



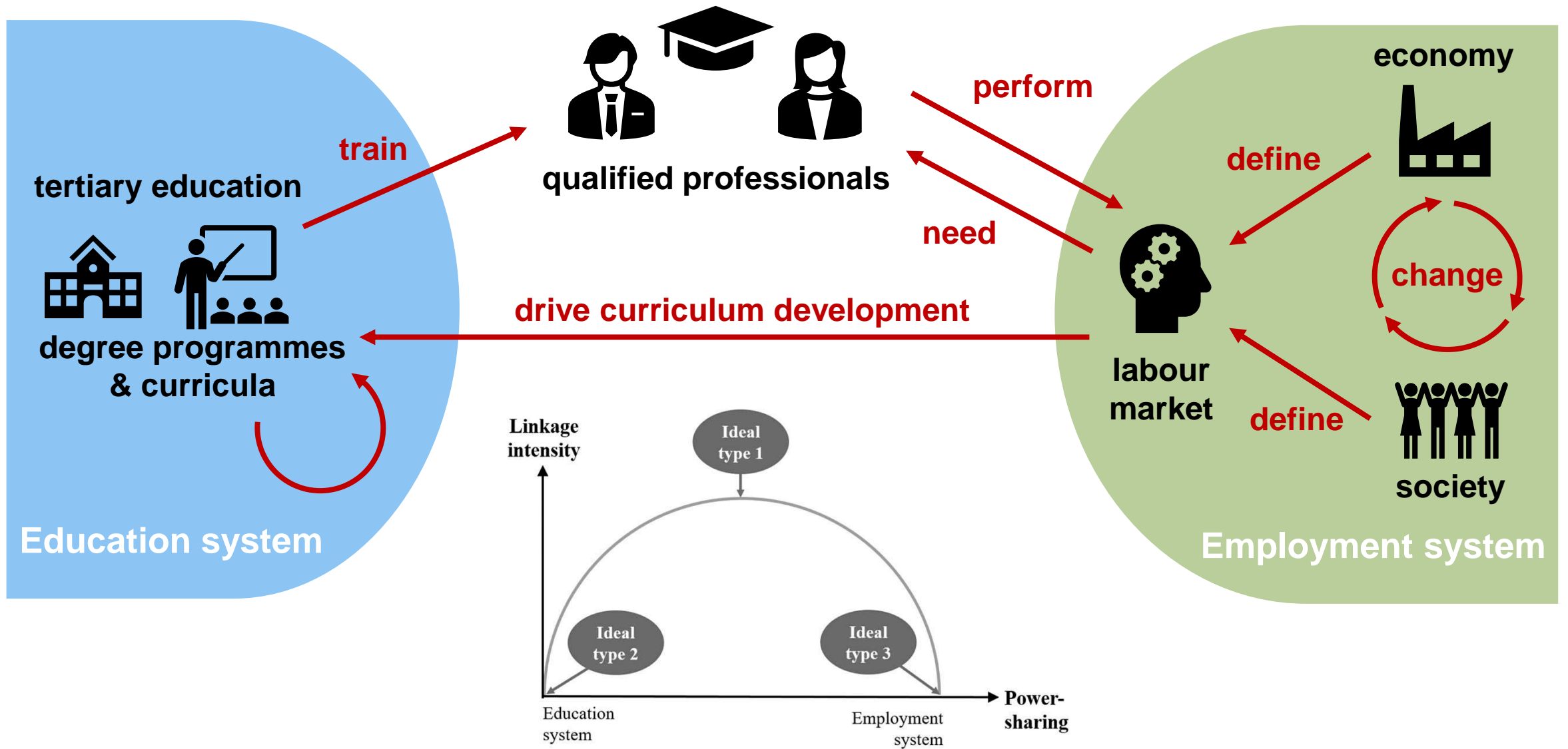
## Analysis of the degree programmes in food science and technology at ETH and the universities of applied sciences

Dr. Philipp Bieri, Rector's Staff, ETH Zürich

SEL Webinar

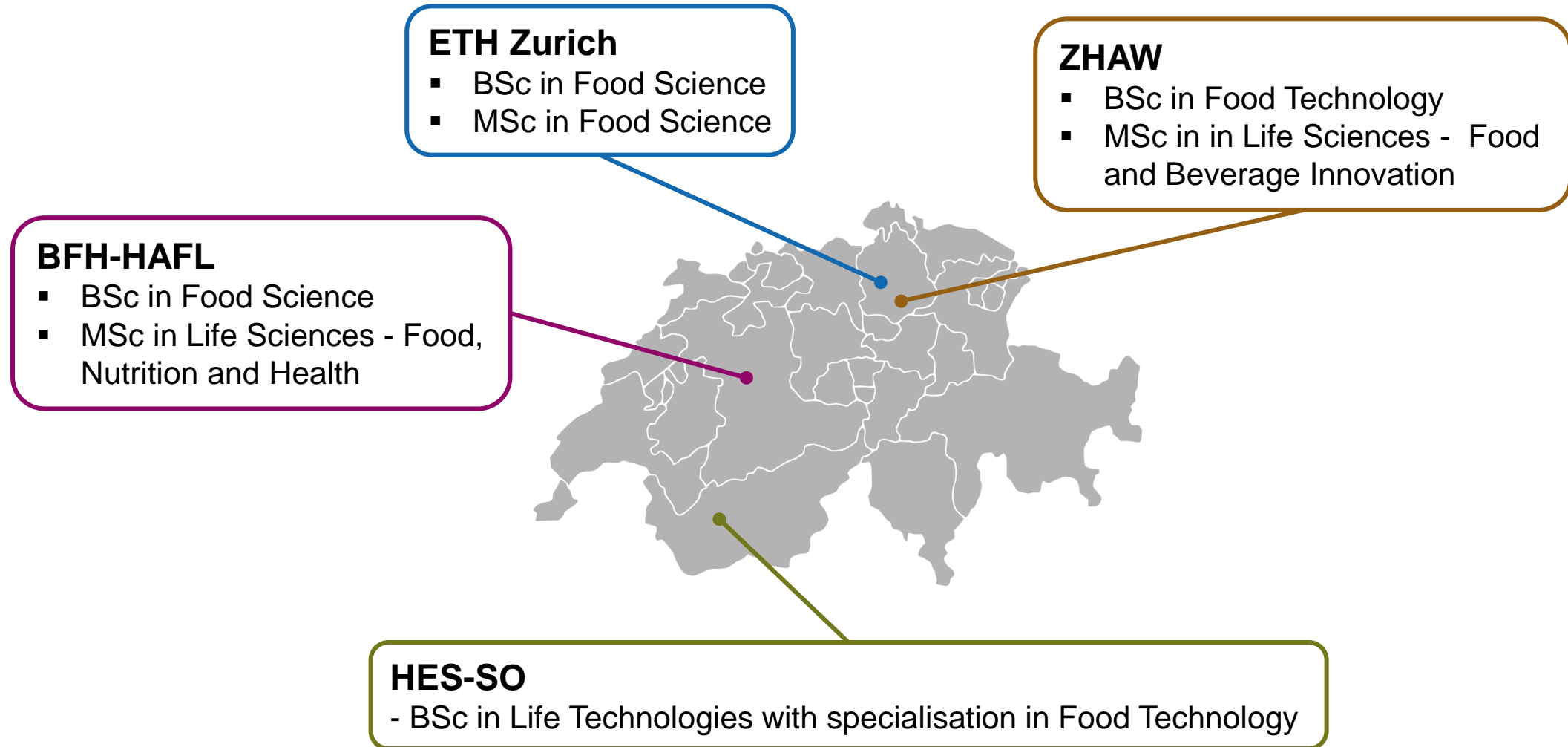
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# Linkage of the education and employment system



# Overview of the analysed degree programmes

## 4 Bachelor's & 3 Master's degree programmes



# Scope and approach of the thesis

## Research question:

How do the degree programmes in food science and technology offered at ETH Zurich and the universities of applied sciences differ in structure and content?

## Tools:

- Curriculum analysis
  - Survey among ETH graduates
  - Survey among professionals
  - Semi-structured interviews with responsible persons of the degree programmes
- } conducted by D-HEST/Food Science in 2020

# Today's menu

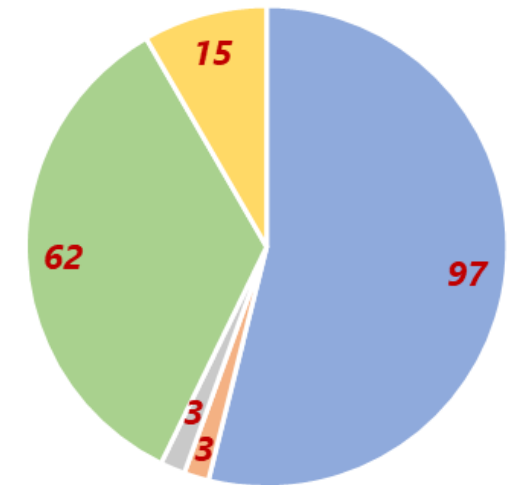
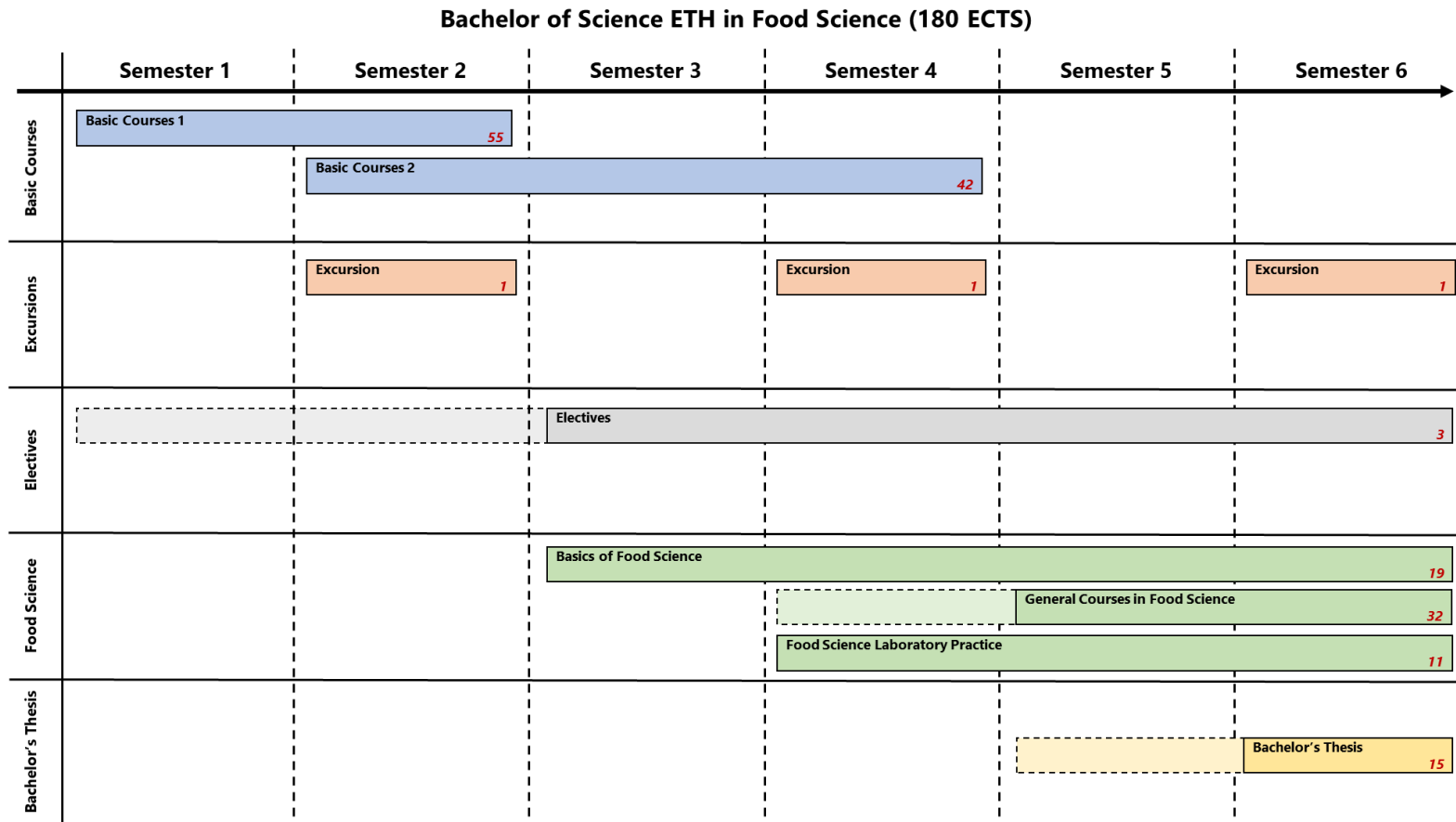
## ► A systematic approach for a curriculum analysis



- 1) Analysis of the **structure** of the curricula
- 2) Analysis of the **content** of the curricula
- 3) The issue of the different **comprehensiveness** of the data
- 4) An appetizer from the results:  
Which **competencies** are taught in the curriculum?

# Analysis of the **structure** of the curriculum

- Comparable representation of all degree programmes
- Time on the x-axis and categories on the y-axis
- Prerequisite for the analysis of the content



- Basic Courses
- Excursions
- Electives
- Food Science
- Bachelor's Thesis

# Analysis of the **content** of the curriculum (I)

Aspect	Metric for evaluation	Interest
<b>Subject</b>	<p>The course teaches a ...</p> <ul style="list-style-type: none"> <li>▪ basic science</li> <li>▪ food science</li> <li>▪ additional ... subject.</li> </ul>	The evaluation reveals the educational focus of the degree programme.
<b>Theory or practice</b>	<p>The course teaches ...</p> <ul style="list-style-type: none"> <li>▪ theoretical knowledge.</li> <li>▪ practical applications.</li> <li>▪ both.</li> </ul>	The evaluation shows how much practical training the students receive during their studies.
<b>Course orientation</b>	<p>The course teaches ...</p> <ul style="list-style-type: none"> <li>▪ scientific</li> <li>▪ professional</li> <li>▪ general ... knowledge and skills.</li> </ul>	The evaluation indicates whether the degree programme is intended more for an academic or a professional career.
<b>Competencies</b>	<p>The course fosters ...</p> <ul style="list-style-type: none"> <li>▪ subject-specific</li> <li>▪ method-specific</li> <li>▪ social</li> <li>▪ personal ... competencies.</li> </ul>	The evaluation reveals the competence domains that are fostered the most and the least or whether they are in balance.
<b>Type of performance assessment</b>	<p>The course content is examined with ...</p> <ul style="list-style-type: none"> <li>▪ written, oral or online examination,</li> <li>▪ graded or ungraded performance,</li> <li>▪ written work.</li> </ul>	The evaluation shows which types of performance assessment are used to examine the course content and the fostered competencies.



# Analysis of the **content** of the curriculum (II)

## Data source (course description in the course catalogue)

752-6001-00L Introduction to Nutritional Science	
Semester	Herbstsemester 2020
Dozierende	<a href="#">M. B. Zimmermann</a> , <a href="#">C. Wolfrum</a>
Periodizität	jährlich wiederkehrende Veranstaltung
Lehrsprache	Englisch
<a href="#">Lehrveranstaltungen</a> <a href="#">Katalogdaten</a> <a href="#">Leistungskontrolle</a> <a href="#">Lernmaterialien</a> <a href="#">Gruppen</a> <a href="#">Einschränkungen</a> <a href="#">Angeboten in</a> <a href="#">Übersicht</a>	
Kurzbeschreibung	Dieser Kurs bietet eine Einführung in die Grundlagen der Mikro- und Makronährstoffe. Mikronährstoffe umfassen fett- und wasserlösliche Vitamine, Mineralien und Spurenelemente. Makronährstoffe umfassen Proteine, Fett und Kohlenhydrate. Der Kurs umfasst die Bereiche Verdauung, Bioverfügbarkeit, Metabolismus und Ausscheidung sowie die Kontrolle der Energie Homöostase.
Lernziel	Einführung der Studenten in die Bereiche Makro- und Mikronährstoffe im Bezug auf Ernährung und Metabolismus.
Inhalt	Der Kurs ist in zwei Teile unterteilt. Die Vorlesungen zu Mikronährstoffen werden von Prof. Zimmermann, die Vorlesungen zu Makronährstoffen werden von Prof. Wolfrum gegeben. Der Bereich Mikronährstoffe umfasst fett- und wasserlösliche Vitamine, Mineralien und Spurenelemente. Der Bereich Makronährstoffe dient der Einführung in die grundlegenden Aspekte der Nahrungswissenschaften in Bezug auf Proteine, Kohlenhydrate und Fette. Die Nährstoffe werden im Hinblick auf Verdauung, Absorption und Metabolismus besprochen. Spezielle Aspekte der Homöostase und Homeorhese werden ebenfalls behandelt.
Skript	Es gibt kein Skript, die Powerpoint Präsentationen werden zur Verfügung gestellt.
Literatur	Elmadfa I & Leitzmann C: Ernährung des Menschen UTB Ulmer, Stuttgart, 4. überarb. Ausgabe 2004 ISBN-10: 3825280365; ISBN-13: 978-3825280369  Garrow JS and James WPT. Human Nutrition and Dietetics Churchill Livingstone, Edinburgh, 11th rev. ed. 2005 ISBN-10: 0443056277; ISBN-13: 978-0443056277



## Extrapolated Data

Subject	<input type="checkbox"/> basic science <input checked="" type="checkbox"/> food science <input type="checkbox"/> additional
Theory or practice	<input checked="" type="checkbox"/> theoretical knowledge <input type="checkbox"/> practical applications <input type="checkbox"/> both
Course orientation	<input type="checkbox"/> scientific <input checked="" type="checkbox"/> professional <input type="checkbox"/> general
Competencies	<input checked="" type="checkbox"/> subject-specific <input type="checkbox"/> method-specific <input type="checkbox"/> social <input type="checkbox"/> personal
Type of performance assessment	<input checked="" type="checkbox"/> written, oral or online exam <input type="checkbox"/> (un)graded semester perf. <input type="checkbox"/> written work



# Analysis of the **content** of the curriculum (III)

Category	Course	ECTS	Subject	Theory or practice	Course orientation	Competencies	Performance assessment
Basic Courses	Mathematik I: Analysis I und Lineare Algebra	6	Basic science	both	scientific	subject-specific	written examination
Basic Courses	Ökonomie	3	Additional subject	theoretical	general	subject-specific method-specific social	written examination
Food Science	Introduction to Nutritional Science	3	Food Science	theoretical	professional	subject-specific	written examination
Food Science	Lebensmittel-Technologie	3	Food Science	both	professional	subject-specific	online examination
Food Science	Laborpraktikum Toxikologie und Ernährung	3	Food Science	practical	professional	subject-specific method-specific	ungraded semester performance
Excursions	Exkursionen I	1	Food Science	practical	professional	subject-specific personal	ungraded semester performance
BSc Thesis	Bachelor-Arbeit	15	Basic science	both	scientific	subject-specific method-specific personal	written work

# Analysis of the **content** of the curriculum (IV)

- 1) Each aspect is evaluated individually
- 2) Sum of the metric counts for each category

Category	Course orientation			avail. ECTS	<i>required</i> ECTS
	Scientific	Professional	General		
Basic courses	88	5	4	97	97
Excursions	0	3	0	3	3
Electives	0	0	3	3	3
Food Science	15	71	6	92	62
BSc Thesis	15	0	0	15	15
<b>Sum</b>	<b>118</b>	<b>79</b>	<b>13</b>	<b>210</b>	<b>180</b>



- 3) Apply weighting formula

Category	Course orientation		
	Scientific	Professional	General
Basic courses	88	5	4
Excursions	0	3	0
Electives	0	0	3
Food Science	9.4	48.8	3.8
BSc Thesis	15	0	0
<b>Total Metric Score</b>	<b>112.4</b>	<b>56.8</b>	<b>10.8</b>

$$S_{x,i} = \sum_{i=1}^n a_i \times \frac{b_i}{c_i}$$

$S_{x,i}$  = total score for metric x in ECTS

$n$  = number of categories

$a_i$  = amount of ECTS required in category i

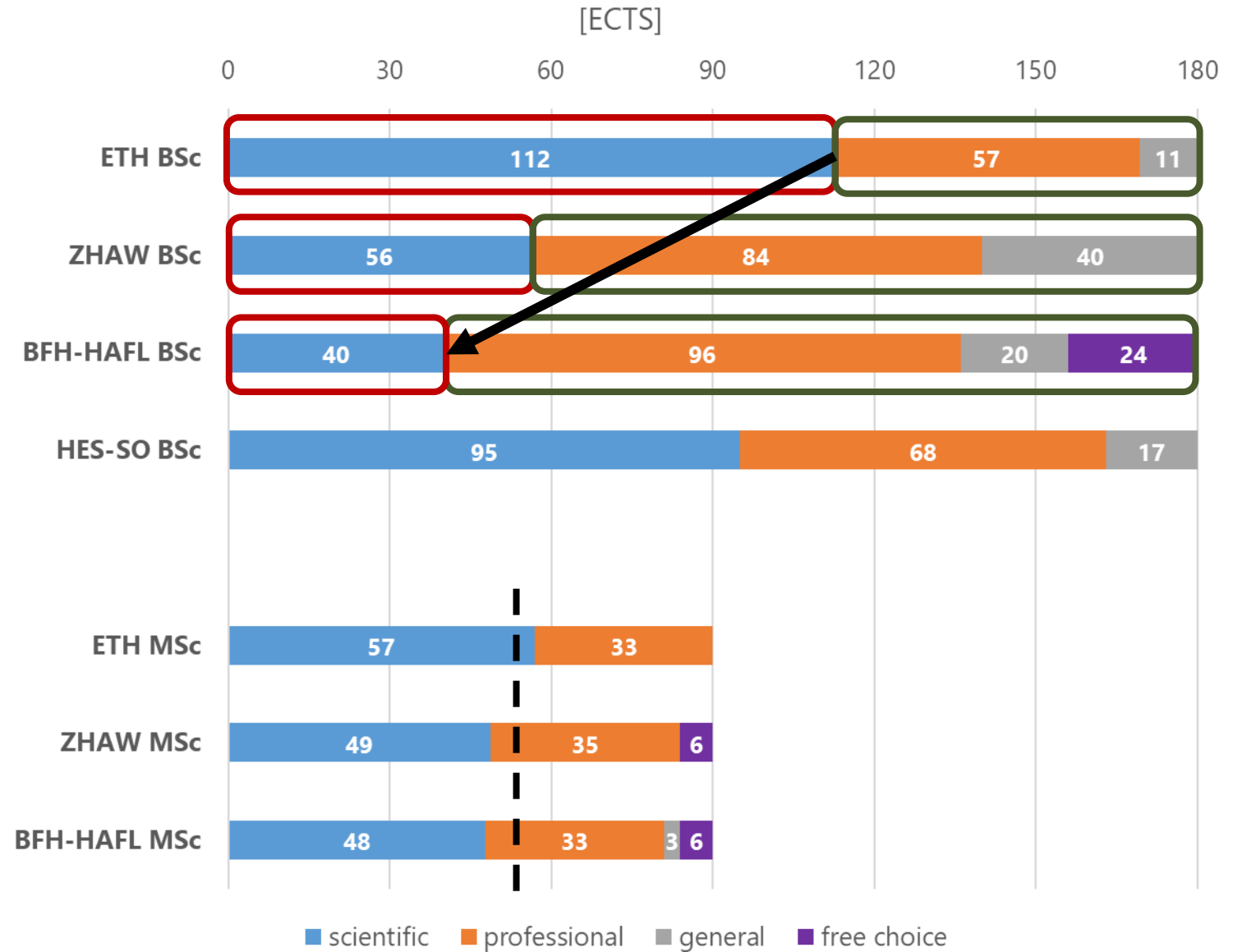
$b_i$  = amount of ECTS with metric x

$c_i$  = amount of ECTS total available in category i

# Analysis of the **content** of the curriculum (V)

The course teaches ...

- scientific
- professional
- general
- ... knowledge and skills.



# Comprehensiveness of the course descriptions (I)

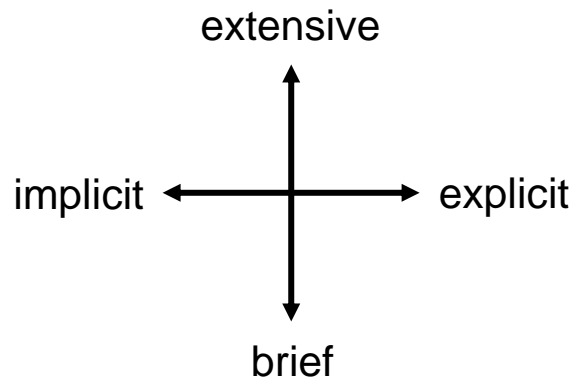
The analysis of the content depends on the comprehensiveness of the course description in the source examined.



There is variability due to ...

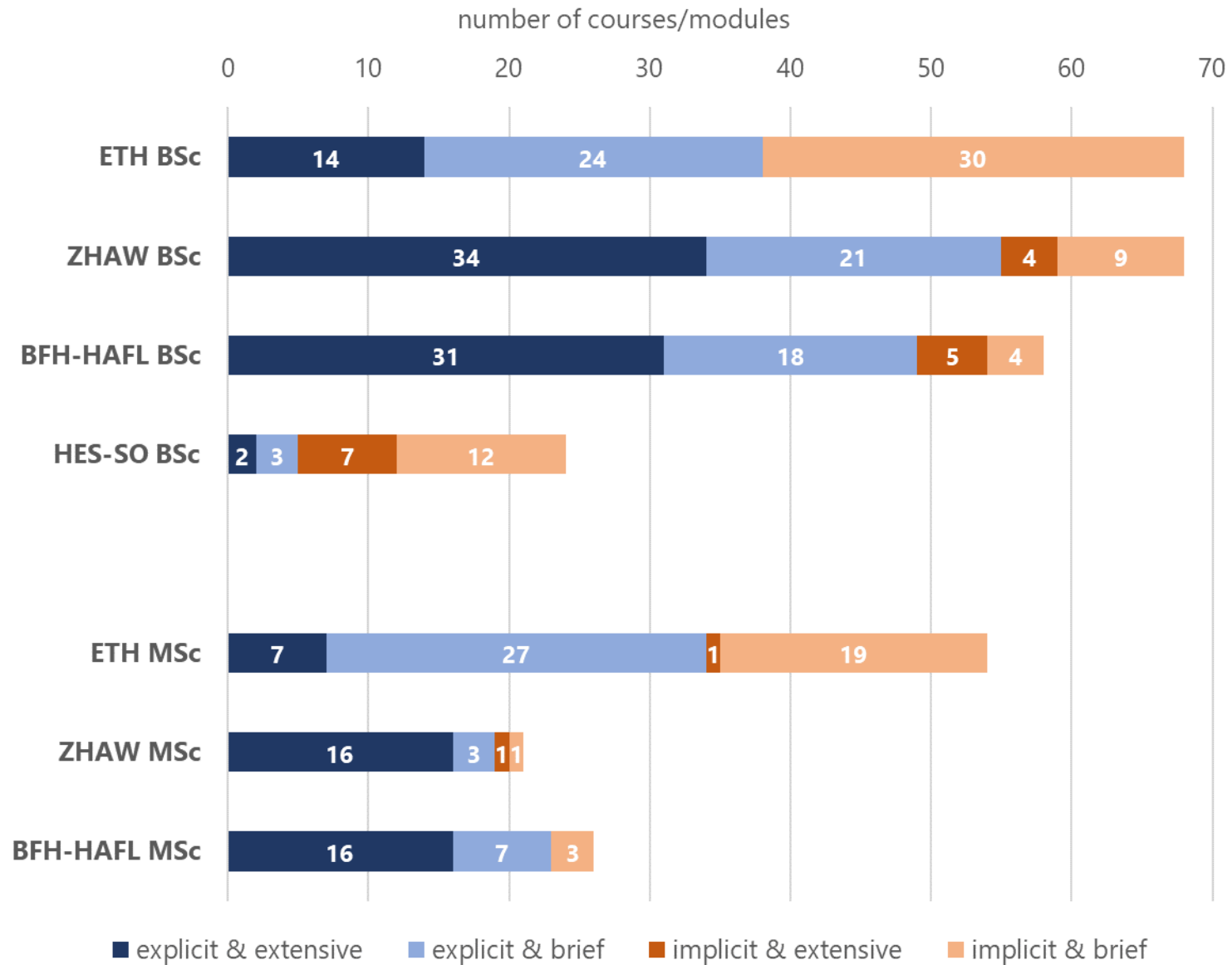
- the different structure and information content of the course catalogues.
- the different authors of the entries

To consider this variability, I classified the description of the courses using the concept of Levander & Mikkola (2009):



<b>dimension</b>	<b>state</b>	<b>attributes</b>
<b>extensiveness</b>	extensive	complete and well-formulated sentences
	brief	few generic words
<b>explicitness</b>	explicit	specific and detailed information about concepts and competencies taught key words with explanation
	implicit	unspecific information about upper level concepts key words without explanation

# Comprehensiveness of the course descriptions (II)

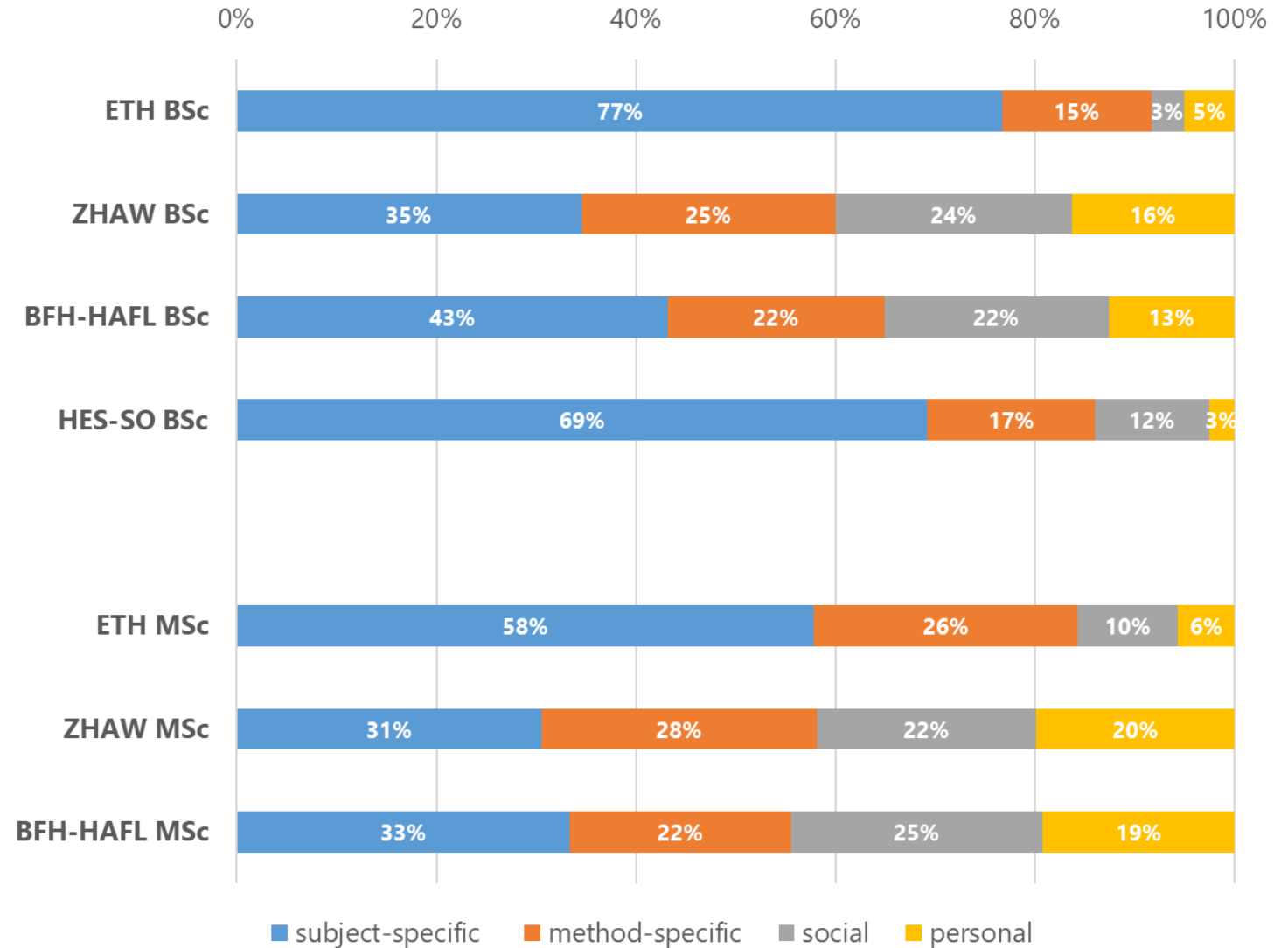


# Competencies

The course fosters ...

- subject-specific
- method-specific
- social
- personal

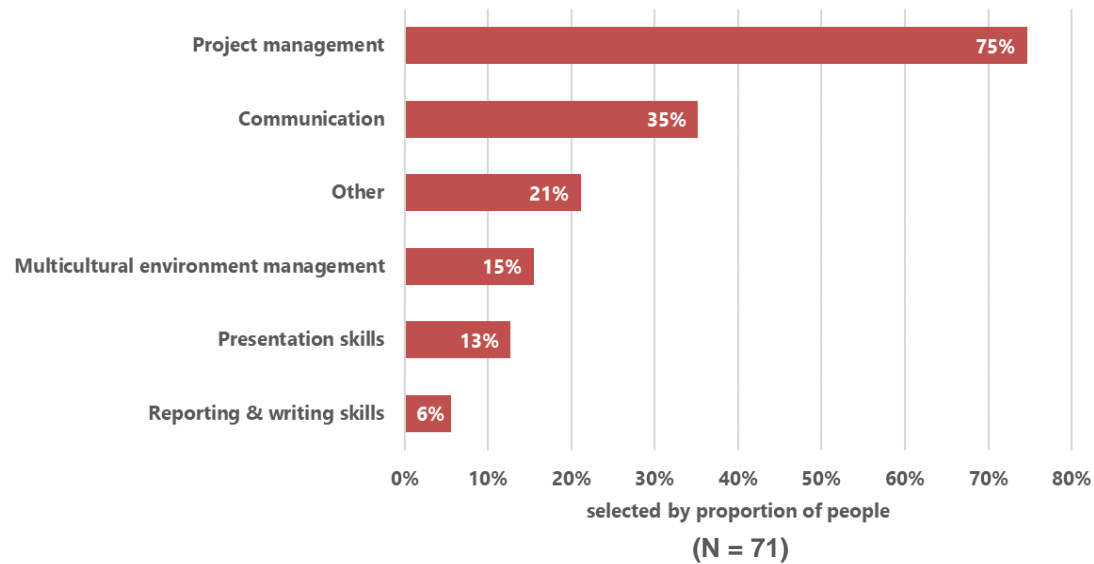
... competencies.



# Missing competencies – indications from the surveys

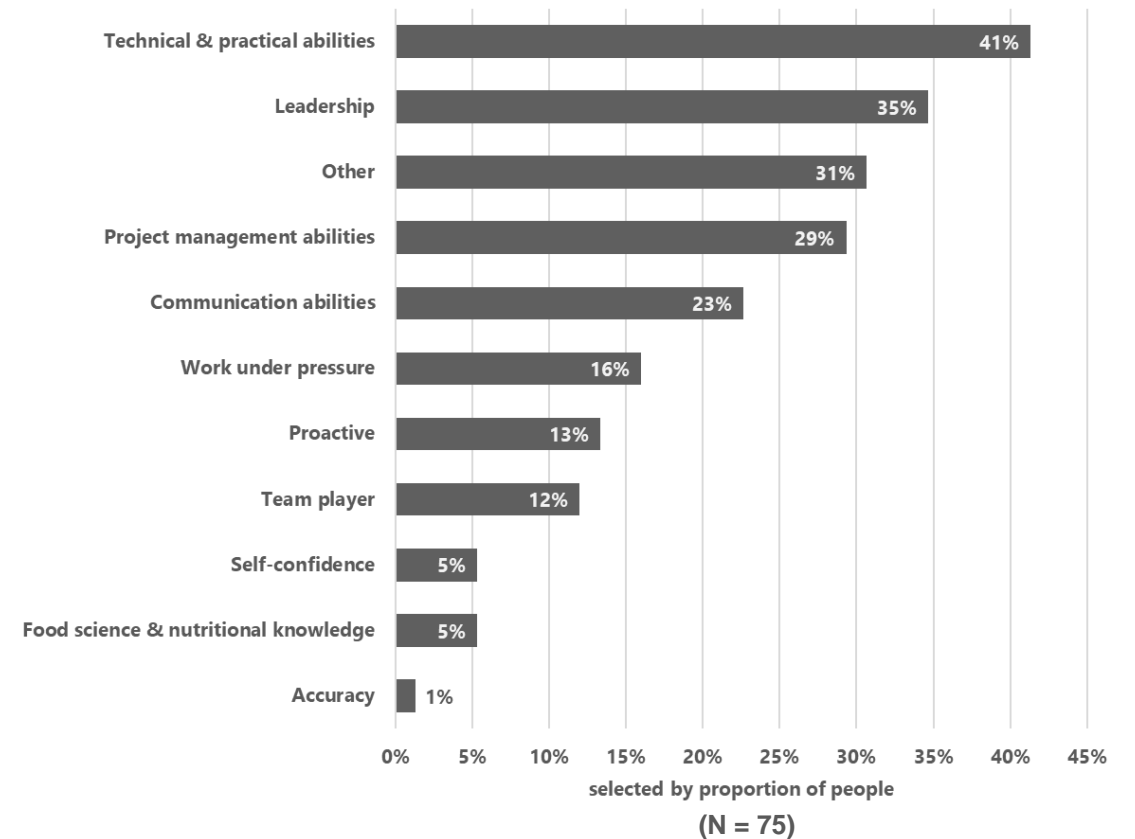
## Survey among ETH graduates

What competencies were missing at the beginning of your professional career?



## Survey among professionals

What do the candidates from ETH lack?





# Examples of the findings and conclusion of the study

## Results of the curriculum analysis

- At Bachelor's level, the proportion of courses that teach professional knowledge and skills is higher at the ZHAW and BFH than at the ETH and HES-SO.
- Social and personal competencies are usually fostered in special teaching formats, which include practical work or simulations in group. These teaching formats are incorporated more frequently in the additional subjects and in the module structure.
- A broad and balanced teaching of competencies is successful when a consistent orientation towards competencies is aimed for in the design phase of the curriculum.

# Summary

## Method of the curriculum analysis

- Procedure that converts the qualitative information of the course descriptions into a quantitative evaluation of the whole curriculum.
- The approach ...
  - provides a good overview,
  - allows the comparison between curricula,
  - and is a good starting point for a curriculum reform.

# Outlook

- It make sense to look at the education and employment system holistically.



- The overarching research question of whether the education and the employment system are linked can only be conclusively clarified with additional analysis.

# Thank you for your interest!



Contact: Dr. Philipp Bieri  
Rector's Staff, ETH Zurich  
[philipp.bieri@sl.ethz.ch](mailto:philipp.bieri@sl.ethz.ch)

