

## Hovedprofil Innovasjon og Entreprenørskap IE (for MTIØT studenter)

Gjennom denne fordypningen gis du muligheten til å bli ekspert i **(1) forretningsutvikling og kommersialisering av teknologi**, og/eller **(2) entreprenøriell læring**. I forhold til **(1) forretningsutvikling og kommersialisering av teknologi**, er det flere mulige problemstillinger og temaer. Eksempelvis, hvordan utvikle teknologi i ett kommersialiseringsprosjekt? Hvordan identifisere riktig kundesegment, hvordan gå til markedet, hvordan velge optimale forretningsmodeller (inklusive hvordan starte en tosidig plattform)? Strategiske utfordringer knyttet til vekst, finansiering av vekstbedrifter, herunder risikovillig kapital (business angels, såkornkapital, venture capital, osv.). Eller hvordan få tilgang på ressurser du ikke besitter selv? Du vil få muligheten til å studere caser ved NTNUs Entreprenørskole eller andre oppstartsbedrifter. Det er også mulig å studere forretningsutvikling og kommersialisering i etablerte bedrifter. Faggruppen har flere partnere som også er interessert i å utvikle ny kunnskap gjennom prosjekt- og masteroppgaver.

I tillegg vil du kunne fordype deg i **(2) entreprenøriell læring**, som er fokus i Engage. Dette er et senter for fremragende utdanning (SFU) tildelt av NOKUT i 2017, innen entreprenørskap, i sterk nasjonal konkurranse. Et hovedmål for Engage er å bidra til utdanning som vil utvikle entreprenørielle ferdigheter og tankesett blant studenter innenfor et bredt spekter av utdanninger, slik at de kan opptre som endringsagenter i de organisasjoner de senere skal jobbe innenfor. Engage er et konsortium bestående av NTNUs Entreprenørskole, Handelshøgskolen Nord, NTNU Eksperter i Team, TrollLABS og Spark NTNU. Her kan aktuelle problemstillinger være knyttet til prosesser som foregår under og etter gjennomføringen "Venture Creation Program" (som eksempelvis NTNUs Entreprenørskole eller andre tilsvarende internasjonale programmer). Her er det aktuelt å med masteroppgaver relatert til alumner fra NTNUs Entreprenørskole. Eksempler på tema er: Hvilke effekter har slike programmer? Hvordan kan man måle effekter? Har studenter fra VCP annerledes karrierer enn andre studenter? Hvordan vurderer arbeidsgivere kunnskapen og ferdighetene til kandidater fra VCPer? Andre eksempler på forskningstema er hvordan entreprenørielle metoder i nye student – industrisamarbeid, i EiT landsbyer, entreprenørielle metoder i helseutdanninger, i musikkutdanningen osv. Hvordan kan mer aksjonsorienterte læringsformer bidra til å øke læringsutbyttet, bidrar det til at man utdanner fremtidens endringsagenter?

Forskningen innenfor begge hovedområdene gir muligheter for å samle inn internasjonale sammenlignende data. Fordypningsprosjektet skrives i grupper på 2-3 studenter.

#### Mulige veiledere:

Professor Øystein Widding

Professor Roger Sørheim

Professor Lise Aaboen, koordinator

Professor Elsebeth Holmen

Førsteamanuensis Torgeir Aadland

Førsteamanuensis Dag Håkon Haneberg

Førsteamanuensis Øyvind Bjørgum

Førsteamanuensis Elli Verhulst (EiT)

Førsteamanuensis Il Jørgen Veisdal

Førsteamanuensis Il Haakon Thue Lie

Postdoktor Sara Maryami

Stipendiat Benjamin Holen Dybendal

Stipendiat Jicky Lullies

Stipendiat Meike Siefkes

Stipendiat Vårin Vaskinn

Veileder tildeles på bakgrunn av kompetanse, interessefelt og kapasitet. Vi kommer til å kjøre eget infomøte **13 april 13:00** for denne spesialisering i Undervisningsrommet på Entreprenørskolen i Oppredningen.

#### **Forutsetninger for å velge fordypningen**

De studentene som skal ta fordypningen i Innovasjon og Entreprenørskap må ha tatt:

- TIØ4265 Strategisk Ledelse og
- TIØ4235 Industriell Markedsføring og Internasjonal Handel.

Studenter som har vært på utveksling må ha tatt kurs med tilsvarende innhold.

#### **Suggested themes and topics**

##### **IE01 – Green business angels: what is their value for the start-ups?**

Entrepreneurial finance providers, especially business angels, offer their start-ups more than just financial capital. Business angels provide a range of value-adding activities, such as strategic advice, mentoring, resource acquisition, and monitoring and supervision. The "smart capital" aspect to angel involvement has been shown in several research articles. With green finance becoming more relevant, it is especially interesting to see that business angels not only provide smart capital, but specialised sustainability value adding activities, such as developing a sustainability strategy with the start-ups, requiring sustainability performance indicators, or mentoring activities to ensure that the start-ups stay true to their impact mission. This way, business angels that are positioned as "green" business angels can offer a competitive advantage to their start-ups. However, it has not been investigated whether start-ups actually require this kind of smart capital and specifically "sustainability capital" - after all, don't start-ups need mostly money in the early stages?

In this master thesis project, students can explore start-ups' needs and their demands for their investors. It could be investigated what start-ups across different maturity stages of the founding process require (and receive) from their investors. Additionally, this can be compared across investor types, e.g. comparing green business angels and green venture capital funds. The specific characteristics and resulting needs of green start-ups play a central role in this thesis. With a special focus on green entrepreneurial finance, later empirical work offers a promising research project aimed at talking to green start-ups and exploring what they require from their investors and whether "green" investors offer relevant activities that others cannot provide.

This project is connected to a PhD project researching green angel investors. We invite interested students to contact supervisors listed below for more information about the possibilities in the project. The project is suitable for one group consisting of 2 to 3 students.

Supervisors: Øyvind Bjørgum, [oyvind.bjorgum@ntnu.no](mailto:oyvind.bjorgum@ntnu.no), Meike Siefkes, [meike.siefkes@ntnu.no](mailto:meike.siefkes@ntnu.no)

This project suggestion relates to the department's strategic research initiative *Green Value Creation*.

## **IE02 – Experimental Investigation of Learning from Uncertainty in Entrepreneurship**

A universal characteristic of entrepreneurs is that they act under uncertain conditions. As an entrepreneur, you could be uncertain about the state of things (e.g., market uncertainty, policy uncertainty), uncertainty about effects on your own endeavours (e.g., the effect of regulations on firms, effect of economic changes on firms), or have response uncertainty (e.g., inability to predict how well responses to situations or changes will turn out, or how to act under uncertain situations). Being an entrepreneur will therefore expose you to uncertainty. However, whether being exposed to entrepreneurial uncertainty will develop the individual's entrepreneurial abilities, and if this is the case, how this occurs, are both unknown and under-researched themes/topics. This specialisation and master project will try to explore and test how uncertain scenarios influence the individual's perception of their ability to handle entrepreneurial uncertainty; that is, whether decision-making under uncertainty would influence future decision-making – and whether the initial decision's outcome matters. A potential research question could be: *how does exposure to uncertain scenarios influence an individual's perception of their ability to handle entrepreneurial uncertainty, and does the initial decision's outcome matter?*

In the specialisation project, you will investigate the relationship between the individual's experience with uncertainty and the development of acceptance for uncertainty or perceived decision control/comfort. It might also be an opportunity to develop and test scales measuring potential theoretical constructs related to uncertainty acceptance and learning. In the master thesis, a potential project will be to experimentally explore how uncertain scenarios influence the individual's perception of their ability to handle entrepreneurial uncertainty.

Supervisors: Torgeir Aadland, Sara Maryami, Benjamin Holen Dybendal, (Ann Elida Eide)

This project suggestion relates to the department's strategic research initiative *Leading transitions: Co-create a sustainable future*.

### **IE03 – Exploratory Understanding of Learning to Cope with Uncertainty in Entrepreneurship**

Experienced entrepreneurs have encountered uncertain situations during their careers, often with severe impact on their entrepreneurial endeavours which requires swift action and ability to flexibly change focus and activities. Experiencing uncertain situations might aid in handling future entrepreneurial activities, however, whether and how these experienced entrepreneurs are relying on their past experiences with uncertain situations when standing in decision-making for new uncertain situations, is unknown. In this specialisation and master project, you will therefore explore how entrepreneurs learn to cope with uncertain situations.

In the specialisation project, a literature review on the role of previous experience with uncertainty in decision-making in entrepreneurship will be carried out, especially on how the individual learn to cope with uncertainty. The master thesis will investigate how experienced entrepreneur's cope with uncertainty and investigate how their former experiences with uncertainty shape future decision-making.

Supervisors: Torgeir Aadland, Sara Maryami, Benjamin Holen Dybendal, Jicky Lullies (Ann Elida Eide)

This project suggestion relates to the department's strategic research initiative *Leading transitions: Co-create a sustainable future*.

### **IE04 – Transition towards circular/sustainable business models**

The change from a linear to a circular economy is a necessity for staying within planetary boundaries. The circular value chain offers many new opportunities with regard to new business models, as recycling, reuse or repurposing, and product as service. What is the role start-ups and small businesses can and do take in a circular value chain, and how is that reflected in their business models? How and which sustainable values get created for different stakeholders in the value chain? What are limitations that occur within the value chain during the transition towards circular business models? How does a shift to circular business models affect cooperation between stakeholders?

The students are welcome to work in pairs and can choose a specific industry or industrial value chain for this topic, as battery or other renewable energy, textile, construction, or another industry in agreement with the supervisor.

A direct connection can be made to the current [Hole-LiB project](#), which focuses on the transition towards sustainable/circular business models for repurposed and recycled Lithium-Ion batteries (LiBs) from electric vehicles.

Supervisor: Elli Verhulst ([elli.verhulst@ntnu.no](mailto:elli.verhulst@ntnu.no))

This project suggestion relates to the department's strategic research initiative *Leading transitions: Co-create a sustainable future*.

## **IE05 – Building knowledge resources for a competitive advantage**

Entrepreneurship concerns commercialization of innovation by combining resources into something that is perceived as new in the market. Managing resources is important in order to achieve a competitive advantage. Knowledge is one of the most important resources for technology-based firms. Research is scarce when it comes to how nascent entrepreneurs access business knowledge, both in terms of what knowledge it is that is critical to access at what point in time, where they access the knowledge and how they manage the knowledge. This is particularly interesting since knowledge is elusive, it may be tacit or explicit, and it is usually difficult to protect (which is important when it comes to sustainable competitive advantage). Both qualitative and quantitative methods may be used when gathering data from start-ups in order to explore this theme.

Supervisor: Øystein Widding

This project suggestion relates to the department's strategic research initiative *Technology-based organization design*

## **IE06 – When public customers matter: Born-public ventures and GovTechs**

Many startups imagine that they will sell to private customers, only, and do not think about the many opportunities to develop and sell products and services to public customers. Furthermore, many do not realize that the public sector is in urgent need of innovative products and services to solve the many current and future challenges in society.

Particularly related to solving future challenges in terms of health and pandemics, an aging population, sustainable energy, higher environmental and social requirements, in the face of expected lower tax revenues, the public sector must become more innovative and also purchase more innovative solutions.

In Norway, the public sector buys for approx NOK 600 billion annually. New innovative procurement methods enable the public sector to engage with innovative suppliers. The role of public organizations as business developers is becoming increasingly important, and through innovative procurement, the public sector can contribute to the development of Norwegian businesses and industry, both startups and established companies.

However, public organizations and companies need knowledge about how they can meet and collaborate in a good way when it comes to "innovating together" with startups.

In this project, we will look at challenges and opportunities for startups that orient themselves towards public customers, engage in innovative procurement processes, or who see unresolved needs in the public sector as an important basis for their development, so-called Born-public ventures or GovTechs.

Some organizations are created with the aim to assist public organizations and their suppliers to bring about innovation. Such actors are called Innovation Intermediaries and form part of the national policy instruments. One such player is NHO's National Program for Supplier Development, which guides public clients in innovative procurement processes and creates meeting places, see [www.innovativeanskaffelser.no](http://www.innovativeanskaffelser.no). Another innovation intermediary is StartOff, a programme dedicated to «start-up-friendly procurements», see <https://startoff.anskaffelser.no/>. For a recent example, see the

article about Leasi, <https://www.universitetsavisa.no/entreprenorskolen-grndere-oslo-kommune/ntnu-grndere-inngar-kontrakt-pa-en-halv-million-med-oslo-kommune/377128>. Some private actors also have programs that link startups to large private or public customers, for example Sopra Steria's ScaleUp platform, see <https://soprasteriascaleup.com/clients/mind-the-gap>.

Different angles in the project are possible, for example:

- From the perspective of startups: How a startup experiences public customers who drive innovation and business development in the startup. The task will address challenges and opportunities startups experience in their business development when they work to solve needs for public customers. It is also possible to focus on how startups experience differences and similarities between interaction with public customers versus interaction with private customers.
- From the perspective of innovation intermediaries and actors who facilitate Born Publics and GovTechs. How these work to understand the needs of startups in order to assist and facilitate more joint value creation in innovative procurement processes and publicly driven business development, and their roles as creators of public innovation ecosystems with startups.

The project is linked to various research projects, including the research council project FORAN -Anchoring innovative public procurement in municipalities, which is a collaboration with the National Program for Supplier Development, Sintef Digital and three Norwegian municipalities.

The assignment can be combined with a student research assistant job on the topic, if the students so wish.

Supervisor: Elsebeth Holmen ([elsebeth.holmen@ntnu.no](mailto:elsebeth.holmen@ntnu.no))

This project suggestion relates to the department's strategic research initiative *Health and the Public Sector*

### **IE07 – Qualitative Dimensions of Start-Up Communities**

Start-up communities differ in a variety of ways, including their culture, composition, degree of inclusivity, relationships with industry, the strength of ties and so on. An interesting dimension often testified by community insiders is a feeling of a 'joint mission' where "a rising tide lifts all boats". In such communities, a willingness to contribute to public service and the sharing of common goods is typical. Members are welcomed regardless of background or ability and often enjoy benefits paid for by others—as long as they agree to 'pay it forward' in the future. This ethos indeed arguably summarizes the culture of openness, trust and feeling of joint destiny present in such communities.

How do they differ from other start-up communities? What are commonly found characteristics? Are there any reliable predictors of why a start-up community will evolve into either 'open/inclusive' or 'closed/exclusive'? Which perform better and according to what metric?

These are interesting and relevant questions which have implications for both policy and community managers. This theme/topic may be explored using for instance ecosystem, social network or community of practice literature. The theme/topic was suggested by 6AM and they want to contribute with access to data but it is also possible to explore other communities.

Supervisors: Jørgen Veisdal and Lise Aaboen

This project suggestion relates to the department's strategic research initiative *Leading transitions: Co-create a sustainable future*.

#### **IE08 – Openness, Access and Knowledge Flow from Public-Funded Research**

The public is funding innovation through research from universities and with funding to R&D projects. Contribution to innovation, through knowledge transfer and commercialization of research results, is a core objective for universities. Collaboration between universities, industry and the public sector is crucial to ensure the utilization of the research. The Norwegian government spends around 15 billion NOK on sponsoring firms' R&D with public grants, loans, advice, and other services. A question is to what regard the tax-payers' money is used to create knowledge monopolies - where one firm alone profits – or open science where the knowledge can be used by all for more innovation. The contracts between the parties frame how they control access to the R&D results. Intellectual property such as patents, copyright and trade secrets are key mechanisms in controlling and leading transitions.

The understanding of open innovation and collaboration between universities, research institutes, firms and the public sector is essential for creating circular economies and technology standards. Developing technology platforms as diverse as the 5G mobile networks and the gene-editing CRISPR technology depends on successfully managing the related intellectual property. Openness, access and knowledge flow from public-funded research can be studied both on an innovation system level or at the firm level.

There is a rich material of publications from the supervisors. Data can be analysed further or enhanced with qualitative studies (see <https://www.fpol.no/dehns/> and <https://hdl.handle.net/11250/3054379> ),The project connects to developing practical tools for R&D project managers, steering groups and sponsors with a base in NTNU Technology Transfer AS [www.ntnutto.no](http://www.ntnutto.no) and Dehns [www.dehns.com](http://www.dehns.com) .

The project can be solved qualitatively through case studies with interviews or quantitatively through surveys and public data. The supervisors can make both firms to study and survey data available and cover the costs of new data collection if needed.

We invite interested students to contact the supervisors listed below for more information about the possibilities in the project and to define more precisely what this project can entail for you.

The project is open for one group of two or three students.

Supervisor: Haakon Thue Lie, [haakon.thue.lie@ntnu.no](mailto:haakon.thue.lie@ntnu.no) / [htlie@dehns.com](mailto:htlie@dehns.com) and Head of IPR at NTNU Technology Transfer, Knut Jørgen Egeli, PhD [knut.egeli@ntnu.no](mailto:knut.egeli@ntnu.no).

This project suggestion relates to the department's strategic research initiative *Leading transitions: Co-create a sustainable future*.

#### **IE09 – Innovation, trade secrets and workforce mobility**

Firms control their innovation through what the research literature calls “appropriation mechanisms”. These mechanisms are primarily intellectual property such as copyright, trade secrets, patents, designs and trademarks – but combined with, for example, human resource management, lead time advantages and revealing strategies. There is rich literature on each of these mechanisms used separately. However, firms use the mechanisms in combination. For example, a crucial part of an artificial intelligence solution could be controlled by copyright to the software, database rights to the collection of data used for machine learning combined with trade secrets in the form of the researchers’ skills in selecting the datasets for training. There are few publications on how firms manage this mix of appropriation mechanisms, how the managers decide on their blend of openness and secrecy and how this affects the personal knowledge of employees.

A theoretical foundation is in the knowledge-based view of innovation and in the framework “Profiting from Innovation” by David Teece. At the core is value creation and the interaction of the firms’ processes with the available appropriation mechanisms. However, in the future the technology-based organizational design that creates the appropriation mechanisms will be supported by artificial intelligence.

There is data that can be analysed further or be enhanced with qualitative studies (including a 2021 survey for the Department of Trade and Fisheries). The workforce mobility issues are discussed in Chapter 19 of “Norsk arbeidsliv mot 2050”, see <https://oa.fagbokforlaget.no/index.php/vboa/catalog/view/6/7/39>

The project can be solved qualitatively through case studies – both in entrepreneurial firms or established enterprises - or quantitatively through surveys and public data. I invite interested students to contact me for more information about the possibilities in the project and to define more precisely what this project can entail for you.

The project is open for one group of two or three students.

Supervisor: Haakon Thue Lie, [haakon.thue.lie@ntnu.no](mailto:haakon.thue.lie@ntnu.no) / [htlie@dehns.com](mailto:htlie@dehns.com) .

This project suggestion relates to the department’s strategic research initiative *Technology-based organization design*

### **IE10 – Nurses and Physicians starting MedTech Start-ups**

Until recently, there was a dissonance between entrepreneurship activities and healthcare (Schiafone & Vershinina, 2022). However, physician entrepreneurs, like other healthcare personnel, have a strong motivation to solve healthcare issues and literature has shown that they develop novel ideas, found ventures and create new products as well as services (Battle, 2022). The venture development process in MedTech consists of three sub-processes where compromises are made in order for them to be aligned; business development, technology development and regulatory process (Lehoux et al., 2017). There is a lack of well-integrated theory linking healthcare, entrepreneurship and innovation and little is known about how the healthcare entrepreneurs develop and scale their start-ups (Schiafone & Vershinina, 2022). Hence, there are many possible angles and perspectives that can be chosen in the theses exploring nurses and physicians starting MedTech start-ups. This theme/topic is connected to a PhD project on the same theme/topic.



Supervisors: Vårin Vaskinn and Lise Aaboen

This project suggestion relates to the department's strategic research initiative *Health and the Public Sector*

#### **IE11 – The development and growth of startups at NSE**

The development and growth of startup companies at NSE. More than 150 companies have been started since 2003, however our knowledge about them is rather limited. We do know that only a limited number achieve significant growth. Who are these companies? What pattern could be observed?

How do they achieve growth? This will be a part of larger project on alumnus and alumni companies at Engage.

Supervisor: Roger Sørheim

This project suggestion relates to the department's strategic research initiative *Technology-based organization design*

#### **IE12 – Corporate angels – SMEs as investors**

Entrepreneurial ventures are resource constrained. A solution for these potential high growth firms has been to seek finance from different types of equity providers like business angels, institutional venture capital. The role of business angels as equity providers is documented in empirical studies since the early eighties. The role of institutional venture capital has caught scholars attention since the seventies and onwards. However, the role of SMEs as investors is not covered in previous research. There are two main reasons for this: 1) access to data and 2) the assumption that SMEs do not invest in entrepreneurial ventures.

The point of departure for this thesis is a unique dataset of 93 investing SMEs. Students can build their work on the existing dataset and add more data through qualitative case studies. Examples of questions:

Why do SMEs invest in entrepreneurial ventures? What and how to their SMEs benefit from doing investments?

To what extent do "corporate angels" contribute with smart capital? How?

Supervisor: Roger Sørheim

This project suggestion relates to the department's strategic research initiative *Technology-based organization design*

#### **IE13 – Why do firms fail?**

The failures of startup companies at NSE. There is very limited knowledge about why and how entrepreneurial firms fail. In this project will the focus be on the companies that fail at NSE, when, why

and how do they fail? And is it failure? This will be a part of larger project on alumnus and alumni companies at Engage.

Supervisor: Roger Sørheim

This project suggestion relates to the department's strategic research initiative *Technology-based organization design*

#### **IE14 - The power of ESAF**

NTNU School of Entrepreneurship (NSE) is a leading venture creation program and in this study you will explore the power of alumni engagement within the NSE family. Alumni engagement through ESAF is claimed to impact the success of both start-ups and individuals. We have of course a lot of anecdotal evidence on how recruitment, customer/supplier development, investment etc. happen, but there is no research on the impact of this alumni engagement. Why and how does the magic happen?

Supervisors: Roger Sørheim and Lise Aaboen

This project suggestion relates to the department's strategic research initiative *Leading transitions: Co-create a sustainable future.*

#### **IE15 - Other project in the area of business development or entrepreneurial learning**

This is a project in the area of business development or entrepreneurial learning that is suggested by the student team. In order to select this project the group need to prepare a proposal showing the topic, potential research questions and relevant literature that you will present to the fagstab on the 21<sup>st</sup> of April. The assignment of supervisors to these projects is dependent on the feasibility of the proposal and total resource situation for supervision so make sure to also select themes from the list above. The alternatives above are themes that are used as a starting point for defining a project and not pre-defined projects.