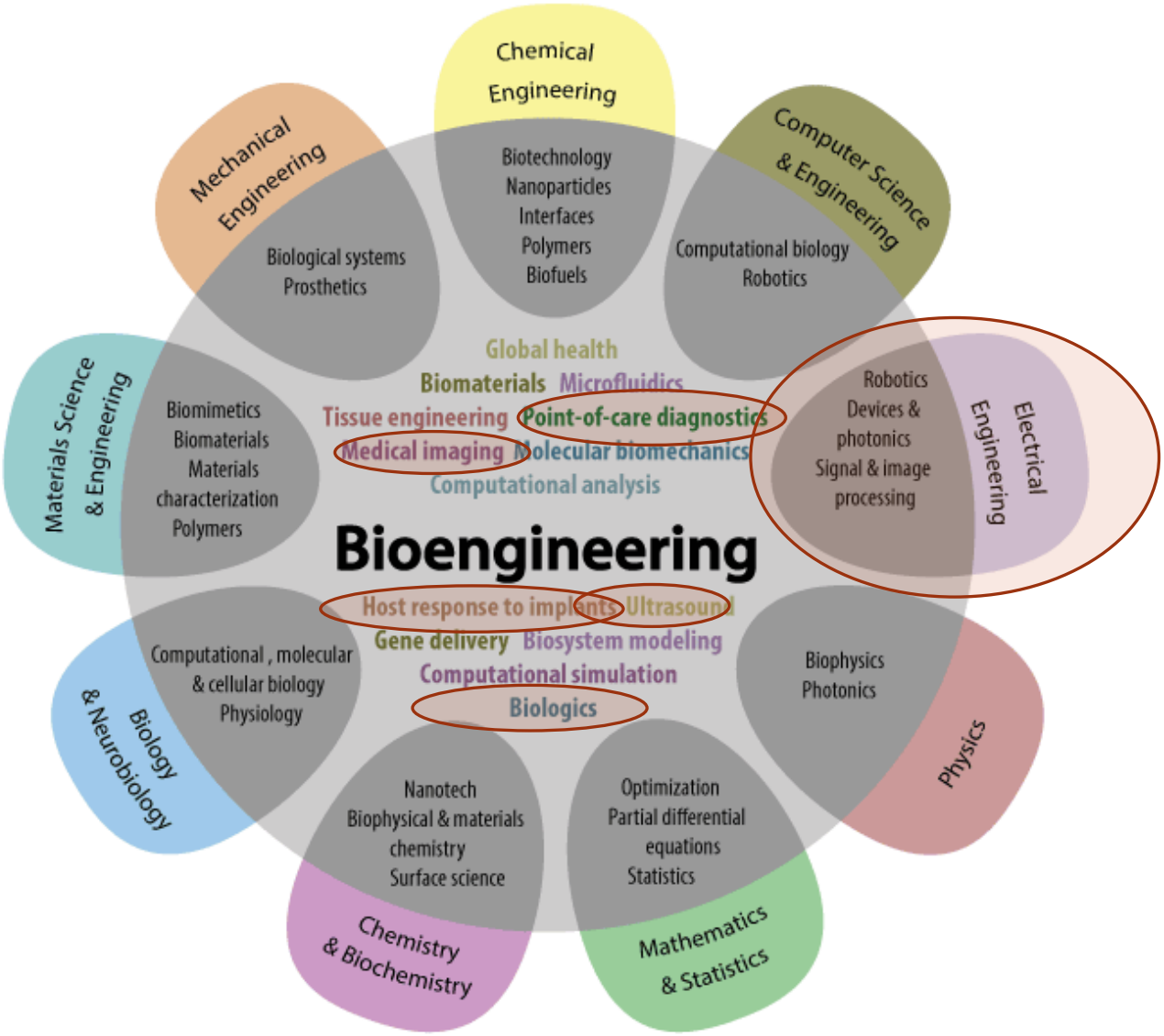
POSTAVENÍ BIOMEDICÍNSKÝCH INŽENÝRŮ V MEDICÍNSKÉ PRAXI U NÁS A V ZAHRANIČÍ

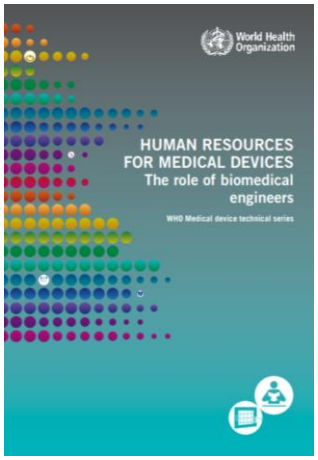
ING. JANA HRUŠKOVÁ

Chápání pojmu biomedicínské inženýrství



University of Washignton - https://bioe.uw.edu/academic-programs/about-bioengineering/

Chápání pojmu biomedicínské inženýrství -WHO



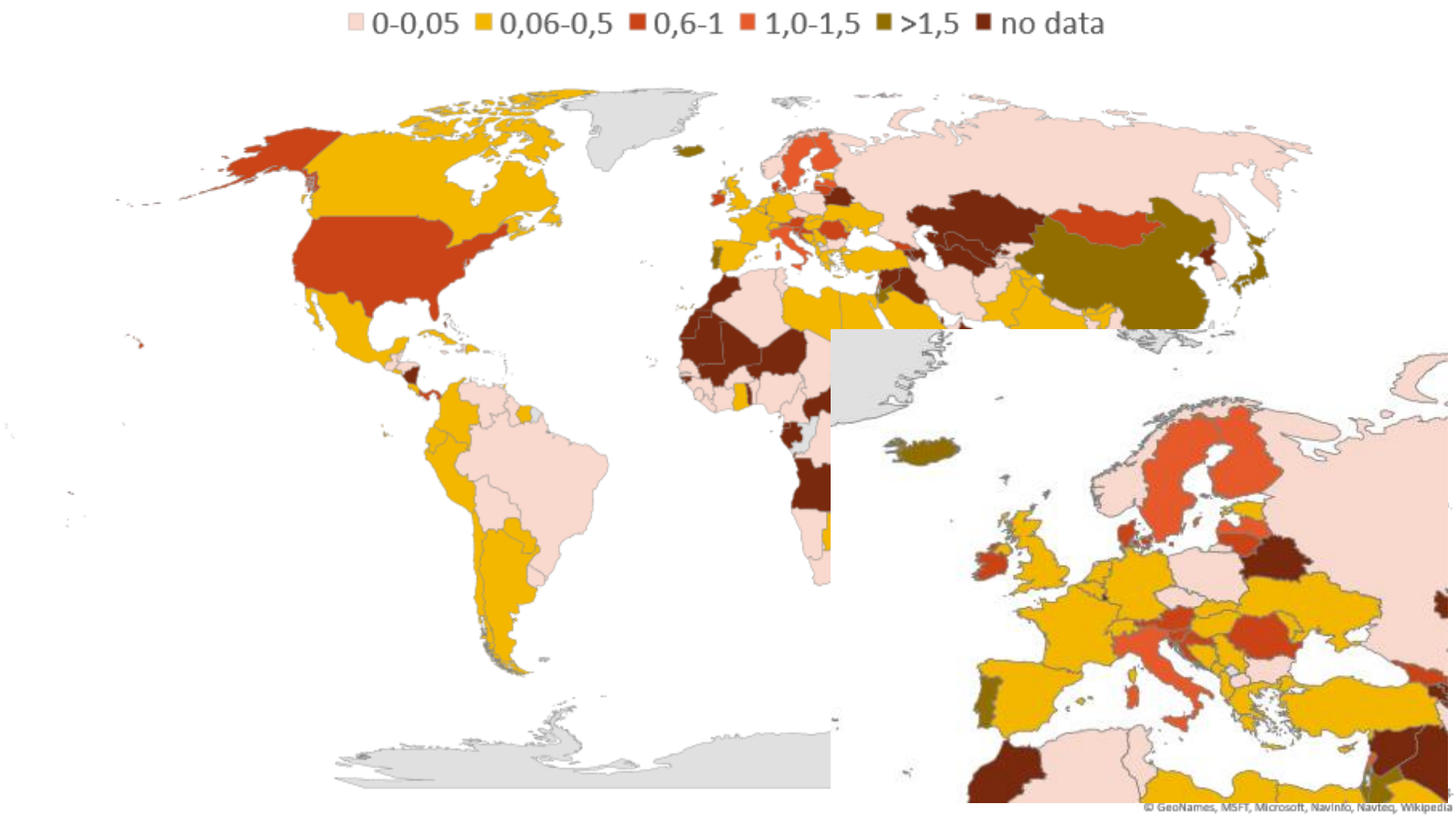
Biomedical engineering (BME): Medical and BME integrates physical, mathematical and life sciences with engineering principles for the study of biology, medicine and health systems and for the application of technology to improve health and quality of life. It creates knowledge from molecular to organ systems levels, develops materials, devices, systems, information approaches, technology management and methods for assessment and evaluation of technology, for the prevention, diagnosis and treatment of disease, for health-care delivery and for patient care and rehabilitation.*(24)*

Clinical engineer: In some countries, this defines the biomedical engineer that works in clinical settings. The American College of Clinical Engineering defines a clinical engineer as, "a professional who supports and advances patient care by applying engineering and managerial skills to health care technology".*(25)* The Association for the Advancement of Medical Instrumentation describes a clinical engineer as, "a professional who brings to health-care facilities a level of education, experience, and accomplishment which will enable him to responsibly, effectively, and safely manage and interface with medical devices, instruments, and systems and the user thereof during patient care…".*(26)*

Biomedical engineering technician/technologist (BMET): Front-line practitioners dedicated to the daily maintenance and repair of medical equipment in hospitals, meeting a specified minimum level of expertise. BMETs who work exclusively on complex laboratory and radiological equipment may become certified in their specialism, without needing to meet the more general professional engineering requirements. The difference between a technician and a technologist relates to the level and number of years of training. Normally technicians train for two years, technologists for three years, but this can differ per country.

University of Washignton - https://bioe.uw.edu/academic-programs/about-bioengineering/

Geografické údaje dle WHO – Množství Biomedicínských inženýrů na 10 000 lidí



http://apps.who.int/iris/bitstream/handle/10665/255261/9789241565479-eng.pdf;jsessionid=B74E6DAB3FB571E01AB8DA734BAF3657?sequence=1

Geografické údaje dle WHO – Množství Biomedicínských inženýrů na 10 000 lidí

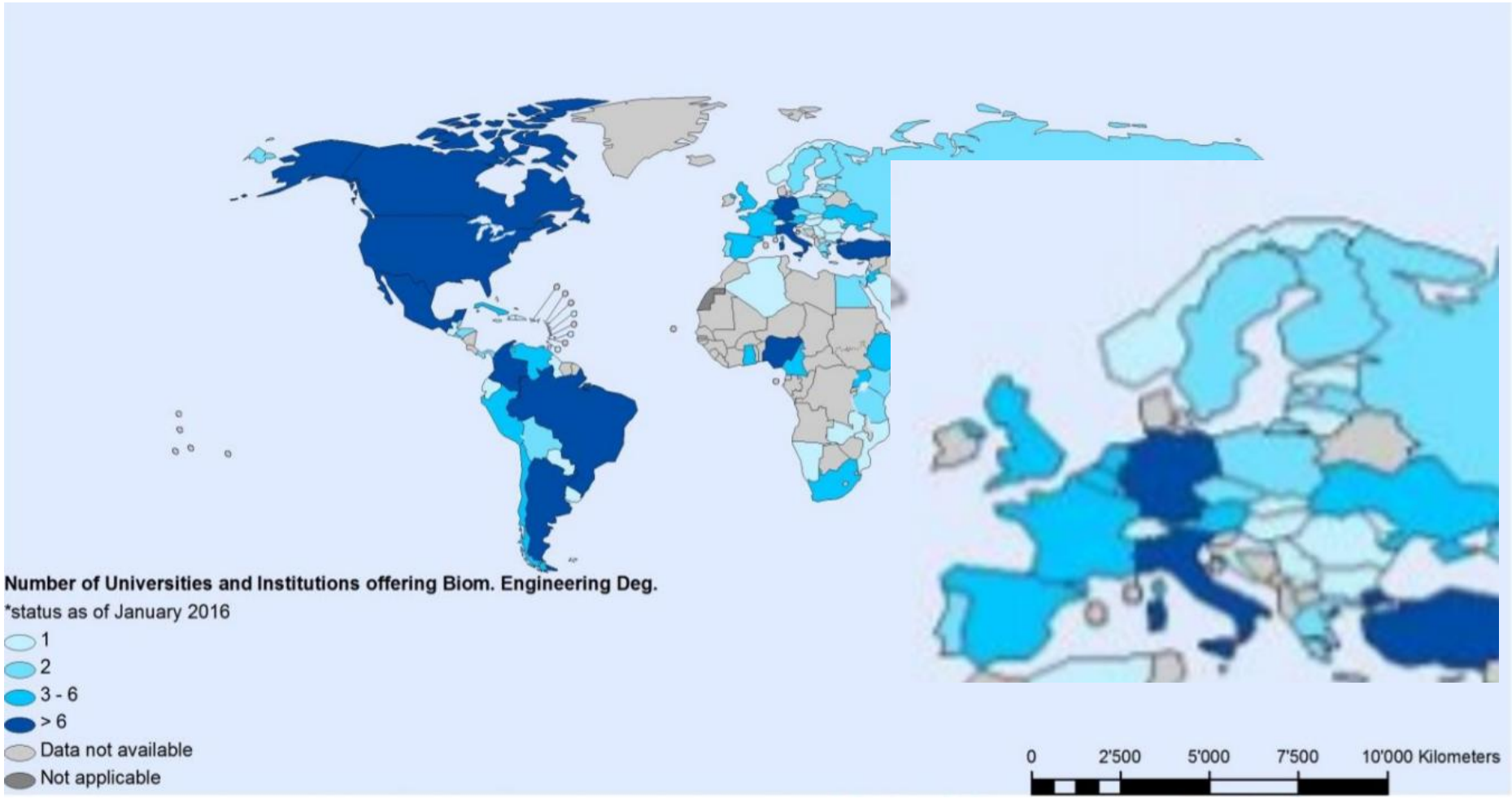
PUBLISH STATES (string	Year (string	WHO region (string	Country (string	Biomedical engineers density (per 10 000 population) (string	Biomedical engineers density (per 10 000 population) (numer	Biomedical engineers density (per 10 000 population) (comment)	Number of biomedical engineers (strin	Number of biomedical engineers (numeric)	Number of biomedical engineers (comment)
Published	2017	Europe	Belarus	No data			No data		
Published	2017	Europe	Belgium	0.44	0,44	Reported number of biomedical engineers by country.	500	500	Reported number of biomedical engineers by c
Published	2017	Europe	Bosnia an	0.14	0,14	Reported number of biomedical engineers by country.	50	50	Reported number of biomedical engineers by c
Published	2017	Europe	Bulgaria	0.05	0,05	Reported number of biomedical engineers by country.	35	35	Reported number of biomedical engineers by c
Published	2017	Europe	Croatia	0.6	0,6	Reported number of biomedical engineers by country.	250	250	Reported number of biomedical engineers by c
Published	2017	Europe	Cyprus	0.13	0,13	Reported number of biomedical engineers by country.	15	15	Reported number of biomedical engineers by c
Published	2017	Europe	Czechia	<0.05		Presence of biomedical engineers but not available specific data.	≥1	1	Presence of biomedical engineers but not avai
Published	2017	Europe	Denmark	0.79	0,79	Reported number of biomedical engineers by country.	450	450	Reported number of biomedical engineers by c
Published	2017	Europe	Estonia	0.46	0,46	Reported number of biomedical engineers by country.	60	60	Reported number of biomedical engineers by c
Published	2017	Europe	Finland	1.55	1,55	Reported number of biomedical engineers by country.	850	850	Reported number of biomedical engineers by c
Published	2017	Europe	France	0.09	0,09	Reported number of biomedical engineers by country.	600	600	Reported number of biomedical engineers by c
Published	2017	Europe	Georgia	0.67	0,67	Reported number of biomedical engineers by country.	250	250	Reported number of biomedical engineers by c
Published	2017	Europe	Germany	0.25	0,25	Reported number of biomedical engineers by country.	2050	2050	Reported number of biomedical engineers by c
Published	2017	Europe	Greece	0.28	0,28	Reported number of biomedical engineers by country.	300	300	Reported number of biomedical engineers by c
Published	2017	Europe	Hungary	0.41	0,41	Reported number of biomedical engineers by country.	400	400	Reported number of biomedical engineers by c
Published	2017	Europe	Iceland	1.68	1,68	Reported number of biomedical engineers by country.	56	56	Reported number of biomedical engineers by c
Published	2017	Europe	Ireland	0.69	0,69	Reported number of biomedical engineers by country.	330	330	Reported number of biomedical engineers by c
Published	2017	Europe	Israel	2.34	2,34	Reported number of biomedical engineers by country.	2000	2000	Reported number of biomedical engineers by c
Published	2017	Europe	Italy	1.4	1,4	Reported number of biomedical engineers by country.	8477	8477	Reported number of biomedical engineers by c
Published	2017	Europe	Kazakhsta	No data			No data		
Published	2017	Europe	Kyrgyzstar	<0.05		Reported number of biomedical engineers by country.	3	3	Reported number of biomedical engineers by c
Published	2017	Europe	Latvia	1.12	1,12	Reported number of biomedical engineers by country.	220	220	Reported number of biomedical engineers by c
Published	2017	Europe	Lithuania	0.87	0,87	Reported number of biomedical engineers by country.	250	250	Reported number of biomedical engineers by c
Published	2017	Europe	Luxembou	No data			No data		
Published	2017	Europe	Malta	No data			No data		
Published	2017	Europe	Monaco	No data			No data		
Published	2017	Europe	Netherlan	0.29	0,29	Reported number of biomedical engineers by country.	500	500	Reported number of biomedical engineers by c
Published	2017	Europe	Norway	<0.05		Presence of biomedical engineers but not available specific data.	≥1	1	Presence of biomedical engineers but not avai
Published	2017	Europe	Poland	<0.05		Reported number of biomedical engineers by country.	163	163	Reported number of biomedical engineers by c
Published	2017	Europe	Portugal	2	2	Reported number of biomedical engineers by country.	2060	2060	Reported number of biomedical engineers by c
Published	2017	Europe	Republic c	0.25	0,25	Reported number of biomedical engineers by country.	90	90	Reported number of biomedical engineers by c

notice | data-coded | **data-text** | Indicator | PUBLISH STATES | Year | WHO region | **Country**

RAVEN PRŮMĚR: 1 POČET: 13 SOUČET: 1

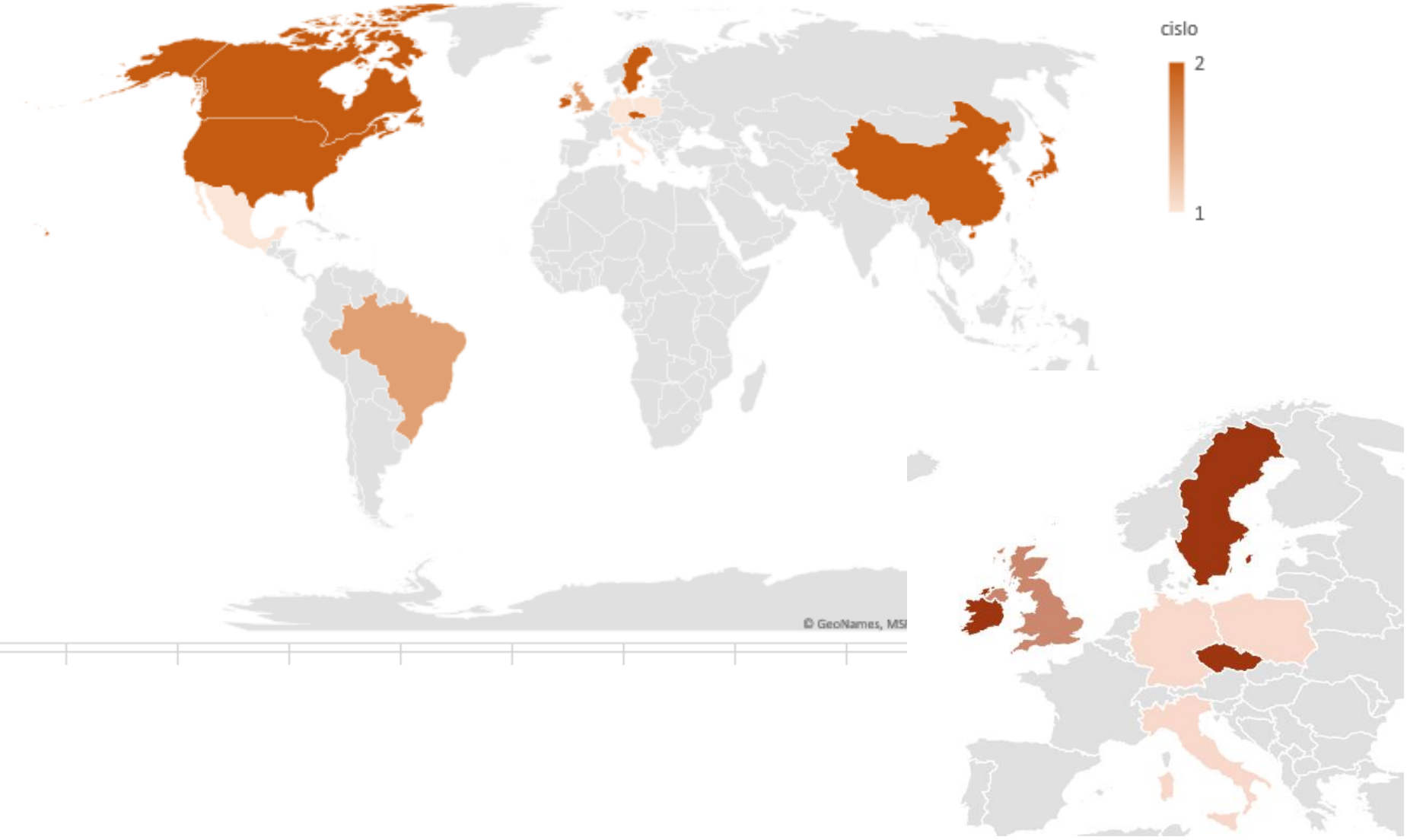
http://apps.who.int/iris/bitstream/handle/10665/255261/9789241565479-eng.pdf;jsessionid=B74E6DAB3FB571E01AB8DA734BAF3657?sequence=1

Geografické údaje dle WHO –Počet univerzit poskytující biomedicínské vzdělání



http://www.who.int/medical_devices/global_forum/Humanresourcesofmedicaldevices.pdf

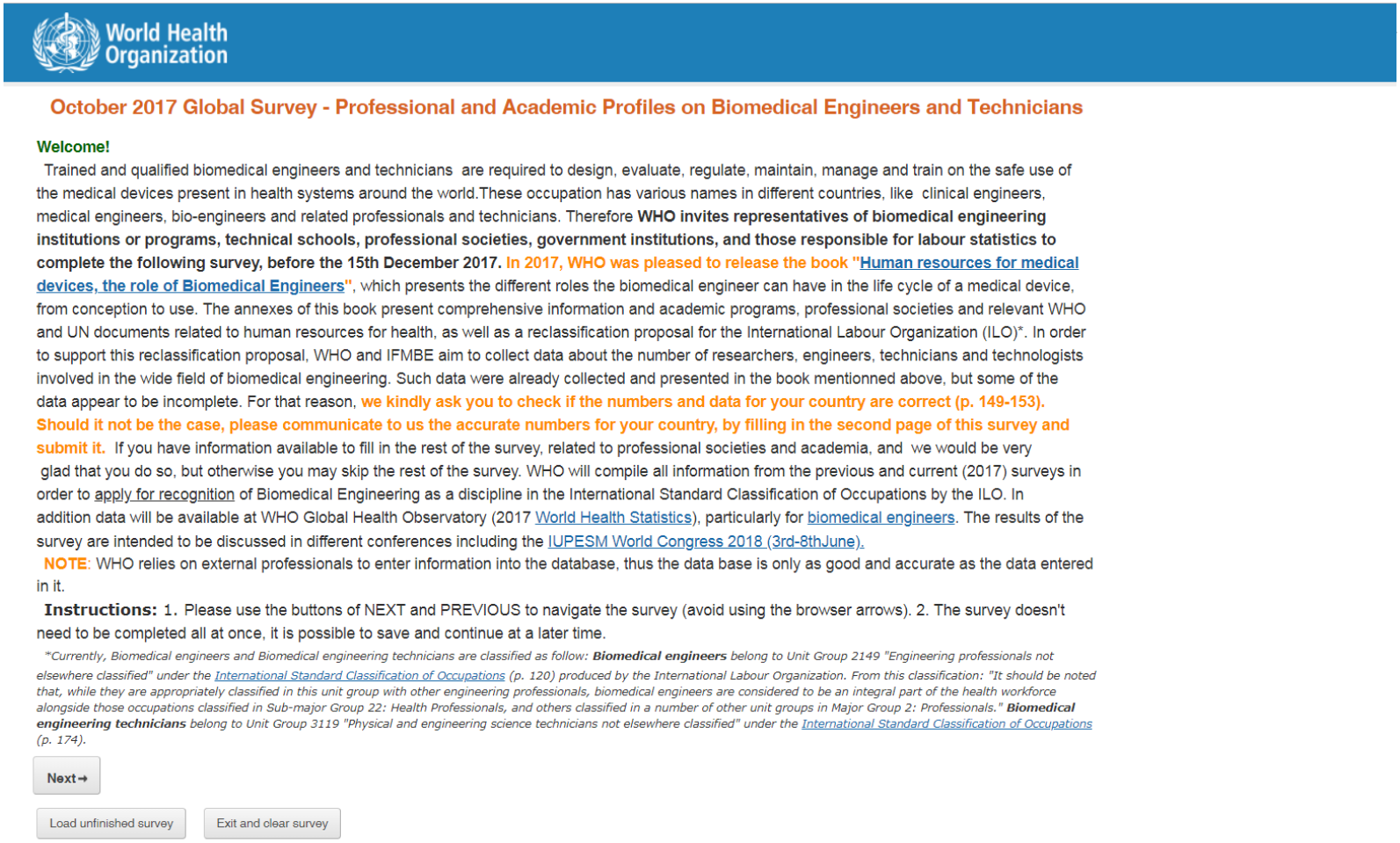
Stupně vzdělání ve světě



	 USA	 VELKÁ BRITÁNIE	 ČESKÁ REPUBLIKA
BAKALÁŘSKÝ OBOR	Biomedicínský technik Sonografista Elekrorfyziologický technik Vaskulární technik ICD/pacemaker technik Neurologicko diagnostický technik Technik v Invazivní kardiologii	Biomedicínský technik	Biomedicínský technik
MAGISTERSKÝ OBOR	Biomedicínské inženýrství	Biomedicínské inženýrství	Biomedicínské inženýrství
SPECIALIZACE	Klinické inženýrství (CCE)	Klinické inženýrství (pod HCPC)	Klinický inženýr –Kardiologie* Klinický inženýr – Chirurgie, intezivní medicína* Klinický inženýr – Diagnostika* Klinický inženýr – Radioterapie* Klinický inženýr – Biosignály*

https://www.indeed.com/ ; http://www.carnegie-institute.edu/programs/cardiovascular-technologist/ ; * zkrácené názvy

Update biomedicínských inženýrů v ČR



World Health Organization

October 2017 Global Survey - Professional and Academic Profiles on Biomedical Engineers and Technicians

Welcome!

Trained and qualified biomedical engineers and technicians are required to design, evaluate, regulate, maintain, manage and train on the safe use of the medical devices present in health systems around the world.These occupation has various names in different countries, like clinical engineers, medical engineers, bio-engineers and related professionals and technicians. Therefore **WHO invites representatives of biomedical engineering institutions or programs, technical schools, professional societies, government institutions, and those responsible for labour statistics to complete the following survey, before the 15th December 2017.** In 2017, WHO was pleased to release the book "Human resources for medical devices, the role of Biomedical Engineers", which presents the different roles the biomedical engineer can have in the life cycle of a medical device, from conception to use. The annexes of this book present comprehensive information and academic programs, professional societies and relevant WHO and UN documents related to human resources for health, as well as a reclassification proposal for the International Labour Organization (ILO)*. In order to support this reclassification proposal, WHO and IFMBE aim to collect data about the number of researchers, engineers, technicians and technologists involved in the wide field of biomedical engineering. Such data were already collected and presented in the book mentionned above, but some of the data appear to be incomplete. For that reason, **we kindly ask you to check if the numbers and data for your country are correct (p. 149-153). Should it not be the case, please communicate to us the accurate numbers for your country, by filling in the second page of this survey and submit it.** If you have information available to fill in the rest of the survey, related to professional societies and academia, and we would be very glad that you do so, but otherwise you may skip the rest of the survey. WHO will compile all information from the previous and current (2017) surveys in order to apply for recognition of Biomedical Engineering as a discipline in the International Standard Classification of Occupations by the ILO. In addition data will be available at WHO Global Health Observatory (2017 World Health Statistics), particularly for biomedical engineers. The results of the survey are intended to be discussed in different conferences including the IUPESM World Congress 2018 (3rd-8thJune).

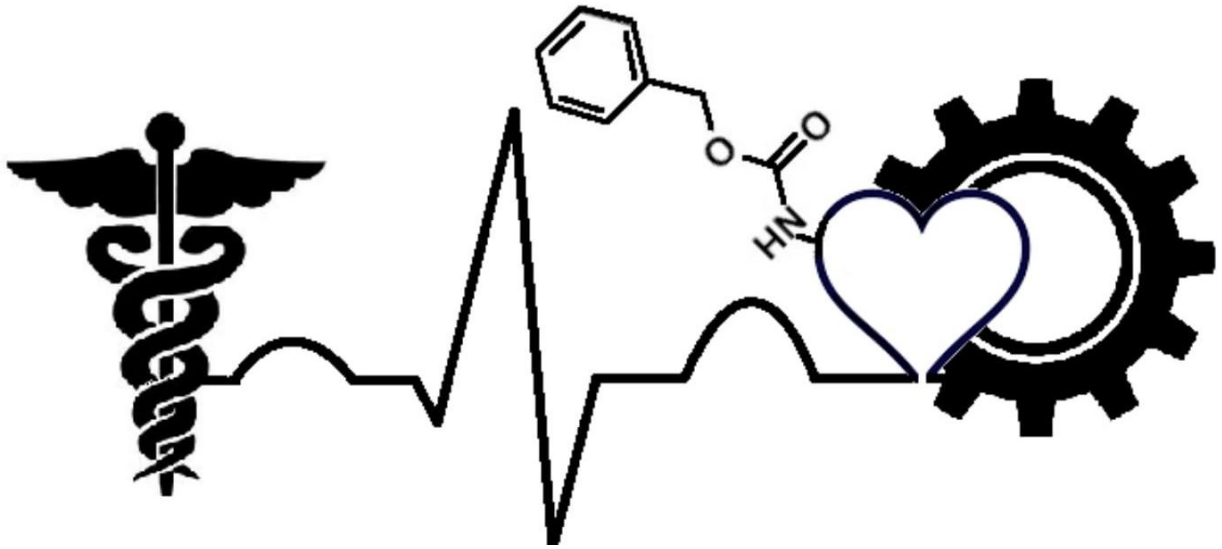
NOTE: WHO relies on external professionals to enter information into the database, thus the data base is only as good and accurate as the data entered in it.

Instructions: 1. Please use the buttons of NEXT and PREVIOUS to navigate the survey (avoid using the browser arrows). 2. The survey doesn't need to be completed all at once, it is possible to save and continue at a later time.

Currently, Biomedical engineers and Biomedical engineering technicians are classified as follow:* ***Biomedical engineers* *belong to Unit Group 2149 "Engineering professionals not elsewhere classified" under the International Standard Classification of Occupations (p. 120) produced by the International Labour Organization. From this classification: "It should be noted that, while they are appropriately classified in this unit group with other engineering professionals, biomedical engineers are considered to be an integral part of the health workforce alongside those occupations classified in Sub-major Group 22: Health Professionals, and others classified in a number of other unit groups in Major Group 2: Professionals."* ***Biomedical engineering technicians*** *belong to Unit Group 3119 "Physical and engineering science technicians not elsewhere classified" under the International Standard Classification of Occupations (p. 174).*

Next →

Load unfinished survey | Exit and clear survey



Ing. Jana Hrušková
Jana.hruskova@fnusa.cz