

A strategic approach to curriculum development for embedding interdisciplinarity for the Sustainable Circular Bioeconomy across all Bachelor degree programs

Charlotte Voigt

Student Member and Vice Chair University Senate

ICA CoP Bio-Edu Colloquium May 19.-20.2022

Ghent, Belgium



150 YEARS
FEATURING
FUTURE
1872 - 2022

UNIVERSITY OF NATURAL RESOURCES AND
LIFE SCIENCES, VIENNA

Who am I ?

- Bachelor: Environmental and Bio-Resources Management
- Master: Agricultural and Food Economics
 - Currently working on Thesis
- Student Assistant at the Institute for Development Research
- Vice Chair of the University Senate since 2019
- Previously Chair of the Student Union

Presentation outline

- BOKU History and Competencies
- Key Terms: Bioeconomy and Interdisciplinarity
- Three Pillar System and implementation in curricula
- Challenges
- Current discussions in curricula development
- The surroundings
- Questions for discussion

University of Natural Resources and Life Sciences, Vienna (BOKU)



© bokuvienna

150 Years

- 10,800 Students
- 7 Bachelor programs



© bokuvienna

1991: Landscape ecology
and landscaping

1954: Fermentation
Technology



© bokuvienna

1883: Civil Engineering
and Water Management

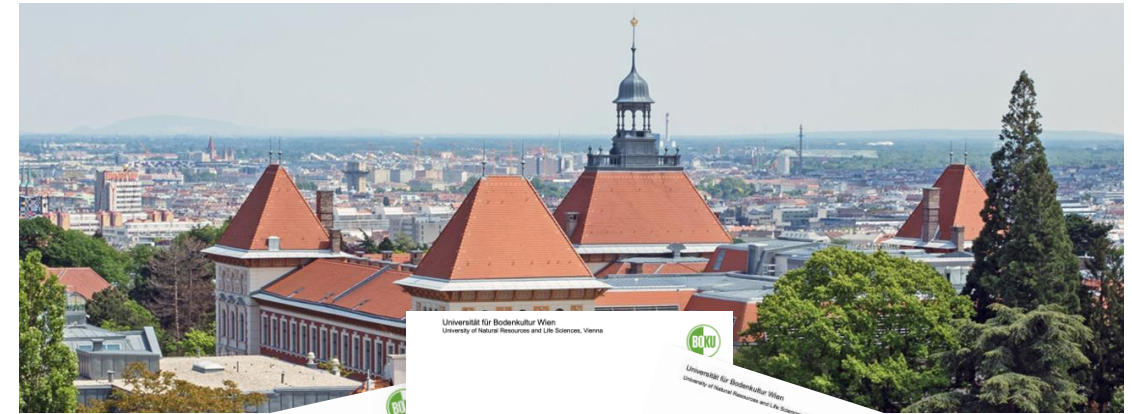
Founded 1872:
Agriculture
Forestry



© bokuvienna

BOKU Bachelor programs

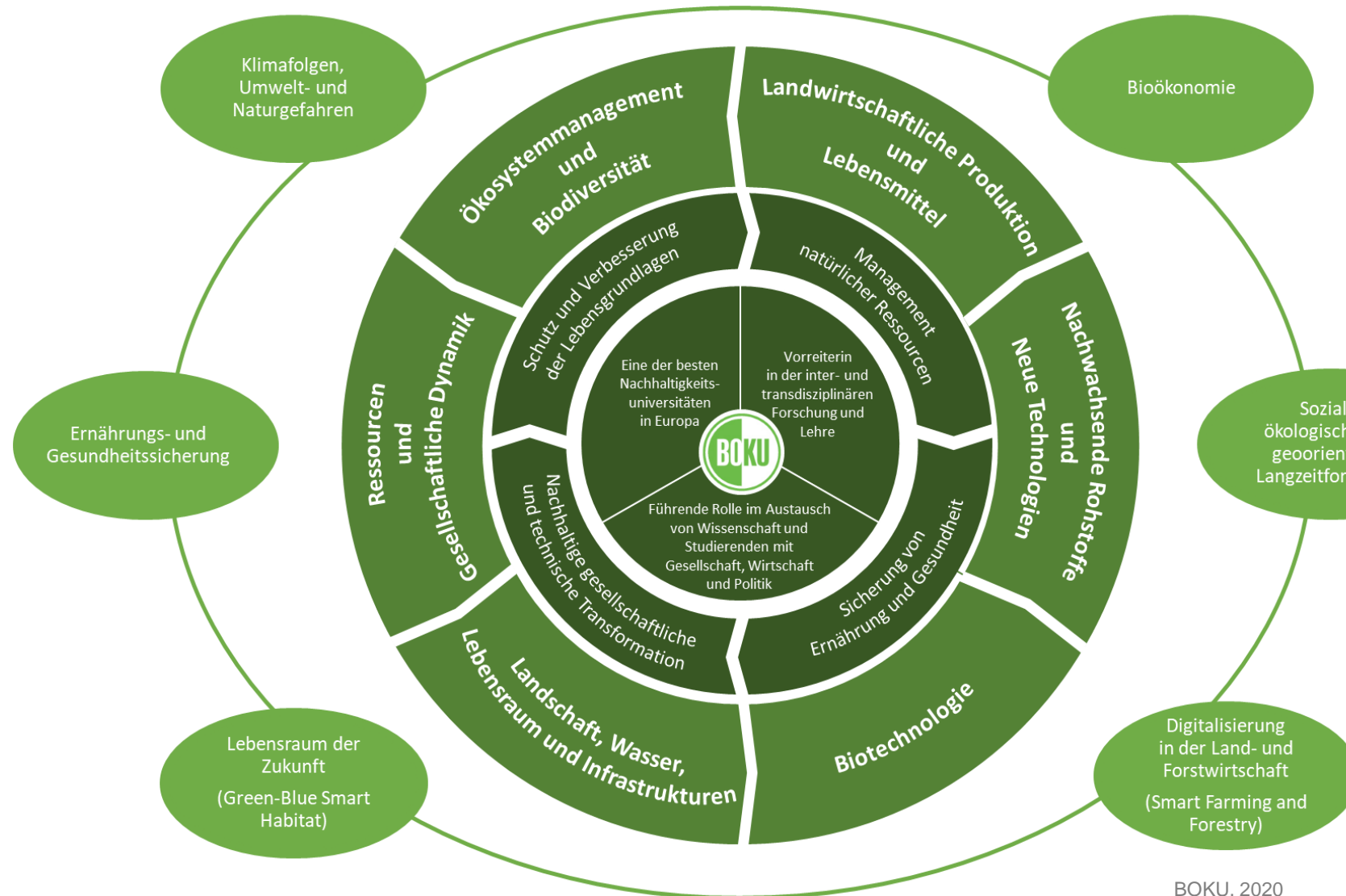
- Forestry
- Agricultural Sciences
- Environmental Science and Civil Engineering
- Food Science and Biotechnology
- Landscape Planning and Architecture
- Wood and Fibre Technology
- Environment and Bio-Resources Management
- 27 master programs (English and German)



© bokuvienna



Themes and competences

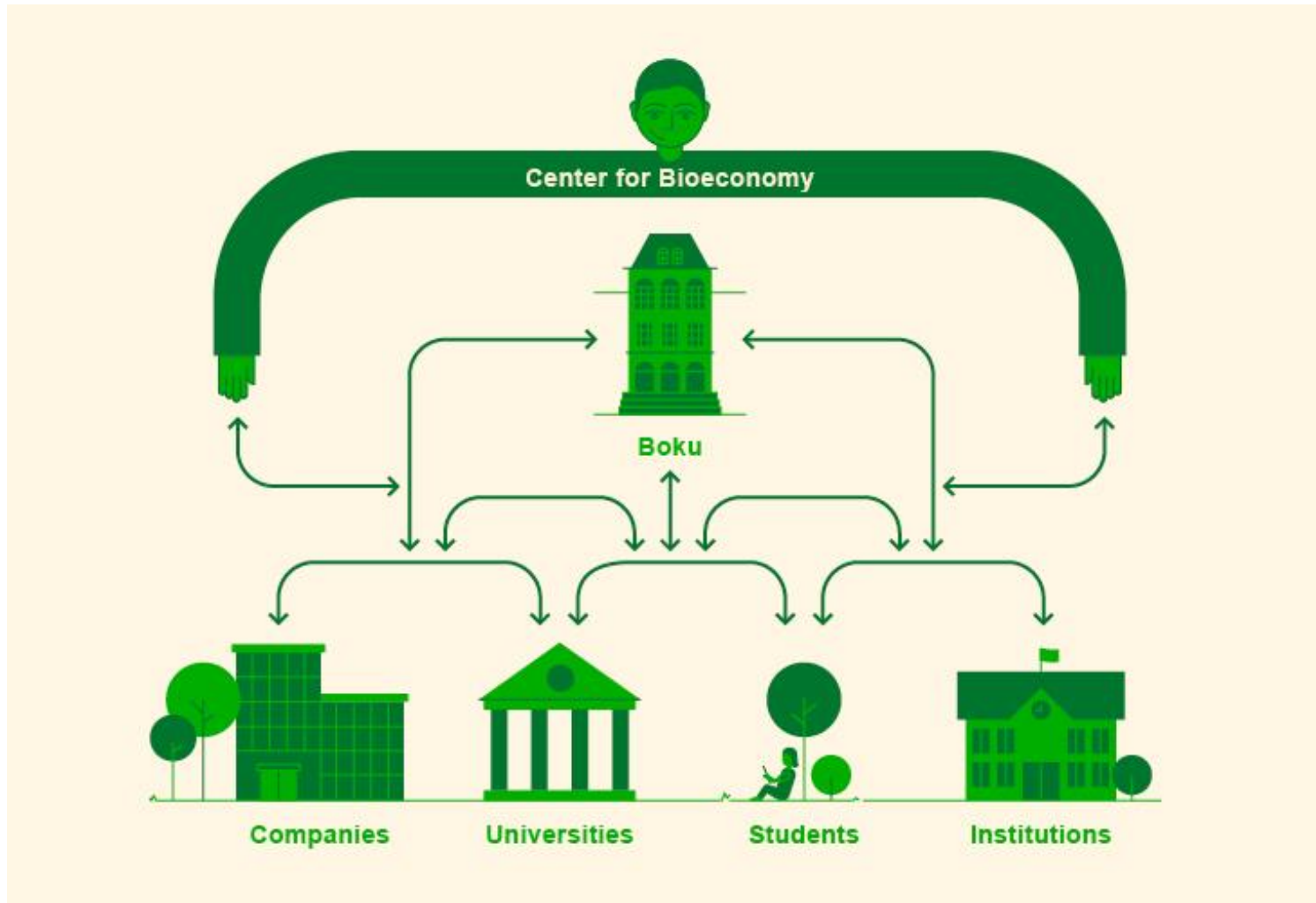


BOKU, 2020

- Ecosystem Management and Biodiversity
- Agricultural Production and Food
- Renewable Raw Materials and New Technologies
- Biotechnology
- Landscape, Water, Habitat and Infrastructure
- Resources and Social Dynamics

Which Bioeconomy ?

Creating a university wide dialogue about the Bioeconomy



Center for Bioökonomie, BOKU

Coordination

Cooperation

Collaboration

Communication

BE as a socio-cultural system

- Post-consumerism
- Fostering a healthy human-nature-relationship

BE as a technical economical solution

- For production (Agriculture, forestry, fishery, technological intensification)
- For processing (transportation and logistics, biorefineries and chemical processing, mechanical processing)

BE as an interface

- Providing information on the environmental status
- Regulating resource-flow between human and nature (output and input)
- Book keeper of natural resources

Bioeconomy

Which Interdisciplinarity ?

Interdisciplinarity: cooperation in research and teaching across created disciplinary boundaries

Transdisciplinarity: cooperation that removes these boundaries leading to co-evolution of disciplines within and beyond science (strong interdisciplinarity)

Mittelstraß, 2012

Students for the Bioeconomy?

- Anticipatory competence
- Normative competence
- Strategic competence
- Systems-thinking competence
- Interpersonal competence → Interdisciplinary competence
- Each competence relies on the ability to “analyse, apply, map, design and implement **collectively.**”
 - Interdisciplinary competence as an overarching necessity

Lask et al 2018



© bokuvienna

Students that come to BOKU

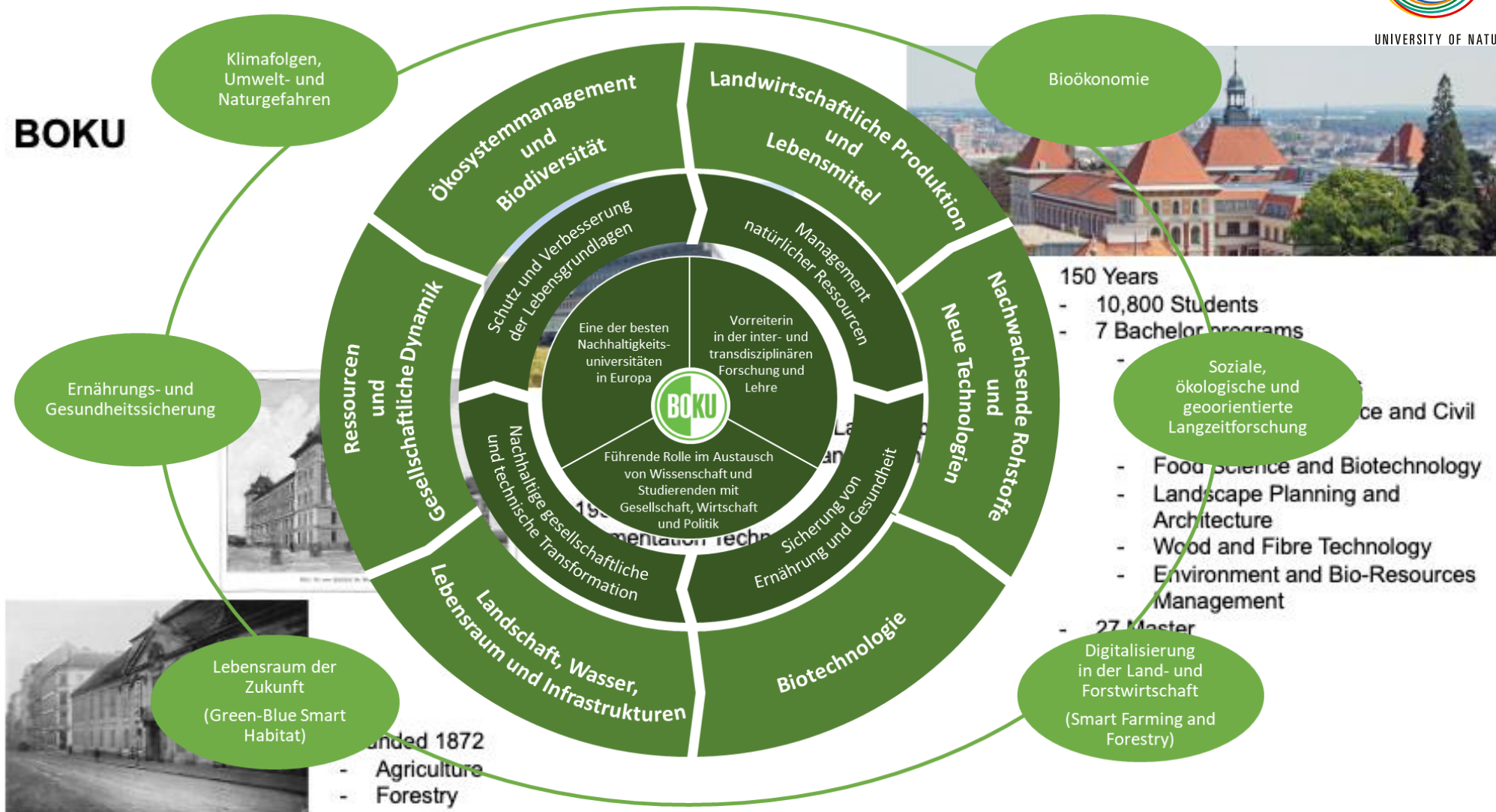
- Approx. 20% with educational background outside of Austria
- Approx. 80% with educational background in Austria
 - **Around 43% come from a general school background (AHS/Gymnasium)**
 - **32% with a background in vocational school (HAK, HTL, HBLA..)**
- Under 50% with parents that went to University
- Approx. 50 / 50 urban and rural background
- Nearly 50% state that they are employed/working throughout the semester, another 18% state they work occasionally during the semester – on average 8,2 to complete the Bachelor



© bokuvienna



















(IHS, 2020; BMBWF, 2020)

Department structure




Department struc



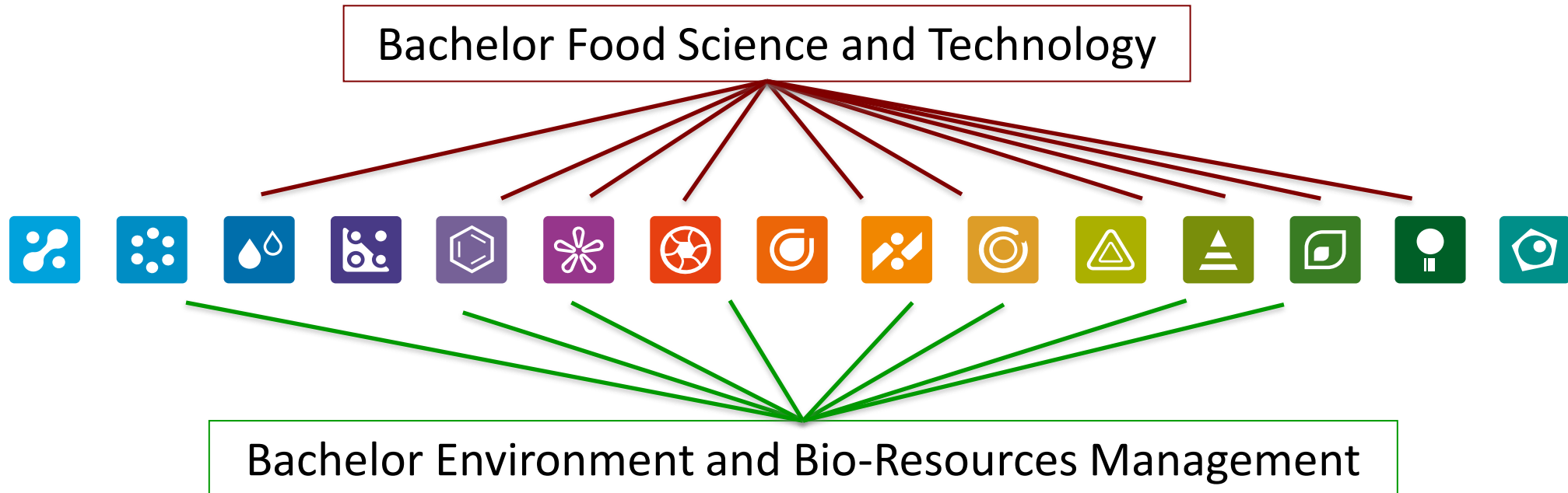
	UNIVERSITY MANAGEMENT	
	H89000	Department of Material Sciences and Process Engineering (MAP)
	H79000	Department of Biotechnology (DBT)
	H81000	Department of Water, Atmosphere and Environment (WAU)
	H80000	Department of Nanobiotechnology (DNBT)
	H77000	Department of Chemistry (DCH)
	H83000	Department of Integrative Biology and Biodiversity Research (DIB)
	H75000	Department of Food Science and Technology (DLWT)
	H85000	Department of Landscape, Spatial and Infrastructure Sciences
	H73000	Department of Economics and Social Sciences (WiSo)
	H93000	Department of Sustainable Agricultural Systems
	H87000	Department of Civil Engineering and Natural Hazards
	H91000	Department of Forest- and Soil Sciences
	H95000	Department of Crop Sciences (DNW)
	H97000	Department of Agrobiotechnology, IFA-Tulln
	H94000	Department of Applied Genetics and Cell Biology (DAGZ)
	Core Facilities & Scientific Centres	
	Service Units & Interest Groups	

for staff and content

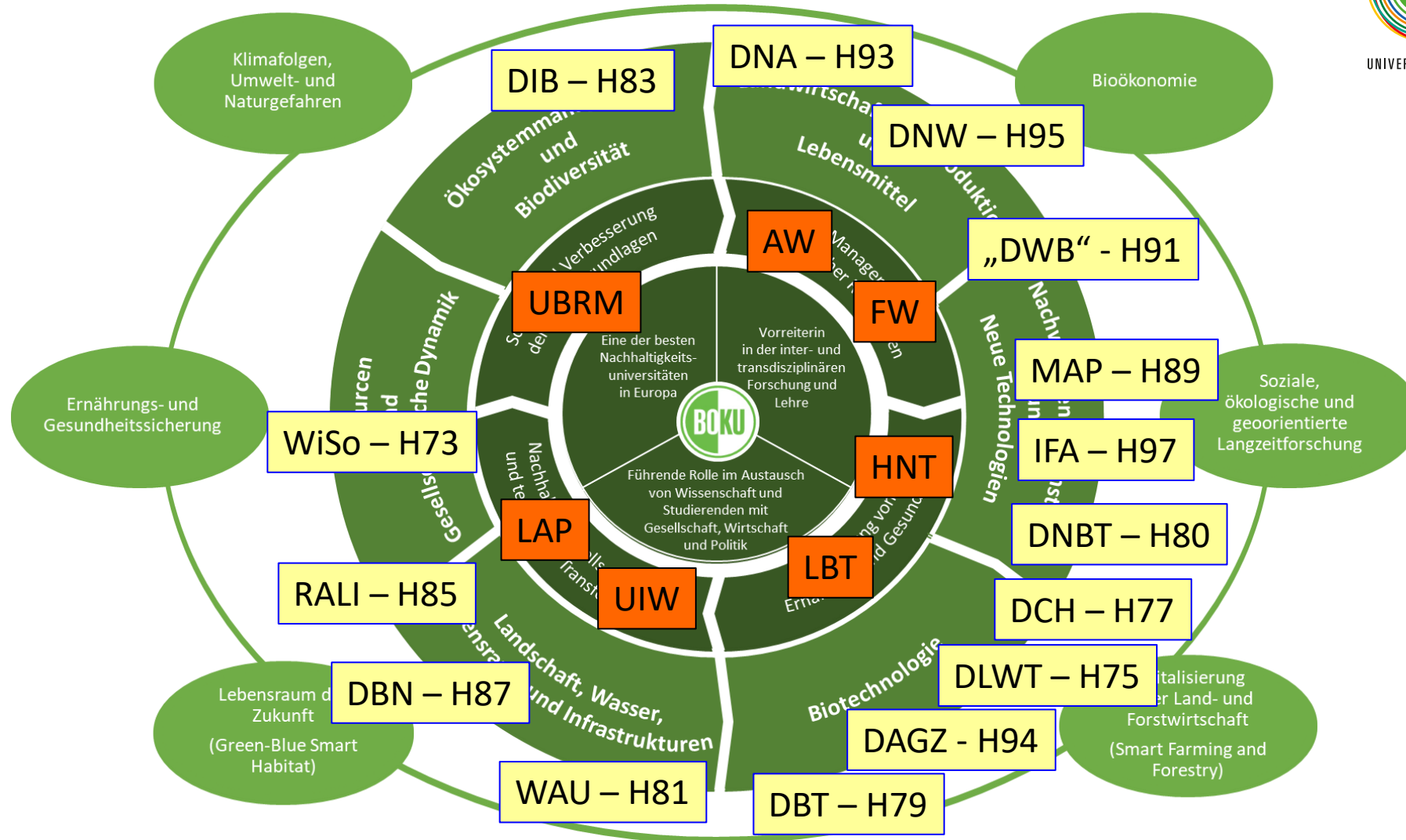
	H81100	Institute of Sanitary Engineering and Water Pollution Control (SIG)
	H81200	Institute of Hydrobiology and Aquatic Ecosystem Management (IHG)
	H81300	Institute of Waste Management (ABF-BOKU)
	H81400	Institute of Meteorology and Climatology (BOKU-Met)
	H81500	Institute for Soil Physics and Rural Water Management (SoPhy)
	H81600	Institute for Hydrology and Water Management (HyWa)
	H81700	Werkstätten der Wasserbauinstitute
	H93100	Institute of Agricultural Engineering
	H93200	Division of Livestock Sciences (NUWI)
	H93300	Division of Organic Farming (IFÖL)
	H93400	Institute for Development Research



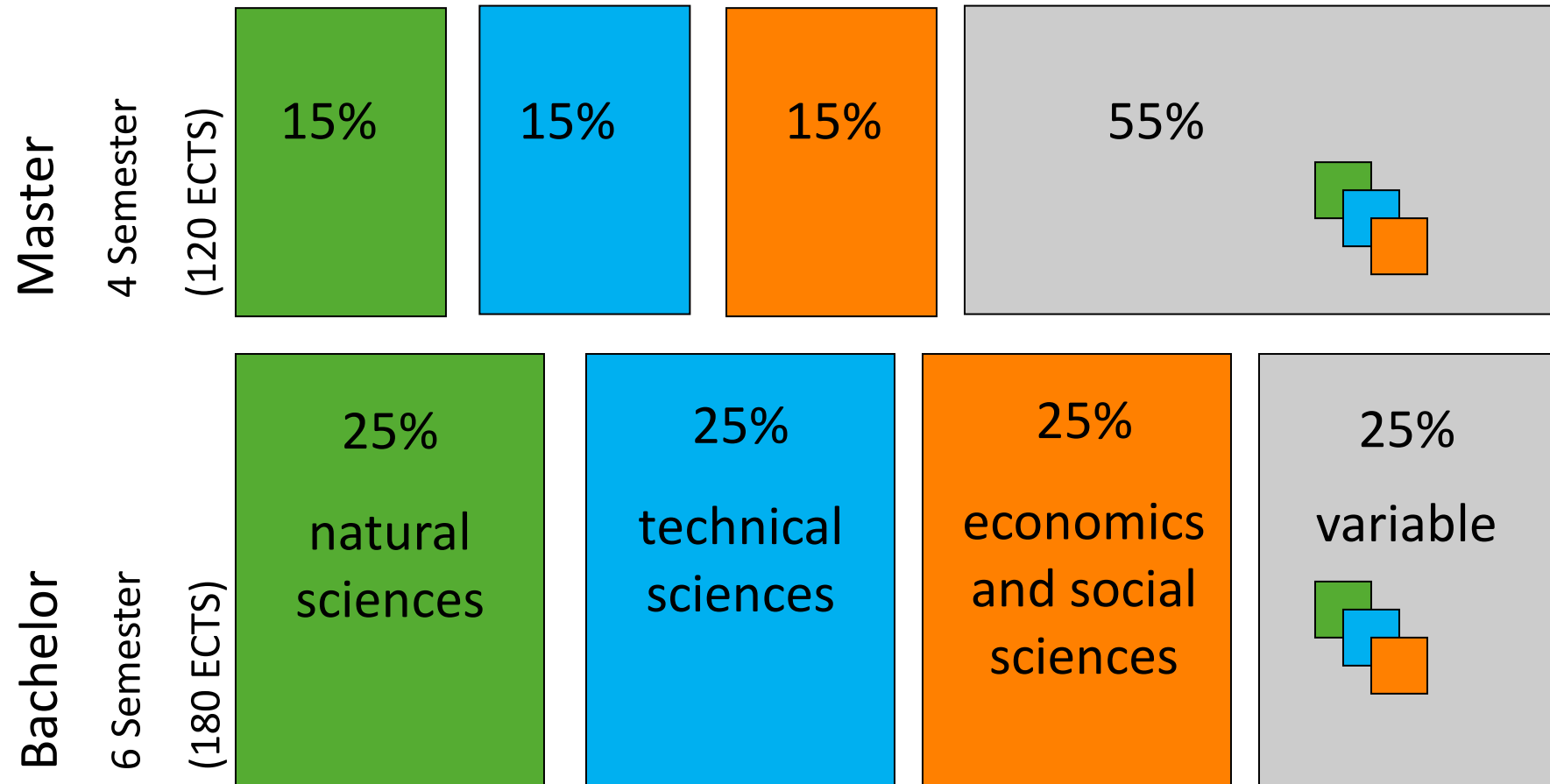
Department structure



- Department structure means study programs are fed by multiple departments



Three Pillar System



- Based on classification of science branches by Statistik Austria

Implementation of the Three Pillars

- Strategic considerations and parameters
- External stakeholders



Environment and Bio-Resources Management



© bokuvienna

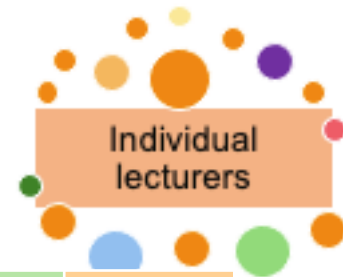
Methodologies in natural and social sciences

Business management and sustainability

Environment in society, politics and law

Ecology, conservation and land use

Environmental technologies

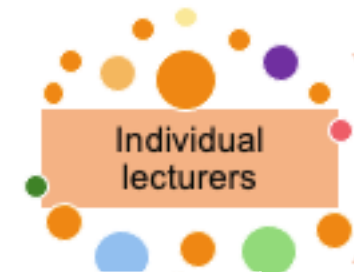


TYPE	LV-TITLE	% Tech	% Nat	% EcoSoc
VU	Introduction to Communications and Public Relations	0	0	100
UX	Hydrobiology	20	70	10
VO	Energy and Environmental technology	60	10	30

Food Science and Biotechnology



© bokuvienna



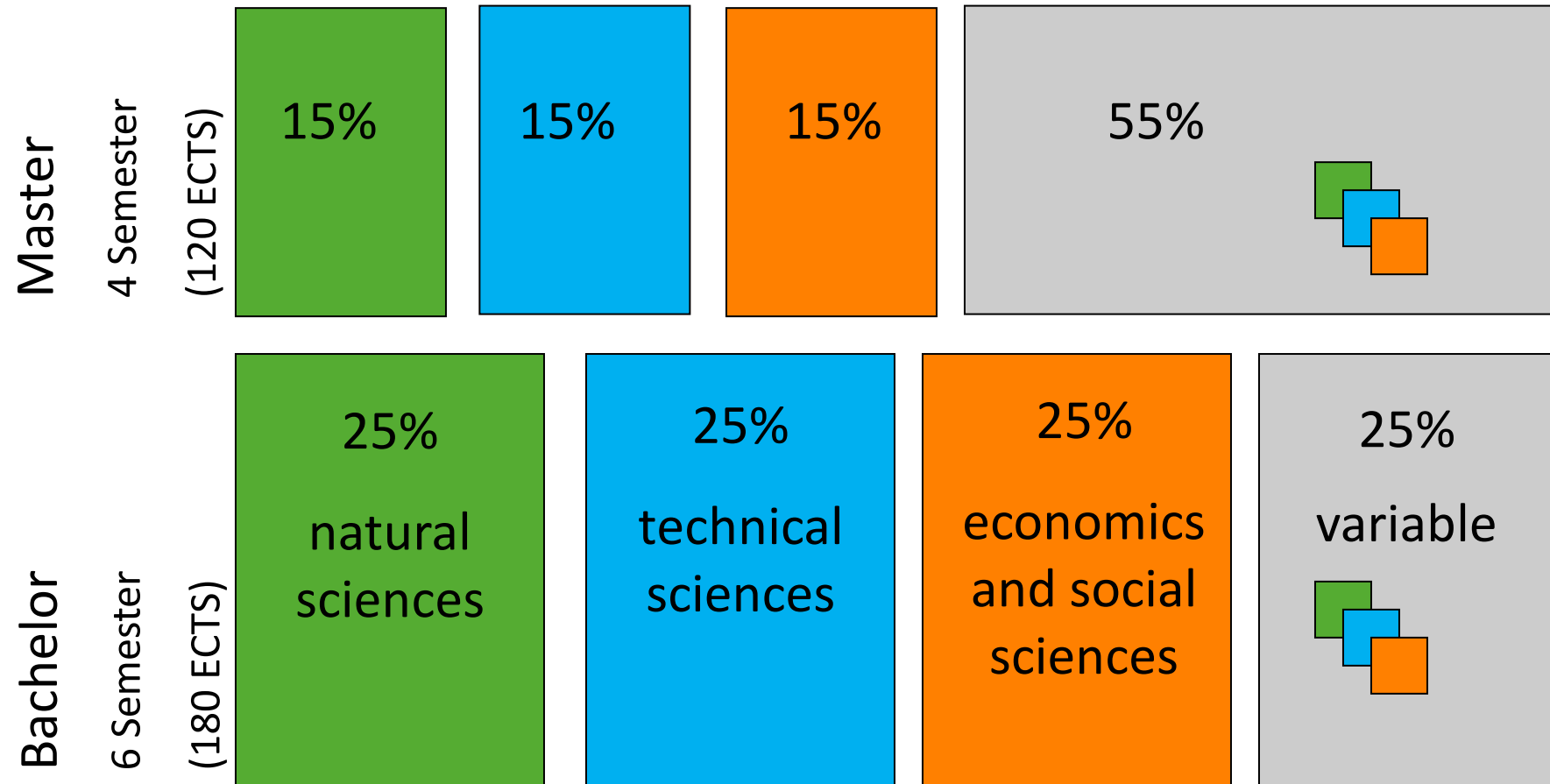
Foundations in Chemistry,
Biochemistry, Cell and
molecular biology as well as
process technology

Quality management,
legal aspects

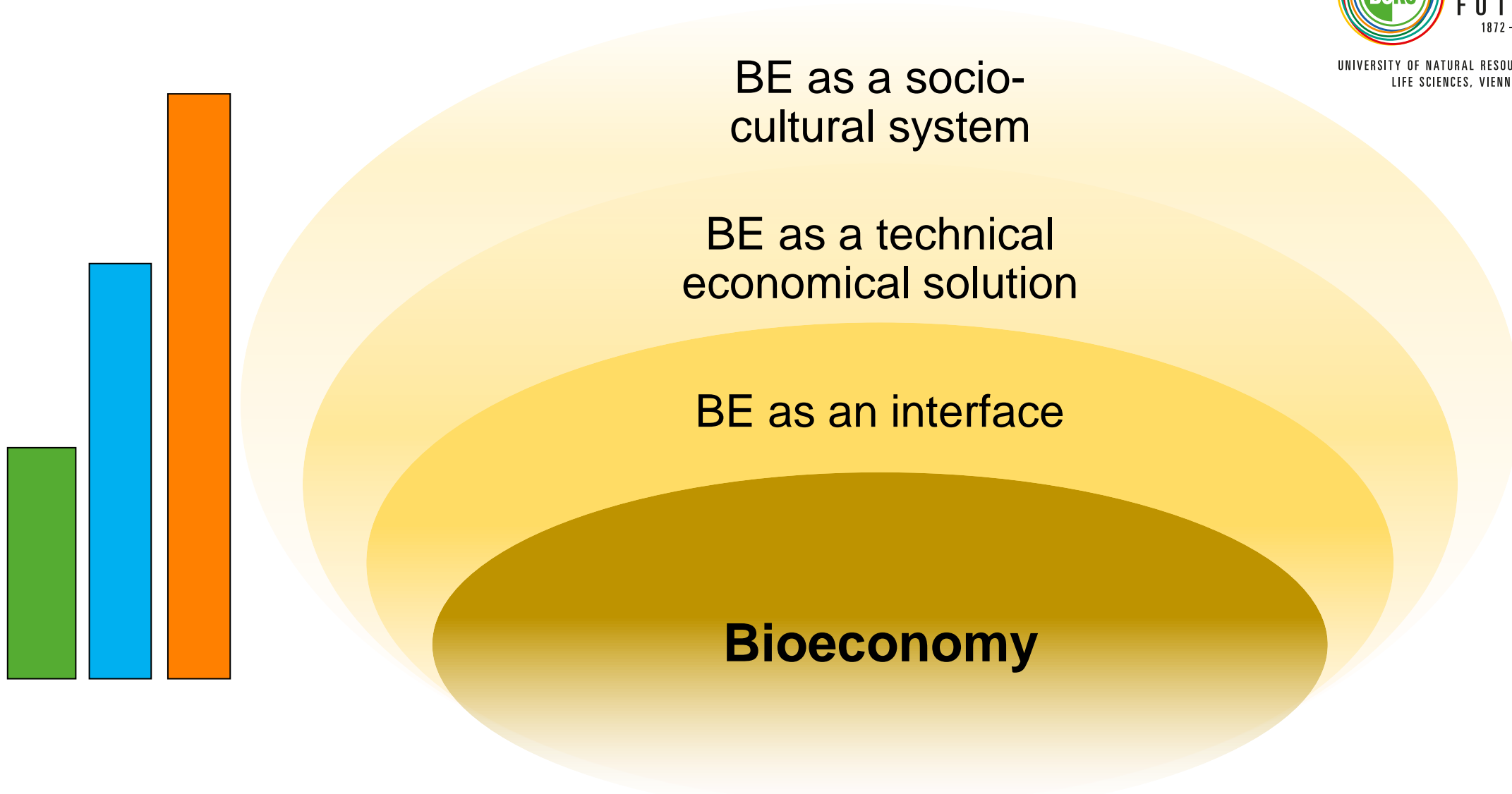
Moderation techniques,
marketing, organisation
behaviour

TYPE	LV-TITLE	% Tech	% Nat	% EcoSoc
VO	Foundations in Biochemistry	15	75	10
VO	Statistics (LBT)	0	100	0
VS	Business administration and organization	10	10	80

Three Pillar System



- Based on classification of science branches by Statistik Austria



Bridging the disciplines



PixaHive

%
ica
ces



Wikimedia Commons

What's inside the box?



This Photo by Unknown Author is licensed under [CC BY](#)

Teaching methods?

Assessments?

Projects?

Coordination
between lecturers?

Further challenges

- Student workload 180 ECTS
- External developments: University Finance Regulation
 - Output vs. process
- Time and space for interdisciplinary learning and teaching

Current discussion in curriculum development

- From 'classes' to 'modules' – changing the structure of the curriculum into 6 ECTS modules
 - Aims include better coherence between units
- Querschnittsthemen – Cross cutting topics
 - Bioeconomy, Diversity and Gender, Globalisation ...
 - Highlight these contents in existing lectures/seminars
 - Create new overarching content and space for connections

The surroundings

- Free Electives in study programs
- Extra-curricular activities (informal learning)
 - Student Union (ÖH BOKU)
 - Student Innovation Centre and other student initiatives
 - TüWi cultural association
- Entrepreneurship – BOKU Base
- EBU – European Bioeconomy University – BOKU as a leading member



Discussion questions

- How do we foster a collaborative curriculum when performance metrics are individualized (and often still disciplinary)?
- How do we create incentives for interdisciplinarity in teaching?
- Are three pillars enough?

...

References

- Institut für Höhere Studien (IHS), 2020. Studierenden Sozialerhebung 2019 – Tabellenband Universität für Bodenkultur.
- Lask, J., Maier, J., Tchouga, B. and Vargas-Carpintero, R. 2018. The Bioeconomist. In: Bioeconomy. I. Lewandowski (Eds.). 344-356. Springer. https://doi.org/10.1007/978-3-319-68152-8_12
- Ministry for Education, Science and Research (BMBWF), 2020. Statistisches Taschenbuch – Hochschulen und Forschung 2021. <https://www.bmbwf.gv.at/Themen/HS-Uni/Hochschulsystem/Hochschulstatistik---unidata/StatTB2021.html>
- Center for Bioeconomy, 2022. Bioeconomy Austria Basisworkshop. Salzburg 19.04.2022
- Mittelstraß, 2012. Transdisziplinarität. Gegenworte, 28. <http://www.gegenworte.org/heft-28/gegenworteheft28.html>
- University of Natural Resources and Life Sciences, Vienna (BOKU), 2020. Entwicklungsplan 2027. https://boku.ac.at/fileadmin/data/H01000/mitteilungsblatt/MB_2020_21/MB06/Entwicklungsplan_2027_web.pdf