



# **Evaluation of Mathematics, ICT and Technology (EVALMIT) 2023-2024**

**Self-assessment from the Entrepreneurship group,  
Section for Digitalization, Department of Informatics,  
University of Oslo.**

## **Self-assessment for research groups**

Date of dispatch: 19 September 2023

Deadline for submission: 31 January 2024

**Institution:** University of Oslo (UiO)

**Administrative unit:** Department of Informatics (IFI)

**Research group:** Entrepreneurship group (ENT)

**Date:** 29 January 2024

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# 1. Organisation and strategy

## 1.1 Research group's organisation

Describing the establishment and the development of the research group, including its leadership.

### ***Internal structure, personnel categories***

With a staff of more than 400, The UiO Department of Informatics (IFI) is a “powerhouse” for informatics training and research in Northern Europe. It is the largest such unit in Norway and the one with the strongest international rankings. Around a comprehensive core in computer science, IFI interprets informatics in substantial breadth: from microelectronics or signal processing, to participatory design or digital innovation. In 2023, IFI hosts five BSc and eight MSc study programmes, with close to 2500 students. The department is organized in four thematic sections, each of which comprising 2–5 research groups. Our group, the entrepreneurship (ENT) group, is a new research group at the section of digitalization (DIG). The group used to be the center for entrepreneurship with teaching, research and outreach obligations, but after the university decided to take the triple helix role more seriously, and prioritize innovation, the faculty of mathematics and natural sciences, together with the medical faculty, formed a separate unit to handle the overall innovation activities and incentive programs. From 2018, the educational and research activities were reorganized as a group within the department of informatics, and as such, we must be evaluated on those grounds.

The research group is the academic backbone of three independent study programs that were part of the merger, and consists of one university lecturer, two associate professors, and one professor (group manager), along with adjunct staff assisting in teaching the study programs, and one senior advisor/adjunct associate professor facilitating the practical activities, and who also teach. We find this to be an optimal way since the senior advisor is also a seasoned practitioner (see Table 1).

Moreover, the group currently has one postdoctoral researcher, and two PhD research fellows, and offer a STEM based MSc program in Entrepreneurship and Innovation Management (120 ECTS), and is also responsible for teaching the Gründerskolen diploma program (30 ECTS), and the Social Entrepreneurship diploma program (30 ECTS), but also contributes to the section's MSc program in Digital Economics and Leadership (120 ECTS). The unit also offer a STEM based PhD course, as well as a STEM based BSc course, to the various STEM departments at the university.

The MSc program in entrepreneurship and innovation management collaborates tightly with the industry, and works closely with Det Norske Veritas (DNV), Kahoot!, Møller Mobility Group, Norsk Gjenvinning, Orkla, TietoEvry, and the renowned StartUp Lab among others, whereas Gründerskolen (also known as the ‘Norwegian School of Entrepreneurship’) has a well-developed network abroad through the wide collaborative partnerships, at the administrative level.

Overall, the group members have diverse and unique educational backgrounds (scholars with PhDs from Massachusetts Institute of Technology (MIT), University of Cambridge, Stanford University, National University of Singapore, and University of Manchester) but we are fairly united in the entrepreneurial phenomena we address with diverse interests and research methodologies. The heterogeneity involved is an advantage, but it is also a challenge, and the group is socio-behaviourally well integrated, and highly productive along a set of dimensions ranging from teaching to research.

What is demanding, is the relatively strong orientation towards practice and relevance, in which we have found a very good balance between theory and practice in the study programs. Gründerskolen is a nationally renowned international study program abroad, partly funded by the Ministry of Education and Research to serve the country, and the master program has a high standing at the Norwegian Agency for Quality Assurance in Education (NOKUT) ranking of program quality.

Lastly, the unit serves as an attractive career trajectory for the employees. The unit has contributed significantly with members to form the industrial-related INTRANSIT research centre on digitalization and sustainability, and the unit delivers content to viable and important study programs within entrepreneurship and innovation management and not least digital economics and leadership.

**Table 1. List of number of personnel by categories**

|                                     | Position by category         | No. of researcher per category | Share of women per category (%) | No. of researchers who are part of multiple (other) research groups at the admin unit | No. of temporary positions |
|-------------------------------------|------------------------------|--------------------------------|---------------------------------|---------------------------------------------------------------------------------------|----------------------------|
| <b>No. of Personnel by position</b> | Senior Advisor               | 1 (code 1364)                  | 0%                              |                                                                                       |                            |
|                                     | Professor                    | 1 (code 1013)                  | 0%                              |                                                                                       |                            |
|                                     | Associate professors         | 2 (code 1011)                  | 50%                             |                                                                                       |                            |
|                                     | Assistant professors         | 1 (code 1009)                  | 0%                              |                                                                                       |                            |
|                                     | Doctoral fellows             | 2 (code 1017)                  | 100%                            |                                                                                       | 2                          |
|                                     | Postdoctoral fellows         | 1 (code 1352)                  | 0%                              |                                                                                       | 1                          |
|                                     | Adjunct associate professors | 5 (code 1011)                  | 20%                             | Teaching only (20%)                                                                   | 5                          |
|                                     | Adjunct senior lecturer      | 1 (code 1198)                  | 100%                            | Teaching only (20%)                                                                   | 1                          |
|                                     | Adjunct lecturer             | 3 (code 1009)                  | 67%                             | Teaching only (20%)                                                                   | 3                          |

## 1.2 Research group's strategy

a) Describing the research group's main goals, objectives and strategies to obtain these goals.

*The primary objective* of the research group has been to advance the field of entrepreneurship, as a body of evidence-based knowledge, by developing new concepts and novel theories. We start from the idea that the phenomenon of entrepreneurship cannot be fully explained by a single theory or fully investigated using a single approach. Developing a more comprehensive and deeper understanding of the phenomenon requires the adoption of epistemological pluralism. Not necessarily at the level of the individual researcher (that would be an unrealistic goal), but at the level of the group as a whole. The interplay between different perspectives and worldviews provides ample opportunities for new theory development. *An important secondary objective* has been to create a platform for internal and external collaboration and communication across different disciplines and intellectual traditions.

We are currently engaged with projects on entrepreneurship in the digital era; one project on board leadership, one on digital entrepreneurship and ethics, another one on creativity, design and AI, and one on design and entrepreneurship, including one on management and governance applying machine learning methods, and advanced econometrics methods. Our well-developed research networks are through members of the Academy of Management, the Entrepreneurship division, the EGOS Colloquiums, The BCERC (Babson) conferences, and the research school NORSI for early-stage faculty and PhDs, and well developed relational ties to 'significant others' secure very well collaborations and high-level outputs.

b) Describing the benchmark of the group

The **research** profile of the ENT group is defined as:

We aim is to improve our understanding of how individuals, teams, and organizations commercialize new products and services by drawing on multiple perspectives. The perspectives currently taken are entrepreneurship in the digital era, entrepreneurship as design, collaborative AI tools in extending human creativity in the fuzzy front end of innovation, digital transformations, entrepreneurial teams, venture boards, and governance, employing qualitative as well as advanced econometric methods, including machine learning methods applied to the entrepreneurship, management, and governance domains. This is best accomplished with three-four high-quality publications in a proper research outlet each year. The expectations here need to be **balanced** with the high expectations affiliated with our educational efforts.

The **educational** profile of the ENT group is defined as:

We aim is to prepare candidates to effectively contribute to, and lead, commercialization processes of new products and services through a practice-based educational experience. We do that by offering courses at the **Master**, BSc and PhD levels. The benchmark we have for this is to deliver high quality educational programs that scores high on the Norwegian Agency for Quality Assurance in Education's (NOKUT) ranking of program quality. We are currently in the upper 'dark green' (i.e. upper tier).

The **outreach** profile of the ENT group is: Higher visibility in the public arena. (see Table 6/7).

c) Describing the research group contribution to education.

The group delivers a STEM based MSc program in Entrepreneurship that takes time from our research. The average number of graduated candidates per year from the MSc program are 13 MSc candidates, and we have produced 3 PhDs the last three years, and we will have produced 2 more PhDs, the next two years. The research unit also delivers a PhD course, and a BSc course, both for the wider STEM community, and the unit, on average, supervises 2 PhDs.

The ENT group also delivers content to an entrepreneurship diploma program in entrepreneurship abroad, and typically have approx. 120 MSc internship students abroad each year including the Covid years. Normal production is 140 MSc internship students abroad. Typically, in San Francisco (Silicon Valley), Boston, Houston, Singapore, and Cape Town (The Social Entrepreneurship diploma program). Both these programs are resource intensive, and handled by a separate administrative unit at the department. For comparative reasons, the 30 ECTS diploma compare to 60 man-year equivalents, or 30 extra graduated master students in 120 ECTS study programs. These diploma students have coursework and internship in startups abroad, typically in STEM based firms which is popular, which facilitates not only entrepreneurial competence, but also international practical experience. There are great synergies between the courses in the MSc program, the diploma programs, and the other courses that the unit delivers at the department, and to the other STEM departments at the university. Although the unit does not have the benefits of 'scale', it has more the synergistic benefits of 'economy of scope'.

d) Describing the support the host institution provides to the research group.

The administration facilitates most activities with regard to recruiting and overall administration.

## 1.3 Relevance to the institutions

Describing the role of the research group within the organisation.

In UiO's 'Strategy 2030', we can read that "UiO will contribute to value creation and new jobs through innovation and entrepreneurship", and "UiO shall promote innovation and entrepreneurship". The ENT group contributes to the domain of entrepreneurship to the section, the department, the MN faculty, and the University at large, and to Norway as a society, by offering relevant courses and study programs, and by being in the forefront with regard to knowledge dissemination and its production.

As such, the group has contributed to develop the department's Strategic plan 2023-2026 on entrepreneurship, but also to the Strategic plan for 2014-2017 where it specifically stresses the support to, and the contribution from, the research and teaching group on entrepreneurship, and the Action plan for 2019-2021 has specifically highlighted the viability of entrepreneurship research and teaching.

The MSc program is taught in English. Approximately 50% of the students have an international background, which makes up a very good study composition. The ENT group also serves as the knowledge foundation of the national Gründerskolen and the Social Entrepreneurship program.

## 1.4 Research group's resources

Describing the funding portfolio of the research group the last five years.

The entrepreneurship group has historically been student orientated, and geared towards facilitating **internship practice** to MSc students, and for that we needed the collaboration with industry, nationally and globally. Gründerskolen facilitates yearly, on average, 120 internships abroad, and we do the same with our own master program students, and we have organized that collaboration as a project accelerator for collaborating firms, which serve as an **R&D practice arena** for our program MSc students. In many ways, the Gründerskolen program may be regarded as a junior executive entrepreneurship training program that has generated 50% of the unit's external funding, and the funding has been 50% of the total unit budget. Due to these practice activities, the group has historically been occupied with acquiring external program funding, not research funding, but we recently had one "Young talents" application at the Research Council that ended up receiving internal funding from the department (see Project 1 in Table 4). This project is led by associate professor Yangyang Zhao, with Joseph Makokha as a postdoctoral research fellow.

After the merger, we were encouraged to apply for more such funding. Associate professor Birthe Soppe, at the time affiliated with the ENT group, and with a leave to fill a two-year postdoctoral scholarship at Stanford University (serving together with Professor Walter Powel), joined in on an INTRANSIT application upon her return, and now currently co-lead the new research centre on sustainability and digital transformation. (See Project 3 in Table 4). Prior to forming the INTRANSIT centre, she served at the ENT research group supervising Matthew Good and Raissa Pershina for their PhDs. Soppe joined the INTRANSIT centre at TIK as an externally funded co-director, and with Raissa Pershina as an externally funded postdoc, both employed by the ENT group, but when Pershina accepted a job offer from the DIN group, she was appointed associate professor there. As such, the ENT research group serves as a major career trajectory for younger research scholars both within the section, but also outside its departmental borders. Birthe Soppe now has a full-time position at the University of Innsbruck, and Associate professor Glenn Roger Kristiansen filled the new vacant position. Soppe now also serves as an adjunct co-director at INTRANSIT.

**Table 2. Describing the sources of R&D funding for the research group in the period 2018-2022.**

| In 1000 NOK                                                                  | 2018<br>(kNOK) | 2019<br>(kNOK) | 2020<br>(kNOK) | 2021<br>(kNOK) | 2022<br>(kNOK) |
|------------------------------------------------------------------------------|----------------|----------------|----------------|----------------|----------------|
| <b>Basic funding</b>                                                         | 3317           | 2683           | 2734           | 2215           | 3228           |
| <b>Funding from industry and other private sector sources</b> (the D in R&D) |                |                | 750            | 450            | 450            |
| <b>Commissioned research for public sector</b>                               |                |                |                |                |                |
| <b>Research Council of Norway</b><br>(all directed towards INTRANSIT)        |                | 76             | 1393           | 2013           |                |
| <b>Grant funding from other national sources</b>                             |                |                |                |                |                |
| <b>International funding</b>                                                 |                |                |                |                |                |
| <b>Other</b>                                                                 |                |                |                |                |                |

The basic funding here is for research, but the overall internal funding we have for education equal this amount, and the external funding for educational programs abroad more than double that amount again. A significant portion of these funds were earmarked from the Ministry of Education and Research, in compensation for the costs Innovation Norway (funded by the Ministry of Industry) had for the foreign collaboration activities (organizing internship spaces abroad). However, it is unclear how much exactly this is now, as the collaborating universities abroad (e.g. University of California, at Berkeley, Boston University) now do most of these internship placements and the evening classes themselves. See also Project 2 in Table 4 for some more elaboration. Beyond that, as can be seen, most of the other available funds relate to the D in the firms' R&D which is practice-based (See Project 5 in Table 4), except for the external funds from the Norwegian Research Council, but they are *currently* deployed at the INTRANSIT center through the DIN group at the section. Before the year of 2022, they were deployed through the ENT group. See Project 3 in Table 4 for some more elaboration).

## 1.5 Research group's infrastructures

a) Describing which national infrastructures the research group manages or co-manages.

The entrepreneurship group does not have any physical infrastructures, but we have a nationally wide recruitment infrastructure for Gründerskolen, and a strong informal affiliation with research driven network for education and research, labelled NORSI, initially funded as a research school on innovation studies from the Research Council of Norway, but is currently receiving Nordic funding.

b) Describing the most important research infrastructures used by the group.

The most important research infrastructure for the ENT group is facilitated through the University library.

## 1.6 Research group's cooperations

Table 3. Reflect on the current interactions of the research group with other disciplines

|                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Interdisciplinary</b><br/>(Within and beyond the group)</p>                                                                                                                                                                                                                 | <p>The group has currently the following paper collaboration <u>within the ENT group</u>:</p> <p>Undheim, Leunbach &amp; Erikson<br/>Leunbach, Kristiansen &amp; Erikson<br/>Kristiansen, Makokha and Erikson<br/>Zhao and Makokha, plus a three-paper research project between Dyvik-Clark, Zhao and Erikson</p> <p>The group has currently the following paper collaboration <u>within the DIG section</u> (<b>bold</b> text marking the members of the group):</p> <p><b>Zhao</b> and Junge (from the RT group)<br/><b>Zhao</b> and Hong Li (from the DIN group)<br/><b>Makokha, Zhao</b> and Culèn (from the Design group)<br/><b>Undheim</b> and Pershina (from the DIN group)<br/><b>Kristiansen</b> and Hydle (from the DIN group)</p>                                                                                                               |
| <p><b>Collaboration with other research sectors</b></p>                                                                                                                                                                                                                           | <p>The group has currently the following <b>external</b> paper project collaborations:</p> <p><b>Undheim, Erikson</b> &amp; Timmermans (NHH, Norwegian School of Economics)<br/><b>Undheim</b>, Pershina (from the DIN group) &amp; Vulcan (Saïd Business School, at Oxford University)<br/><b>Erikson, Undheim</b> and Kubberød (NMBU, the Norwegian university of Life Sciences)</p> <p>An almost completed three-paper project where the first paper is published in Technovation as Erikson, Coleridge (Cambridge Judge Business School) &amp; Bjørnåli (NTNU Business School), (Publication 1 in Table 5), and the second is published in the Journal of High-Tech Management Research (a SAGE journal), then with Bjørnåli as the lead author. The third paper was given at the DRUID conference last summer, and is currently undergoing review.</p> |
| <p><u>Transdisciplinary</u><br/>(including non- academic stakeholders)<br/><i>Transdisciplinary research involves the integration of knowledge from different science disciplines and (non-academic) stakeholder communities to help address complex societal challenges.</i></p> | <p>The group has currently the following <b>external</b> collaboration with practice addressing both <u>industrial</u> and <u>societal</u> challenges where the focus is on the D in the R&amp;D:</p> <p>Orkla<br/>Kahoot!<br/>TietoEvry<br/>Det Norske Veritas (DNV)<br/>Møller Mobility Group<br/>Norsk Gjenvinning<br/>Start-Up Lab</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## 2. Research quality

### 2.1 Research group's scientific quality

Describing the profile of the group and the activities that contribute to the group's scientific quality.

The ENT group aims to improve our understanding of how individuals, teams, and organizations commercialize new products and services by drawing on multiple perspectives. The perspectives currently taken are entrepreneurship in the digital era, entrepreneurship as design, collaborative AI tools in extending human creativity in the fuzzy front end of innovation, digital transformations, entrepreneurial teams, venture boards, and governance, employing qualitative as well as advanced econometric methods, including machine learning methods applied to the entrepreneurship, management, and governance domains.

The group regularly contribute to international conferences on these topics, ranging from DRUID, EGOS, BCERC, EURAM, INCOSE, RENT to the Entrepreneurship division at the Academy of Management (AoM), and we publish on these topics in journals such as Technovation, Research Policy, Long Range Planning, Journal of Business Venturing, Journal of Technology Transfer, Scandinavian Journal of Management, Technological Forecasting and Social Change, amongst others. The PhD research fellows that the group supervise publishes in these journals, as well. The research group is well knit with competencies in design, machine learning, quantitative research methods, the behavioural sciences, and philosophy.

In the following, we present the outcomes of the various research efforts. Instead of presenting the papers chronologically, the group efforts are presented theme wise: As demonstrated, members of the research team have collaborated *within* the research group, *across* the section, and beyond, both nationally, and internationally, as exemplified (**bold** text marking the members of the ENT group):

**Leunbach, Daniel**; Mathisen, Marius Tuft; Johnson, Alan Richard & **Knockaert, Mirjam** (2017). Signaling Through Insider Ownership: Interaction and Time Effects in Technology Acquisitions. *Academy of Management Proceedings*. ISSN 0065-0668. doi: 10.5465/AMBPP.2017.203.  
Bjørnåli, Ekaterina S.; **Knockaert, Mirjam**; Foss, Nicolai; **Leunbach, Daniel & Erikson, Truls** (2017). Unraveling the Black Box of New Venture Team Processes, *The Wiley Handbook of Entrepreneurship*. Wiley-Blackwell. ISSN 978-1-118-97083-6. pp. 313–348. doi: 10.1002/9781118970812.ch15

These are select research activities before the entrepreneurship centre's research and educational activities merged with the Department of Informatics involving Daniel Leunbach, Mirjam Knockaert, Mari Svalastog, and Truls Erikson. Birthe Soppe, Mirjam Knockaert and Matthew Good embarked on a **Technology transfer research project** that resulted in the following topic related publications:

**Good, Matthew; Knockaert, Mirjam; Soppe, Birthe & Wright, Mike** (2018). The technology transfer ecosystem in academia. An organizational design perspective. *Technovation*. ISSN 0166-4972.  
**Good, Matthew; Knockaert, Mirjam & Soppe, Birthe** (2019). A typology of technology transfer ecosystems: how structure affects interactions at the science–market divide. *Journal of Technology Transfer*. ISSN 0892-9912. pp. 1–27. doi: 10.1007/s10961-019-09745-w.  
**Pershina, Raissa; Soppe, Birthe & Good, Matthew** (2018). Friend or Foe? The adoption of Big Data in the creative industries. *Academy of Management Global Proceedings*. ISSN 2638-4892. Surrey: <https://journals.aom.org/doi/abs/10.5465/amgbproc.surrey.2018.0112.abs>

Prior to that, Truls Erikson, Mirjam Knockaert and Maw Der conducted a three-paper project on **young aspiring scientists**, as part of the triple helix debate those days, and the project surveyed all the STEM PhDs and Postdocs at UiO (in 9 STEM departments), and published the following pieces:

**Erikson, Truls; Knockaert, Mirjam** and Maw Der Foo. (2015) "Enterprising scientists: The shaping role of norms, experience and scientific productivity". *Technological Forecasting and Social Change*. ISSN 0040-1625. 99, pp. 211–221. doi: [10.1016/j.techfore.2015.06.022](https://doi.org/10.1016/j.techfore.2015.06.022).

**Knockaert, M., Foo, M.D., Erikson, T., Cools, E.** 2015. Growth intentions among research scientists: A cognitive style perspective. *Technovation*, 38, 64–74. doi.org/10.1016/j.technovation.2014.12.001

Foo, Maw Der; Knockaert, Mirjam; Chan, Elsa & **Erikson, Truls** (2016). The Individual Environment Nexus: Impact of Promotion Focus and the Environment on Academic Scientists' Entrepreneurial Intentions. *IEEE Transactions on Engineering Management*. ISSN 0018-9391. 63(2), pp. 213–222. doi: 10.1109/TEM.2016.2535296.

The above project on enterprising scientists was conducted while a more industry-configured study was conducted. That industry-related study addressed high-tech startups, not only spin-offs from the universities (those aforementioned enterprising scientists), but also from the industry. The following publications were written on that project: The first piece in the Norwegian language was published with Erikson as the lead author in Magma (2011), and as co-author on the remaining two in the following journals, where the latter one was also included in the Academy of Management's Proceedings:

**Knockaert, Mirjam; Bjørnåli, Ekaterina S. & Erikson, Truls** (2015). Joining forces: Top Management Team and Board Chair Characteristics as Antecedents of Board Service Involvement. *Journal of Business Venturing*. ISSN 0883-9026. 30(3), s. 420–435. doi: 10.1016/j.jbusvent.2014.05.001.

Bjørnåli, Ekaterina S.; **Knockaert, Mirjam & Erikson, Truls** (2016). The Impact of Top Management Team Characteristics and Board Service Involvement on Team Effectiveness in High-Tech Start-Ups. *Long Range Planning*. ISSN 0024-6301. 49(4), s. 447–463. doi: 10.1016/j.lrp.2015.12.014.

The following paper projects address **university pedagogy topics** in an entrepreneurial setting:

**Erikson, Truls; Svalastog, Mari & Leunbach, Daniel** (2014). Global start-up internships as a source of experiential learning. In Fayolle, Alain & Redford, Dana T. (Red.), *Handbook on the Entrepreneurial University*. Edward Elgar Publication. <https://www.e-elgar.com/shop/gbp/handbook-on-the-entrepreneurial-university-9781781007013.html>

Lahn, Leif Christian & **Erikson, Truls** (2016). Entrepreneurship education by design. *Education + Training*. ISSN 0040-0912. 58(7-8), pp. 684–699. doi: 10.1108/ET-03-2016-0051.

Kubberød, Elin; Pettersen, Inger Beate; **Erikson, Truls & Lahn, Leif Christian** (2018). Progresjon og kvalitet i høyere entreprenørskapsutdanning. [Progression and quality in higher entrepreneurship education]. Special Issue, *UNIPED*. ISSN 1500-4538. 41(1), s. 5–9. doi: 10.18261/issn.1893-8981-2018-01-01.

The one published in Education + Training was a pilot on a new pedagogy at the master's level, employing pedagogical insights from Lev Vygotsky, and the latter one, an editorial in the national university pedagogic journal addressing the progression and the quality of entrepreneurship education at the master's level. These initiatives were initially part of our response to a call for **Centre of Excellence in Education** status and funding, where we reached the competitive 'grand finale'.

Yangyang Zhao has published research with tailor-made methods, catalysing innovation in existing businesses, through collaboration with industries, such as healthcare, oil and gas, and the maritime sector. The papers contribute to the ongoing conversations on digital transformation in business processes and the important role of human-centered design in such transformations.

**Zhao, Yangyang**, and Jensen, H. (2022) "Towards a Modern Learning Organization: Human-Centered Digitalization of Lessons Learned Management for Complex Systems Development Projects", *Technologies*. Vol. 10, No. 6, 117.

**Zhao, Y.Y.** and Craig, T. (2022) "Capitalizing on Empathic Actions: Design Principles of Digitally Transforming Business Processes", in *Empathy and Business Transformation*. Routledge.

Wiulsrød, S., **Zhao, Y.Y.** and Muller, G. (2022) "Applying A3AO to facilitate future working processes in the Oil and Gas Industry", *INCOSE International Symposium*. Vol. 32, No. 1, pp. 36-50.

Vatle, T. S. **Zhao, Y.Y.** and Falk, K. (2022) "Evaluating the Effectiveness of a Digital Engineering Tool in a Project Engineering Company", *INCOSE International Symposium*. Vol. 32, No. 1, pp. 328-342.

Craig, T. and **Zhao, Y.Y.** (2021) "Organizational Redesign Through Digital Transformation: A Case Study in the Life Science Industry", *INCOSE International Symposium*. Vol. 31, No.1, pp. 1229-1240.

**Zhao, Y.Y.** (2019) "Transforming Systems Engineering Design for Accelerated Industrial Innovation", in *Managing Complexity and Creating Innovation through Design*. Routledge.

Johanssen, M. and **Zhao, Y.Y.** (2019) "An A3AOs Method of Software Tools Integration in the Complex System Development", *INCOSE International Symposium*. Vol. 29, No. 1, pp. 1003-1017.

Kløcker, S. T. and **Zhao, Y.Y.** (2019) "Optimizing the Requirement Engineering Process: A Case Study of I/O List Management in Integrated Automation Systems", *INCOSE International Symposium*. Vol. 29, No. 1, pp. 233-247.

Moraga, M. and **Zhao, Y.Y.** (2018) "Reverse engineering a legacy software in a complex system: A systems engineering approach", *INCOSE International Symposium*. Vol. 28, No. 1, pp. 1250-1264.

Birthe Soppe and Raissa Pershina have completed a research project where the goal was to increase our knowledge of how entrepreneurial firms create digital innovation at the intersection of digital and analog fields and to contribute to the ongoing conversation on digital shifts that transform industries and society at large which resulted in the following publications:

**Pershina, Raissa & Soppe, Birthe** (2017). Let the Games Begin: Institutional Complexity and the Design of New Products. In Höllerer, Markus; Daudigeos, Thibault & Jancsary, Dennis (Red.), *Multimodality, Meaning, and Institutions*. Emerald Group Publishing, pp. 219–254. <https://www.emerald.com/insight/publication/doi/10.1108/S0733-558X201754A>

**Soppe, Birthe & Pershina, Raissa** (2019). Melting icebergs vs. spectacularization: Storytelling of conflicting institutional demands in wildlife documentaries. Research in the Sociology of Organizations. In Haack, Patrick; Sieweke, Jost & Wessel, Lauri (Red.), *Microfoundations of Institutions*. Emerald Group Publishing. ISSN 978-1-78769-128-5. pp. 85–106. doi: 10.1108/S0733-558X2019000065B007.

**Pershina, Raissa; Soppe, Birthe & Thune, Taran Mari** (2019). Bridging analog and digital expertise: Cross-domain collaboration and boundary-spanning tools in the creation of digital innovation. *Research Policy*. ISSN 0048-7333. 48(9), pp. 1–13. doi: 10.1016/j.respol.2019.103819.

**Pershina, Raissa & Soppe, Birthe** (2020). Alone or in Concert? Creative Entrepreneurs and the Role of Multiple Institutional Logics in Crowdfunding Pitches. In Strandgaard Pedersen, Jesper; Slavich, Barbara & Khaire, Mukti (Red.), *Technology and Creativity. Production, Mediation and Evaluation in the Digital Age*. Palgrave Macmillan. ISSN 978-3-030-17565-8. pp. 147–180. doi: 10.1007/978-3-030-17566-5\_7.

Last, but not least, Dennis Gan, Steffen Korsgaard, Truls Erikson and affiliated colleagues looked into the overall challenges of growth, addressing venture governance of not only high-tech firms, but also regular start-ups in the country, which have so far resulted in the following publications:

**Erikson, Truls;** Coleridge, Chris & Bjørnåli, Ekaterina S. (2022). Venture governance and its dynamics: Intraboard relationships and CEO duality. *Technovation*. ISSN 0166-4972. 115. doi: 10.1016/j.technovation.2022.102540.

**Gan, Dennis & Korsgaard, Steffen** (2022). When courtships fail: The antecedents of failure in strategic alliances between startups and incumbents. *International Journal of Entrepreneurship and Innovation*. ISSN 1465-7503. doi: 10.1177/14657503221128015.

**Gan, Dennis & Erikson, Truls** (2022). Venture governance as a syndicate. *Journal of Business Venturing Insights*. ISSN 2352-6734. 18. doi: 10.1016/j.jbvi.2022.e00330.

**Gan, Dennis & Erikson, Truls** (2022). Venture governance: CEO duality and new venture performance. *Journal of Business Venturing Insights*. ISSN 2352-6734. 17. doi: 10.1016/j.jbvi.2022.e00304.

The above publications show the various research themes during the period of 2012-2022, and as such, visualize the historic research development of the research group, and illustrate the collaborative culture and the underlying affiliated activities that contribute to the group's scientific production. The above publications also show how the group's work contributes to the wider research domain not only nationally, but also internationally. Glenn Roger Kristiansen is the latest addition to the group, and he has just started on his research trajectory and collaborate with dScience on machine learning themes.

In total, in the 2012-2022 period, the unit has produced 24 NVI level 1 articles, and ten NVI level 2 articles, and eight NVI level 1 chapters, and three NVI level 2 chapters within the domain of technology entrepreneurship and innovation. In other words, 45 unique publications from various research projects. Since the merger with the Department of Informatics, the projects have been geared more towards the digital domains, and not least towards digital transformation, whereas it was more geared towards technology entrepreneurship prior to the merger.

The link to the ENT group's website, and statistics:

The link to all the CRISTIN publication data can be accessed here:  
<https://www.mn.uio.no/ifi/english/about/strategy/evalmit/ent.html>

The public webpage presenting the ENT group:  
<https://www.mn.uio.no/ifi/english/research/groups/ent/>

**Table 4. List of projects**

|                                                                                                                                                                                                       |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Project 1:</b><br><br><i>Project title:</i><br>"Redesigning the Pivot to Entrepreneurial Competency in the Digital Era: A Pan-disciplinary Paradigm Approach"<br><i>Project period: 2022-2026.</i> | <b>Project owner(s)</b>                                   | Department of Informatics, Strategic Young Talent Project, led by Yangyang Zhao and Joseph Makokha.                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                                                       | <b>Total budget and share allocated to research group</b> | Total project of 4 MNOK, with approx. 3 MNOK to the research group for research                                                                                                                                                                                                                                                                                                                        |
|                                                                                                                                                                                                       | <b>Objectives and outcomes and link to website</b>        | The research objective is to <i>uncover the mechanisms by which humans interact in a basic social system to innovate more efficaciously in the digitalized environment, and the methodology for discovering common principles underlying those mechanisms. The research outcomes are to publish in the high-quality journals in the broader field of management in considering the digitalization.</i> |
| <b>Project 2:</b><br><br><i>Project title:</i><br>"Gründerskolen"<br><i>Project period: 1999-ongoing</i>                                                                                              | <b>Project owner(s)</b>                                   | Department of Informatics                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                                                                                                                                                       | <b>Total budget and share allocated to research group</b> | The Gründerskolen diploma program is partially funded by the Ministry of Education, but more than 75MNOK has been in the form of external funding during the evaluation period of 2012-2022 for all the arrangements abroad.                                                                                                                                                                           |
|                                                                                                                                                                                                       | <b>Objectives and outcomes and link to website</b>        | The Gründerskolen diploma program is an internship and training program abroad:<br><a href="https://www.uio.no/studier/program/grunderskolen/">https://www.uio.no/studier/program/grunderskolen/</a>                                                                                                                                                                                                   |

|                                                                                                                                          |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Project 3:</b><br><br><i>Project title: INTRANSIT,<br/>Project period: 2019-2022<br/>(within the ENT group).</i>                      | <b>Project owner(s)</b>                                   | TIK - Centre for Technology, Innovation and Culture, UiO. The eight-year funded INTRANSIT centre jointly led by Taran Thune (TIK), and Birthe Soppe (previously ENT, but now Digital Innovation group (DIN) at the DIG Section at the Department of Informatics).                                                                                                                                                                                                                                                                                              |
|                                                                                                                                          | <b>Total budget and share allocated to research group</b> | Approx 9 MNOK of which 3,5 MNOK externally funded by the Research Council of Norway.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                                                                                          | <b>Objectives and outcomes and link to website</b>        | The Centre for the study of innovation policy for industrial transformation, sustainability and digitalization (INTRANSIT) focuses on understanding how the Norwegian economy can be made smarter and more sustainable through industrial transformation.<br><a href="https://www.sv.uio.no/tik/english/research/centre/intransit/">https://www.sv.uio.no/tik/english/research/centre/intransit/</a>                                                                                                                                                           |
| <b>Project 4:</b><br><br><i>Project title:<br/>Entrepreneurial governance<br/>in new high-tech firms.<br/>Project period (2019-2024)</i> | <b>Project owner(s)</b>                                   | Department of Informatics, collaboration project with Judge Business School, Cambridge University, & NTNU Business School, The Norwegian University of Science and Technology.                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                                                          | <b>Total budget and share allocated to research group</b> | Internally funded with extra sabbatical means from the MN Faculty (approx. 1 MNOK)                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                                                                                                          | <b>Objectives and outcomes and link to website</b>        | This is a three-paper project in collaboration with Cambridge Judge Business School.<br><a href="https://www.jbs.cam.ac.uk/2023/tech-startups-ceos-and-board-chairs/">https://www.jbs.cam.ac.uk/2023/tech-startups-ceos-and-board-chairs/</a>                                                                                                                                                                                                                                                                                                                  |
| <b>Project 5:</b><br><br><i>Project title:<br/>Industry collaboration<br/>Project period (2019-ongoing)</i>                              | <b>Project owner(s)</b>                                   | Industry collaboration, Department of Informatics with Jens Petter Falck                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                                                                                          | <b>Total budget and share allocated to research group</b> | In the range 450k to 750k NOK yearly depending on the number of student teams. The funds are allocated to follow-up the industry-collaboration and to the learning environment for the participating study programs (MSc of Entrepreneurship and Innovation Management and MSc in Digital Economics and Leadership).                                                                                                                                                                                                                                           |
|                                                                                                                                          | <b>Objectives and outcomes and link to website</b>        | Students organized in small teams carry out a predefined innovation project within the program's corporate partner. The purpose of the course is to build the students' in-depth understanding and hands-on experience with developing new or improved products or services within an established company, i.e. corporate entrepreneurship.<br><a href="https://www.managroup.no/news/mana-partners-up-with-uio-to-mentor-the-next-generation-of-leaders">https://www.managroup.no/news/mana-partners-up-with-uio-to-mentor-the-next-generation-of-leaders</a> |

**Table 5. Research group's contribution to publications**

|                                                                                                                                                                                                                                                                                                                                                                             |                                      |                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Publication 1:</b><br><br><i>Project title/Journal/Year/DOI/URL</i><br>“Venture governance and its dynamics: Intraboard relationships and CEO duality”. (2022). <i>Technovation</i> . ISSN 0166-4972. 115.<br>doi: <a href="https://doi.org/10.1016/j.technovation.2022.102540">10.1016/j.technovation.2022.102540</a> .                                                 | <b>Authors</b>                       | Erikson, Truls; Coleridge, Chris and Ekaterina Bjørnåli.                                                                                                                                                                                                                                                            |
|                                                                                                                                                                                                                                                                                                                                                                             | <b>Short description</b>             | The project addresses governance challenges among high-tech new firms, a synopsis from the first article ‘at a glance’ at Cambridge Judge Business School:<br><a href="https://www.jbs.cam.ac.uk/2023/tech-startups-ceos-and-board-chairs/">https://www.jbs.cam.ac.uk/2023/tech-startups-ceos-and-board-chairs/</a> |
|                                                                                                                                                                                                                                                                                                                                                                             | <b>Research group's contribution</b> | Lead author on a three-paper project on venture governance with co-authors from Cambridge Judge Business School, and NTNU Business School in Norway.                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                                                                             |                                      |                                                                                                                                                                                                                                                                                                                     |
| <b>Publication 2:</b><br><br><i>Project title/Journal/Year/DOI/URL</i><br>“Enterprising scientists: The shaping role of norms, experience and scientific productivity”. (2015). <i>Technological Forecasting and Social Change</i> . ISSN 0040-1625. 99, pp. 211–221.<br>doi: <a href="https://doi.org/10.1016/j.techfore.2015.06.022">10.1016/j.techfore.2015.06.022</a> . | <b>Authors</b>                       | Erikson, Truls; Knockaert, Mirjam and Maw Der Foo.                                                                                                                                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                             | <b>Short description</b>             | The project surveyed all STEM PhDs and postdocs at the University of Oslo.                                                                                                                                                                                                                                          |
|                                                                                                                                                                                                                                                                                                                                                                             | <b>Research group's contribution</b> | Lead author on a three-paper project on “Young scientists” with co-authors from University of Ghent, and University of Colorado.                                                                                                                                                                                    |
|                                                                                                                                                                                                                                                                                                                                                                             |                                      |                                                                                                                                                                                                                                                                                                                     |

|                                                                                                                                                                                                                                                                                                                                                                |                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Publication 3:</b><br><br>“Muddling through Akerlofian and Knightian uncertainty: The role of sociobehavioral integration, positive affective tone, and polychronicity”, 2019<br><i>Journal of International Entrepreneurship</i> , pp. 1–20. ISSN 1570-7385.<br>doi: <a href="https://doi.org/10.1007/s10843-019-00255-2">10.1007/s10843-019-00255-2</a> . | <b>Authors</b>                       | Leunbach, Daniel; Erikson, Truls and Max Rapp-Ricciardi.                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                                                                | <b>Short description</b>             | This paper advances entrepreneurship research by developing and testing a theoretical model linking behavioural constructs to team effectiveness. The paper contributes to opening up the black box of entrepreneurial team processes by providing theoretically and practically interesting clues about how venturing teams can work more effectively under conditions of uncertainty.                                                                                                 |
|                                                                                                                                                                                                                                                                                                                                                                | <b>Research group's contribution</b> | Daniel Leunbach has it as part of his PhD thesis to be defended spring 2024.                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                                                                                                                                                                                                                                                                                                |                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Publication 4:</b><br><br>“Bridging analog and digital expertise: Cross-domain collaboration and boundary-spanning tools in the creation of digital innovation”, 2019, <i>Research Policy</i> , 48(9), 103819. ISSN 0048-7333,<br><a href="https://doi.org/10.1016/j.respol.2019.103819">https://doi.org/10.1016/j.respol.2019.103819</a> .                 | <b>Authors</b>                       | Raissa Pershina, Birthe Soppe, Taran Mari Thune.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                | <b>Short description</b>             | The purpose of this paper was to explore how specialists rooted in digital and analog knowledge domains engage in cross-domain collaboration to jointly create digital innovation.                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                                                                                                                | <b>Research group's contribution</b> | Raissa Pershina and Birthe Soppe did this while they were part of ENT group. Now they are part of the DIN group at the department, while also serving at the INTRANSIT centre.                                                                                                                                                                                                                                                                                                          |
|                                                                                                                                                                                                                                                                                                                                                                |                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Publication 5:</b><br><br>“Entrepreneurship as a family resemblance concept: A Wittgensteinian approach to the problem of defining entrepreneurship”. (2021). <i>Scandinavian Journal of Management</i> . ISSN 0956-5221.<br>doi: 10.1016/j.scaman.2021.101141.                                                                                             | <b>Authors</b>                       | Leunbach, Daniel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                                                                                                                                                                                                                                                                                                                | <b>Short description</b>             | This paper uses Wittgenstein's conception of philosophy to argue in favor of the idea that entrepreneurship is a family resemblance concept. This perspective is used to explain why it has been so difficult to agree upon an analytic definition of entrepreneurship and to make the case that the field will benefit from embracing ‘entrepreneurship concept pluralism’, i.e., the position that there are many legitimate and defensible ways of conceptualizing entrepreneurship. |
|                                                                                                                                                                                                                                                                                                                                                                | <b>Research group's contribution</b> | Daniel Leunbach has it as part of his PhD thesis to be defended spring 2024.                                                                                                                                                                                                                                                                                                                                                                                                            |

## 2.2 Research group's societal contribution

Describing the societal impact of the group's research.

Our greatest contribution to society is through our study programs; the nationally renowned **Gründerskolen** (partially directly funded by the Ministry due to the national university collaborative commitment, with a special purpose arrangement from the Educational loan funds where all the students receive funding through grants), the **Social Entrepreneurship diploma** program, and the **applied STEM-based MSc program in Entrepreneurship**, and our somewhat modest contribution to the *MSc program in Digital Economics*. The group members have also documented in more depth the pedagogical approaches in not only the diploma programs, but also in the MSc program in the following research outlets:

**Erikson, Truls; Svalastog, Mari, & Daniel Leunbach** (2014). Global start-up internships as a source of experiential learning. In Fayolle, Alain & Redford, Dana T. (Red.), **Handbook on the Entrepreneurial University**. **Edward Elgar Publishing**. ISSN 978-1-78100-701-3, pp. 301–320. doi: 10.4337/9781781007020.00020.

Lahn, Leif Christian & **Erikson, Truls** (2016). Entrepreneurship education by design. **Education + Training**. ISSN 0040-0912. 58(7/8), pp. 684–699. doi: 10.1108/ET-03-2016-0051.

The latter study was conducted in affiliation with an application for **Centres of Excellence in Education** status and funding, in which the application reached the final interview stage among 24 applicants, but not fully through. Beyond that, the group has facilitated Employability conferences together with the industry.

Our greatest contribution to the nation must be the Gründerskolen program that facilitates international entrepreneurial training practice abroad, which is a collaboration between the major national universities. As part of the for **Centres of Excellence in Education** effort, we also made a special issue on the topic:

Kubberød, Elin; Pettersen, Inger Beate; **Erikson, Truls** & Lahn, Leif Christian (2018). Progresjon og kvalitet i høyere entreprenørskapsutdanning. [Progression and quality in higher entrepreneurship education]. Special Issue editorial, *UNIPED*. ISSN 1500-4538. 41(1), pp. 5–9.

Members of the group has also launched and edited a 'perspective book' in entrepreneurship in the Norwegian language where various chapters are used as supplementary materials in diverse BSc courses around the country:

Jenssen, Jan Inge; Kolvereid, Lars & **Erikson, Truls** (Eds.) (2012). *Perspektiver på Entreprenørskap*. [Perspectives on Entrepreneurship]. Cappelen Damm Akademisk. ISBN 978-82-7634-956-6. pp. 1-356. <https://utdanning.cappelendamm.no/perspektiver-pa-entreprenorskap-9788276349566>

The ENT group also delivers PhD and BSc courses to the wider science faculty. Those are *ENT3000 Business development in teams*, and *ENT9800 Innovation and Intellectual Property Rights*. Also, worthwhile to mention, many of our MSc students create and form businesses, typically like the following (an example from the last cohort): <https://www.nexro.io/>

**Table 6/7. The research group's societal contribution**

| No. | Name of publication/product                                                                                                                                                                                                         | Date of publication/product                                                                                      | Link to the document                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Dagens Næringsliv ( <b>Cronicle</b> ): «Vi skjønner ikke rekkevidden av kunstig intelligens» [We do not understand the latitude and reach of artificial intelligence].                                                              | <b>Undheim, Kristin, Erikson, Truls</b> and Bram Timmermans (NHH) on Undheim's 'Responsible AI' project in 2022. | <a href="https://www.dn.no/innlegg/kunstig-intelligens/personvern/datatilsynet/vi-skjonner-ikke-rekkevidden-av-kunstig-intelligens/2-1-1379053">https://www.dn.no/innlegg/kunstig-intelligens/personvern/datatilsynet/vi-skjonner-ikke-rekkevidden-av-kunstig-intelligens/2-1-1379053</a><br>[In English at NHH: <a href="https://www.nhh.no/en/nhh-bulletin/article-archive/2023/february/we-dont-understand-the-implications-of-artificial-intelligence/">https://www.nhh.no/en/nhh-bulletin/article-archive/2023/february/we-dont-understand-the-implications-of-artificial-intelligence/</a> ] |
| 2   | AI and Ethics journal ( <b>Commentary paper</b> ): "True uncertainty and ethical AI: regulatory sandboxes as a policy tool for moral imagination"                                                                                   | November 2022 by <b>Undheim, Kristin, Erikson, Truls</b> and Bram Timmermans (NHH)                               | <a href="https://link.springer.com/article/10.1007/s43681-022-00240-x">https://link.springer.com/article/10.1007/s43681-022-00240-x</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 3   | On the Limitations of Ludwig Wittgenstein's Anti-Intellectualist Philosophy. ( <b>Dialogue paper</b> ). Academy of Management Review. ISSN 0363-7425.                                                                               | <b>Leunbach, Daniel.</b><br>Submitted November 2 <sup>nd</sup> , 2022.                                           | <a href="https://journals.aom.org/doi/abs/10.5465/amr.2022.0491">https://journals.aom.org/doi/abs/10.5465/amr.2022.0491</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 4   | UNIPED ( <b>Special issue editorial</b> ) Progresjon og kvalitet i høyere entreprenørskapsutdanning. [Progression and quality in higher entrepreneurship education]. Special Issue, <i>UNIPED</i> . ISSN 1500-4538. 41(1), pp. 5–9. | Kubberød, Elin; Pettersen, Inger Beate; <b>Erikson, Truls</b> & Lahn, Leif Christian (2018).                     | doi: <a href="https://doi.org/10.18261/issn.1893-8981-2018-01-01">10.18261/issn.1893-8981-2018-01-01</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 5   | Industry collaboration (one example out of five to seven, ongoing)                                                                                                                                                                  | Example of type of project partners                                                                              | <a href="https://www.managroup.no/news/mana-partners-up-with-uo-to-mentor-the-next-generation-of-leaders">https://www.managroup.no/news/mana-partners-up-with-uo-to-mentor-the-next-generation-of-leaders</a>                                                                                                                                                                                                                                                                                                                                                                                      |

### 3. Challenges and opportunities

Reflecting on what might be the challenges and opportunities for developing and strengthening the research and the position of the group.

The challenges, and opportunities, for developing and strengthening the research and the position of the group **in the near future** (1-2 years from now) is to publish what we already have abductively explored on venture governance employing machine learning as a research technique and method in management research. We will further the research on entrepreneurship that also has a pre-emptive purpose, departing from the various authority's use of regulatory sandboxes vis a vis digital technology (currently addressing AI development and deployment). We are also addressing calls for research of AI in Management, and we are entering the domain of leadership and governance of digital platforms. Our group is now also part of a COFUND programme, partly funded by the EU Horizon, under the Marie Skłodowska-Curie Action (MSCA), with the following first announcement:

<https://www.uio.no/dscience/english/dstrain/research-areas/informatics/digital-technology-and-responsible-innovations/> Glenn Kristiansen will next year follow up with another announcement, .

The challenges, and opportunities, within an **intermediate future** (approx. 3 years from now) would be to address 'the changing role of governance in the digital era' (i.e., explore the role of digitally savvy boards, and digitally savvy management teams, and various conceptual and behavioural ways of dealing with not only epistemic but also aleatory uncertainty, which the research group is good at, or at least 'ought to be' good at. In collaboration with colleagues from the Norwegian School of Economics (NHH), we seek to land a Research Council-funded project related to digital technology, and to form an international project around this topic, and to continue the good working relationship that we have established with NHH, as illustrated by the collaboration around responsible innovation here:

<https://www.nhh.no/en/nhh-bulletin/article-archive/2023/february/we-dont-understand-the-implications-of-artificial-intelligence/>

The challenges, and opportunities, **within a five-year time frame**, would be to further develop the Strategic Young Talent project on entrepreneurial teamwork in the digital era (i.e., collaborative AI tools in creative processes, and teamwork dynamics in the digital sphere) into a Research Council-funded project. Moreover, the research group has by then also completed the supervision of four PhD projects with at least one journal publication from each. Since we are tightly knit with our educational programs, a *continued* high score on NOKUT's rankings is also important. The research group is also aiming for ERC grants highlighting the role of entrepreneurship and management of digital technologies, we will seek to do this with some of our current international colleagues, perhaps best exemplified through the ongoing collaboration: <https://www.jbs.cam.ac.uk/2023/tech-startups-ceos-and-board-chairs/>

In a **ten years' time frame**, the research group will be a leading European hub for research into responsible digital innovation and entrepreneurship, and with a 'Scandinavian take', and with EU-funded research projects that build on the COFUND initiatives, but then in the form of ERC grants.