



AALBORG UNIVERSITY
DENMARK



University
of Stavanger



The Role of Universities in Innovation and Regional Development

Rogaland Region seen by ESRs

“A close look to university-industry collaborations in Rogaland”

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Outline



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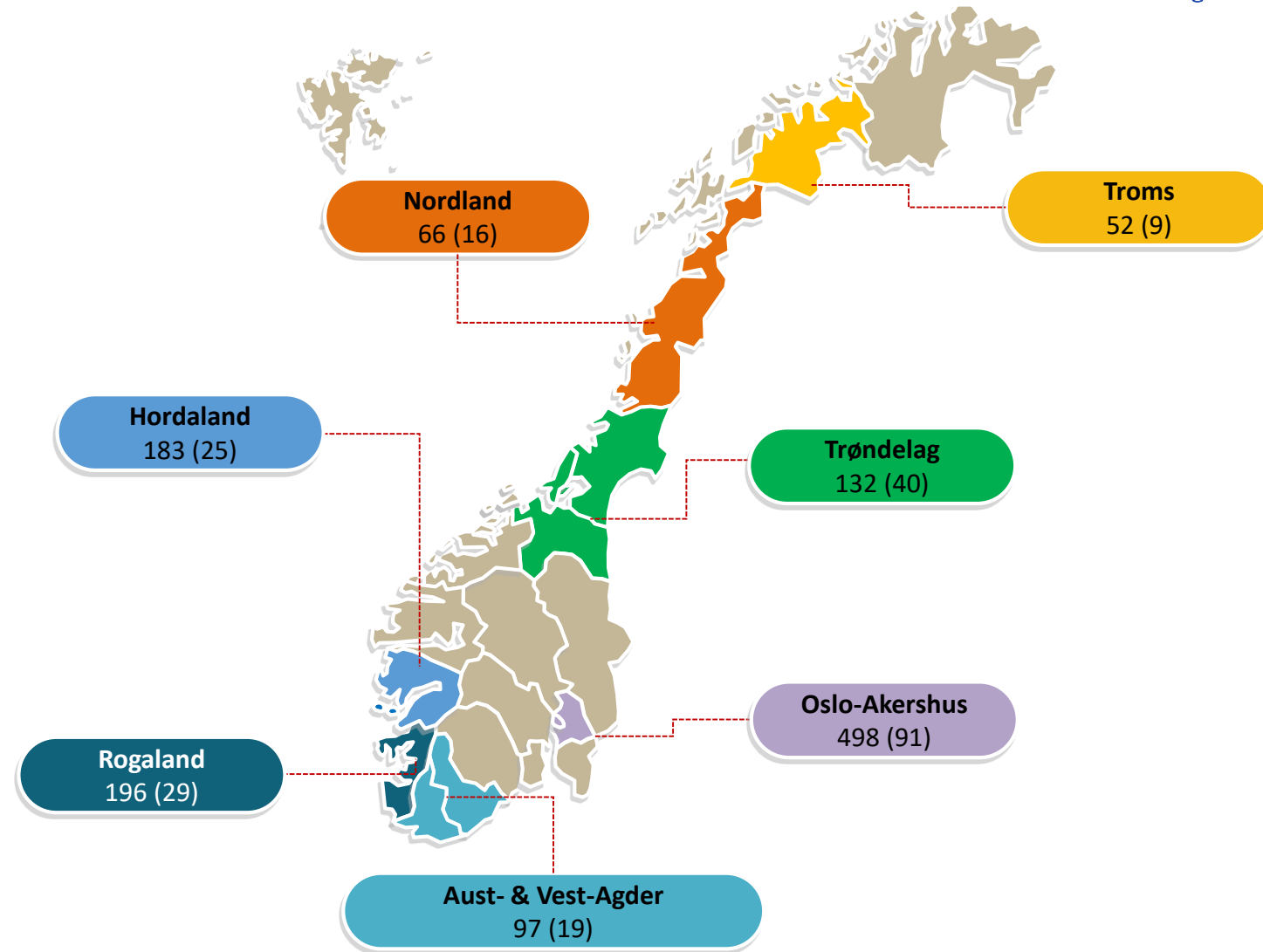
- PART I : Overview of university-industry collaborations in Norway
 - Data & Methodology
 - Results
- Discussion & Conclusion (Survey)
- PART II: Exploring how UICs start, and unfold through case studies
 - Data & Methodology
 - Results
- Discussion & Conclusion (Case studies)
- PART III: Overall Discussion & Conclusion: Linking the case studies to the survey
- Food for Thought

Part I: University-Industry Collaboration (UIC)

- Potentially ideal, practically difficult
 - The least preferred partners for businesses (Fitjar&Rodriguez-Pose, 2017)
- A variety of channels: Joint research projects, co-publications, graduate recruitment, spin-offs, consultancy, etc.,
 - Focus on 'the tip of the iceberg' (Norn, 2016)
- Large investments in firms' ability to acquire knowledge might be needed: R&D spending, university-trained employees (Drejer & Østergaard, 2017; Laursen & Salter, 2004).
 - SMEs, firms sectors traditionally not linked to university research, UIC less likely (Pavitt, 1984).
- Divergent institutional logics as the barriers
 - Differences in incentive mechanisms, motivations, time horizons, secrecy and heavy bureaucracy (Bruneel et al., 2010)
 - 'Two worlds' paradox (Hewitt-Dundas et al., 2019)

Context

- Telephone survey by IPSOS
 - December 2018
- 1,201 businesses in Norway
 - 9 counties (Akershus, Aust-Agder, Hordaland, Nordland, Oslo, Rogaland, Troms, Trøndelag and Vest-Agder)
 - 7 sectors
 - +5 employees
- Mainly targeted to account for university-industry collaborations



Data & Methodology

- UIC types

Research-oriented interactions

- Consultancy / Contract research
- Joint research projects

Education-oriented interactions

- Joint PhD supervision/Industrial PhDs
- Temporary staff exchanges for research purposes
- Training of firm staff/employees
- Student internships/apprenticeships
- Student projects (Bachelor and Masters level)
- Guest lecturing at universities
- Recruitment of graduates based on a contract/referral
- Co-development and co-delivery of curriculum (courses, modules, study programmes)

Commercialization

- Purchase of university patent, license or other IPR
- Use of universities' facilities, laboratories, equipment etc.
- Creation/funding of Research Centers / Incubation centers / Research, Science and Technology Parks
- Creation of new ventures/firms (Spin-offs, start-ups)

Informal interactions

- Informal consultations

Other interactions

- Sponsorship, scholarships, fellowships provided to university
- Joint organization of events (seminars, conferences)
- Other interactions

Dark Side – No Collaborators

- Barriers / reasons for not collaborating

	Rogaland	Agder	Oslo& Akershus	Hordaland	Trøndelag	Troms	Nordland	Whole Norway	W/O Rogaland
We do not have any need to interact with universities.	3.68	3.78	3.58	3.84	3.33	3.88	3.54	3.64	3.63
We do not have any capacity to interact with universities.	3.42	3.58	3.22	3.52	3.14	2.85	3.18	3.30	3.27
We do not know how to contact universities.	2.88	2.58	2.55	2.69	2.74	2.24	2.71	2.64	2.59
We do not know how universities can help us.	3.73	3.68	3.52	3.47	3.37	3.48	3.86	3.56	3.53
We do not believe that universities have the competence to respond to our needs.	2.28	2.17	2.33	2.34	1.79	2.13	2.24	2.25	2.24
We lack funding/financial resources to interact with universities.	2.90	2.63	2.85	2.80	2.82	2.87	2.80	2.83	2.81
We find universities hard to interact with due to heavy bureaucracy.	2.79	2.73	2.88	2.95	2.90	3.52	3.00	2.90	2.92
We find universities hard to interact with due to different motivations, time horizons.	2.79	2.98	2.74	2.85	2.90	3.44	3.44	2.85	2.86
We are located far away from universities.	1.50	1.92	1.34	2.02	1.91	2.31	2.63	1.67	1.71

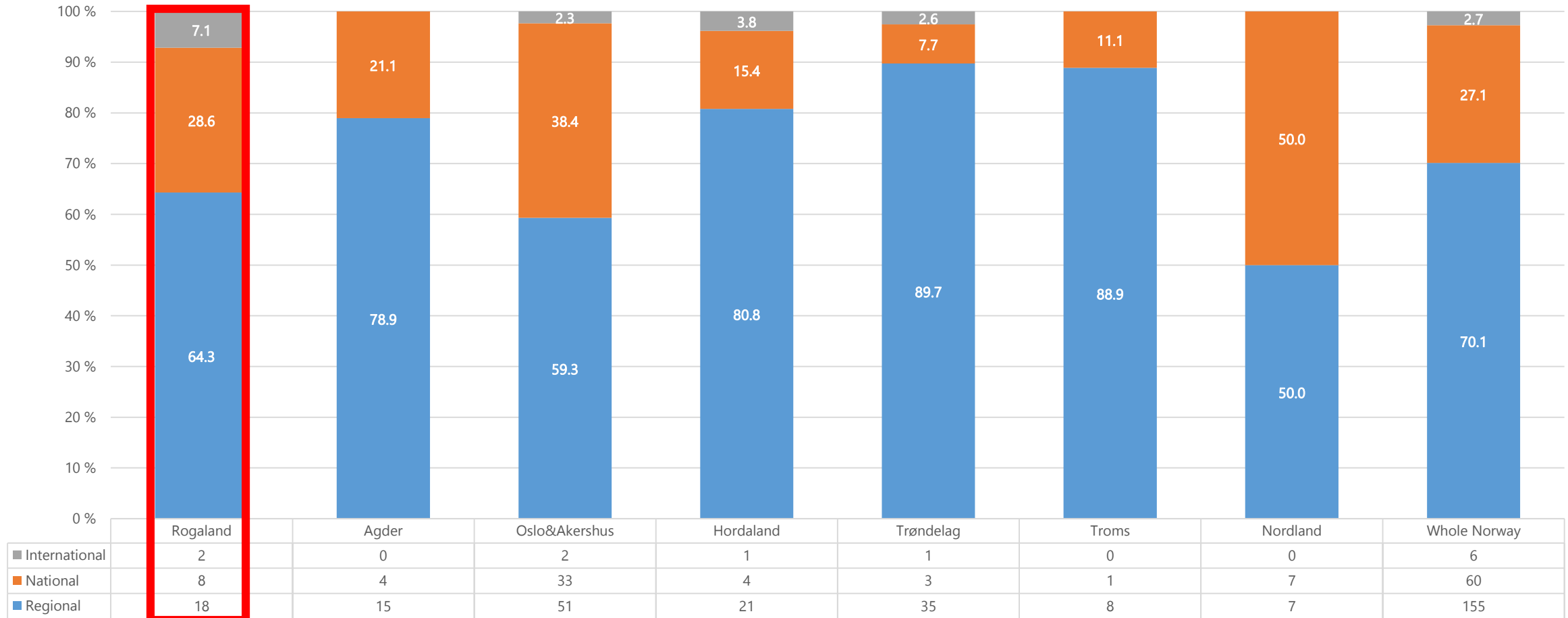
Bright Side – Collaborators

- Reasons for collaborating

	Rogaland	Agder	Oslo& Akershus	Hordaland	Trøndelag	Troms	Nordland	Whole Norway	W/O Rogaland
We want access to new knowledge.	4.21	4.21	3.91	3.57	4.33	4.22	3.88	4.01	3.99
We want to improve the skills of our employees/develop human resource capacities.	3.72	4.21	3.43	3.54	3.82	3.38	3.50	3.61	3.60
We want access to R&D facilities.	3.18	3.63	2.64	2.93	3.30	3.38	3.40	3.02	3.00
We want access to human resources (students and staff) at the university.	4.10	4.63	4.37	3.86	4.45	4.50	4.50	4.32	4.35
We want to obtain funding/financial resources.	2.25	2.39	2.36	2.61	2.73	2.50	3.00	2.50	2.53
We want to address societal challenges better.	3.68	3.95	3.97	3.71	4.05	4.44	4.38	3.96	4.00
We want to increase our image, prestige and reputation.	3.55	4.00	3.77	3.93	3.70	3.89	4.25	3.81	3.84

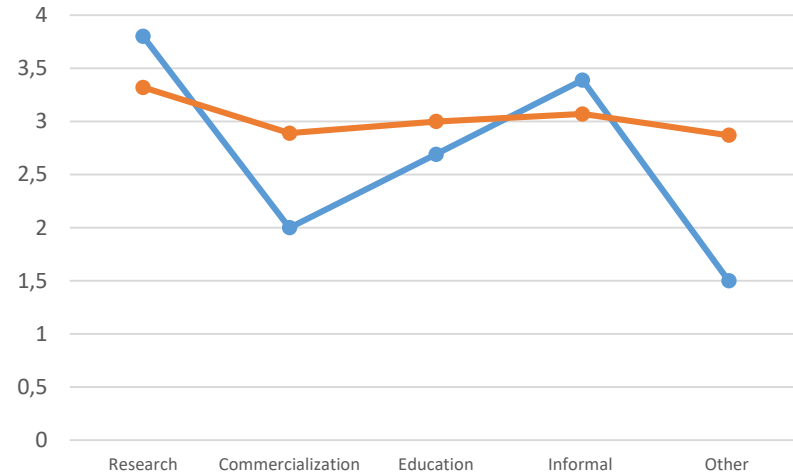
Main university partners: Who & Where?

- Distribution of main university partners by location

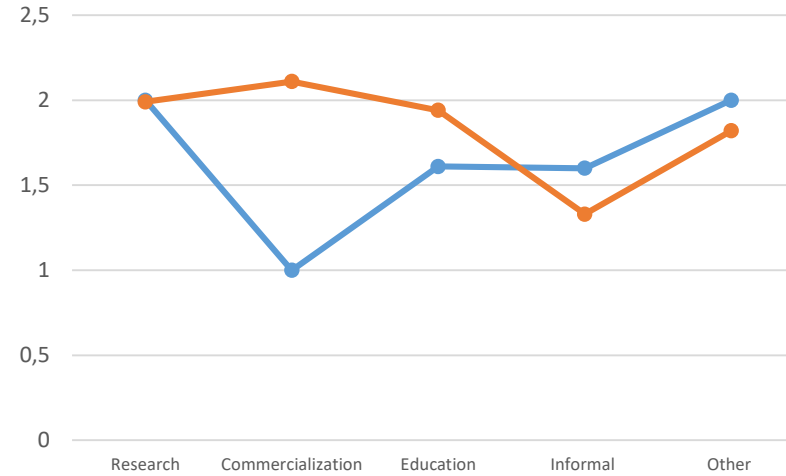


Main university partners: What drives collaborations?

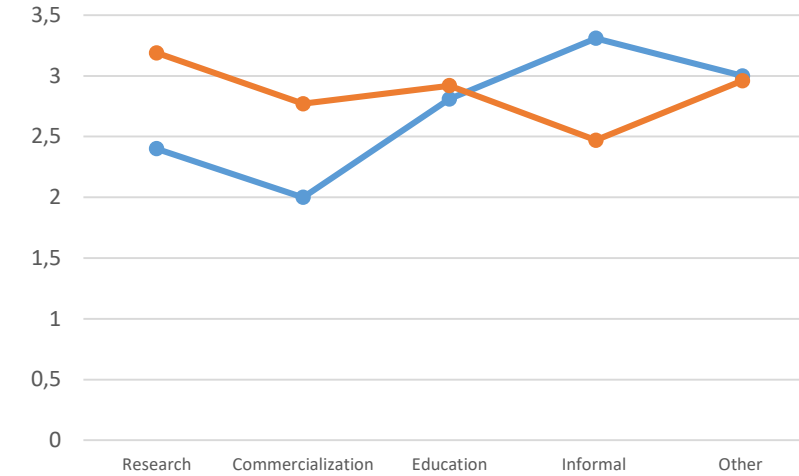
Cognitive Proximity



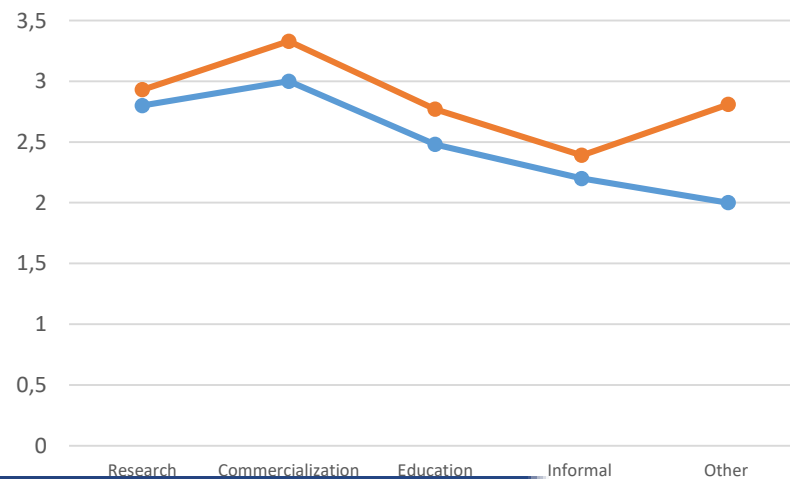
Organizational Proximity



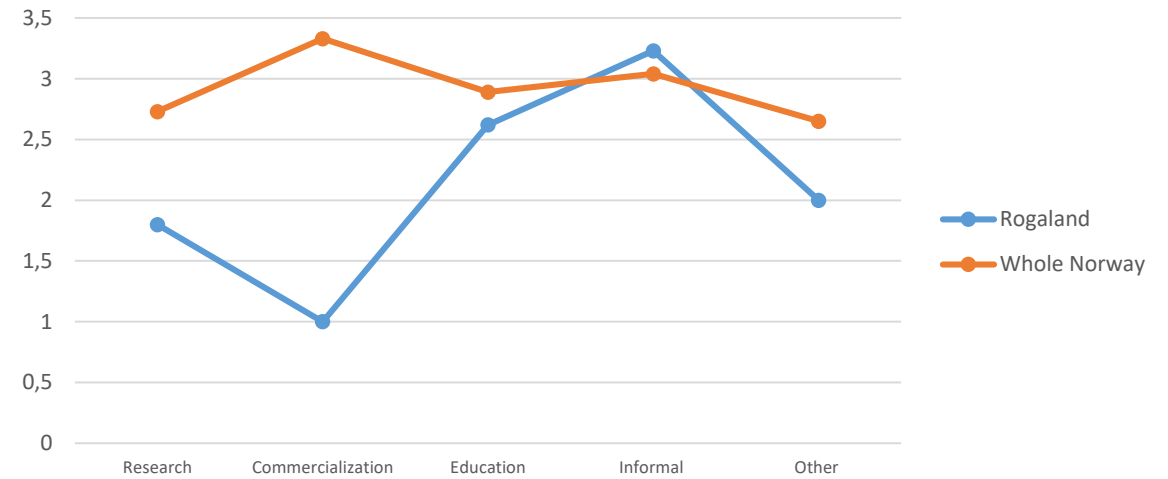
Institutional Proximity



Social Proximity



Geographical Proximity

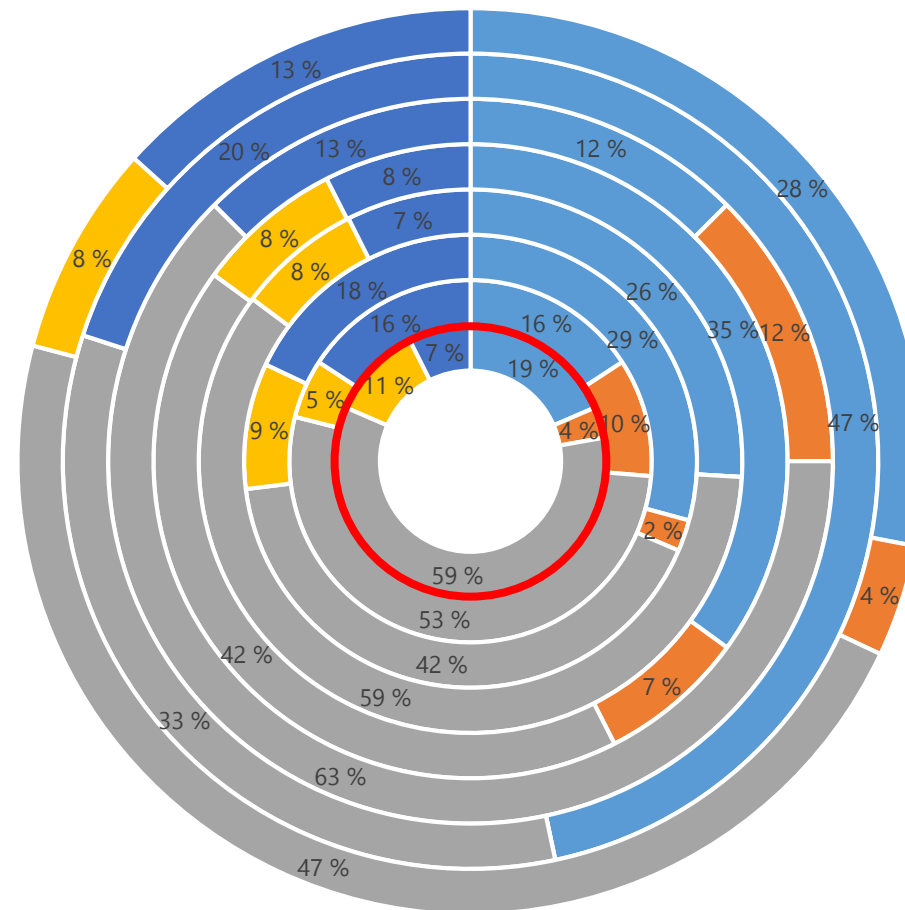


—●— Rogaland
—●— Whole Norway

Main collaboration channels

- Distribution of UIC types by regions

Total
Nordland
Troms
Trøndelag
Hordaland
Oslo-Akershus
Agder
Rogaland



- Research-oriented interactions
- Commercialization-oriented interactions
- Education-oriented interactions
- Informal interactions
- Other interactions

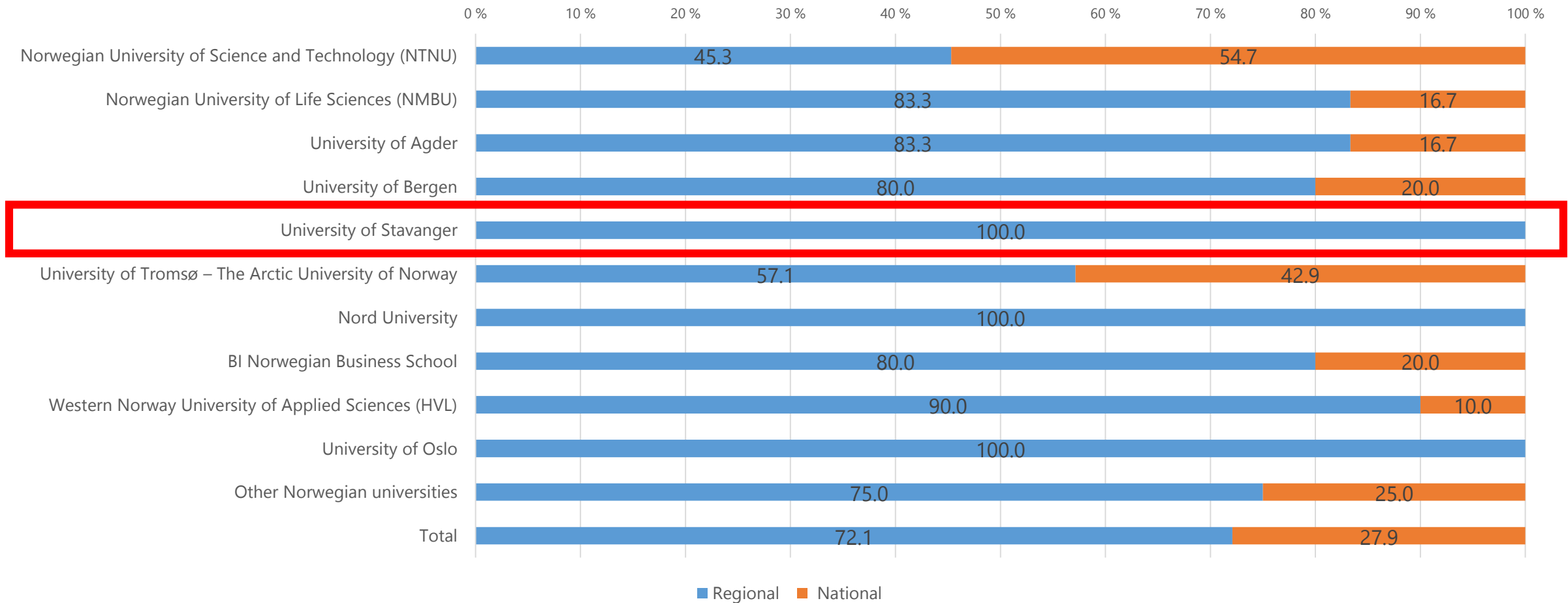
Collaboration outputs

- What do the collaborations deliver?

	Rogaland (37)	Agder (31)	Oslo&Akershus (136)	Hordaland (42)	Trøndelag (55)	Troms (14)	Nordland (21)	Whole Norway (336)
	%	%	%	%	%	%	%	%
Patents, licenses or other IPR	5.4	0.0	8.1	7.1	12.7	7.1	9.5	7.7
Joint publications	5.4	3.0	15.4	11.9	7.3	7.1	4.8	10.4
Spin-off / Start-up company	5.4	3.0	2.2	2.4	5.5	7.1	0.0	3.3
Recruitment of graduates/ transfer of university staff	16.2	15.2	22.8	26.2	23.6	21.4	28.6	22.2
Product innovation	32.4	18.2	14.7	26.2	25.5	7.1	4.8	19.2
Process innovation	5.4	21.2	9.6	4.8	7.3	21.4	14.3	10.1
Organizational innovation	5.4	6.1	5.1	4.8	5.5	0.0	9.5	5.3
Marketing innovation	10.8	12.1	8.8	9.5	5.5	7.1	9.5	8.9
Other	13.5	21.2	13.2	7.1	7.3	21.4	19.0	13.0

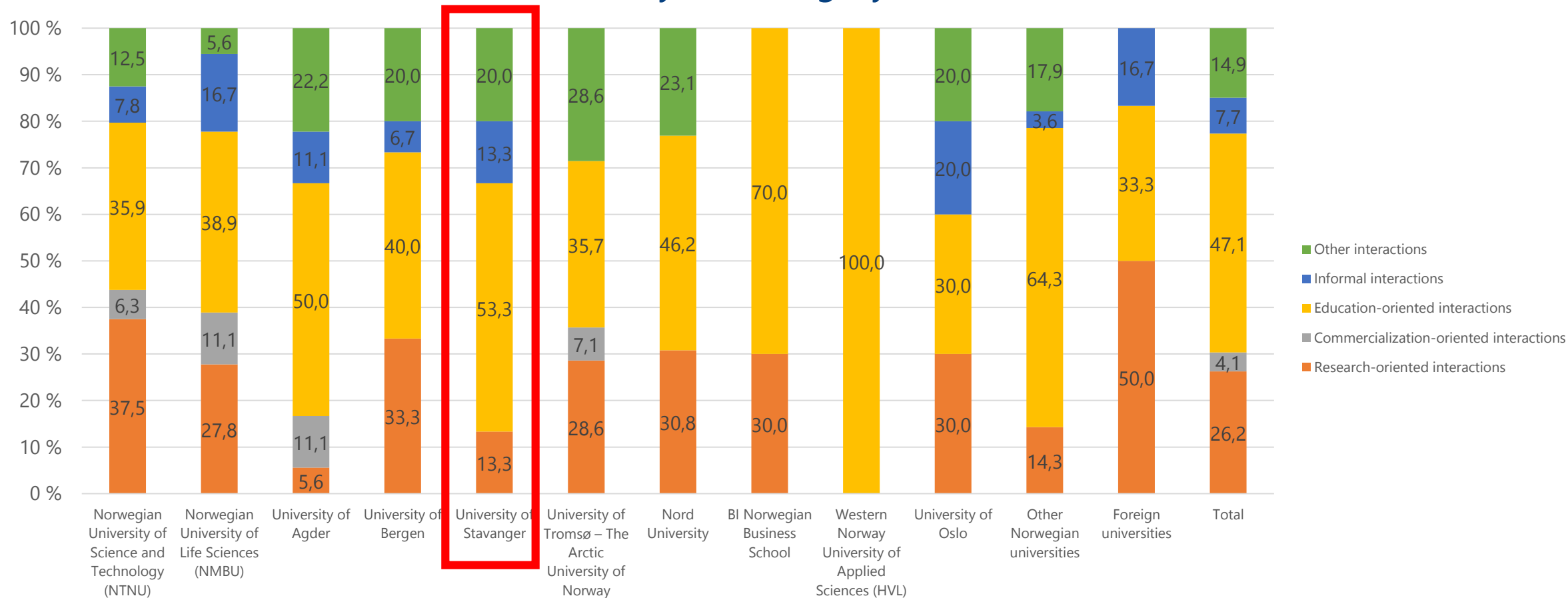
Collaborators of UiS

- Distribution of collaborations by universities per geographical scale



Collaborators of UiS

- The most interacted universities by UIC category



Discussion & Conclusion (Survey)

- UICs happen mostly in the local sphere, but differences among regions should be acknowledged (slide 7).
- UICs are not limited to measurable channels like patents, publications. Indeed, other mechanisms are more prevalent. (slides 9&10)
- Proximity acts as a facilitator but the effect/significance of dimensions varies and mostly depends on the type of UIC considered. (slide 8)

Part II: Data & Methodology (Case studies)

- Complementary to survey data: Case studies allow exploring how different factors facilitated start, and development of UICs. Making sense of quantitative data?
- Multiple case study involving 12 firms from non-metropolitan and metropolitan regions of Norway, Denmark and Portugal, involved in UICs.
 - Goal: Finding commonalities among non-metropolitan firms through cross-case comparisons. Metropolitan firms as contrast (Gilbert, 2005; Graebner & Eisenhardt, 2004).
 - Norway: 2 firms Rogaland (non-metropolitan region) collaborating with University of Stavanger (UiS), 1 firm Oslo metropolitan region collaborating with University of Bergen.
 - Denmark: 3 firms North Denmark, 2 Copenhagen metropolitan region.
 - Portugal: 2 firms Aveiro region, 1 Lisbon metropolitan region.
- Firms: SMEs (less than 250 employees at beginning of focal UIC), manufacturing, sectors not traditionally involved in UIC (Bogliacino & Pianta, 2016; Pavitt, 1984).
- UICs STEM departments. Collaborative research currently supporting innovation in the firms.
- Data sources: Semi-structured interviews, documents (press clippings, reports at firm website).

Context

- Inter-regional differences proportion workforce employed in medium and high technology sectors.
- Non-metropolitan regions specialised in sectors traditionally not linked to university research, e.g. machinery manufacturers Rogaland.
- Rogaland and other non-metro. Regions: Universities have oriented education and training activities to support regional firms' innovation (Alpaydin et al., 2018; Fonseca & Çinar, 2017; Guerrero & Evers, 2018).
- Development of University of Stavanger linked to key industries in the region, e.g. oil & gas. Similar to the other non-metropolitan universities/regions (ibid).

Table 1: Regional characteristics	Norway		Denmark		Portugal	
	Oslo metropolitan region	Rogaland	Copenhagen metropolitan region	North Denmark	Lisbon metropolitan region	Aveiro region
Population, 2018	1.287.495	473.525	1.822.659	589.148	2.833.679	363.095
Population density, 2017	252,5	53,5	745,4	76,2	1.006,2	221,5
Main university campuses	3	1	5	1	5	1
Inhabitants/Main university campus	429.165,0	473.525,0	364.531,8	589.148,0	566.735,8	363.095,0
Percentage of firms that collaborate with universities, 2014-2016 (all the country for Norway; 2012-2014 for the Danish regions due to data limitations)	20%		16,53%	20,41%	10,30%	10,30%
Percentage of the 25-64 age group with tertiary education, average 2007-17	50,41%	35,63%	45,60%	28,21%	26,44%	16,56%
Percentage of the 25-64 age group with tertiary education, change 2007-17	7,90%	7,60%	9,30%	8,20%	12,10%	10,70%
Employment in medium and high-technology manufacturing, and in knowledge-intensive services as a percentage of the workforce, 2017 (score from the Regional Innovation Scoreboard 2019)	143,79	93,61	141,05	79,93	105,47	51,65

Results: Origins of UICs

- Case firms in Rogaland approached UiS, looking for solutions to customer needs.
 - *University researcher, firm NO1: "So [former CTO] contacted me [in 2011] because [s]he wanted to have some understanding of the [product] mechanics, and their customers came up with questions. [...] Then I just mentioned [...] I have a semester project within a couple of months".*
 - *Manager 1, firm NO2: "A customer asked if we had a solution... if it's possible to do something with the [pipeline] pressure". / Manager 2, firm NO2: "I didn't have the background [...] I was googling and [UiS researcher] came up".*
- Other non-metropolitan regions: Case firms approached by university researchers/management.
 - *Manager, firm DK1: So the [Aalborg University] consultant's job was to do some development, but not research collaborations as industrial PhD. [...] It was [him/her] who approached the company".*
 - *Manager, firm PT1: "In 2009 I was at the first session on university-industry collaboration, ok? This was promoted by the Portuguese SME Institute and the University of Aveiro, where we got to know the University of Aveiro and its technology transfer office".*
- Metropolitan case firms: Diverse starting points, some involving collaborative research.

Results: Development of UICs

- Case firms Rogaland: Turning university links with UiS into full-fledged collaborative research, to compete and develop products in an international market.
 - *Manager 1, firm NO1: "From my boss' part, when [s]he looked at it [the industrial PhD] for first time, I think he saw the opportunity to go in depth into the technical issues, because if we want to expand in the world, we need a stronger technical background".*
 - *Manager 2, firm NO2: "So what we are doing now is to show it in a theoretical model as well, because actually what comes from the University of Stavanger has credibility amongst all the operator companies [...] then we can get funding for a full-scale test".*
- Case firms other non-metropolitan regions, similar.
 - *Manager, firm DK1: "New regulations mean that customers have problems with the engines. So in that sense you can also say that the customers drive research. [...] So the biggest companies are [foreign MNC competitors]. [...] How can we be better than our competitors [...] research is a big strategic factor there".*
 - *Manager, firm PT2: "[The current project with the University of Aveiro] has brought many ideas that are being applied to the products [...] which puts us at the level of the great European producers".*
- Competing internationally is also a motivation for metropolitan case firms.

Results: Development of UICs (II)

- Case firms Rogaland: Public funding has contributed to the transition to collaborative research, with schemes such as industrial PhDs; projects less ambitious in its absence.
 - *Manager 1, firm NO1: "So I got the contact of RNO1 at the time I started, so I went out at the university. [...] Two years ago my boss came to me... I think [s]he had a meeting at Innovation Norway and [s]he learned it was possible to do an industrial PhD".*
 - *Manager 1, firm NO2: "If we have had bigger frames in economics I think that we would have run the project in a totally different way".*
- Case firms other non-metropolitan regions, similar.
 - *Manager, firm DK1: "So I think one year before I started the PhD [2014], I think in the Northern region, they have this meeting on research in the Northern area [...] In this meeting the CEO attended, and [s]he was definitely interested in the industrial PhD programme".*
 - *Manager, firm PT2: "I knew there were H2020 incentives to do small research projects [...] that could be materialised in one year, and we started there in December 2016, with the team we have now".*
- Metropolitan case firms: UICs can also start as publicly-funded.

Discussion & Conclusion (Case studies)

- Among Rogaland case firms, and other non-metropolitan case firms...
 - Satisfying customer needs, motivation for start of UICs (Hewitt-Dundas et al., 2019).
 - Being able to compete and develop products in international markets, motivation for unfolding of UICs (Fitjar & Rodríguez-Pose, 2011).
 - Access to public funding supports development of UICs into collaborative research (Mohnen & Hoareau, 2003; Segarra-Blasco & Arauzo-Carod, 2008).
- Note: Case studies not generalisable, per se. Subject to further research.

Part III: Overall Discussion & Conclusion

- In Rogaland, it is mostly firms that approach the university (slide A3). Reasons for UIC pointed out by Rogaland firms (slide 6): Access new knowledge; improving skills of employees; developing HR capacities; accessing R&D facilities.
 - Reasons related to satisfying customer needs (UIC start), competing internationally (UIC development).
- Lack of public funding, obstacle to UIC particularly relevant among Rogaland firms (slide 5).
 - Public funding contributes to develop UICs into full-fledged collaborative research projects, which can also involve industrial PhDs.
- Lack of: Capacity to interact with universities; knowledge on how to contact universities; knowledge on how universities can help the firm → Obstacles to Rogaland firms' UICs (slide 5).
 - Obstacles + common among SMEs (Laursen & Salter, 2004) and firms sectors usually not linked to university research (Pavitt, 1984). Case studies suggest how to promote UICs among them.
- University of Stavanger: Relatively high share of education-oriented UICs, relatively low share of research-oriented UICs (slide 12).
 - Case studies: research-oriented UICs, education-oriented UICs with high research efforts (industrial PhD).

Food for Thought

- How can
 - we increase the level of awareness of firms on the benefits of UICs?
 - we facilitate the communication between firms and UiS? (to make them understand each other's competences, capabilities)
 - we create the initial contact between firms and UiS?
 - we develop the education-oriented collaborations effectiveness?
 - we foster the research-oriented and commercial type of collaborations?
 - UiS attract the attention of firms from other regions?
 - UiS employ a more business-friendly, entrepreneurial mindset?
 - UiS attract the attention of SMEs or/and firms from sectors traditionally not linked to university research?



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THANK YOU FOR YOUR ATTENTION!

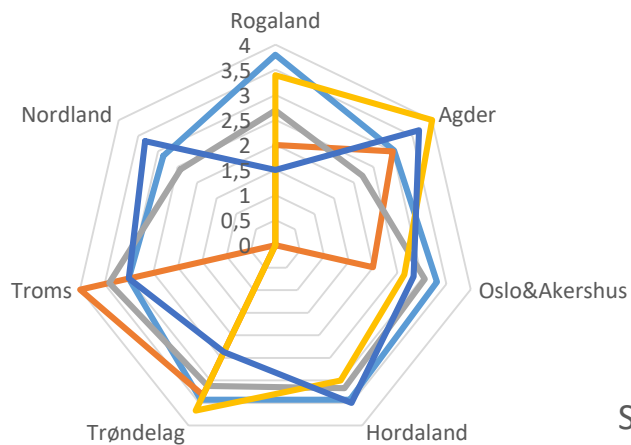
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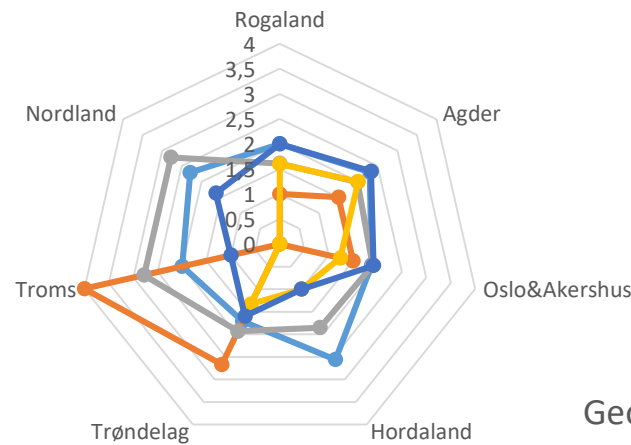
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Mean Proximity Values by UIC type per region

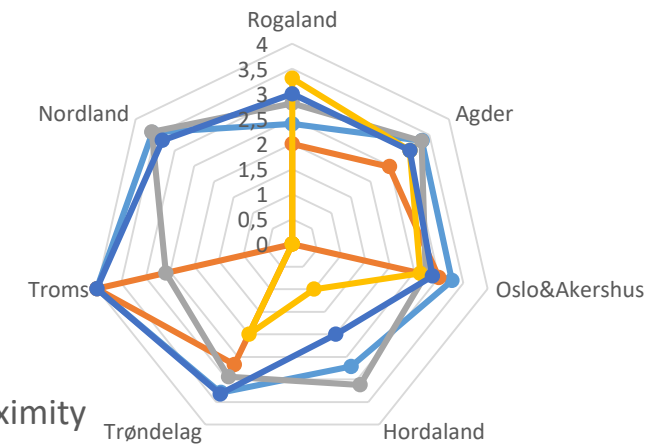
Cognitive Proximity



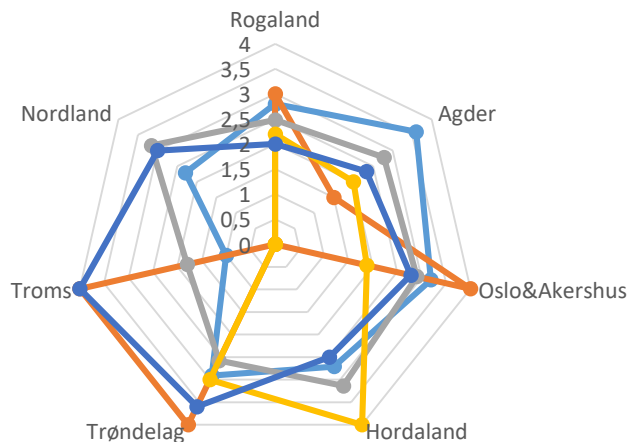
Organizational Proximity



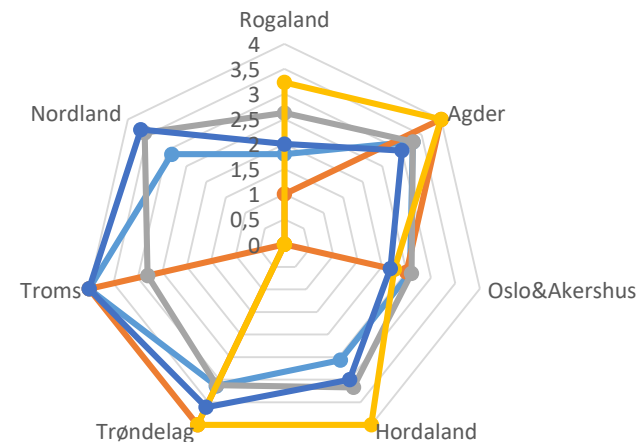
Institutional Proximity



Social Proximity

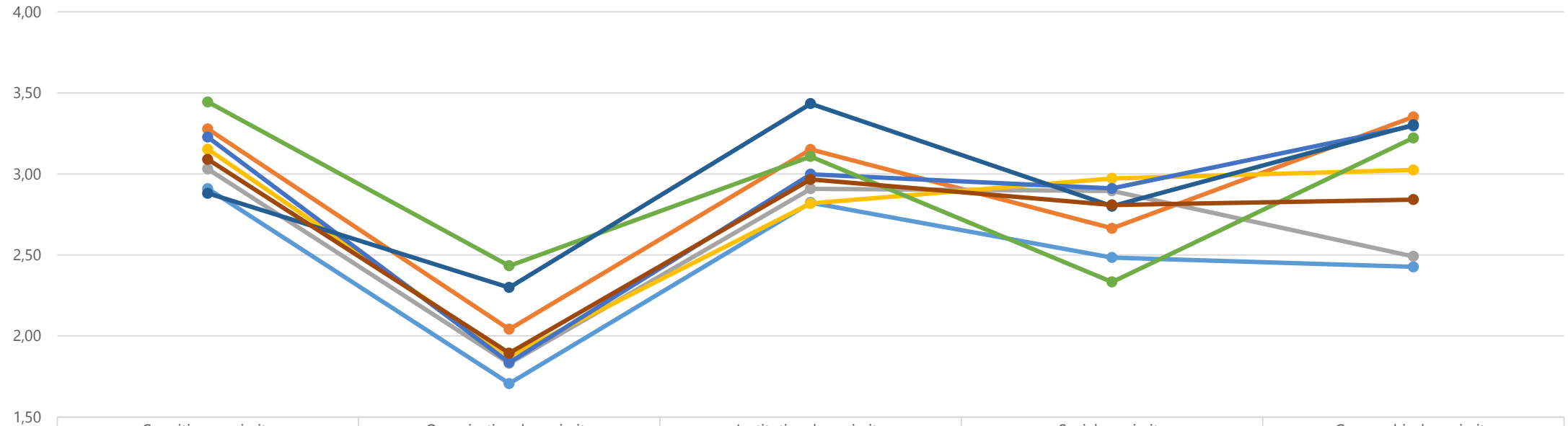


Geographical Proximity



Research-oriented interactions Commercialization-oriented interactions Education-oriented interactions Informal interactions Other interactions

Mean Proximity Values by UIC type per region



	Cognitive proximity	Organizational proximity	Institutional proximity	Social proximity	Geographical proximity
Rogaland	2,91	1,71	2,82	2,48	2,43
Agder	3,28	2,04	3,15	2,66	3,35
Oslo&Akershus	3,03	1,83	2,91	2,90	2,49
Vestlandet	3,15	1,87	2,82	2,97	3,02
Trøndelag	3,23	1,84	3,00	2,91	3,30
Troms	3,44	2,43	3,11	2,33	3,22
Nordland	2,88	2,30	3,43	2,80	3,30
Whole Norway	3,09	1,89	2,97	2,81	2,84

Who initiated the interaction?

A3

