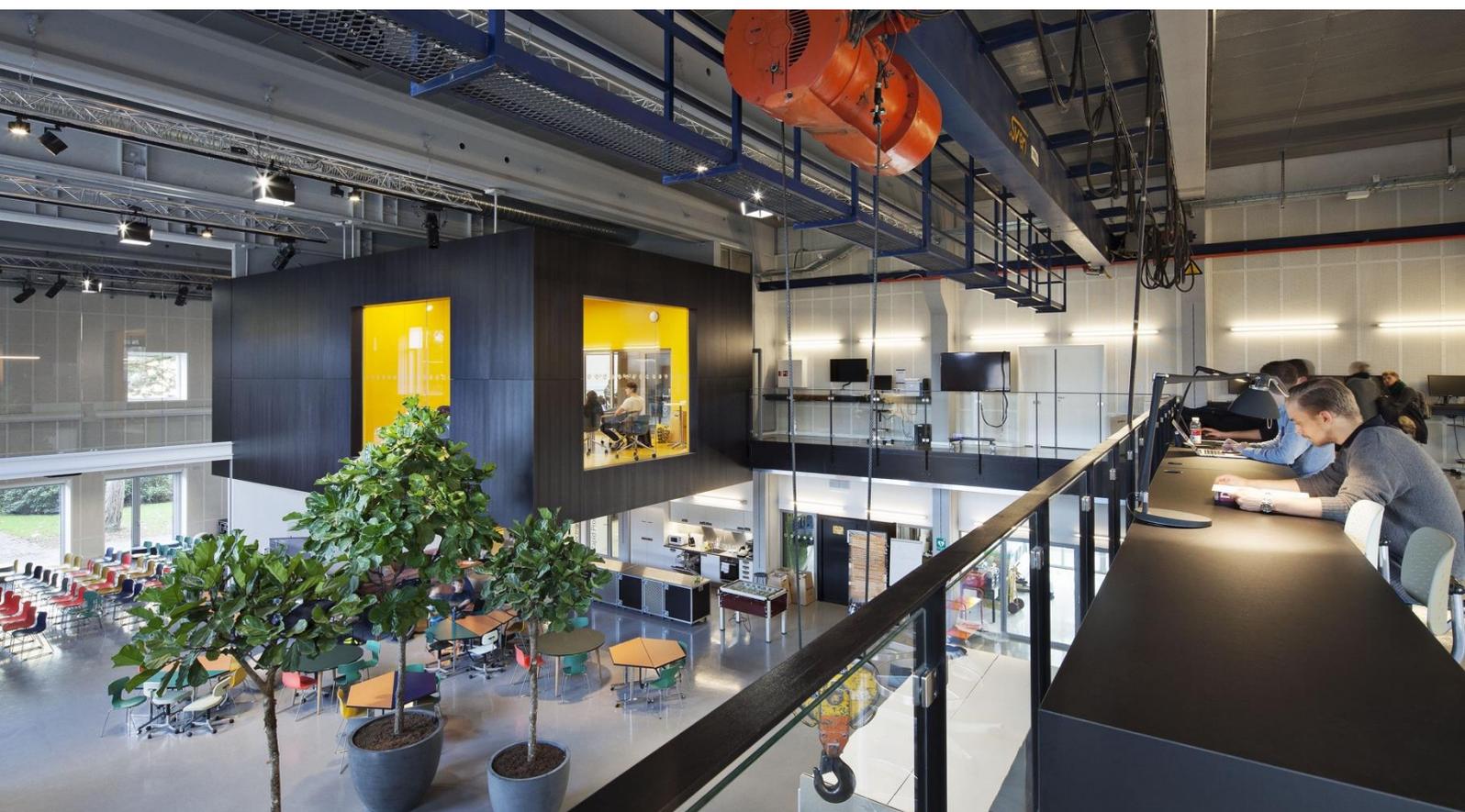




DTU Skylab: A laboratory and a community for the next generation of entrepreneurs

Lyngby, Denmark





General Information

Title	DTU Skylab										
Pitch	A laboratory and a community for the next generation of entrepreneurs										
Organisation	Technical University of Denmark (DTU)										
Country	Denmark										
Author	Mihai Melonari (Science-to-Business Marketing Research Centre)										
Nature of interaction	<table><tr><td><input type="checkbox"/> Collaboration in R&D</td><td><input type="checkbox"/> Lifelong learning</td></tr><tr><td><input checked="" type="checkbox"/> Commercialisation of R&D results</td><td><input type="checkbox"/> Joint curriculum design and delivery</td></tr><tr><td><input type="checkbox"/> Mobility of staff</td><td><input type="checkbox"/> Mobility of students</td></tr><tr><td><input type="checkbox"/> Academic entrepreneurship</td><td><input checked="" type="checkbox"/> Student entrepreneurship</td></tr><tr><td><input type="checkbox"/> Governance</td><td><input checked="" type="checkbox"/> Shared resources</td></tr></table>	<input type="checkbox"/> Collaboration in R&D	<input type="checkbox"/> Lifelong learning	<input checked="" type="checkbox"/> Commercialisation of R&D results	<input type="checkbox"/> Joint curriculum design and delivery	<input type="checkbox"/> Mobility of staff	<input type="checkbox"/> Mobility of students	<input type="checkbox"/> Academic entrepreneurship	<input checked="" type="checkbox"/> Student entrepreneurship	<input type="checkbox"/> Governance	<input checked="" type="checkbox"/> Shared resources
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Supporting mechanism	<table><tr><td><input checked="" type="checkbox"/> Strategic</td></tr><tr><td><input checked="" type="checkbox"/> Structural</td></tr><tr><td><input checked="" type="checkbox"/> Operational</td></tr><tr><td><input type="checkbox"/> Policy</td></tr></table>	<input checked="" type="checkbox"/> Strategic	<input checked="" type="checkbox"/> Structural	<input checked="" type="checkbox"/> Operational	<input type="checkbox"/> Policy						
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Summary	Skylab is an innovation hub at the Technical University of Denmark (DTU) created to help students evolve from engineers to potential entrepreneurs by offering them a creative environment and work and developing (prototyping) facilities. Beyond supporting start-ups, Skylab drives innovation and entrepreneurial behaviour by combining academia (courses held at Skylab) with real-world projects (company challenges). Skylab represents not just a cross-disciplinary hub but also a community for student innovation and a nurturing environment for start-ups.										



Introduction & Overview

1. BACKGROUND

DTU (Technical University of Denmark) is one of the leading technical universities in Europe, known for its accomplishments in research (especially in engineering), knowledge and technology transfer and for its scientific consulting activities. Founded in 1829, the university focuses on the natural and technical sciences and the benefits they bring to society. The university's high reputation is reflected in their employability rate. 85% of MSc graduates are employed within six months of graduating.

In order to support student innovation and student entrepreneurship, DTU introduced Skylab in March 2013, **a cross-disciplinary hub and community for student innovation**. Skylab is four years old, starting as a prototype with a fixed timeframe of one and a half years in a facility that was to be torn down after that period. The Skylab team, as well as the management of the university, recognised an opportunity. The first set of proposed activities were put forward by the potential users of the initiative (students) as well as drawing on best practice from other foreign initiatives (e.g. Aalto University) and on the identification of users' needs (e.g. Arduino workshops). These included various events; consulting methods; strategic external partnership approaches; integration within the university; and even opening hours. Activities that worked during the prototyping phase were improved and established within the Skylab initiative. Those which failed were dropped quickly from the pilot phase, using the same principles as one would see in an entrepreneurial environment.

DTU Skylab, as it is known today (Skylab 2.0), was officially opened in September 2014 in a brand new building on the campus of DTU. Today, **Skylab focuses on three main areas: startups, academics and real-world projects**.



2. OBJECTIVES AND MOTIVATIONS

DTU's long-term objective is to develop strong international innovators and technical entrepreneurs with the ability to create future companies and develop existing companies. Moreover, entrepreneurial education improves job market perspectives and job performance for students. Both will also support economic growth in the area of Greater Copenhagen. An additional university objective is the creation and commercialisation of knowledge. The latter is also the reasoning behind the proximity of Skylab facilities to the Technology Transfer Office.



Students engage and take an active role in the Skylab ecosystem. Their main motives include the opportunities to:

- ▶ acquire and test new competencies;
- ▶ share knowledge;
- ▶ test and develop their ideas;
- ▶ make a social impact;
- ▶ commercialise research (bachelor or master thesis) results;
- ▶ combine theory with practical projects;
- ▶ learn an independent and autonomous work attitude;
- ▶ work for one's own success;
- ▶ make mistakes in a safe environment;
- ▶ vary work during the launch of a business;
- ▶ and collaborate with lecturers and external partners from the business community to gain mutual benefits.

The students' acceptance and need for an expansion of the offering were the reason for the constant development and improvement of the first prototype towards the scaled version (Skylab 2.0).

Entrepreneurs are defined by their mind-set and perspective. In order to instil provide access to the above opportunities and to increase their ability to think and act entrepreneurially, **Skylab serves as a neutral knowledge melting pot.** Therefore, its facility provides a cross-disciplinary learning environment using experience learning.¹ The knowledge is mainly provided by academics that hold courses related to innovation and entrepreneurship and by the associated coaches. The creation of (pre-) start-ups is viewed as a natural outcome from the practical learning and team-building initiatives.

The last objective related with the real-world projects. This focuses on providing solutions to real-world challenges of companies by engaging students in the solution-development process.

3. STAKEHOLDERS

Skylab is part of DTU and therefore the stakeholders of the university are the stakeholders of Skylab. This includes DTU students, partner universities, academics, management and even external parties like industry partners or the general audience that is willing to engage.

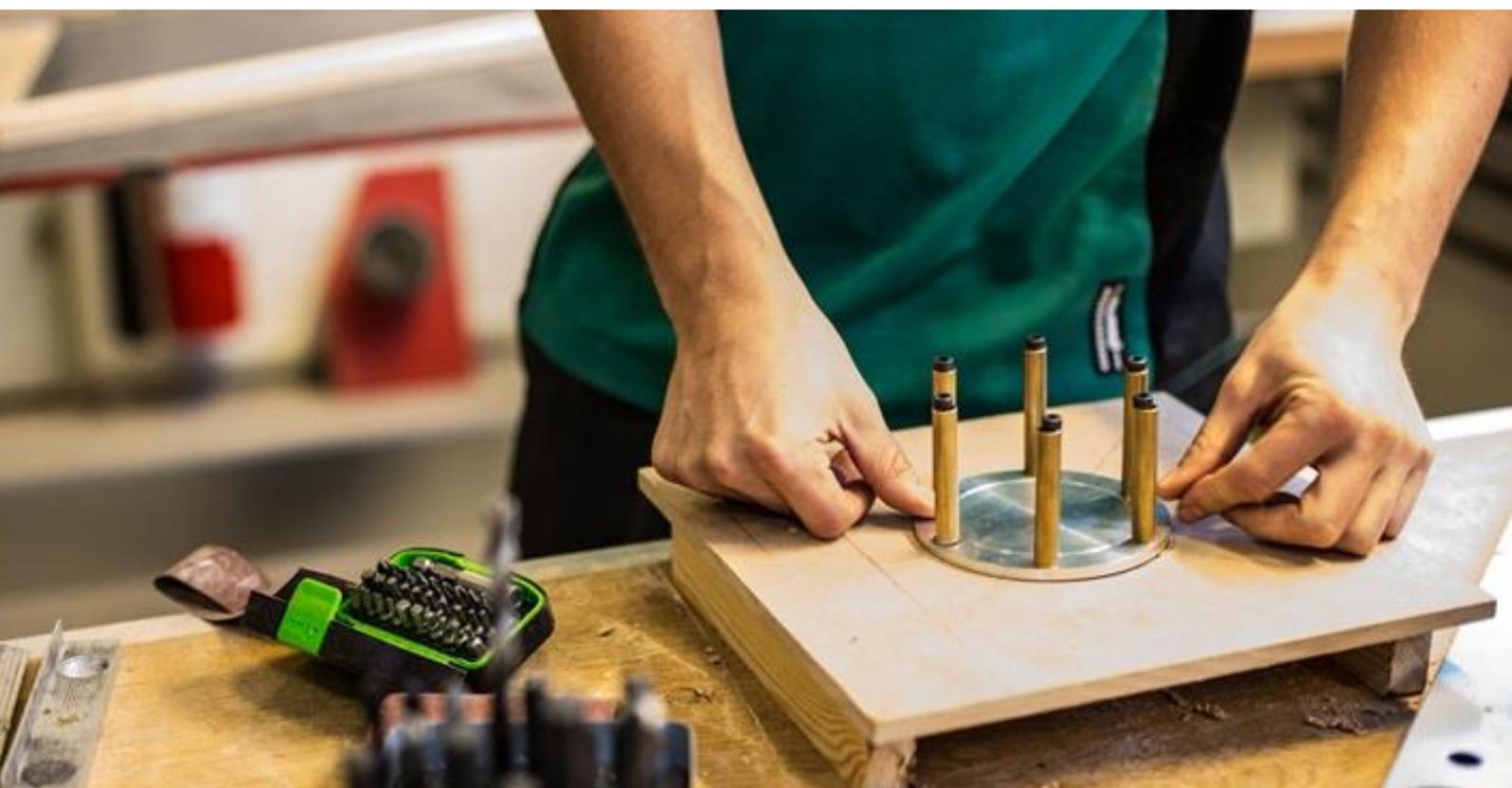
All DTU students and those of affiliated universities participate in activities and use the facilities. They can either work together in groups or bring outsiders, with the pre-condition of one DTU student being part of that team.

Academics benefit from the business creation process and the exchange of knowledge at Skylab. They are inspired and supported to adjust their curriculum to be more project-based, include relevant and practical teaching methods. They gain insights on how to develop a holistic incubator and encouraged and supported to create spin-offs based on their research.

The top-management created this initiative with the ambition of further developing the university towards a research-driven and entrepreneurial one and they have a vested interest in the success of this initiative.

Sponsors and partners, such as the European Commission, the Danish Industry Foundation² and the region of Greater Copenhagen also profit from the potential of growth and job creation that students with entrepreneurial ambitions provide. Companies such as IBM, KPMG and Siemens collaborate and sponsor (e.g. events, prizes) Skylab because they are interested in the rich talent and can also benefit from developed solutions and even test how to work with open innovation.

The public shows great interest in the initiative and can participate in open events, which are contributing to and enhancing the entrepreneurial ecosystem.





Implementation

4. INPUTS

DTU provides **physical, financial** and **human** resources to Skylab.

Skylab **facilities** are located in a renovated, 1,550 square meter factory, which costed about €4m. In order to match to students' needs, the architect firm conducted a needs-based analysis for the building to address students' and academics requirements. This resulted in the construction of the following: three group meeting rooms (30-60m²); three project rooms with write-on walls and roll down curtains for brainstorming sessions (14-16m²); an auditorium (for 110-300 people); a lounge; an open work area; a central kitchen; and a ceiling mountain crane to move heavy objects. The prototyping area consists of a metal workshop, a welding workshop, a wood workshop, an electronic lab, a wet lab and a rapid prototyping area with 3D printers and laser cutters. In addition, Skylab will introduce the Foodlab in 2017 to complete the offered programmes. Foodlab serves as an additional platform to develop, test and validate concept ideas into prototypes in the food industry. Skylab counted more than 70,000 visitors and more than 3,000 bookings of the rooms in 2016, proving great interest and demand from the students in using the facility.

Further physical input factors were provided in the form of **equipment** such as: printers (incl. 3D-Printers); computers including a variety of software; robot cameras for lecture recording; metal machinery; robot arms, etc.. Additionally, the furniture, including tables on wheels, ensure a high degree of flexibility to adjust to the required needs of an event. **Skylab offers access to everything students need for transferring an idea into a tangible prototype.**

Generally, the Skylab initiative provides **monetary support** to current DTU students and those within a year of graduation from 15,000 DKK (€2,000) to 150,000 DKK (€20,000) per project, which is provided through six industrial funds.³ The allocation of these funds is decided either by Skylab directly or by the sponsors, who receive the most promising ideas from Skylab as suggestions.

Human capital and intellectual input in 2016 comprised over **1,700 lecture hours** included in 23 courses (e.g. 'Biomimetics and Bio-inspired Design', 'Innovation and Product Development'), which are provided by six DTU departments. In addition, Skylab employs 13 people on several contracts (seven hold a permanent position and the rest are financed through projects) as managers, coaches, workshop staff and assistants. These people are highly important to develop the community, to engage the academics and to sustain the positive attitude of the involved stakeholders. Some also have the responsibility to act as coaches for the start-ups by applying their technical and/or business expertise.

Guidance is offered not just through the staff members but also through experience shared by other students, existing start-ups, DTU researchers and externally from industry. Furthermore, competitions (e.g. 'Open Innovation X') are created in collaboration with companies

that pay and provide data in order to participate in the real-world projects. Hereby, the combination of business and technological expertise is essential.

5. ACTIVITIES

Skylab focuses on three main activities: **start-ups**, **academic engagement** and **real-world projects**, which consist of several sub-initiatives⁴.

The **Skylab (pre-) start-ups** division involves extracurricular coaching, mentor programmes, international entrepreneurship programmes and workshops. Moreover, it offers a wide network of professionals to support students in their start-up phase on topics of funding, product and business development and patenting. The major contribution of Skylab is the access to labs and workshops in the fields of metal, wood, welding, electronics, design and chemistry. The workshops provide high value for the students as they can quickly build a prototype or a minimum viable product to show to potential customers or investors.

A new programme called “Skylab Ignite”⁵ supports students in the ideation phase through coaching sessions and events like “Validation Hacking” or “Pitching with Fire”.



DTU Skylab’s Involvement in other projects

In order to support the development of the Nordic start-up scene, two projects have been initiated. Firstly, the Government funded ‘**Grow Nordic desk surfing**’⁶, which encompasses a project period from 2016 to 2017 with 4 partner universities, offering DTU students the opportunity to work in co-working spaces at collaborating Scandinavian technical universities. Students can visit other incubators either individually, in study groups or with their start-up partners. The travel to four of these partner universities is supported through funding. The aim is to experience a new ecosystem abroad, participate in competitions and meet customers. Secondly, the ‘**Nordic Entrepreneurship Hubs**’⁷, an ERASMUS programme with a project period from 2016 to 2019, aims at the creation of permanent and strong cooperative structures between student-entrepreneurs and supporting agencies across Denmark and Sweden. This involves easy access to essential facilities, networks, advice and flexible start-up and growth packages. A further collaboration has been established between the **EVP**⁸ (European Venture Programme) and the **EU-XCEL**⁹ (European Virtual Accelerator) which work together with DTU Skylab in order to enable student collaboration in cross-national teams. The aim is to create new ideas that result in IT pre-start-ups and to expand students’ horizons by travelling to the other participating countries.

On an **academic level**, Skylab collaborates with the university departments in order to support the faculties who offer academic innovation and entrepreneurship courses. The courses offered (23 in 2016) at DTU on innovation and entrepreneurship related topics are enhanced with real-world projects as case studies for the curricula. Beyond these lectures, Skylab co-developed together with other departments, throughout the **Talent Programme**, two official academic courses: one created for bachelor students and one for master students. The main elements of the Bachelor course 'High-Tech Entrepreneurship' are self-efficacy; transformation of entrepreneurial ambitions into work; high-tech knowledge; tools for innovation and development in a high-tech context. The Master course 'Business Model Design for Growth Entrepreneurship' is more business-practice oriented and designed to test theoretical knowledge, validate one's own assumptions through interactions with potential customers in order to create a sound business model. The number of participants in the talent programme has also increased from one Master and six Bachelor students in 2015 to 16 Master and 33 Bachelor students in 2016. The programme is most popular among students studying design and innovation, followed by architectural engineering, physics & nanotechnology and engineering management.

In order to shape the mind on a social level, the **SDGii¹⁰** (Sustainable Development Goals drive innovative engineering initiatives) was added to Skylab's programmes/offering. The SDGii enables students and researchers to impact society by using the 2030 Global Sustainable Development Goals as the framework for innovations. The initiative entered a humanitarian-business partnership with Grundfos and the Danish refugee Council.



Skylab conducts **real-world projects** by collaborating with a variety of industries, whereby the related themes vary from year to year (e.g. from big data to food innovation). Company representatives are involved in ten-day intensive development projects, after which the participating students present their solution. In order to provide the platform for collaboration, the **Open Innovation X (Oi-X¹¹)** has been launched. The Oi-X, an event in a hackathon format, attracted 148 students in 2016 who worked on 14 challenges from sponsor companies. The concept stipulates an open-innovation environment and therefore the companies bring all the necessary information to the table, which is, for some companies, a difficult task. The competition has one winner and a winning prize of 100,000 DKK (€13,500) for the best solution



6. OUTPUTS

In total at DTU, there have been over 190 spin-outs since 2013 (year 2013:19; 2014: 51; 2015: 54; 2016: 66). The number of pre-start-ups/projects is not well documented throughout the departments, but is estimated to reach a minimum of 500.

At Skylab, by the end of 2016, 133 student **(pre-) start-ups** received coaching or help. During the workshops, more than 300 **prototypes** were built using more than 24,000 meters of filament for the 3D printers and more than 4000 jobs performed by the laser cutter. Additionally, 23 **courses on entrepreneurship** and innovation were taught to over 500 students. Further results of Skylab are the development of one Bachelor- and one Master study course and **94 organised events with more than 70,000 visitors** (open to non-/students, companies and investors).¹² The interest of other institutions in Skylab, its events and lectures is represented by 122 visits from various delegations. As a result of Skylab's success, the name itself has become well-established and serves as a door-opener for students and DTU with other companies. Overall, Skylab and its accompanying ecosystem managed to create a motivating atmosphere for its students.

Furthermore, through Skylab, 18 start-ups have been awarded 1,140,000 DKK (€153,382) in 2016.

7. IMPACTS

Skylab **changed the mindset of the students**, as in this environment their voice counts as much as those of professors and other staff members. Students develop and gain a higher level of independency, organisational competences, confidence, self-responsibility, cross-disciplinary expertise and knowledge such as in technology development. This is also a result of the trial and error approach that is offered by Skylab. At the same time the awareness that several experts are needed to develop a business idea, as opposed to a lone-wolf, has increased. The employment of 85% of the master graduates within six months after graduation¹³ indicates that students also benefit after their graduation from their acquired business contacts, practical experience and from the increased university reputation. Additionally, the business collaboration **impacts society** because the concept of open innovation and university education is carried into companies.

Skylab not only changed students' **minds** but also that of the overall **DTU top-management**. They see the value it created and, compared to the initial stage, Skylab's perceived potential has increased. Early scepticism among academics and lecturers turned into interest, acknowledgement and acceptance of the input of Skylab. However, some reservations remain mainly due to the unconventional approach of the initiative.





Support & Influencing factors

8. SUPPORTING MECHANISMS

The creation of a community around Skylab was key to engage students beyond single course and workshops attendance. The idea was to encourage them spend a considerable amount of their daily time within the facility. Free coffee and a policy of mutual help and openness to all ideas has created an aspiring entrepreneurial culture, which reinforces itself. The opportunity for DTU students to bring outside friends to their teams enabled the fast increase of student start-ups and an enrichment of ideas and talent. Role models from industry and from prior successful student start-ups offers inspiration and motivation to current students. Furthermore, the possibility for the university to acknowledge talented students with a distinction on their diploma, including extracurricular activities and extra ECTS points, raised their eagerness to participate.

In an attempt to increase engagement with even more start-ups, Skylab organises various events. Through events such as pitch competitions like the 'Seed Discovery Days', Skylab collaborates with SEED Capital¹⁴, a venture capital investment firm based in Lyngby, Denmark where the winning start-up receives an investment of 500,000 DKK (€67,000).

Prior to the creation of Skylab, **a new position in the form of a Senior Vice President for Innovation emphasised the importance and the focus of the university on innovation.** This led to continuous support of the top-management and allowed the Skylab-team to be experimental, close to the user and keep their fingers on the pulse of trends. Now Skylab has its new building, people like to visit the facilities. DTU top-management also regularly visits and keeps contact with the newest activities. It represents a very modern, dynamic and open environment. Furthermore, a governmental policy allowing DTU to be the owner of its own campus design makes the decision process for buildings like Skylab lean and minimises the number of decision-makers at the table.

Skylab is not linked to any department, but to the science park and this structural decision allows the initiative to be open to all departments and all students at DTU.

Skylab **benefits from society's interest in entrepreneurship in terms of funding, support, acknowledgement,** branding, network and publicity. Consequently, the hub's name itself facilitates access to industrial companies.

Extraordinary activities, free coffee, a good working atmosphere, project funding and the high number of students in the facilities contribute to the image of Skylab as a "cool place to be". This helps attract even more students. **The most important channels to generate awareness are the courses from other departments** held within the facilities. Students experience the place first hand and often come back. Even if they are just doing their coursework, the creative

atmosphere will likely catch their attention through one of events or through a simple chat with another student.

The interest of companies improves the attractiveness of Skylab. Funding and support by mentors are also important elements of the offer.

A further mechanism of the DTU top management is keeping the offer simple. If they provide too much support or resource, it can have the opposite effect and inhibit entrepreneurship, while not offering too many resources to Skylab at certain times encourage creativity and more entrepreneurial attitudes.

9. BARRIERS AND DRIVERS

Skylab is a big success and due to the wide acceptance of Skylab offerings, the institution is **underequipped** to serve the initially underestimated number of users. This means that financial input needs to be secured in order to extend use of the facilities and invest in more specific machinery. Rooms need to be booked far in advance and the controlling system needs to be updated because sometimes rooms are booked but not used. Skylab is also **understaffed**, but more important is that the users feel there is a need for more externally contracted personnel dedicated to coaching start-ups in order to meet students' demands. Student projects currently receive on average an hour of coaching, which, from a business perspective, is not enough to support the students' ongoing challenges. Further restrictions are the financial and human resources, which are needed to provide ways to develop soft skills (initiative; collaboration; creativity; empathy; fortitude; global view; and intercultural and interdisciplinary capabilities). Therefore, **more support functions, more mentoring and more specific courses are needed**. Especially mentoring and companionship from professionals from the industry seems to be underutilised.

More marketing and social network activities need to be conducted under the umbrella of an implemented recruitment plan, which would also involve a higher rate of ambassadors among academics and lecturers. Potential users are not well enough informed about what Skylab has to offer and who is involved.

Furthermore, **students are limited in their resources to attend Skylab**. On the one hand, they have regular study courses that amount to up to 30 hours in addition to their study time. Along with this, a policy urging students to finish their studies within five years makes pursuing side-projects very challenging. This is the main reason why Skylab is always trying to **link the curricula to its activities** and why they are supporting the departments to develop ECTS-bearing courses to make entrepreneurial activities fit with the study course.

The **usability** of Skylab is currently more supportive for projects and events than for operative start-up work. The extension from project support to constant support is crucial to motivate the users. Although Skylab is opened 24/7 to anyone with a DTU study/employee cards, the workshops can only be used during office hours between 08:00 and 18:00. The facilities are often overcrowded due to start-up users and teaching courses and need to be expanded with more working rooms.

Finally, the **geographic reach** to the students is a problem as the university is very spread out and student's residences can be far away. This kind of facility needs to be located more centrally and opening hours need to match students' schedules. Currently Skylab has a perfect reach for engineering students, who are the main users.

One of the drivers of the success of Skylab is the creation of **efficient teamwork**, which is achieved through a flat hierarchy combined with the values of good working collaboration: openness to other peoples' opinion; active listening; willingness to learn from others; helpfulness; results driven; having fun; and mutual engagement.

The development process was characterised by a high user involvement, including suggestion making and (Facebook-) voting. The fact that there are only a few innovation hubs like Skylab (in Denmark) contributed to its success. It has become clear that the availability of financial, human and physical resources in order to build the premises and offer workshops, programmes and equipment were the foundation of Skylab's success.

The strong **entrepreneurial mentality** is another driving factor for Skylab. This does not only offer a hub to bring people together, but also gives participants the opportunity to fail quickly in order to learn from their mistakes. The principle of an open-door policy promotes this mentality and fosters transparency. As the system offers engagement on an ad hoc basis, the entry level is low. Moreover, the **collaborative factors** such as the staff's networks and previous innovation and business knowledge and partnerships with other universities' hubs contributes to the overall drivers. Skylab managers and coaches support the students with guidance and invite various experts to address the start-ups' needs along the development phases.

A remarkable driver was the **building of a community** from day one and the finding of early adopters. Currently, the users come mainly from four departments, which raises the challenge of attracting students from other departments. Creating branding and awareness through collaboration with academics and departments is a further challenge that can be supported through the involvement of users as active ambassadors. Therefore, it is vital to emphasise the benefits of the offering to the students and what they could learn by using the different pieces of machinery. In order to avoid discouragement and frustration, the expectation management for students needs to be improved so they get a realistic impression of what kind of support is provided by the staff and at which magnitude.

Finally, the ability to **involve external companies** with attractive offers and very good **communication with the top management** as a means of keeping all parties interested is essential to Skylab's success.

10. FUTURE CHALLENGES

There are various challenges for Skylab to sustain the current positive development:

- ▶ **Focusing** on a particular field of students is currently not applied. On the basis that students need to be addressed differently, there is a room for efficiency improvements regarding more specific machinery which can be closely related to the

studies or more focused workshops. Another challenge is to re-focus the work efforts and structure the tasks so the staff available can direct their time towards users' support instead of branding themselves. Also, looking at the focus, the expansion of offering (e.g. incubator) needs to be chosen wisely, to adapt to new and diverse needs of more developed start-ups.

- ▶ **Commitment and enthusiasm** from the users is just as important as that of the partners. Advocates from any stakeholder group are needed to convince others to join the initiative. If the current entrepreneurship trend decreases along with the number of Skylab users, the university management would still need to show its commitment and support to Skylab to keep the enthusiasm. Currently, students raise the issue that external organisations also need to commit more to the projects so that students are guided more closely. This could be potentially accomplished with commitment contracts which outline the collaboration with the students.
- ▶ **Scaling** and success measurement is a big challenge because proof needs to be given by how much the outcome will increase with an increase of monetary input. The open communication of existing methods and results contributes to a significant positive perception of stakeholders.
- ▶ Another challenge is to maintain the **balance between the agility and experimental nature** of Skylab and the administrative regulations that increase as Skylab grows. Although Skylab is not an autonomous organisation, it benefits from a high level of freedom to create the necessary experimental attitude.
- ▶ Resources might become a challenge for the future, as budgets change towards **competing projects**, according to new trending topics or new societal needs. When looking at competing projects, a further challenge can be to keep the consent of all departments to have one hub and not multiple hubs serving each department.

11. CONTEXT

Scanning the context to understand the environment of Skylab, three factors need to be mentioned. First, Skylab is part of a technical university with a campus covering a large area. The former explains the high focus of Skylab on building prototypes. The latter unintentionally influenced the main audience that leans more towards engineering students, as these have their main buildings close to Skylab.

The second factor is derived from governmental policies. The impact of Skylab on students is negatively influenced by a new reform called the "State Educational Grant and Loan Scheme"¹⁵ released in 2013 pushing students to earn their degree on time.¹⁶ The timeframe for financial support (free tuition and living allowance) received by students decreased, forcing students to focus on their study course. This shortened the average time spent for a study course by four months, which has a high value for the society in general (i.e. students start working sooner).¹⁷ At DTU the rate of master students finishing their studies in the prescribed time increased by 6% from 2013 to 32%. Students finishing their studies a year after reached 82%, an increase of 8% since 2013.¹⁸ This circumstance on the other hand is not compatible to allowing students to test their potential by pursuing an entrepreneurial venture.

Lastly, technical students of DTU are in a very lucky position to study in the Greater Area of Copenhagen as it opens collaboration opportunities with other great universities in the area (e.g. University of Copenhagen, Copenhagen Business School etc.). Furthermore, the start-up ecosystem in this area is flourishing and start-up activities are reaching record levels (i.e. in terms of investments).¹⁹ For the moment, it is safe to say that the odds are favouring student entrepreneurial activities.

12. KEY SUCCESS FACTORS

An **in-depth analysis of needs** on multiple levels (student, academics, DTU) **and a well-tested proof of the concept** phase during the pilot are the foundations for the development of what now became a solid innovation hub. A central element is the **commitment from stakeholders. Before the creation of Skylab, DTU-top management showed interest in fostering innovation by creating a position for Senior Vice President for Innovation.** Furthermore, the generation of buzz created awareness and, as a consequence, the participation of early adopters.

Overall, the combination of the right mind-set (“think big and global and learn from failures”²⁰); openness to all stakeholders’ ideas and new trends; opportunities for cross-disciplinary help amongst students; the right facilities (to test and validate hypothesis and redirect efforts if necessary); the right knowledge (business background of key staff members); the right network; a good amount of inspiration and the opportunity to apply the knowledge and ideas by working with machinery are key factors for success. By helping students to find their real motivations, mentors, coaches and Skylab staff members play an important role. The necessary development of technical students from generalists to entrepreneurial thinkers was achieved by setting technical and business knowledge at an equal level.

Another success factor is the high student-interest for this hub and their involvement which increased when they recognised that their feedback was taken seriously. Consequently, the community built around Skylab acts as a motor that drives the initiative with current users serving as passive ambassadors.

On a structural level, the crucial success factor are to:

- ▶ build a community from day one;
- ▶ test the activities;
- ▶ include students in the process of building everything up;
- ▶ include academia and lecturers in the process to have close access to their knowledge;
- ▶ secure engagement from university leadership;
- ▶ convince people to fund Skylab, by showing them mutual benefits;
- ▶ team up the right people with different necessary capabilities to each of the most promising ideas during business projects and
- ▶ include business mentors who work closely together with the teams.



Further Information

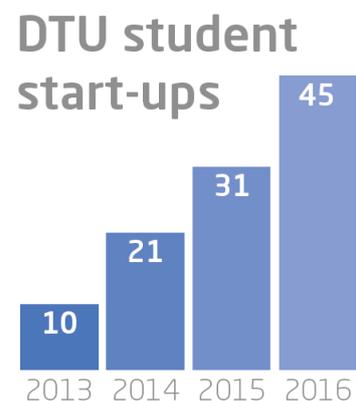
13. MONITORING AND EVALUATION

Scaling Skylab to reach more students is very difficult due to the rapid growth from a small prototype to a high-profile place. However, representatives acknowledge the importance of a profound evaluation in order to:

- ▶ improve developed real-world solutions;
- ▶ steer the initiative more efficiently;
- ▶ and report to stakeholders.

In order to quantify sustainability and involvement, some of Skylab measures are:

- ▶ Start-up-Engagement
 - No. of (pre-) start-ups coached (133 in 2016);
 - No. of new registered companies (45 in 2016)
 - No. of prototypes (300 in 2016);
 - No. of registered students in the workshop rooms;
 - No. of registered projects (650 in 2016);
 - No. of meetings with students;
 - No. of events (94 in 2016)
 - No. of visitors (75,062 in 2016)
- ▶ Academia Engagement
 - No. of courses (23 in 2016);
 - No. of participants (+1100 in 2016);
 - No. of lecture hours (+1700 in 2016);
 - No. of departments (6 in 2016).
- ▶ Real-Works Engagement
 - No. of companies (10 in 2016)
 - No. of challenges (14 in 2016)
 - No. of solutions (33 in 2016)



This is how Skylab is continuously self-evaluating, whereby a necessity to change can quickly be observed because at some point they cannot keep up with pace of growth. For the moment, this is a good way to demonstrate acceptance and keep the morale of the top-management high, to develop more links to academics and to show traction to external partners and sponsors.

Measuring the success by activities is not very precise, as the main goal is to create that melting pot with a vivid community, which is hard to measure. Currently, Skylab is more data driven.

14. SUSTAINABILITY MEASURES

In addition to continuously applying for grants to acquire financial resources, the major sustainability measures lies in keeping the morale high of the stakeholders. A job that requires the management of Skylab to invest significant resources.

15. TRANSFERABILITY

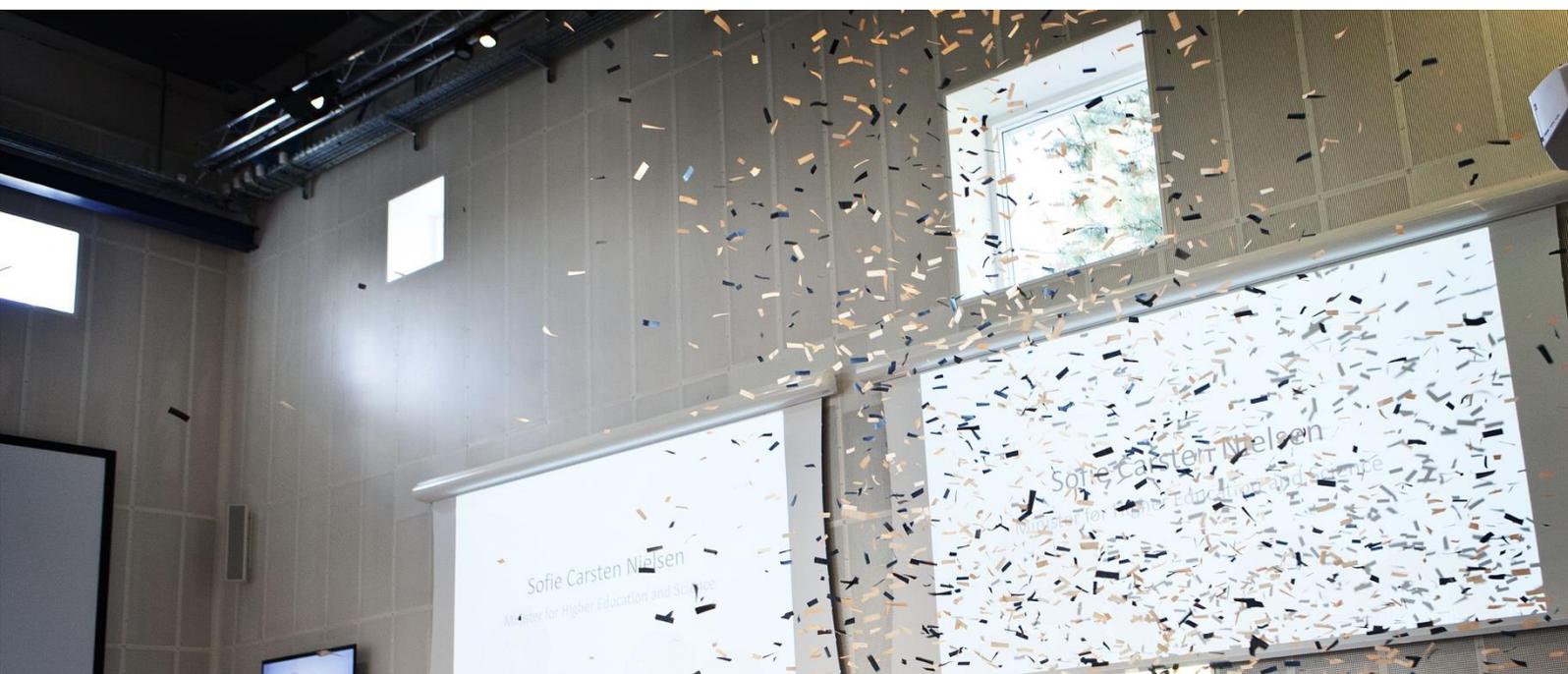
Throughout the world, different types and structures of innovation hubs exist, and Skylab offers a good-practice example for this type of initiative. To replicate this approach, it is necessary to understand that the vision, mission and the scope are built around DTU and its own mission to be a technical but entrepreneurial university. It is necessary to have the best possible understanding of the environment and of the motives of the stakeholders that need to be synchronised.

Looking at the development process, the key message when implementing an innovation hub is to start lean and scale at the right time. Furthermore, openness, flat hierarchies and students' active involvement also seem to be important to create a similar hub. Most of Skylab success factors could be considered and adapted for similar initiatives.

Guidelines to replicate the OI-X programme already exist and can be requested from Skylab.

16. LINKS

Skylab Homepage: <http://www.skylab.dtu.dk/>



17. CONTACT PERSON



Mikkel Sørensen,
Head of DTU Skylab
misoe@dtu.dk

18. REFERENCES

- ¹ http://www.Skylab.dtu.dk/about_us
- ² <http://www.industriensfond.dk/english/about-the-foundation>
- ³ http://www.skylab.dtu.dk/focus_areas/startups/skylab_funding
- ⁴ <http://www.skylab.dtu.dk/programmes/>
- ⁵ http://www.skylab.dtu.dk/programmes/skylab_ignite
- ⁶ http://www.skylab.dtu.dk/programmes/grow_nordic
- ⁷ <http://www.skylab.dtu.dk/programmes/nordic-entrepreneurship-hubs>
- ⁸ <http://www.skylab.dtu.dk/programmes/evp>
- ⁹ <http://www.skylab.dtu.dk/programmes/eu-xcel>
- ¹⁰ <http://www.skylab.dtu.dk/programmes/sdgii>
- ¹¹ <http://www.skylab.dtu.dk/programmes/oi-x>
- ¹² DTU Skylab (2016): Mini annual report 2016. (available at http://www.skylab.dtu.dk/about_us/press)
- ¹³ DTU (2016): DTU in profile 2016. Available at <http://www.dtu.dk/english/About/PRESS-ROOM/Publications>
- ¹⁴ <https://www.seedcapital.dk/>
- ¹⁵ <http://www.su.dk/english/state-educational-grant-and-loan-scheme-su/>
- ¹⁶ <http://cphpost.dk/news/danish-students-finishing-their-studies-faster.html>
- ¹⁷ <https://www.theatlantic.com/education/archive/2015/06/denmark-pushes-college-students-graduate/395666/>
- ¹⁸ Danske Universiteter (2016): Universiteternes Statistiske Beredskab. Available at <http://www.dkuni.dk/Statistik/Universiteternes-statistiske-beredskab>. Last accessed on 27.03.2017
- ¹⁹ <http://nordic.businessinsider.com/denmarks-startup-scene-is-record-hot-2016-9/>
- ²⁰ http://www.skylab.dtu.dk/about_us/history