM Watson in a project intended to develop a tool allowing Watson to support doctors in their decision making. “MD Anderson taps IBM Watson to power “Moon Shots” mission aimed at Ending Cancer, Starting with leukemia”, read the IBM press release for the project.[89] IBM Watson is an AI able to answer to questions posed in human languages.[90] Making interaction with it as seamless as possible. An approach to AI called Deep Question & Answer or DeepQA.[91] In the public mind it signaled the beginning of utilizing AI in health. By now it has become what IBM calls “IBM Watson Health.”[92]

Early signs of success in regards to Watson’s diagnoses and the sheer amount of raw data Watson was able to work through could be seen, signaling a new age in healthcare.[93] In other early projects to introduce Watson to health care it has been found, that especially children are more forthcoming when talking to Watson, than they are when talking to doctors and nurses.[94] Next to providing doctors with data on the patient, IBM’s AI is also assumed to be used in administrative tasks such as queue managing, thus increasing efficiency and reducing costs. Further use, in terms of assisting physicians could be provided through low level Q&As and the collecting information on patient symptoms, freeing up physicians to concentrate on treatment.[95] MD Anderson wasn’t the only partner for training

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[88] Reference.com (2017) How is ICT used in health services?

[89] IBM (2013): MD Anderson Taps IBM Watson to Power "Moon Shots" Mission Aimed at Ending Cancer, Starting with Leukemia

[90] Wikipedia (2017): IBM Watson (computer)

[91] AAAI (2010): The AI Behind Watson – The Technical Article

[92] IBM (2017): IBM Watson Health

[93] Washington Post (2015): Watson's next feat? Taking on cancer

[94] Medical Futurist (2016): What Is Using IBM Watson In Everyday Medicine Like?

[95] Medical Futurist (2016): What Is Using IBM Watson In Everyday Medicine Like? 19.03.2017

Watson to become a valuable assistant in fighting cancer, the Memorial Sloan Kettering Cancer Center too trained Watson to become an assistant to physicians.[96] This project though was a whole lot more successful, than MD Anderson's.[97] The Watson AI trained by Memorial Sloan Kettering has by now become a commercial and medical success.[98]

Apart from the way news coverage and IBM hyped the introduction of Watson into Cancer treatment specifically,[99] the audit from MD Anderson is a valuable insight into why the project failed and what it takes to make ICT in ensuring public health a success.[100] Human failure played a large part in the decision to put the program on hold. Aside from gross misspending and a bad record keeping,[101] it turned out, that after bypassing the University of Texas' IT department IBM Watson was not compatible with the latest IT system in use at MD Anderson.[102] With MD Anderson now seeking for a new contractor willing to work with them on AI development it doesn't seem, that the issue loaded IBM project has put ICT in health care into a dead end.[103]

Problems and concerns with ICT in health care

When looking into the different areas of usage for ICT in health, ranging from simply storing patient's records digitally all the way to Artificial Intelligence actively researching possible treatments for any given disease, a number of concerns arise. It is as of now unclear what standards to ensure with regards to a patient's privacy rights. Some questions remaining unanswered in this area are:

- What kind of data is off limits to usage by doctors and insurers?
- Who has to take responsibility for storing data?
- Who decides what data gets to be distributed to medical personnel?
- What precautions have to be taken by providers and hospitals to ensure the protection of patient data?

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[96] IBM (2012): Memorial Sloan-Kettering Cancer Center, IBM to Collaborate in Applying Watson Technology to Help Oncologists [Retrieved 21.03.2017]

[97] Ars technica (2017): IBM's Watson proves useful at fighting cancer – except in Texas

[98] IBM (2017): Jupiter Medical Center Implements Revolutionary Watson for Oncology to Help Oncologists Make Data-Driven Cancer Treatment Decisions

[99] Health News Review (2017): MD Anderson Cancer Center's IBM Watson project fails, and so did the journalism related to it

[100] University of Texas Systems (2016): Special Review of Procurement Procedures Related to the M.D. Anderson Cancer Center Oncology Expert Advisor Project

[101] Forbes (2017): MD Anderson Benches IBM Watson In Setback For Artificial Intelligence In Medicine

[102] Ars technica (2017): IBM's Watson proves useful at fighting cancer – except in Texas

[103] Ars technica (2017): IBM's Watson proves useful at fighting cancer – except in Texas

As could be seen with the MD Anderson project, ensuring interoperability of existing IT infrastructure and future ICT systems are just basic necessities to begin the introduction of ICT into health care. Furthermore, the health sector, as is with almost all sectors of future economies, will see major disruptions in its employment structure as AI will augment and replace today's work done by humans.

Existing regulations on ICT in health care

On the international level most regulations surrounding ICT in ensuring public health have focused on achieving a common standard of infrastructure to ensure cross-border interoperability.[104] In its resolution 68/167 "The right to privacy in the digital age." the United Nations General Assembly spoke out to ensure the same standard of privacy rights for people online as offline.[105] Therefore, future action by the United Nations and its related organizations will have to take this into account, especially as privacy rights are often seen.

The United Nations specialized agency for telecommunications technology, the ITU, specifically the ITU Telecommunications Standardisation Sector (ITU-T) passed Resolution 78, titled "Information and communication technology applications and standards for improved access to e-health services". In this resolution, the ITU tasked Study Groups to document and disseminate information on best practice examples in eHealth.[106]

Regarding regulation on the actual market itself examples can be found in the EU and in the US. Earliest moves for regulation in the EU were made in 1995 with the European Council's directive 95/46/EC. In this the council set regulations regarding the protection of individuals in regard to the processing of their data and the free movement of health-related data. It states, that processing of data concerning health is only allowed where necessary and by health personnel authorized under national law. Furthermore, processing of data is only possible, when it is tied to a specific procedure, and never diffusely, this especially is an issue for eHealth, as processing of large quantities of data is an essential benefit of eHealth over more traditional health care. Finally, patients also have to be informed over processing of their data.[107] Regulation in the EU extends into medical devices and medical software.[108]

In the US, the Food and Drug Association (FDA) is tasked with regulation of devices intended for treatment, diagnosis or prevention of illnesses and disease. This authority extends to the regulation of cloud-based and data management software. The relevant infrastructure

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[104] ITU (2017): ITU e-Health

[105] UN (2013): United Nations General Assembly Resolution 68/167 The right to privacy in the digital age

[106] ITU (2016): Resolution 78 – Information and communication technology applications and standards for improved access to e-health services

[107] WHO: 13 The EU legal framework on e-health

[108] Practical Law (2013):
EU and US regulation of health information technology, software and mobile apps

for ICT is regulated by the Federal Communications Commission (FCC). Enduring and frequent exchanges, as well as a memorandum of understanding framing basic principles of cooperation have been installed to guarantee a smooth introduction of new technologies.[109] Class based grading of software and devices grant an easy, at a glance assessment of security risks associated with the new technology.[110]

Issues a resolution should address

- Where does the UN fit into the legislative process on ICT in ensuring public health?
- What are the chances for developing countries when using ICT for public health?
- Recommendation: UN Chronicle. Bridging the Digital Divide in Health.
- How can universal standards be ensured, to guarantee interoperability?
- How do a patient's privacy rights fit into eHealth?
- Possible best practice suggestions for member states to put into practice.

[109] Practical Law (2013):
EU and US regulation of health information technology, software and mobile apps

[110] Practical Law (2013):
EU and US regulation of health information technology, software and mobile apps

Bibliography

- AAAI (2010): The AI Behind Watson – The Technical Article. http://www.aaai.org/Magazine/Watson/watson.php [Retrieved 26.03.2017]
- ACCOMPANY(2015): Homepage. http://rehabilitationrobotics.net/cms2/ [Retrieved 13.03.2017]
- Ars technica (2017): IBM's Watson proves useful at fighting cancer – except in Texas. https://arstechnica.com/science/2017/02/ibms-watson-proves-useful-at-fighting-cancer-except-in-texas/ [Retrieved 21.03.2017]
- BBC (2017): Networks and communications – Network types and topologies. http://www.bbc.co.uk/education/guides/z36nb9q/revision/1 [Retrieved 16.03.2017]
- BNAmericas (2014): "Data is the natural resource of the 21st century", says IBM chief. http://www.bnamericas.com/en/news/technology/data-is-the-natural-resource-of-the-21st-century-says-ibm-chief [Retrieved 21.3.2017]
- CORBYS (2017): http://corbys.eu [Retrieved 13.03.2017]
- EFTA (2015): Regulations on the use of ICT standards in the health and care services. http://www.eftasurv.int/media/notification-of-dtr/2015_9005_N-EN.pdf [Retrieved 22.03.2017]
- Face Entrepreneurship (2016): How ICT is changing the world: e-health. http://www.face-entrepreneurship.eu/en/blog/articulos/how-ict-is-changing-the-world-e-health [Retrieved 21.03.2017]
- Forbes (2017): MD Anderson Benches IBM Watson In Setback For Artificial Intelligence In Medicine. https://www.forbes.com/sites/matthewherper/2017/02/19/md-anderson-benches-ibm-watson-in-setback-for-artificial-intelligence-in-medicine/#713dbb653774 [Retrieved 21.03.2017]
- Health News Review (2017): MD Anderson Cancer Center's IBM Watson project fails, and so did the journalism related to it. http://www.healthnewsreview.org/2017/02/md-anderson-cancer-centers-ibm-watson-project-fails-journalism-related/ [Retrieved 21.03.2017]
- IBM (2012): Memorial Sloan-Kettering Cancer Center, IBM to Collaborate in Applying Watson Technology to Help Oncologists. https://www-03.ibm.com/press/us/en/pressrelease/37235.wss [Retrieved 21.03.2017]
- IBM (2013): MD Anderson Taps IBM Watson to Power "Moon Shots" Mission Aimed at Ending Cancer, Starting with Leukemia. http://www-03.ibm.com/press/us/en/pressrelease/42214.wss [Retrieved 19.03.2017]
- IBM (2017): IBM Watson Health. https://www.ibm.com/watson/health/ [Retrieved 21.03.2017]
- IBM (2017): Jupiter Medical Center Implements Revolutionary Watson for Oncology to Help Oncologists Make Data-Driven Cancer Treatment Decisions. https://www-03.ibm.com/press/us/en/pressrelease/51517.wss [Retrieved 21.03.2017]
- ICT for Health (2013): Homepage. http://www.ictforhealth.net [Retrieved 21.03.2017]

- ICT for Health (2013): ICT for Health – Project. http://www.ictforhealth.net/index.php?option=com_content&view=article&id=45&Itemid=27 [Retrieved 21.03.2017]
- ITU (2002): Resolution 56/183. World Summit on the Information Society. https://www.itu.int/net/wsis/docs/background/resolutions/56_183_unga_2002.pdf [Retrieved 15.03.2017]
- ITU (2016): Resolution 78 – Information and communication technology applications and standards for improved access to e-health services. https://www.itu.int/dms_pub/itu-t/opb/res/T-RES-T.78-2016-PDF-E.pdf [Retrieved 24.03.2017]
- ITU (2017): ITU. e-Health. http://www.itu.int/en/ITU-T/e-Health/Pages/default.aspx [Retrieved 24.03.2017]
- LIREC (2012): Homepage. http://lirec.eu [Retrieved 13.03.2017]
- Medical Futurist (2016): What Is Using IBM Watson In Everyday Medicine Like? http://medicalfuturist.com/what-is-using-ibm-watson-in-medicine-like/ [Retrieved 19.03.2017]
- NWHS: Improving Care through ICT. http://www.wales.nhs.uk/improvingcarethroughict [Retrieved 17.03.2017]
- OECD (2004): The Economic Impact of ICT. http://www.keepeek.com/Digital-Asset-Management/oecd/economics/the-economic-impact-of-ict_9789264026780-en#.WNFcoBiX9Xg [Retrieved 21.03.2017]
- OECD (2013): ICTs and the Health Sector – Towards Smarter Health and Wellness Models. http://www.keepeek.com/Digital-Asset-Management/oecd/science-and-technology/icts-and-the-health-sector_9789264202863-en#.WMpkHBiX9Xg [Retrieved 16.03.2017]
- Practical Law (2013): EU and US regulation of health information technology, software and mobile apps http://uk.practicallaw.com/3-518-3154?q=&qp=&qo=&qe= [Retrieved 22.03.2017]
- Reference.com (2017): How is ICT used in health services? https://www.reference.com/business-finance/ict-used-health-services-ac23a561f7b45ec0 [Retrieved: 13.03.2017]
- The Australian (2014): How ICT can improve the health of healthcare. http://www.theaustralian.com.au/business/business-spectator/how-ict-can-improve-the-health-of-healthcare/news-story/fc2a2c50e3dfb22b4e276e22aa80fa35 [Retrieved 13.03.2017]
- UN (2013): United Nations General Assembly Resolution 68/167 The right to privacy in the digital age. http://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/68/167 [Retrieved 24.03.2017]
- University of Herdfordshire (2017) http://www.herts.ac.uk/research/centres-and-groups/ccsir/ict-for-healthcare [Retrieved 13.03.2017]
- University of Texas Systems (2016): Special Review of Procurement Procedures Related to the M.D. Anderson Cancer Center Oncology Expert Advisor Project. http://www.utsystem.edu/sites/utsfiles/documents/system-audit/ut-system-administration-special-review-procurement-procedures-related-utmdacc-oncology-expert-advis/ut-system-administration-

special-review-procurement-procedures-related-utmdacc-oncology-expert-advis.pdf [Retrieved 21.03.2017]

- Wall Street Journal (2016): Toyota to Sell 'Cuddly Companion' Robot in Japan. https://www.wsj.com/articles/toyota-to-sell-cuddly-companion-robot-in-japan-1475486949 [Retrieved 21.03.2017]
- Washington Post (2015): Watson's next feat? Taking on cancer. http://www.washingtonpost.com/sf/national/2015/06/27/watsons-next-feat-taking-on-cancer/?utm_term=.43042666bc55 [Retrieved 21.03.2017]
- WHO: 13 The EU legal framework on e-health. http://www.euro.who.int/__data/assets/pdf_file/0008/138185/E94886_ch13.pdf?ua=1 [Retrieved 22.03.2017]
- Wikipedia (2017): IBM Watson (computer). https://en.wikipedia.org/wiki/Watson_(computer) [Retrieved 26.03.2017]
- Wikipedia (2017): Information and communications technology. https://en.wikipedia.org/wiki/Information_and_communications_technology [Retrieved 14.03.2017]