

# Stakeholder survey results 2020

## Aalto University's Master's Programme in Water and environmental engineering

Stakeholders' perceptions of the development of the field, role and skills of graduates, and working life needs

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# Research themes

Translations of the interview and open text answer citations by the authors.

Used acronyms:

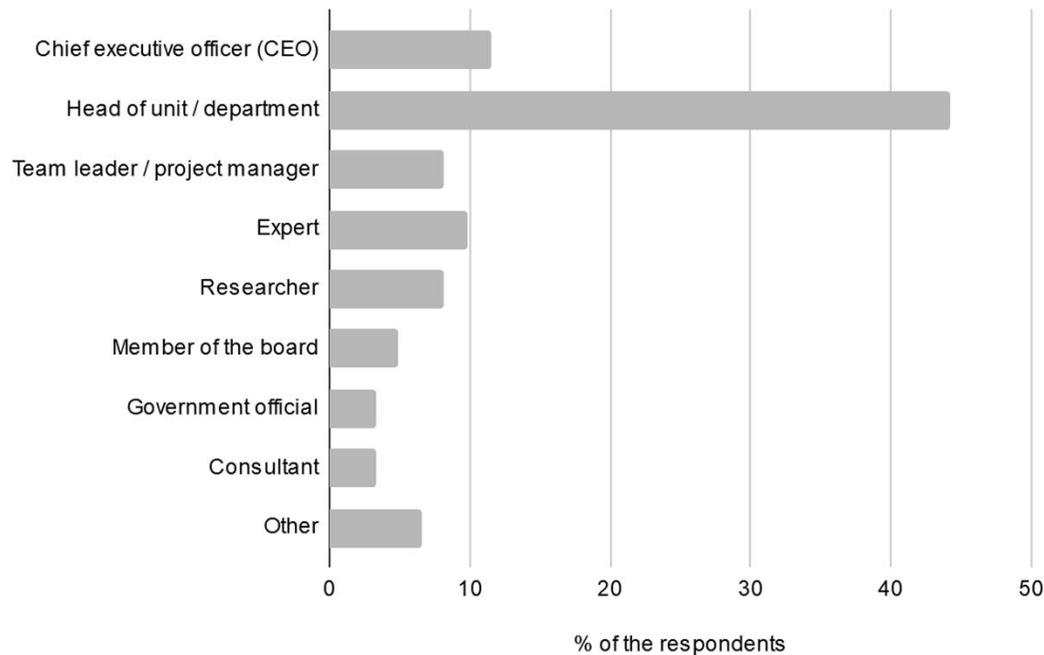
SD = sustainable development

WWT = waste water treatment

	<b>Future prospects of the field</b>
	<ul style="list-style-type: none"><li>• Current situation of the field and most important drivers</li><li>• Changes in the skills needed &amp; future skills</li></ul>
	<b>Graduates in working life</b>
	<ul style="list-style-type: none"><li>• Employers' expectations of the graduates' competences</li><li>• Employers' experiences on the graduates</li><li>• Focus areas suggested for future education</li></ul>
	<b>Stakeholder collaboration</b>
	<ul style="list-style-type: none"><li>• Current status of the university-working life collaboration and development suggestions</li></ul>
	<b>Sustainable development (SD)</b>
	<ul style="list-style-type: none"><li>• The role of SD in the field and perceptions of SD of working life actors</li><li>• Skills related to sustainable development</li><li>• The role of graduates in promoting SD in working life</li></ul>

# Background information, Questionnaires in Webropol

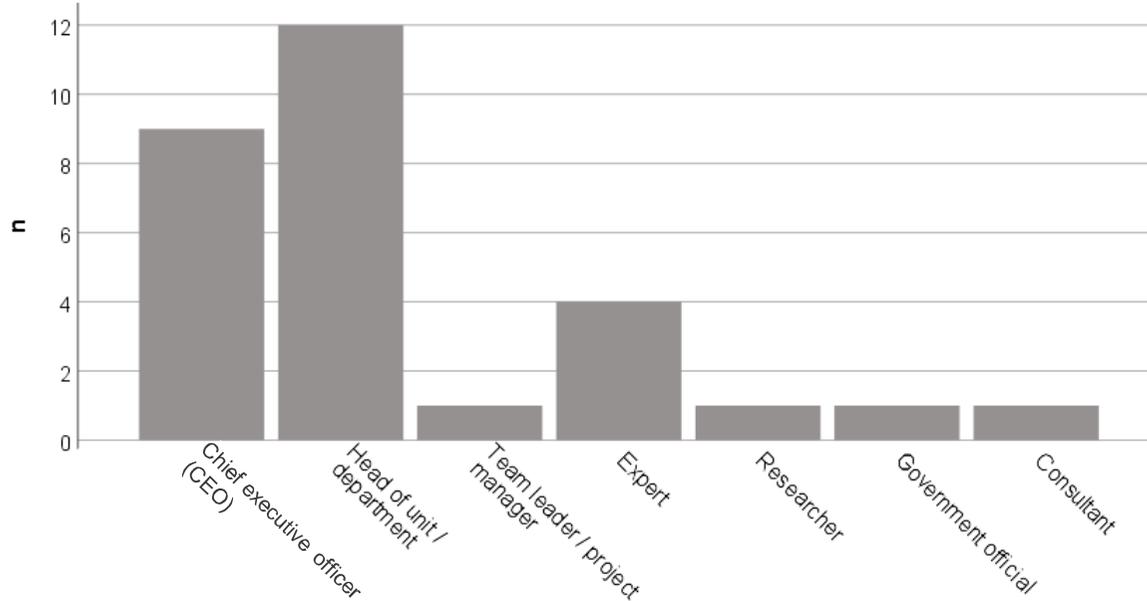
- Employer questionnaire: 62 employers from 50 organisations
  - ❖ Sent by email to employers of the field and collaborators of the WAT Master's Programme. Receivers were also asked to distribute the questionnaire further to suitable persons.
  - ❖ Respondents' career length in the field: >15 yrs. (65%), 11-15 yrs. (6%), 6-10 yrs. (24%), 1-5yrs. (5%)
- Financier questionnaire : 9 representatives from funding organizations



A. Study track			
	Male (n)	Female (n)	Total (n)
Water supply and sewerage engineering	19	4	23
Water resources and hydraulic engineering	10	14	24
Environmental engineering	3	7	10
Water and development	2	3	5
B. Sector			
Third sector	5	7	12
Central administration	2	4	6
Regional and local administration	8	5	13
Research institute	2	3	5
Private sector	17	9	26
<b>Total</b>	<b>34</b>	<b>28</b>	<b>62</b>

# Background information, interviews

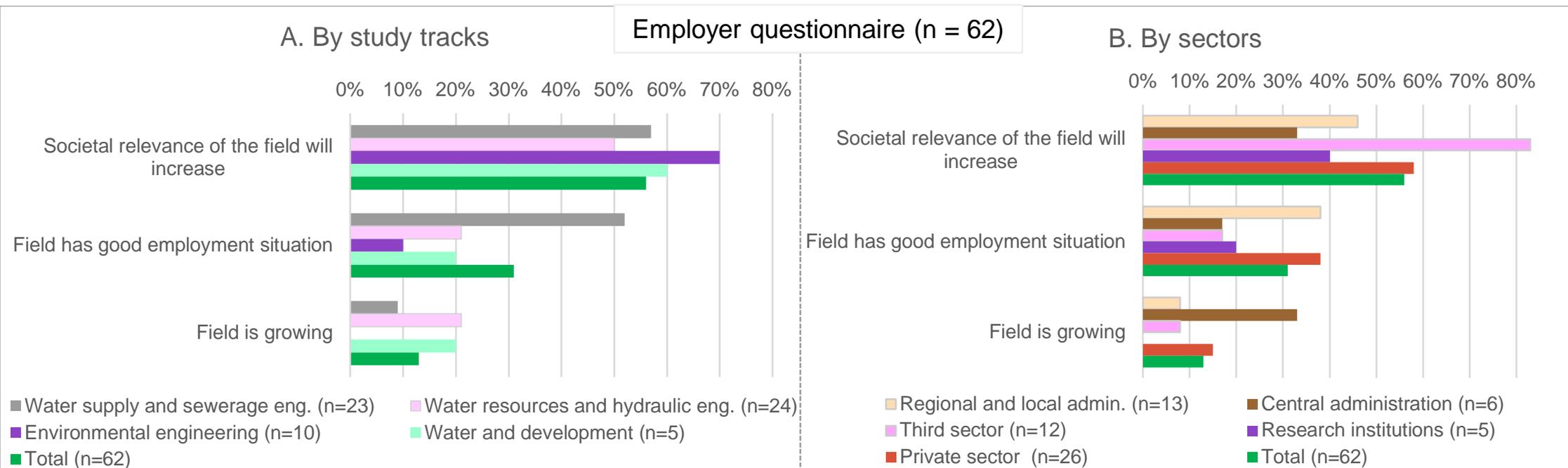
- We invited interviewees having long and impactful career in the field and preferable experience from several societal sectors
- 26 interviews, 30 interviewees (\*three group interviews of 2-3 persons)
  - 26 interviewees answered also the questionnaire
  - Career length in the field: >15yrs. (80%), 6-10 yrs. (20%)



A. Study track			
	Male (n)	Female (n)	Interviews in total (n)
Water supply and sewerage engineering	9	1	10
Water resources and hydraulic engineering	3	6	6*
Environmental engineering	0	4	4
Water and development	1	2	2*
Other (experts, financiers)	3	1	4
B. Sector			
Public sector**	4	3	4*
Research institute	-	3	3
Third sector	-	2	2
Private sector*	8	4	11
Water supply and sewerage / waste management company***	3	1	4
Financing sector	1	1	2
<b>Total</b>	<b>16</b>	<b>14</b>	<b>30*</b>

# **1. Future prospects of the field**

# Current state of the field: top 3 elements according to the respondents



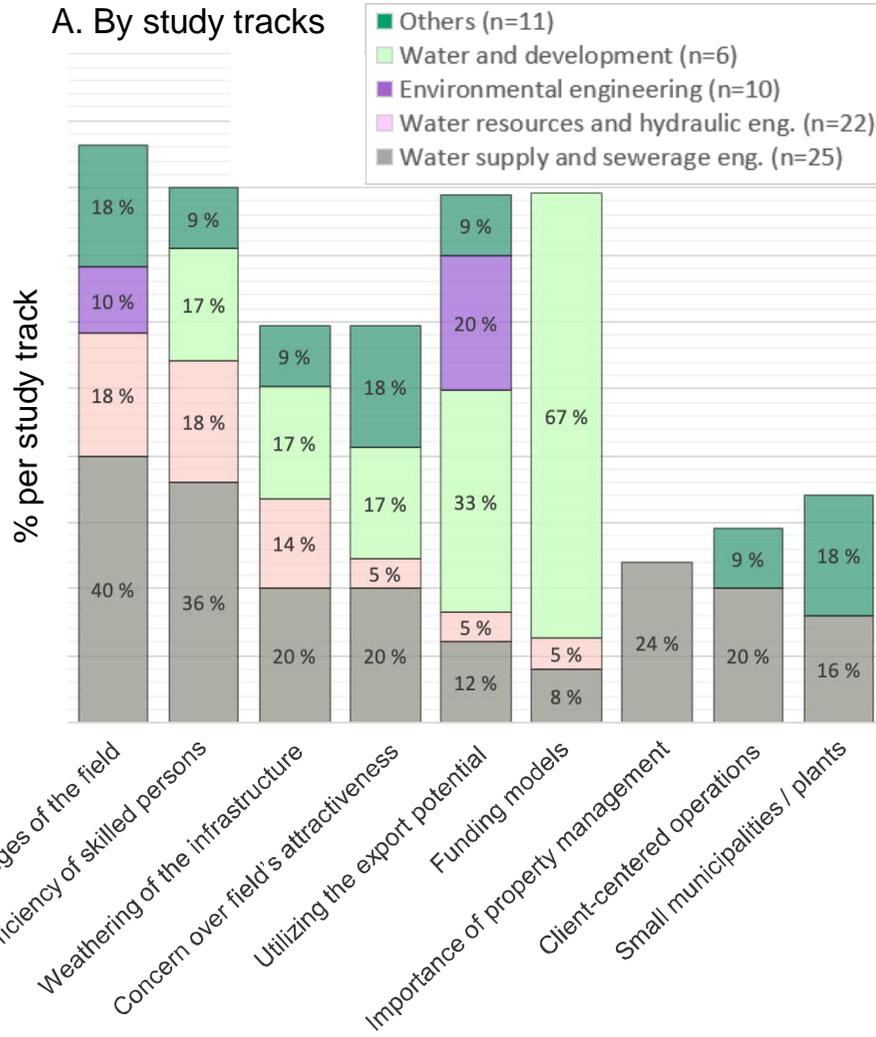
## Key challenges according to interviews (n=26)

Field's development slow (n= 10)	Actors disconnected/ tunnel vision (n = 8)	Need for joint vision for the field / renewal (n = 10)	Field is broad (n = 7)
<p>"On the other hand, big changes, but still when it comes to matters, not necessarily, it's kind of slow.. maybe that.. the changes would go through and become mainstream." <i>Env. Eng. (research intitute)</i></p>	<p>"Feels like the thing goes like, that the engineers just work among themselves with these issues. When is comes to water and such, it's so central thing in many problems, like food production and everything else. <i>Water resources and hydraulic eng. (private sector)</i></p>	<p>"We have these recorder players in every corner. Pulling in different directions. If we look at, that if you listen to certain politicians, environmental engineering will be the next Nokia in Finland. But that we are so disconnected and have different universities and actors and.. amm.. The way we are developing the field is very stop-go, very small scale. It's lacking a clear vision and alignment." <i>Water supply and sewerage eng. (private sector)</i></p>	<p>"This education is valuable for its multidisciplinarity, and certain kind of cross-disciplinarity relating to it, that it includes many things. I think this is not exactly any traditional field of engineering." <i>Water resources and hydraulic eng. (private sector)</i></p>

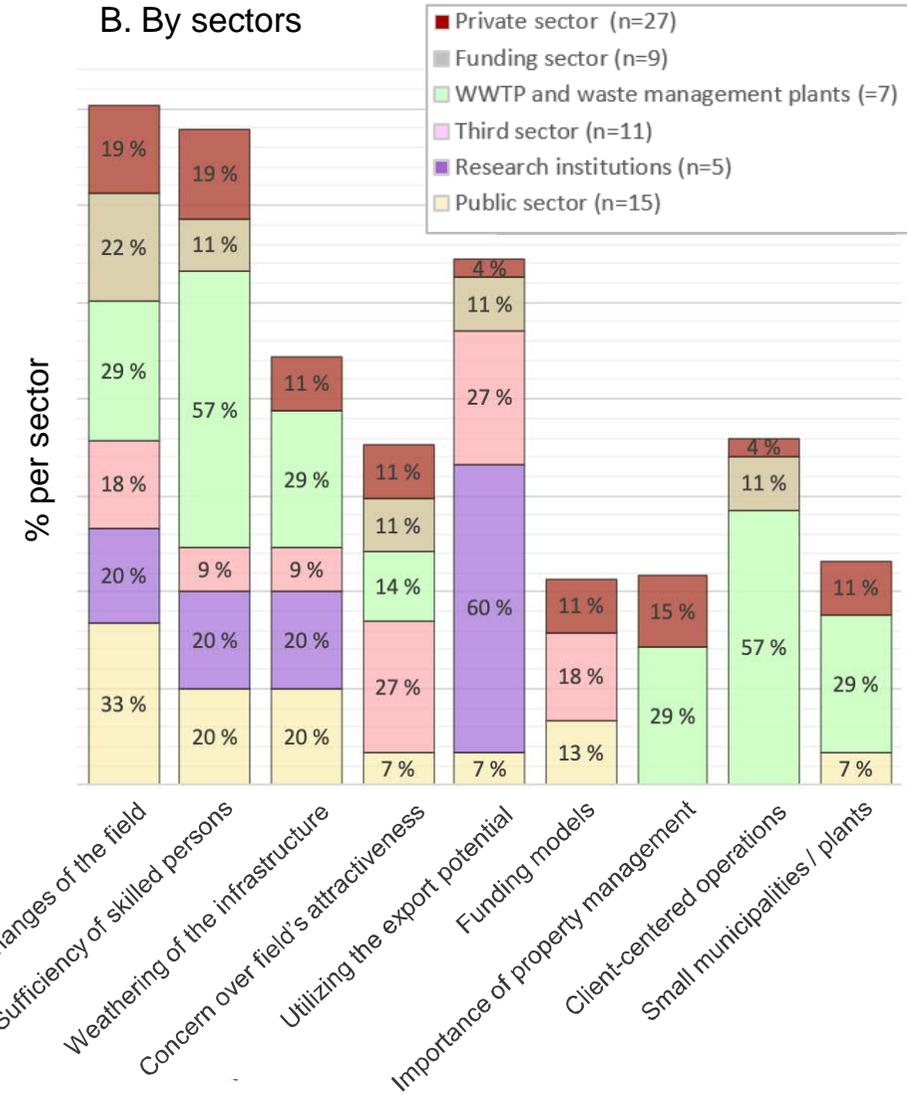
# Most important drivers of the field in Finland

Open text answers of the questionnaires + interviews (n = 72)

A. By study tracks

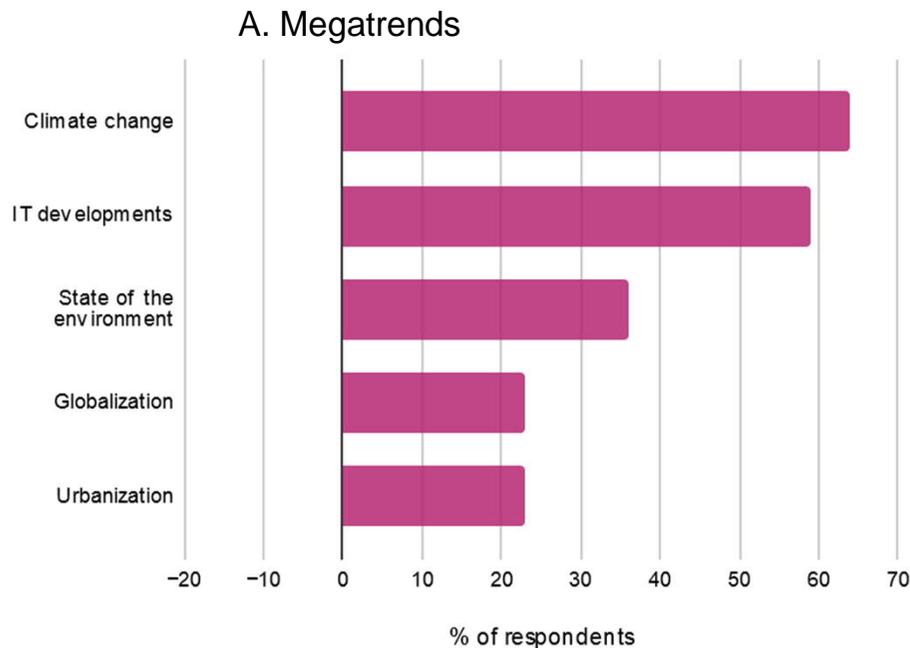


B. By sectors

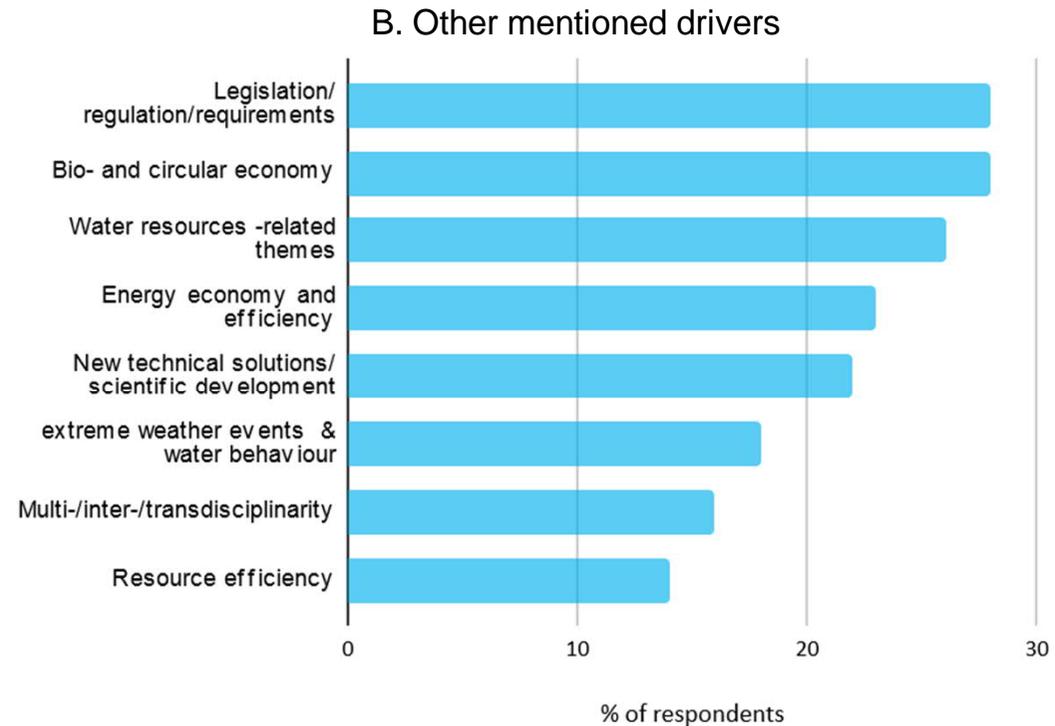


# Most important global drivers affecting the field

Open text answers of both questionnaires + interviews  
(n = 72)



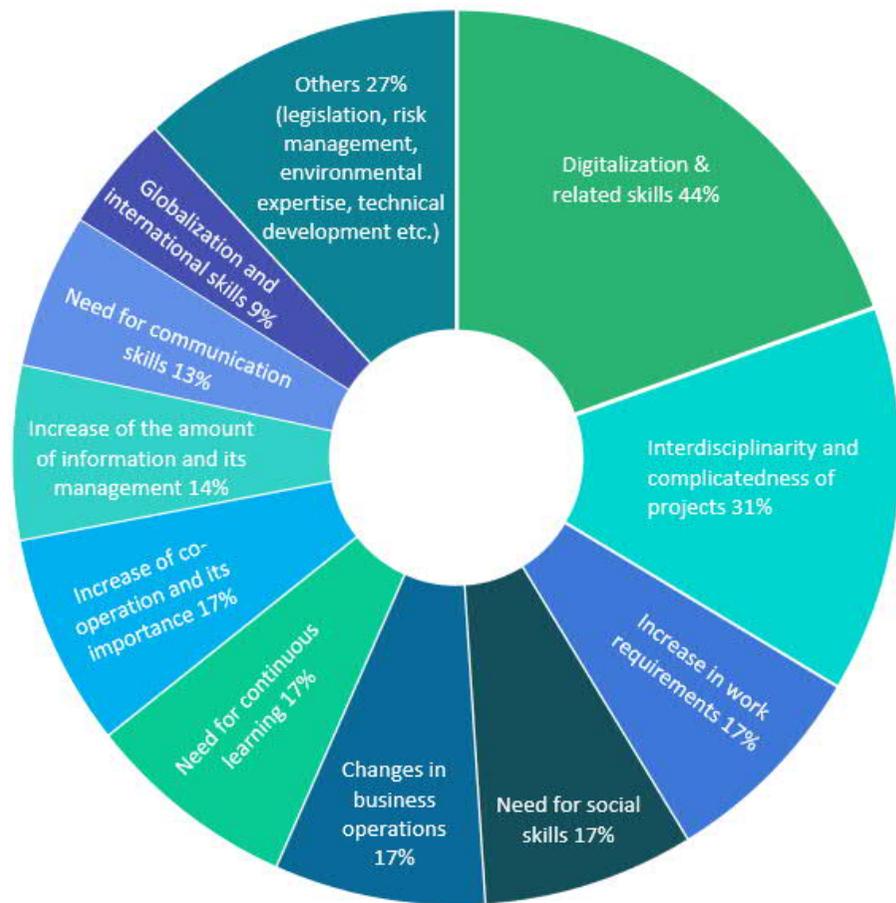
*“Cape Town was the first, in which we knew that now it [water] really dried up for real. It is not anymore in the level of political talks, but it’s really happening today. The industry needs to think about their position, how materials circulate, how to get some of them back. Not only because the regulations say that some electrical waste has to be recycled, but because we really need the material..”*  
Interview, research institute, environmental engineering



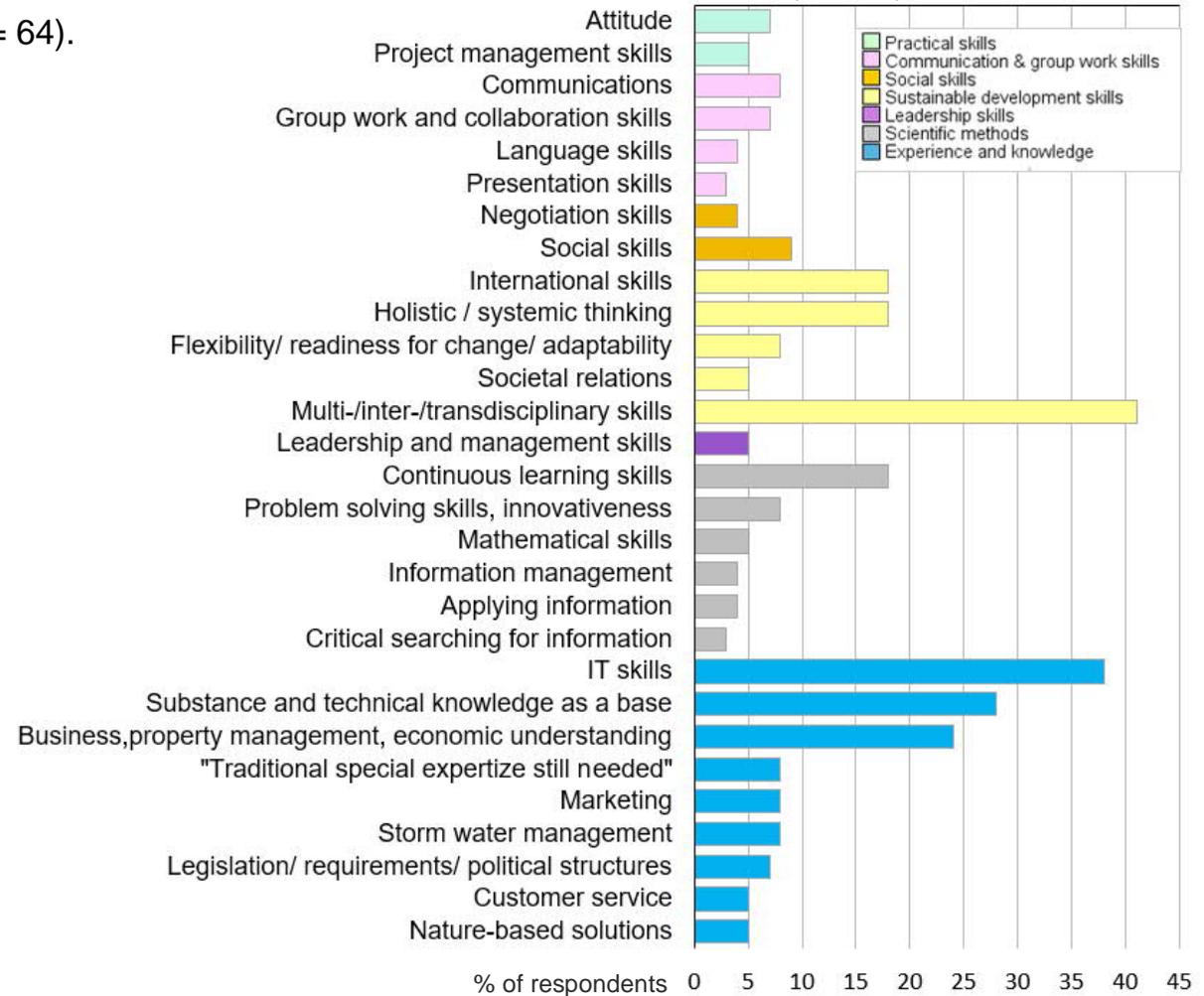
*“I believe that the issues in water sector will become critical in the future , and therefore their importance will increase in climate funding. You can already see some signals on it, and I think that the funding in water sector is becoming a new “blue finance” -trend, in addition to “green finance”.*  
Funders’ questionnaire, open text answer

# Future skills needed in the field of water and env. engineering

**A. Changes in the requirements of the work and skills needed in the field during respondents' careers (5yrs – over 15yrs.).**  
Employer questionnaire, open text answers + interviews (n = 64).

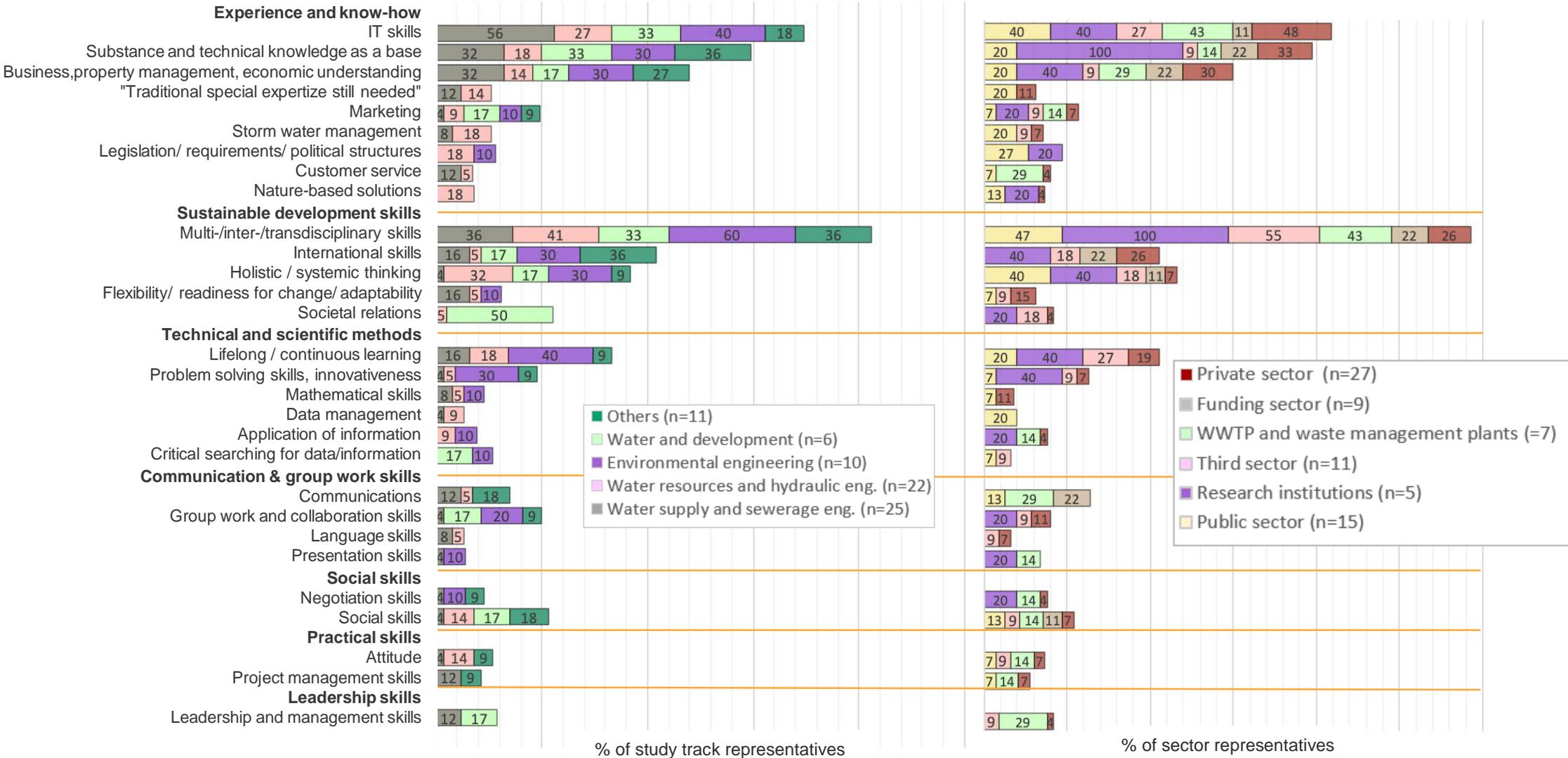


**B. Future skills needed in the field.** Questionnaires, open text answers + interviews (n = 72).



# Future skills needed in the field

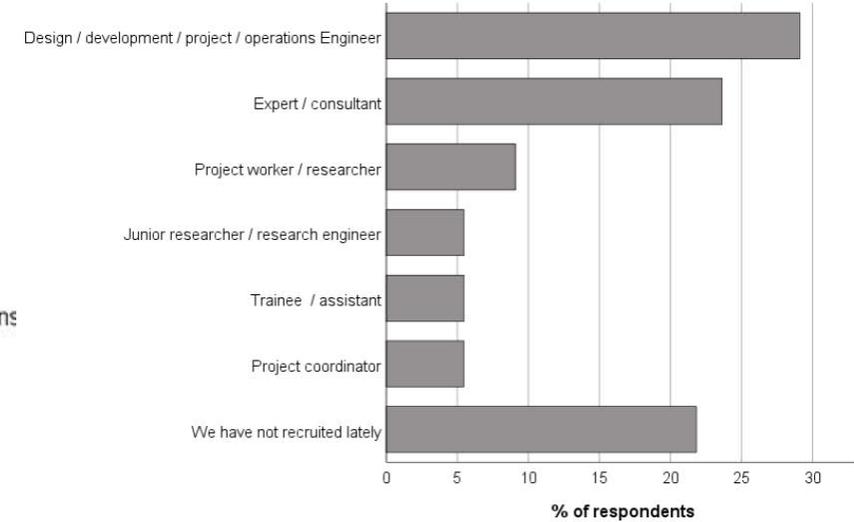
Questionnaires, open text answers + interviews (n = 72)



## **2. Graduates in working life**

# Graduates' positions in recruitment

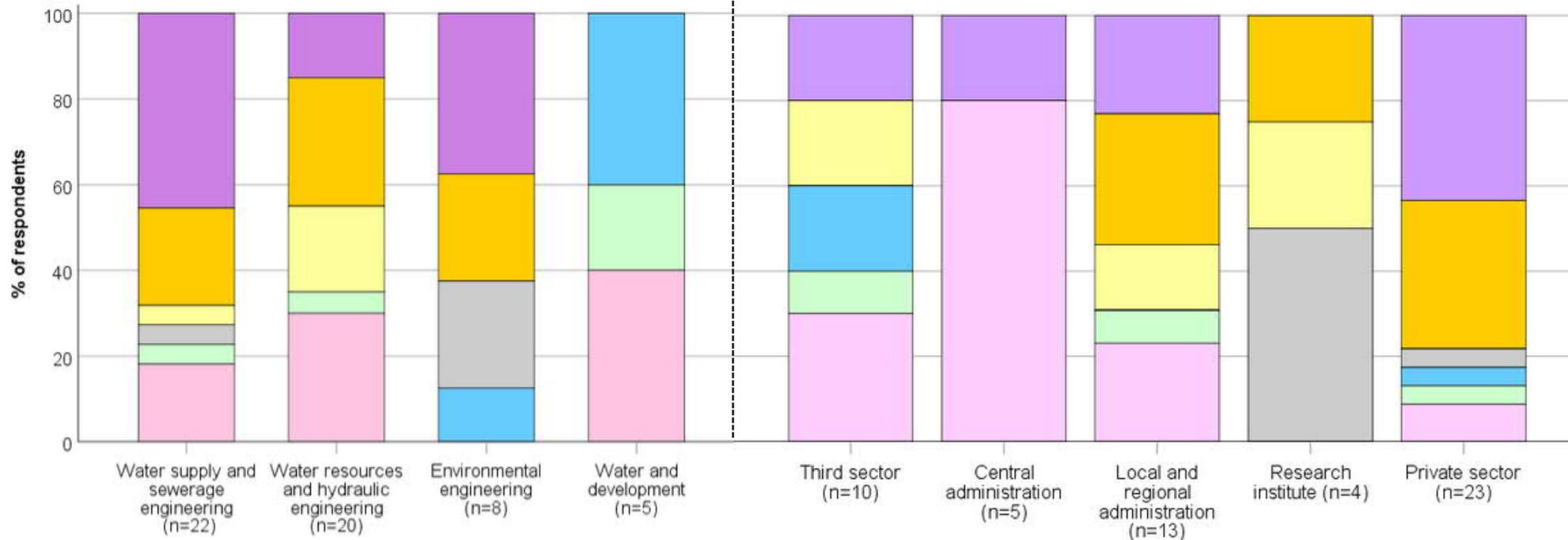
Employer questionnaire (n = 55)



A. By study tracks

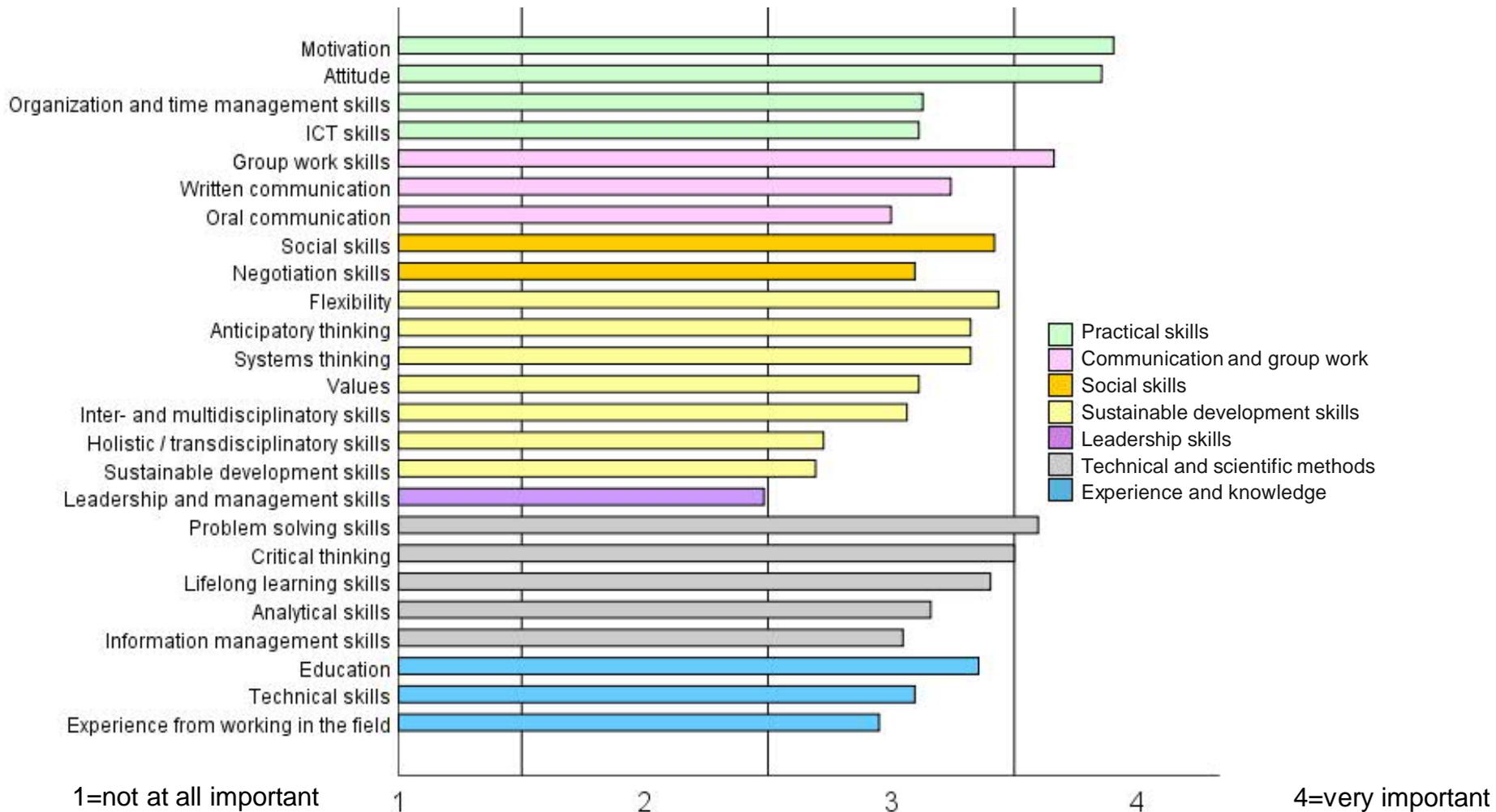
B. By sectors

C. All respondents



# Competences considered important when recruiting

Employer questionnaire (n = 62)

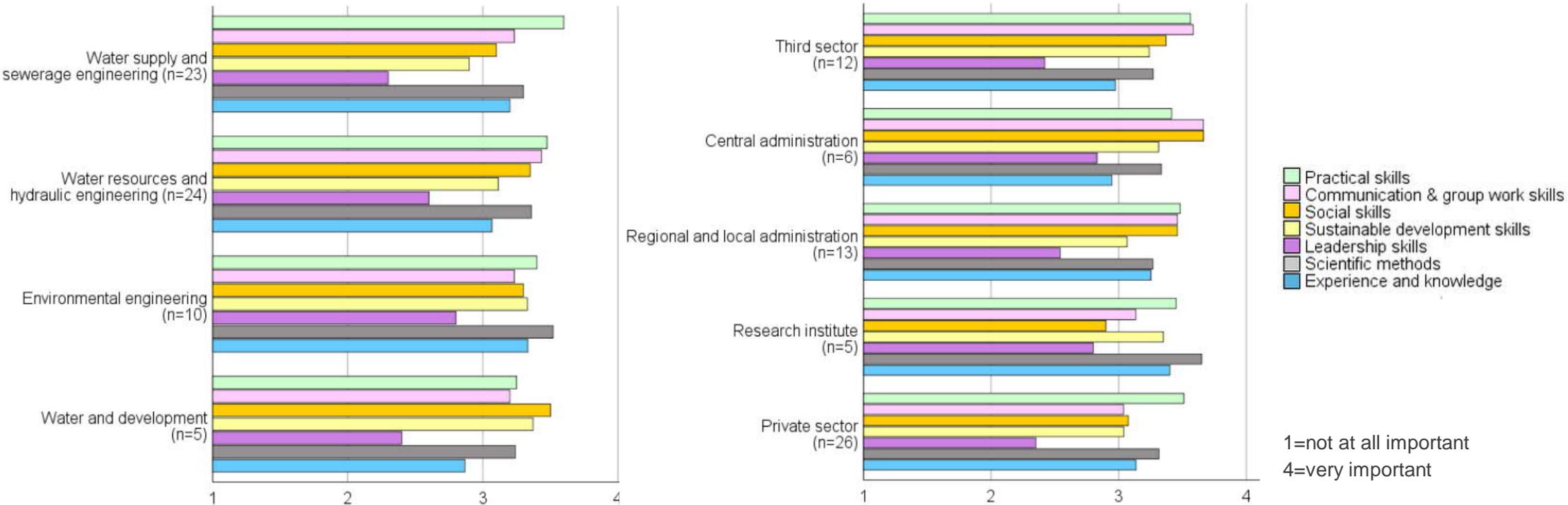


# Competences considered important when recruiting

Employer questionnaire (n = 62)

A. By Study tracks

B. By Sectors



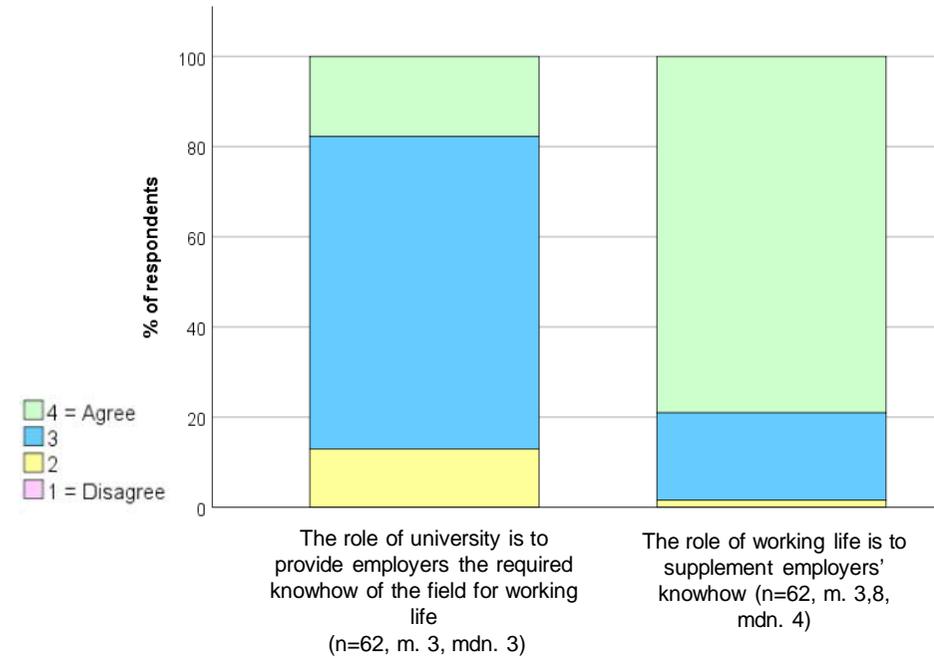
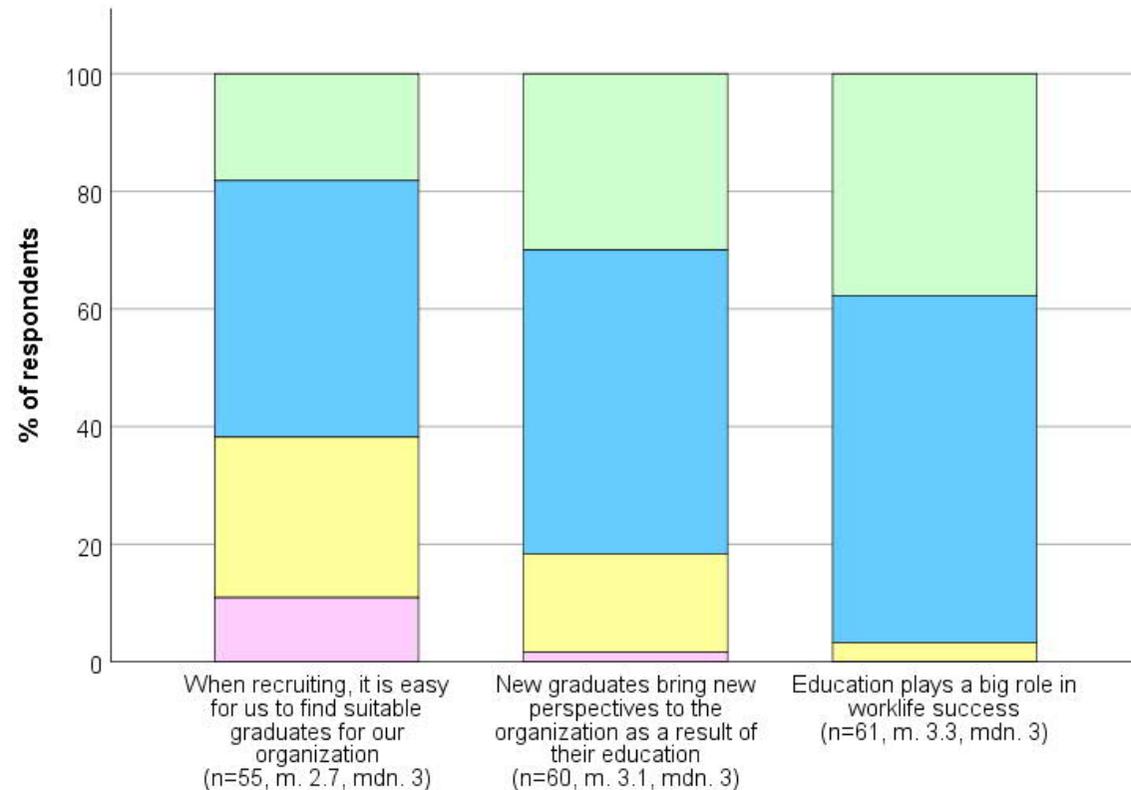
- Practical skills
- Communication & group work skills
- Social skills
- Sustainable development skills
- Leadership skills
- Scientific methods
- Experience and knowledge

1=not at all important  
4=very important

Practical skills	Communication and group work skills	Social skills	Sustainable development skills	Leadership skills	Technical and scientific methods	Experience and know-how
ICT skills	Group work skills	Negotiation skills	Flexibility	Leadership	Problem solving skills	Education suitable for the field
Attitude	Speech communication	Social skills	Sustainable development		Critical thinking	Experience from the field
Motivation	Written communication		know-how		Analytical skills	Technical know-how
Organizing and time management			Systemic thinking		Continuous learning	
			Holistic thinking		Information and data management skills	
			Anticipatory thinking			
			Interdisciplinary skills			
			Values			

# Employers' experiences and perceptions of graduates

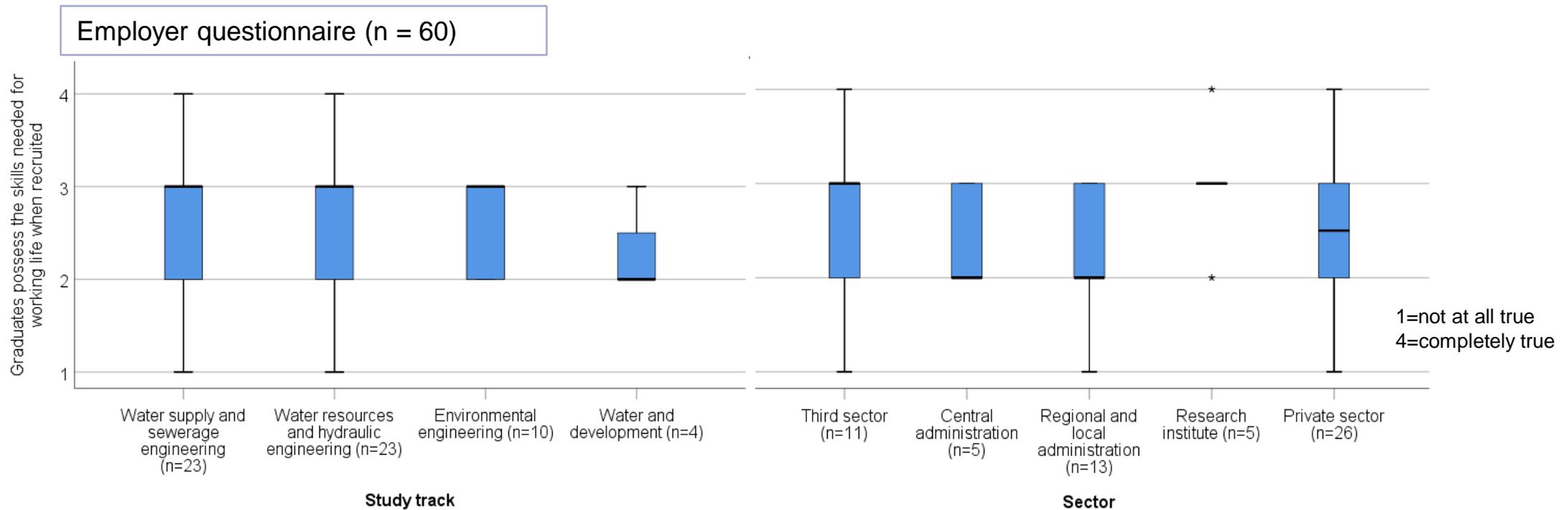
Employer questionnaire (n = 55-62)



*"I don't think that anyone could blame, based on truth, that those most fundamental things could be studied while having a full-time job, like ever again after completing a degree. Meaning like basic mechanics, physics, hydraulics, dynamics, everything that you need, if dealing anyhow with planning, so you need to have a basic understanding about those. But let's imagine that you have a day job and you would study something like that at the same time, so you would need to be some fakir to be able to manage that."*

interviewed expert, private sector

# Graduates have the skills needed for working life when recruited



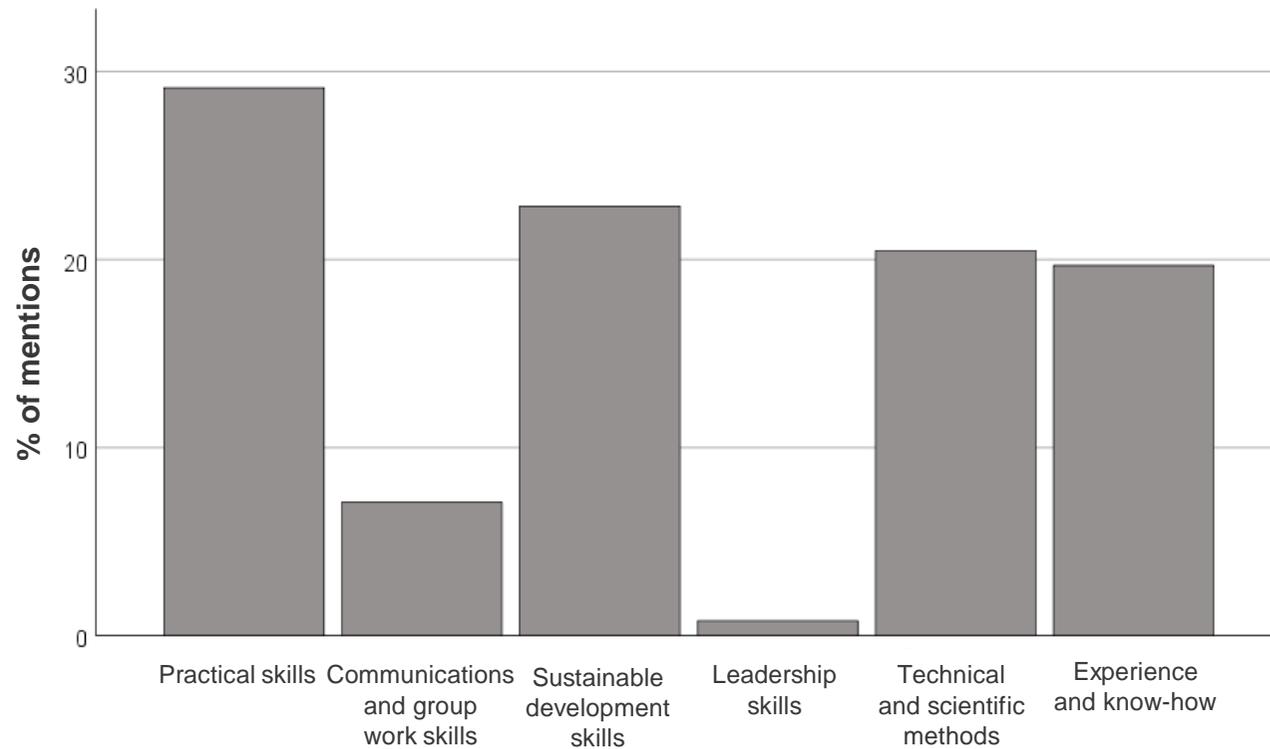
## Haastatteluista:

“– they surely will learn here. Certainly, we’ll teach, you don’t have to think that you should be a complete professional right away – we’ll give a hand and are prepared that those coming to us know certain things, but the rest we’ll teach them, and one learns by doing.”  
interviewed employer, regional/local admin, water resources and hydraulic eng.

“In this field, no one has ever graduated as a skilful professional. Those are trained by ourselves. Good professionals with good reception [...] We tend to say that it takes five years to boost someone up – for some it takes a longer, for some a shorter period of time, and then of course career development is very dependent on, if one adopts to the job, or if one takes another direction, or if one has a wider assimilation. We look for long contracts because it is not a fast path of development.”  
interviewed employer, private sector, water supply and sewerage eng.

“But it can’t be so [that one has all the competences needed after graduation]. The job teaches you. It is just so. It’s like, no studies totally correspond that you are completely ready when you start a job. That is like some utopia. And actually, it would be kind of boring, if it was like that. It kind of means that you wouldn’t develop anymore. But it creates the basic platform, on top of which you build your professional competences. It (education) gives you the abilities to develop yourself in the working life.”  
interviewed employer, research institute, environmental eng.

# What graduates have brought to working life`?

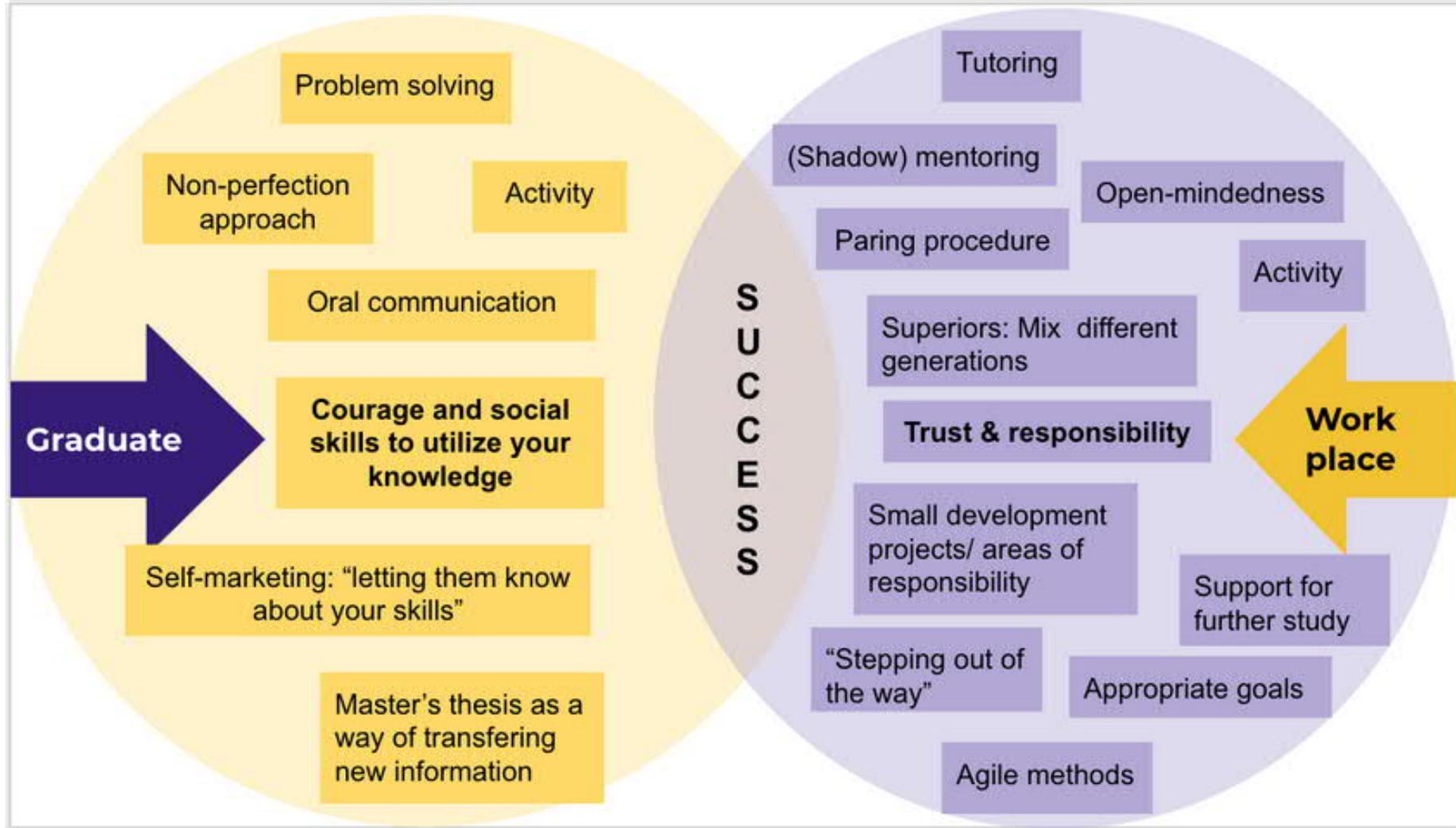


*"In those teams where they (graduates) are, they have always brought that new type of know-how that we just have needed, so that this type of a research institute is able to renew itself and keep up to date. So in that sense, these Aalto's graduates have had good, like even crucial roles."* interviewed employer, research institute, environmental eng.

*"Very open-minded they [the graduates acquire] new things, unlike we who have been here for long. If we do things just among us, so we might have quite starchy practices, but then you notice from a new person that oh, you can do it also that way, and then you get new viewpoints quite easily to the practices and to the different tools you use."* interviewed employer, regional/local admin, water resources and hydraulic eng.

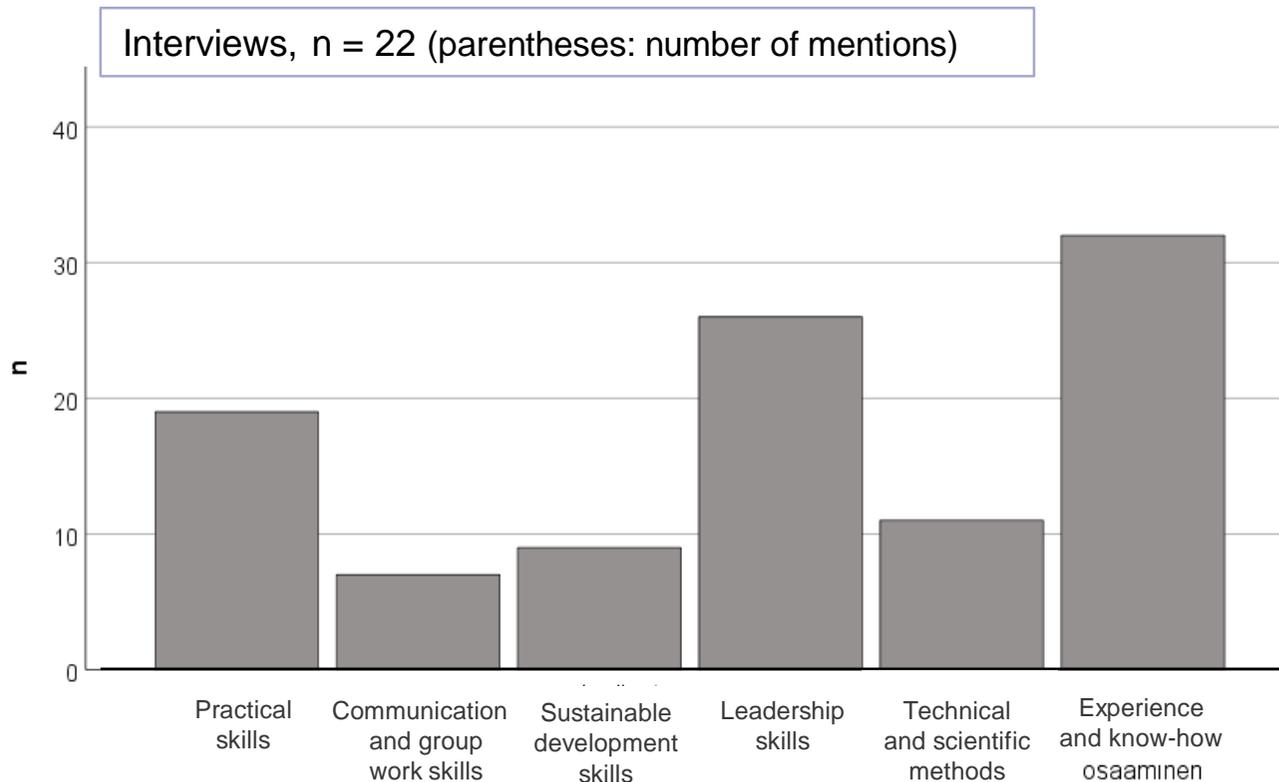
<b>Practical skills (37); n=24</b> IT skills (14) Questioning routines; suggesting new practices (13) Excitement, energy, motivation (8) Project management (1) Self-directive (1)	<b>Communications and group work skills (9); n=8</b> Up-to-date means of communication (e.g. social media) (5) Visual communications (2) Collaboration skills (2)	<b>Sustainable development skills (29); n=19</b> Green values(13) Multicultural interaction skills (incl. languages) (9) Holistic approach (2) Flexibility (2) Proactive and anticipatory thinking(2) Holistic thinking	<b>Leadership skills (1); n=1</b> "Modern management culture" (1)	<b>Technical and scientific methods (26); n=16</b> Willingness to learn (8) Information/data search and management skills (7) Problem solving skills(4) Critical thinking (3) Systematic and analytical approach (2) Theoretical approach (2)	<b>Experience and know-how (25); n=21</b> Technical and substance knowledge (e.g. planning practices and GIS skills) (13) Latest educational knowledge (10) Networks (connections to univ. research and student associations) (2)
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## How to benefit from graduates' new kind of knowhow in work places?



Summary of the workshops in WAT Master's Program Stakeholder event "Water Expo" on 7<sup>th</sup> Feb 2020 (>120 participants)

# Focus areas suggested for future education



*“What I’m after here is that, what you may have done already, that should these design people and of course these social sciences students and engineering students be brought together in a joint, even obligatory, courses about, when they after 5-6-10-15 years, meet each other again, so they would have, due to the joint course, even some kind of an understanding of what and how that other person thinks, and why.”*  
interviewed employer, regional/local admin, water resources and hydraulic eng.

*“Indeed, as I said, the challenge in water supply and sewerage is that this is a multidisciplinary jack-of-all-trades –field, and thus the challenge that we should teach them profoundly enough [...] This is not a very grateful field as a field of research, so that almost right away when we start to investigate something in more detail, it shifts to material engineering, chemistry, microbiology.. To a different field. So that this field anyway only brings together, so to say....”*  
interviewed employer, private sector, water supply and sewerage eng.

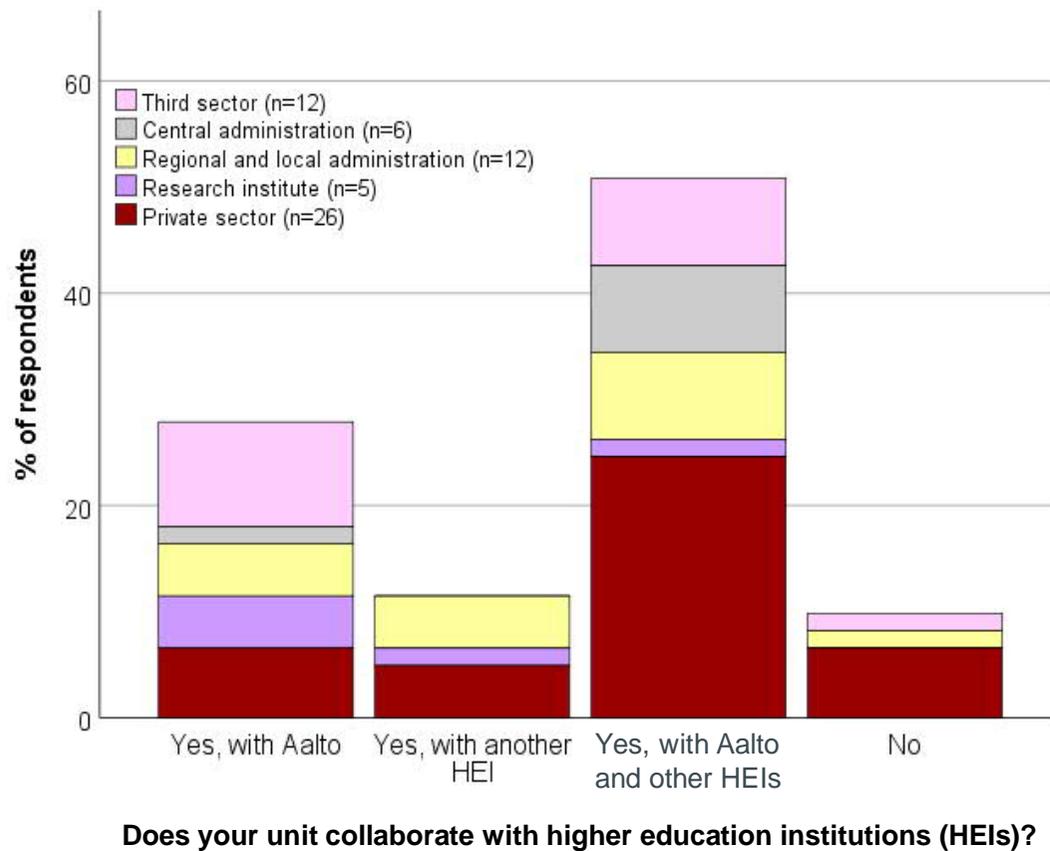
*“How would you get such, that people would be even more aware and sort of more capable of avoiding those pointless conflicts....we would save so much time and money, and even years of our lives. All problems in the end are caused by humans [...] These kind of things are such, for which we arrange trainings. They are expensive: how to recognize the type of people you are, and then there are these other types of people and you are given tools to recognize more of those. If we talk about the contents of a master’s program, like what else than substance knowledge you could get from the university, couldn’t it be something like this, recognizing different types of people..”*  
interviewed employer, private sector, water and development

<b>Practical skills (19); n=13</b> Project management skills (8) IT skills (7) Time management skills (4) Attitude and motivation (2)	<b>Communications and group work skills (7); n=7</b> Group work skills (4) Presentation skills (3)	<b>Social skills (9); n=9</b> Social skills (9)	<b>Sustainable development skills (26); n=18</b> Holistic skills (11) International skills (8) Sustainable development and SD-related skills (7)	<b>Technical and scientific methods (11); n=8</b> Continuous learning (6) Information/data search skills (5)	<b>Experience and know-how (32); n=19</b> Substance knowledge (10) Technical know-how (10) Business knowledge (8) Governance knowledge (2) Legislative knowledge (2)
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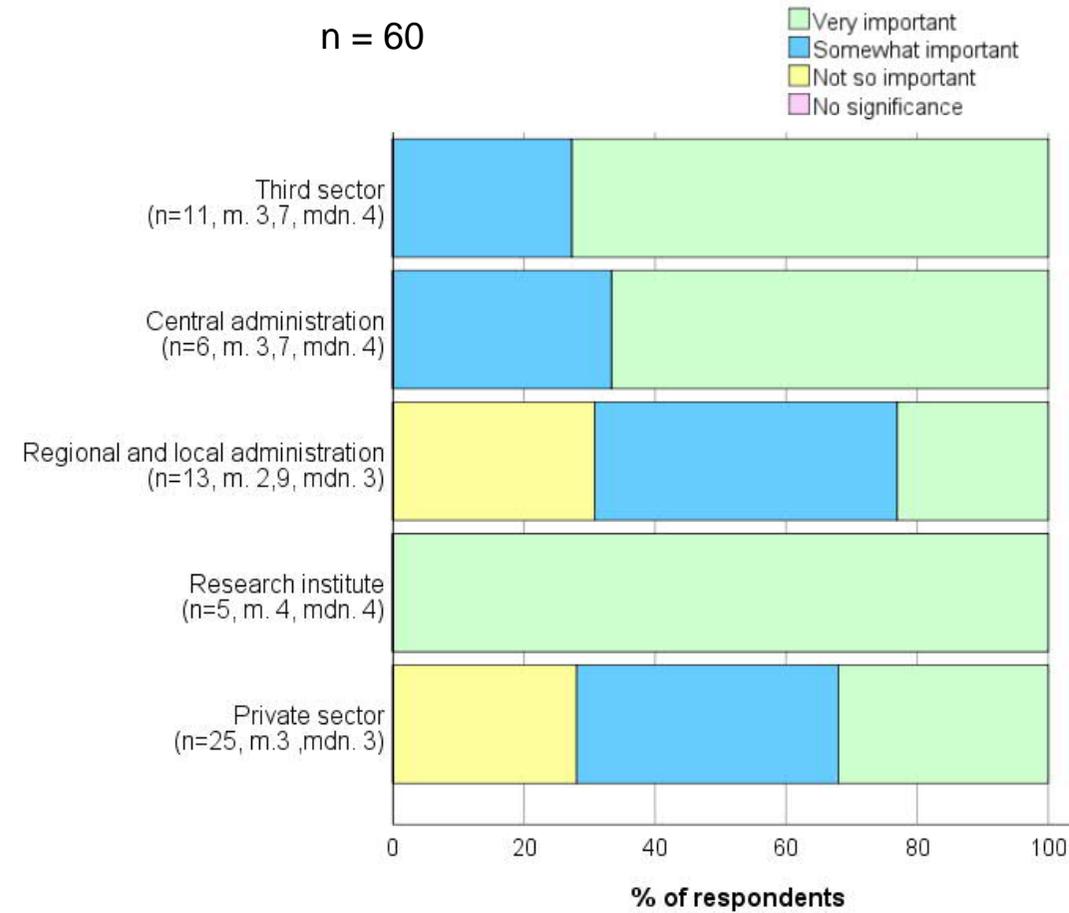
## **3. Stakeholder collaboration**

# Collaboration and its importance to employers

Employer survey (n = 61)



n = 60



# The forms of collaboration & how it works

Employer questionnaire (n = 59)



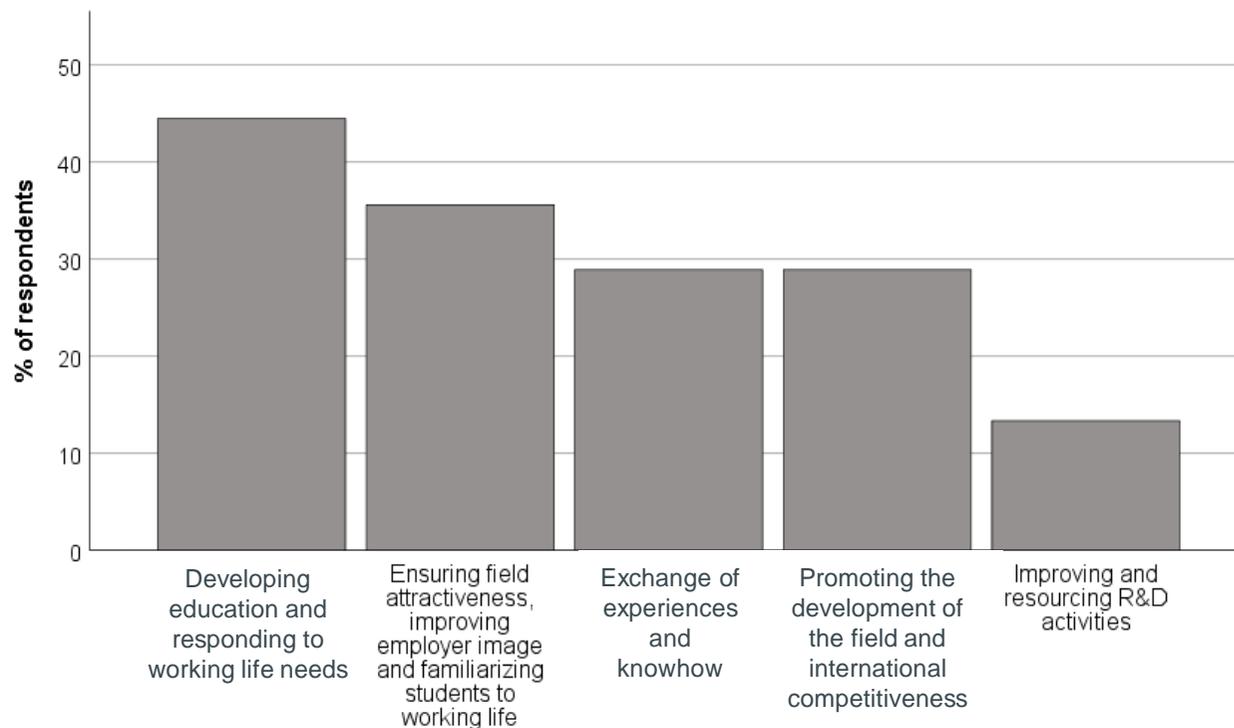
Other forms of collaboration, open text answers, n = 45

4 = has worked very well	3 = has worked ok	2 = things to improve	1 = has not worked at all
Master's thesis and dissertations (14) Development/research projects (7) Internships (3) AKVA (e.g. sauna evenings, excursions) (2) Mentoring (2) Jointly organized seminar Joint workshops Member in an expert group of a research project Hackathon	Internships	Development Steering group of research projects	Master's thesis Hackathon



# Objectives and forms of collaboration

Employer questionnaire, open text answers (n = 59)

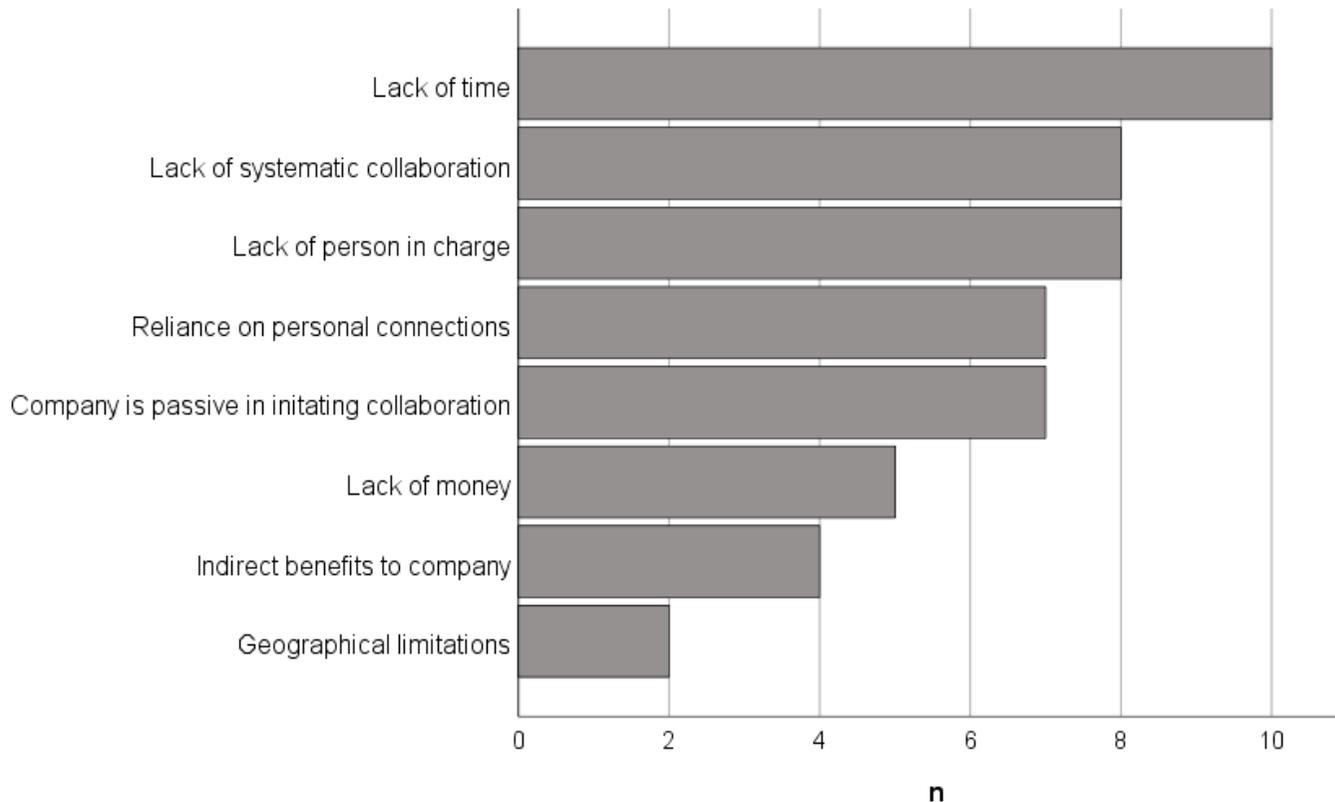


Employer questionnaire + interviews

Collaboration objective	Forms of collaboration supporting the objective
Developing education and responding to working life needs	Face-to-face meetings Joint seminars and workshops
Ensuring field attractiveness, improving employer image and familiarizing students to working life	Internships Project work with companies / working life Field trips Hackathons Lecture visits Collaboration through student associations (e.g. company visits)
Promoting the development of the field and international competitiveness	Master's theses and dissertations Joint projects on future challenges Face-to-face meetings
Exchange of experiences and knowhow	Master's theses and dissertations Reverse mentoring Exchange of experts Joint projects Joint events
Improving and resourcing R&D activities	Master's theses and dissertations Joint projects

# Challenges in collaboration of working life and education

Interviews (n=23)



*“I guess our own resources and interest, and maybe the organization from our side hasn’t always been so clear.. that some companies have a clear responsible person taking care of educational collaboration. We are a bit too big for that and also a little heterogenous , because then we have these collaborators in many levels and a bit in different departments..”*

interviewed employer, WWT and waste management plant

*“Lack of time is one thing, that the benefits for us are very indirect. So in that sense, they realize so slowly and invisibly those benefits, that they are difficult to verify and in that sense they don’t get prioritized in daily work [...] Developing the forms of collaboration could give also more rapid benefits..”*interviewed employer, private sector, water supply and sewerage eng.

*“Every time I have visited there [given a lecture], I have been invited. Maybe this is just being too shy, so that I should offer my expertise more, like “hey, I can do this thing for you”. And then if we talk about for example recruiting an intern and master’s thesis worker, we just don’t have money for that at the moment.”*interviewed employer, private sector, water resources and hydraulic eng.

# Overcoming the challenges in collaboration

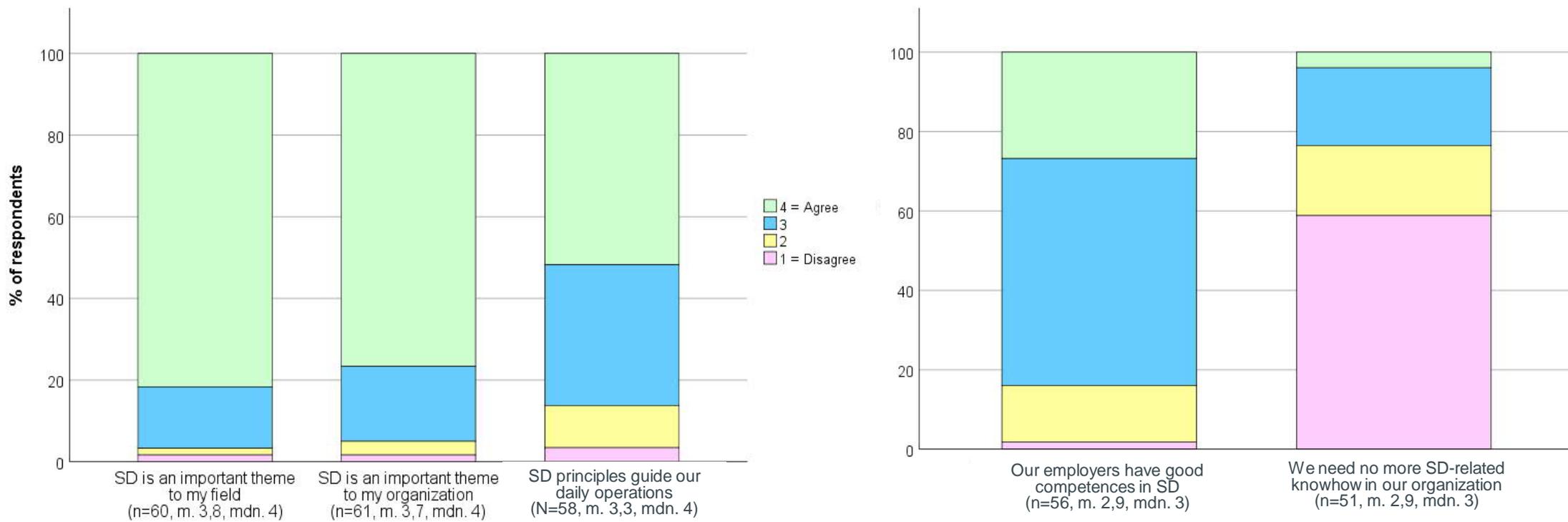
Interviews (n=23)

Challenging factor	Suggestions to overcome the challenge
Lack of time, finance and responsible person Lack of initiatives from the organization	<ul style="list-style-type: none"> <li>● More active initiative and commitment from the organization</li> <li>● Collaboration based on real needs</li> <li>● Flexible financial channels</li> </ul>
Differing expectations about the results of collaboration	<ul style="list-style-type: none"> <li>● Getting to know the core activities and societal roles of both parties</li> <li>● Starting the collaboration based on both parties' standpoints</li> <li>● Clear definition of roles and needs, more open discussion on the expectations towards the results of collaboration</li> </ul>
Collaboration based on personal relationships Lack of organized collaboration	<ul style="list-style-type: none"> <li>● Steering measures for bringing together collaborators by a third party (e.g. funders, associations)</li> <li>● Platform, through which working life would be better informed on the university's activities, content of teaching and past/ongoing projects -&gt; to avoid overlap</li> <li>● Utilizing the multiple actors -model</li> </ul>
Geographical restrictions	<ul style="list-style-type: none"> <li>● Steering measures to bring the collaborators together</li> <li>● Platform, through which working life would be better informed on the university's activities, content of teaching and past/ongoing projects</li> </ul>

## **4. The role of sustainable development in the field**

# Importance and competences of sustainable development in organizations

Employer questionnaire (n = 51-60)



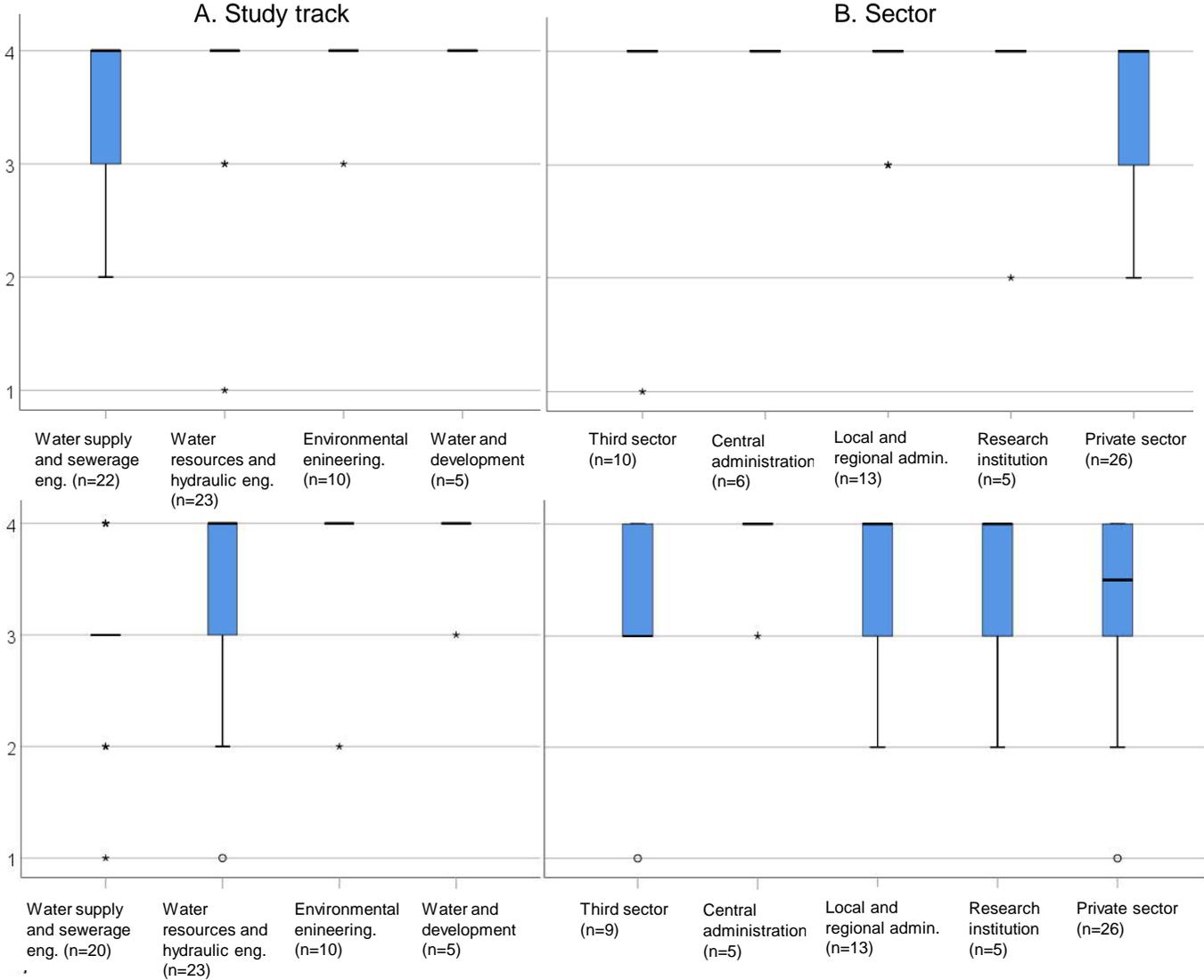
# Importance of sustainable development by study tracks/ sectors

Employer questionnaire

1. SD is an important theme to my organization

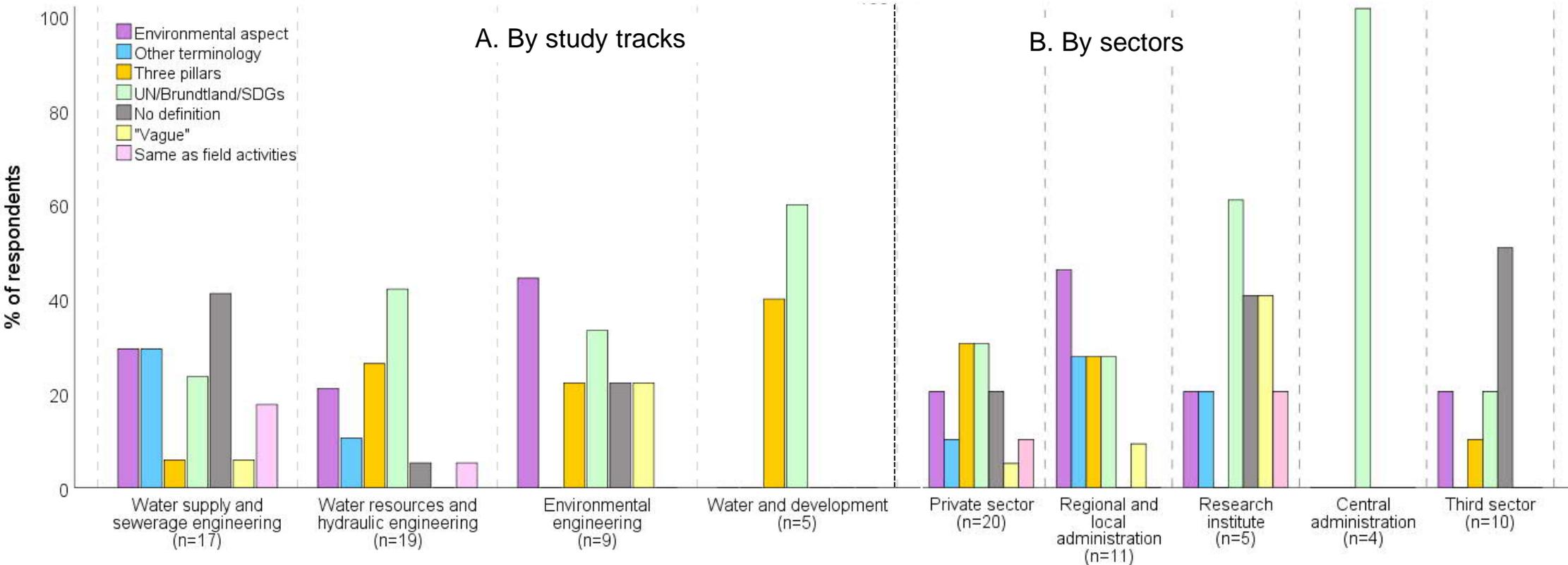
1= not true at all  
4= completely true

2. The principles of SD guide our daily operations



# Organizations' definitions of sustainable development

Employer questionnaire, open text answers (n = 50)



# Employer's perceptions of sustainable development

Employer questionnaire, perceptions of SD being a central theme in WAT Programme, open text answers (n=56)

Interviews (n = 30), perceptions of SD in general

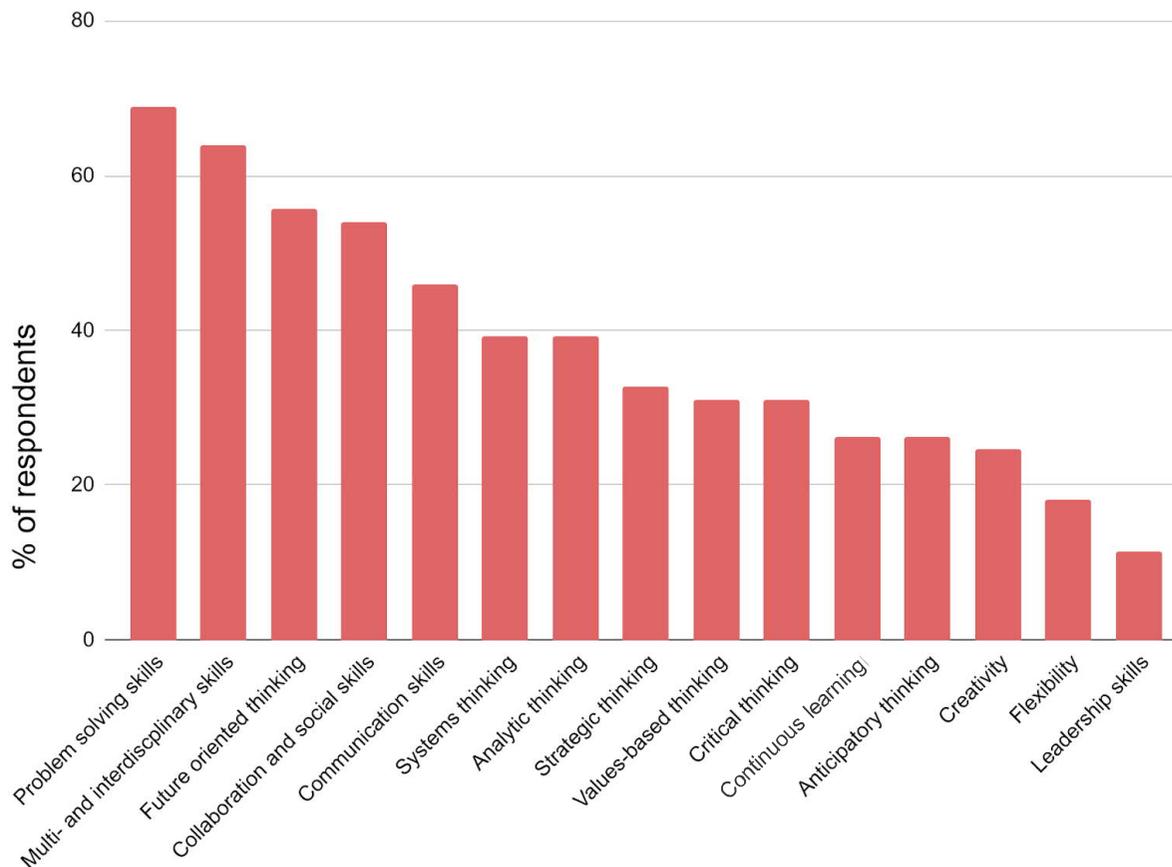
4 = Very positive	3 = Somewhat positive	2 = Somewhat negative	1 = Very negative	0 = Not clear
51,8 %	26,8 %	8,9 %	5,4 %	7,1 %
All activities of the field relate to SD	Theme is good, if it is considers also the larger context	Other themes more central for the field (e.g. security, service reliability, healthy)	Difficult or worn-out concept	"SD competences are probably a cross-cutting theme in everything"
Employers in the field play a central role in SD	Theme is good, if the programme can also bring out practical solutions	Does not concern the area, in which the organization operates	Attracts wrong kind of people to the field	"As a small country we should aim for increasing knowhow in exports and internationalization"
SD competences are required in the field and demand for them will continue to increase	The theme is good, but SD and SD competences require clear definitions	The focus of education should be in engineering and technical aspects	The focus of education should be in traditional engineering and technical aspects	"Avoid outsourced water treatment plants - these are cost pools that rarely win"
Theme supports the competences developing the competences needed in the field (e.g. cross-disciplinarity)	The theme is good, but it is unclear what the application of theme means in practice	Fear, that WAT educates generalists to the field instead of field specific problem solvers		"SDG 2030 goals are interlinked but water and environment are like bridges between the themes"
The theme should be self-evident in other study programmes too	The theme is good, if certain skills (e.g. logical, analytical and systemic thinking) or themes (e.g. maintenance of water supply infrastructure) are highlighted	SD is too broad, general or vague to be a cross-cutting theme		

4 = Very positive  
 3 = Somewhat positive  
 2 = Somewhat negative  
 1 = Very negative

Perceptions	4	3	2	1
Water supply and sewerage eng. (n=10)	3	1	4	2
Water resources and hydraulic eng. (n=9)	8	1	0	0
Environmental engineering (n=4)	3	1	0	0
Water and development (n=3)	3	0	0	0
Other (experts and financiers) (n=4)	2	2	0	0
<b>Total (n)</b>	<b>19</b>	<b>5</b>	<b>4</b>	<b>2</b>

# Sustainable development –related skills needed in the field

Employer questionnaire (n = 61)



Interviews (n = 24):

Above all, there is a need for a combination of competences, where different skills support each other, and for right attitude:

*“That you can convince someone that ”I understand your problem, and this thing I have, will answer it”. Or then maybe, that you are able to see where the problem lies and then you try to find some kind of a common solution for it. A sort of... it’s not math, but kind of humane activity. We surely need such.”* interviewed employer, private sector, water resources and hydraulic engineering

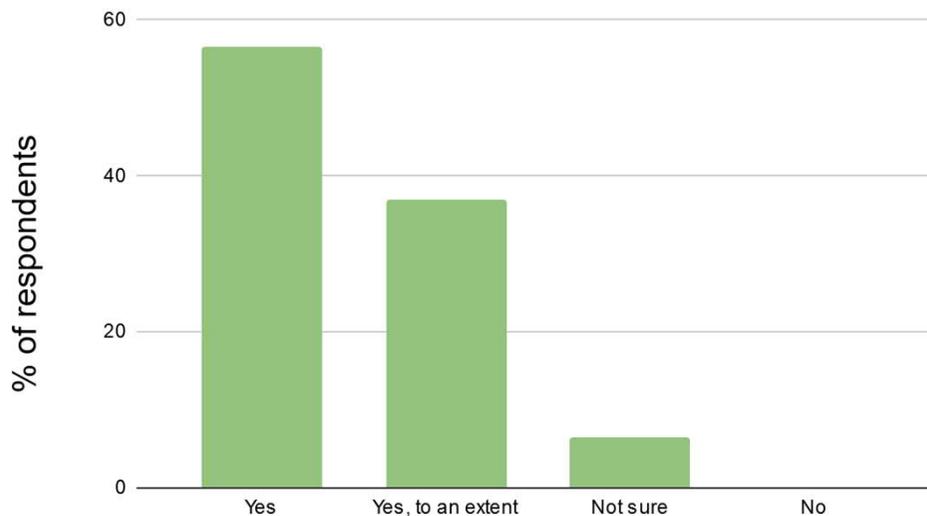
*“What is important, is that with each challenge/problem in hand, we don’t use only engineering sciences, but we would utilize wider know-how and ways of thinking around a ”common table.”* Employer questionnaire respondent, regional and local admin., water resources and hydraulic engineering

*“[S]pecifically in implementing the SDGs, that the challenges are enormous – if we like want to overcome the global famine, we particularly need people to be able to see outside their boxes and think together with other dsciplines those solutions and start thinking something way new, so this kind of picture will become more common.”* interviewed employer, central admin, water resources and hydraulic eng.

# Possibilities of graduates to promote SD in work life

Employer questionnaire, open text answers (n = 46)

Can graduates influence the implementation of SD in their positions?



Employer questionnaire's open text answers and interviews:

*"Can very well by bringing forward own know-how and insights. Often organizations recruit graduates particularly to bring about new developmental insights."* Employer questionnaire respondent, private sector, water supply and sewerage eng.

*"Being spontaneous, at least here in our place you can often do many things if you just have the excitement and are able to sell your ideas."* interviewed employer, third sector, environmental eng.

*"Bringing new ideas, thinking 'out of the box', developing and suggesting new daily practices that support sustainability."* Employer questionnaire respondent, research institute, water resources and hydraulic eng.

*"Partly can. A big part of our work has to be done according to regulations and instructions. Of course sustainable development is taken into account when drafting new regulations. In the beginning of one's career, the chances of having an impact might be minor.."* Employer questionnaire respondent, regional and local admin., water resources and hydraulic eng.

*"Definitely depends on companies and that, that you surely.. The fact is that those in higher positions have more power and chances to have an impact.."* interviewed employer, third sector, environmental eng.

As a summarizing phrase:

***“Compared to a traditional university education, those with technical education have a more holistic understanding of the problems, and in-built desire for problem-solving. The environmental problems are multifaceted and even depressing, but WAT graduates have a great potential to solve them and to promote sustainability. What the field needs increasingly, is multidisciplinary, practical co-operation and internationality. In addition, in-service training and lifelong learning should be supported, instead of leaving that up to individuals alone.”***

- Employer questionnaire respondent, third sector, water supply and sewerage engineering