Regional Deep Tech Commercialization Trajectory Report – The Netherlands

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DT LAUNCH PAD

Enabling Deep Tech Entrepreneurship

Synthesis Report: The Netherlands

Regional Deep Tech Commercialisation Trajectory Report

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Project Consortium

Technische Universiteit Delft (TU Delft) – The Netherlands
University Industry Innovation Network BV (UIIN) – The Netherlands
Univerza V Ljubljani (UL) – Slovenia
Momentum Marketing Services Limited (Momentum) - Ireland
Crazy Town Oy (Crazy Town) - Finland
Institut Mines-Telecom (IMTBS) - France
Munster Technological University (MTU) - Ireland
accent Inkubator Gmbh (accent) - Austria
Ege University (Ege University) - Turkey

1 | INTRODUCTION & POLICY

a. Introduction to the DTLaunchPad Project

The Deep Tech Innovation Launch Pad (DTLaunchPad) project aims to enable the European Deep Tech Community by creating coordinated support services, building the capacity of Deep Tech talent within participating Higher Education Institutions (HEIs), encouraging international knowledge exchange, and providing partner talents with opportunities to initiate and sustain Deep Tech start-ups.

More specifically, the DTLaunchPad project explores the needs and opportunities for Deep Tech at participating HEIs and incubators through primary and secondary research and asset mapping. It will enable European Deep Tech talent through a Deep Tech to Market Services pack, which includes a training programme, (pre-)incubation and acceleration services, mentoring and peer-to-peer exchange. This will involve pilot testing these programmes with training participants, Deep Tech teams incubated/accelerated per partner region, and a cohort of mentors. The project will create a platform to pool and host Deep Tech opportunities, encouraging international team building and resource gathering.

Through the project activities, we will raise awareness of the Deep Tech pathway with educational Introduction to Deep Tech video services, a series of Introduction to Deep Tech mini workshops, and promotional multiplier events. We will bring together the European Deep Tech community, allowing Deep Tech trainees to present their ideas and be exposed to potential funding bodies, culminating in a Fundraising Fair with over 100 participants from across Europe.

The project consortium represents all drivers of Deep Tech entrepreneurship in European regions. This includes two Technological Universities (TU Delft and MTU), which bring extensive expertise and experience in fostering Deep Tech entrepreneurship; three comprehensive universities (IMTBS, Ege, UL) providing alternative expertise and will cascade Deep Tech knowledge to European comprehensive universities; an incubator/accelerator (accent) to bring on-the-ground knowledge of the start-up process; two business partners (Crazy Town and Momentum) to enhance the reach of the project, community development and sharing of outputs; and a VET provider (UIIN) to provide high-quality staff training.

The purpose of this report is to provide an overview of the deep tech entrepreneurship landscape in the Netherlands, with a particular focus on the energy and sustainability sectors. It aims to explore the current state of deep tech commercialisation, highlight the available support mechanisms, and identify the challenges and opportunities within the ecosystem. The intended audience includes academic institutions, policymakers, entrepreneurs, investors that are and want to be involved in deep tech venture development. The report is designed to inform these national and international stakeholders about the unique aspect of deep tech venturing, existing infrastructure,

policies, and funding opportunities that can support the growth and scaling of deep tech ventures in the Netherlands.

b. Deep Tech Regional Policy in the Netherlands and South Holland

The Netherlands is globally recognised for its robust support system for startups, particularly in the deep tech sector. The policy context of deep tech in the Netherlands is shaped by several factors, including government initiatives, funding mechanisms, regulatory frameworks, and collaborative ecosystems aimed at fostering innovation and commercialisation of advanced technologies. **The Ministry of Economic Affairs and Climate Policy (EZK)**[1] is the main responsible actor for developing policies for renewable energy, energy transition, and R&D programmes. **The Netherlands Enterprise Agency (RVO)**[2], which is a part of the EZK provides direct support via funding mechanisms such as research grants, public loans, guarantees, and tax reliefs. Another key actor in Dutch deep tech ecosystem is the **Netherlands Organisation for Applied Scientific Research (TNO)**, an independent research organisation with a strong focus on applied research and technology development in collaboration with universities and deep-tech ventures.

The regional policies also play a significant role. **Regional Economic Development Agencies** support Dutch startups & scale-ups to stimulate the innovation potential of the region. For example, **InnovationQuarter** is the regional economic development agency for the Province of Zuid-Holland, where cities of Leiden, Den Haag, Delft, and Rotterdam are located. Municipalities also take roles in supporting the regional innovation ecosystems. For example, Municipality of Rotterdam launched the **Rotterdam Climate Initiative (RCI)** program. It supports startups and projects that contribute to reducing CO2 emissions and promoting sustainable energy solutions. The RCI offers grants, business development support, and pilot project opportunities within the city's infrastructure (Rotterdam - POLIS Network).

In this report, we have outlined key government initiatives, funding mechanisms, and policies related to sustainability and energy. Our aim is not to overwhelm with the extensive amount of available information but rather to provide a broad overview of the ecosystem, illustrating the general climate for deep tech ventures in the fields of energy and sustainability.

Key government initiatives:

Since 2010, the Netherlands' enterprise policy shifted from direct subsidies to a more facilitative role. The **'top sector policy'**[3] was introduced to enhance the impact of

[1] www.government.nl/ministries/ministry-of-economic-affairs

[2] www.rvo.nl

[3] www.topsectoren.nl

public R&D by encouraging initiatives from knowledge institutes and companies. ‘Top sectors’ are clusters of companies and knowledge institutes that focus on Dutch R&D, are export-intensive, and address societal challenges. The joint effort within the government's so-called mission-driven innovation policy amounts to €5.7 billion annually[4]. Of that amount, €1.4 billion comes from companies and €4.3 billion from public funds. This policy aligns with the European Green Deal[5], emphasizing energy transition, reduction of carbon emissions, and promoting a circular economy. The Netherlands has committed to establish a fully sustainable energy supply by 2050, with a significant CO2 reduction of 80-95% compared to 1990[6], and this ambitious goal drives the deep tech ecosystem, particularly in the energy sector.

Led by 'Top Teams' comprising business, research, education, and government leaders, these teams create **'Knowledge and Innovation Top Consortia' (TKI)** and develop joint **Knowledge and Innovation Agendas (KIA**) to drive innovation and competitiveness. The government supports these programs with additional funding to enhance the effectiveness of public research. Two of the ten top TKIs are **'Holland High Tech'[7]** and **'Energy Innovation NL'[8].** These are independent foundations (Stichting TKI) that is funded by the EZK. Holland High Tech stands for high-tech systems and material (HTSM) sector supporting the development and growth of deep tech innovations, while Energy Innovation NL focuses on energy transition regardless of the level of technology depth. They coordinate and facilitate the knowledge and innovation programmes and branding activities in their focused top sector. Their actions lines are collaboration and connecting, knowledge sharing, strategic program delivering, and supporting SMEs.

These TKIs implement the government's **The Public-Private Partnership (PPP) allowance scheme** (PPS-toeslag in Dutch) to supports entrepreneurs conducting R&D projects with minimum cost of 2 million Euros in partnership with Dutch knowledge institutes[9]. Holland High Tech deliberately work towards stimulating the innovation for SMEs via **Innovation Brokering** and **Networking Activities** so that their involvement in R&D increases. To enhance the talent base for the high-tech sector, they support **jointly designed training courses** by educational institutions and businesses, promote the **role models in tech**, and **facilitate learning communities.**

Another prominent government initiative is **TechLeap[10]**, a non-profit organisation backed by the EKZ. Founded in 2015, TechLeap is the government's temporary booster program to accelerate the Dutch tech ecosystem. Constantijn van Oranje, from the royal family, is appointed to TechLeap to support this policy as Special Envoy. The

[4] Rijksoverheid, 2023, November 2
[5] www.consilium.europa.eu/en/policies/green-deal
[6] www.energie-agenda.nl
[7] www.hollandhightech.nl
[8] www.topsectorenergie.nl
[9] Netherlands Enterprise Agency, 2024
[10] www.techleap.nl

government will continue TechLeap for another 3 years (2023-2026) with a budget of €15 million[11]. Focusing on knowledge-intensive start-ups (deep tech) is one of the five ambitions alongside financing, talent, tech jobs, growth to scale-ups. Their sub-branch **TechLeap for Deep Tech**[12] supports deep tech companies that develop and commercialise breakthrough technologies to solve major societal and environmental challenges, which can typically take 8-12 years. By empowering Dutch leaders in tech, TechLeap aims to accelerate the business development of academic spin-offs, by identifying bottlenecks and barriers to growth and advise or support action plans to limit these, organizing academic startup competition, and bring 30 startups to scale-up stage.

Funding Mechanism:

Invest-NL[13] is a private company financed with public funds. Ministry of Finance is the shareholder and appoints a supervisory board that supervises the management of Invest-NL. With various funding initiatives, Invest-NL aims to facilitate major transitions in the Netherlands, focusing on Deep Tech, Biobased & Circular Economy, AgriFood. For example, in 2022, EZK and Invest-NL jointly launched the €250 million **Deep Tech Fund (DTF)** to support knowledge-intensive start-ups and scale-ups in sectors like photonics, quantum technology, nanotech, and high tech. The fund aimed to enhance the technological knowledge and international competitiveness of the Netherlands, with €175 million contributed by EZK and the remainder by Invest-NL. DTF focused on companies with innovative, complex technologies that struggled to secure financing due to high risks and unproven concepts. Operated independently within Invest-NL, it featured independent fund management and an Investment Committee for binding investment decisions.

Another direct investment mechanism of the Dutch government to deep tech ventures is the **Dutch Future Fund (DFF)**[14], a €300 million fund together with InvestNL and the European Investment Fund. At the later stages of the ventures, the Dutch government is investing €20 billion in projects that ensure long-term economic growth with the **National Growth Fund**[15]**.** The Dutch government has also indirect investment mechanisms. Through RVO, the Dutch government's **Seed Capital scheme**[16] provides interest-free loans to investment funds for up to 12 years, with a requirement that at least three independent shareholders match or exceed the government's contribution. The funds are designated for tech startups active for no more than seven years since their first commercial sale, with investments ranging from €100,000 to €3.5 million per company. The scheme targets closed-end venture capital funds, aiming to support technical and creative startups by providing risk capital.

[11] Rijksoverheid, 2023, May 11
[12] www.techleap.nl/deeptech
[13] www.invest-nl
[14] www.eif.org/what_we_do/resources/dutch-future-fund/index.htm
[15] www.nationaalgroeifonds.nl
[16] www.rvo.nl/subsidies-financiering/seed-capital

In addition to those investment funds, several governmental credit and fiscal schemes are available in the Netherlands to support innovation, especially for startups and SMEs. For example, the **Innovation Credit** is designed for innovative projects with high technological risks and strong market potential, providing financing up to 45% of the project's costs. Meanwhile, the **Proof-of-concept Funding** offers loans to startups and SMEs to explore the feasibility of their ideas in the market, with repayment required along with interest. It targets three specific groups: SMEs, innovative startups (up to five years old), and academic startups that benefit from university research. Additionally, the **WBSO** (R&D tax allowance scheme) helps reduce R&D wage costs and expenses related to prototypes or research equipment. Lastly, the **BMKB (SME Credit Guarantee scheme)** allows businesses to secure more credit from banks than would typically be possible given their collateral, offering a valuable option for expanding access to capital. RVO developed and online **Subsidy and Funding Guide**[17] for startups and SMES to search all the available funding opportunities that suits their own focus and interest.

Specific Policies for Energy & Sustainability Ventures

Energy and sustainability have utmost importance for Dutch economic development. This can also be understood the organisation of Dutch government as the economic affairs and climate policy are merged in one ministry. And as mentioned, one of the top ten key sectors, **Energy Innovation NL**, is dedicated to this domain.

For Dutch sustainable and innovative projects, €350 million in guarantees can be provided from the so-called InvestEU programme. A guaranteed agreement between InvestEU and Invest-NL was signed in 2023. According to the European Commission, access to these European financial guarantees can lead to €750 million in investments in the Netherlands[18]. The agreement helps Invest-NL finance high-risk projects, particularly in sustainable energy and deep tech. In addition, **Deeptech Equity NL,** a thematic investment fund, provides growth and buyout capital for deep tech climate companies up to their IPO phase. Offers equity tickets of €30+ million and non-dilutive growth capital through a global network.

The **MIA (Environmental Investment Deduction)** and **Vamil (Arbitrary Depreciation of Environmental Investments)**[19] schemes provide tax benefits for entrepreneurs investing in environmentally-friendly technologies. Both schemes are designed to encourage investment in sustainable technologies and offer financial incentives to reduce environmental impact.

Regional level initiatives – South Holland

[17] https://english.rvo.nl/subsidy-guide
[18] European Commission, 2021
[19] https://english.rvo.nl/subsidies-financing/mia-vamil/entrepreneurs

At regional level in South Holland, **InnovationQuarter[20],** provides several funding opportunities to Deep Tech Startups, especially in the Energy & Sustainability Domain. Their main funding schemes over the lifecycle of venture development of are listed below:

- **InnovationQuarter Capital**

A fund of € 143 million for investments in disruptive startups & scale-ups with high technological risk and a need for patient capital.

- **ENERGIIQ[21]**

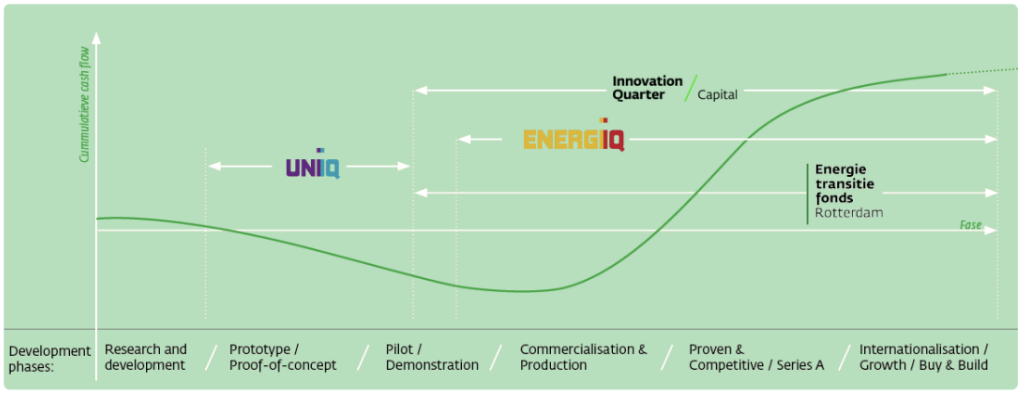
A fund for financing the commercialisation of proven energy innovations that leads to CO2 reduction. The € 35 million fund is powered by the Province of Zuid-Holland.

- **UNIIQ[22]**

A € 47 million seed fund, focused on the proof-of-concept phase to bridge the riskiest phase from concept to promising business. UNIIQ is powered by the European Union.

- **Energy Transition Fund Rotterdam[23]**

A € 100 million investment fund that finances disruptive companies and sustainable projects that realise CO2 reduction, improvement of air quality and a reduced use of raw materials.



2 | METHODOLOGY

Research Methodology

This report was developed using a methodology that included a literature review, asset mapping, in-depth expert interviews. A roundtable discussion is organised to validate key findings. The research activities took place between March 2024 and July 2024.

[20] www.innovationquarter.nl
[21] www.energiiq.nl
[22] www.uniiq.nl
[23] https://www.innovationquarter.nl/item/energietransitiefonds-rotterdam/#toggle-id-1-closed

As a Higher Education Institution located in Delft, South Holland, TU Delft is a key partner in the DT Launchpad consortium. Our research and this report provide insights into both the national and regional contexts of the Netherlands, with a specific focus on Deep Tech in the fields of Energy and Sustainability. This focus reflects TU Delft's expertise and contributions in these areas.

Literature Review

The literature review aimed to assess the current state of Deep Tech commercialisation in the Netherlands, with an emphasis on Energy and Sustainability sectors. This involved identifying opportunities, challenges, required support, and skill gaps among Deep Tech talent for successful commercialisation in these fields. The review primarily focused on grey literature to document these insights.

Asset Mapping

The purpose of asset mapping was to identify and catalogue existing resources, assets, and stakeholders that support Deep Tech commercialisation in the South Holland regional and at TU Delft in the institutional level. The mapping also placed a specific focus on the South Holland innovation ecosystem—one of the key hubs of the Dutch Deep Tech scene.

Interviews

The interviews had two main objectives: (1) to gather insights on the opportunities, challenges, and success factors of Deep Tech commercialisation in the Netherlands, especially in Energy and Sustainability, from experts in the field, and (2) to assess the current state of Deep Tech pre-incubation, incubation, and acceleration services, identifying any gaps. TU Delft conducted ten interviews with experts and educators to achieve these goals (See Appendix A for the list of interviewees).

Deep Tech Community Roundtable

The Deep Tech Community Roundtable aimed to corroborate, validate, and refine the insights gathered from the Literature Review, Asset Mapping, and Interviews. The discussion focused on evaluating the current status of Deep Tech commercialisation trajectories at both Dutch and regional levels, particularly in the Energy and Sustainability sectors. Seven experts with diverse experience background attended the roundtable meeting (See Appendix A for the list of roundtable participants).

3 | DEEP TECH COMMERCIALISATION IN THE NETHERLANDS

a. How Deep Tech Ventures are Different from Standard Tech Ventures

i. OVERVIEW

Deep tech innovations are “disruptive solutions that emerge from unique, protected, or challenging-to-reproduce technological or scientific advancements”[24]. These innovations are not just incremental improvements; they are transformative breakthroughs that can redefine industries or create entirely new ones. Hence, deep tech-based ventures defined as “companies founded on a scientific discovery or meaningful engineering innovation.”[25] Deep tech is characterized by five key dimensions, each of which highlights the profound nature of these innovations[26]:

1. **Deep as fundamental** – This aspect emphasizes that deep tech is rooted in significant scientific discoveries or major engineering advances. These are not superficial changes but foundational shifts that open up new possibilities, often based on cutting-edge research or breakthroughs that push the boundaries of what is scientifically or technologically possible.
2. **Deep as complex** – Deep tech requires a high level of complexity, involving the integration of advanced knowledge across multiple domains. It necessitates an understanding of the intricate interdependencies between different systems, technologies, or scientific principles. The complexity often means that deep tech solutions are not easily replicable and require specialized expertise to develop and maintain.
3. **Deep as distant** – Unlike conventional innovations that might quickly reach the market, deep tech often has a longer development timeline. These innovations require extensive research, prototyping, and testing before they can be commercialised. The path from idea to market is typically longer and more uncertain, requiring patience and sustained investment.
4. **Deep as beneath** – Deep tech often serves as the underlying foundation for applications that ultimately benefit end customers. While the end-user might interact with a polished product or service, the deep tech behind it is what enables its functionality. This foundational nature means that deep tech can be invisible to the end user but is critical to the operation and success of the final product.
5. **Deep as profound** – The impacts of deep tech are profound and far-reaching, often challenging to measure or predict in the short term. The effects of deep tech innovations can ripple across industries, economies, and societies, leading to significant changes in how we live and work. The profound nature of these impacts can make it difficult to fully grasp the long-term implications of deep tech.

ii. Unique aspects of Deep Tech Ventures

When comparing and contrasting deep tech ventures and non-deep tech ventures, several distinct differences and similarities emerge across various aspects. These

[24] De La Tour et al., 2017
[25] Chaturvedi, 2015, p. 1
[26] Romasanta et al., 2022

insights emerged from the expert interviews and supported the extant literature on deep tech venturing. The key unique aspects related to formation and growth of deep tech startups are summarised below:

Starting Point: Deep tech ventures begin with a research-oriented focus, often grappling with questions such as whether the research can be commercialised and what kind of product could be developed. This process involves identifying potential customer partners for early-stage testing and raising societal awareness about the problem being addressed, which can be both difficult and essential. In contrast, non-deep tech ventures start with a clearer business idea or proposition, where the product and market are more defined, allowing them to move forward with greater clarity and purpose from the outset.

Team Building: Building teams is more challenging for deep tech ventures, primarily because they require specialized expertise in scientific or technological fields, and the uncertainty surrounding the commercialisation of their innovations can make recruitment difficult. Non-deep tech ventures, however, typically have an easier time assembling teams due to the accessibility of required expertise and the clearer market proposition, which attracts talent more readily.

Time to Market: One of the most significant differences lies in the time to market. Deep tech ventures require a longer development timeline, needing substantial effort to transition from concept to commercialisation. Their progress is often slow and structured, with sequential development cycles and tight integration of hardware and software, making it impossible to test unfinished products. On the other hand, non-deep tech ventures can bring products to market much faster as they develop using existing technologies. Their product development approach is iterative, allowing for quick adaptations and continuous improvement.

Validation: For deep tech ventures, validation is centred on creating a Minimum Viable Ecosystem due to the complex and interdependent nature of their technologies. This complexity often leads to a longer and more resource-intensive "Valley of Death," where the transition from research to a marketable product can take many years and require significant investment. Conversely, non-deep tech ventures focus on developing a Minimum Viable Product, which enables quicker market readiness and less capital-intensive validation. Their "Valley of Death" is typically shorter, as they can demonstrate rapid user adoption and revenue generation, helping to attract continuous investment.

Scalability and Adoption: Scalability in deep tech ventures often involves industry-scale manufacturing, where sales volumes are large, but the technology's complexity can make adoption challenging. Investors and customers may require a higher level of trust and a stronger value proposition, usually within a B2B context. Non-deep tech ventures, especially those in B2C context, by contrast, focus on scaling by growing their user base, with sales driven by the per-unit success of their products. Adoption is

relatively easier, as their technologies are more familiar to customers who are further along the technology adoption lifecycle, reducing the need for extensive market education.

Support Needs: Deep tech ventures require extensive, long-term support, including deep industry-specific knowledge, strategic partnerships, and continued backing from research institutes. They also face high barriers to entry and longer timeframes to market readiness, making ongoing support from scientific founders and advisory boards crucial. Non-deep tech ventures, however, require initial funding and scalable infrastructure for rapid development. While they benefit from mentorship and guidance, they generally need less specialized support compared to deep tech ventures, relying more on understanding market trends and customer feedback.

Risk and Investment: The risks associated with deep tech ventures are generally higher, due to the complexity of the technology, extended development timelines, and the possibility of technological obsolescence before market readiness. These ventures also require significant upfront investment in infrastructure, such as factories and clean rooms, and have varying investor appetites due to the high stakes involved. Non-deep tech ventures face lower overall risks, with less complex technology, shorter development timelines, and lower capital requirements. They also face fewer regulatory challenges, reducing the risk of delays and additional costs. Investment in non-deep tech ventures is often focused on product development and marketing, with competitive advantages stemming from innovative business models that exploit existing technologies.

Competitive Advantage and Disadvantage: Deep tech ventures gain competitive advantage through novel technologies that are difficult to replicate, but they often suffer from limited brand recognition and direct consumer engagement, which can hinder their ability to build a strong, recognizable brand. In contrast, non-deep tech ventures benefit from direct consumer engagement, rapid feedback and iteration, broader market appeal, and easier access to funding, all of which contribute to a more straightforward marketing.

b. The Current State of Deep Tech Commercialisation on a Regional Level

i. Overview

The Netherlands is one of the top innovation leader countries that ranks 7th in the world and 5th in Europe[27]. Dutch startup ecosystem has also positive atmosphere. It is positioned 14th worldwide and 2nd in Europe after UK[28]. In the Netherlands, there are more than 10,000 start-ups, including more than 10 with a value of more than 1 billion

[27] Global Innovation Index, 2023
[28] Startup Genome, 2024

dollars[29]. The deep tech plays a crucial role in the Dutch tech startup ecosystem due to its potential for tremendous performance improvements over existing solutions and its capability to address significant societal problems such as climate change and energy transition. Among the more than 10,000 start-ups are approximately 1,400 are deep tech companies[30]. The Dutch government, through initiatives like TechLeap, underscores the importance of deep tech by enhancing access to capital, markets, and talent, thereby creating an ideal environment for tech companies to scale.

By adopting a strategic approach towards their goals, the Netherlands has identified nine key enabling deep technologies across nine industries and four challenges that have the highest potential for impact on the Dutch economy and society (See Figure 1)[31]. This strategic focus reflects the country's commitment to fostering innovation and leveraging deep tech to drive economic growth and solve pressing societal issues.

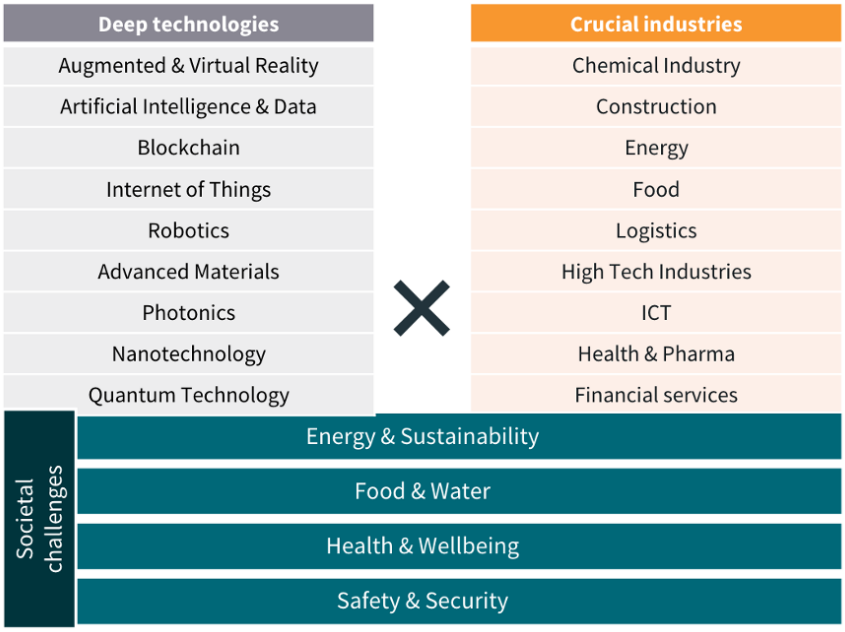


Figure 1: Deep Technologies and crucial industries for deep tech

The Dutch deep technology sector shows strong potential across multiple tech fields. Four strategic approaches are suggested based on the current position and economic opportunities (See Figure 2)[32]:

1. **Potential Winners**: Leverage scientific leadership and growing startup activity to secure a top 10 global position, with diverse applications across industries. Focus on maintaining leadership and fostering spin-offs with scaling potential.

[29]van, Cloosterman et al., 2021

[30] van, Cloosterman et al., 2021
[31] van, Cloosterman et al., 2021
[32] van, Cloosterman et al., 2021

2. **Competitive Arena**: Address intense scientific and startup competition by enhancing scientific leadership to discover and develop novel applications across various sectors.
3. **Early Stage**: Invest in advancing technologies from breakthrough research to practical applications, positioning them for long-term economic growth.
4. **Undecided**: Identify and develop niche areas where the Netherlands can specialize, even without overall strength, to uncover unique market opportunities.

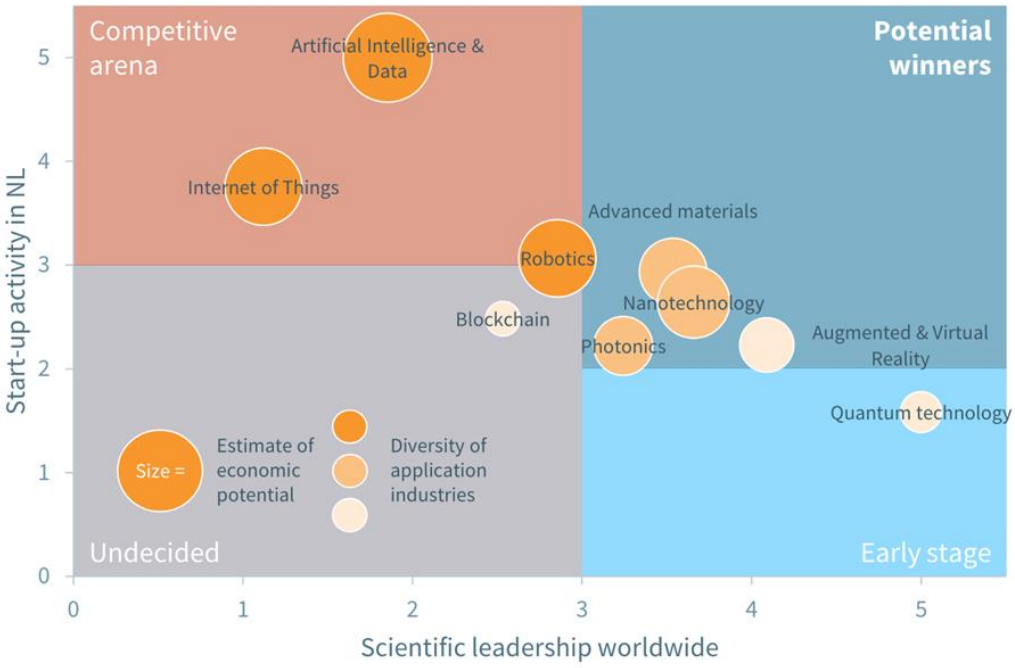


Figure 2: Strategic positioning for Dutch Deep Tech Sector

Support organisations and programs

The Netherlands has established an extensive support network for deep tech startups, comprising 260 organisations that provide a range of assistance, including entrepreneurial mentorship, funding opportunities, business development support, and community services. Initiatives like the Academic Startup Competition offer deep tech founders avenues to gain visibility, tap into resources, and expand their ventures. Furthermore, initiatives such as Deeptech Equity NL focus on funding the growth and scaling of groundbreaking companies, supporting them all the way to their IPO stage. TechLeap mapped out the Deep tech support organisation along the entrepreneurial journey from ideation to scale up (See Figure 3)[33].

[33] https://www.datocms-assets.com/34494/1687511578-deeptech-support-organizations.pdf

Figure 3: Dutch Deeptech Support Organisations

ii. Extent of the existence of three (i.e., [pre-]incubation and acceleration) deep tech commercialisation stages

This section provides an exemplary of key programmes available in South Holland that support deep-tech entrepreneurship at various stages, including pre-incubation, incubation, and acceleration. It is important to note that the distinction between these stages is often fluid and not always explicitly defined. Furthermore, several interview participants expressed that categorising these programmes by stage may be unnecessary or even confusing. Nevertheless, we have applied this categorisation to help identify where further focus is needed for developing tailored training and support programmes, key activities of DT Launchpad project.

Typically, pre-incubation programs focus on entrepreneurs—both recent and aspiring—at the ideation phase, providing training on entrepreneurial thinking and processes while helping them to ideate and then validate their ideas. Incubation programs focus on existing teams and/or startups that are further in the stages, supporting them to build and iterate the product, strengthening their problem-solution fit, find a product-market fit, and get investment by showing an early traction. On the other hands, acceleration programs typically support startups that already have a validated product or service and are looking to scale their operations, enter new markets, or raise more significant investment.

Pre-Incubation:

- **TU Delft Impact Studio[34]:** Impact Studio supports commercialisation of TU Delft technologies via entrepreneurship. The team sources researchers with IP and link them with ambitious student entrepreneurs for 6-months long market validation programme.
- **4TU TTT Circular Technology Pillar 1[35]:** TTT (Thematical Technology Transfer) is a cooperative alliance between the Knowledge Transfer Offices (KTOs) of TNO and the 4TU universities (Delft University of Technology, Eindhoven University of Technology, University of Twente, and Wageningen University & Research), supported by Dutch venture capital funds, Innovation Industries and SHIFT Invest. One of the three theme is Circular Technology. Aimed at fostering innovations in the circular economy, their Pillar 1 program provides support for researchers that wants to start a spin-off for their Proof of Concept (PoC) activities, which focus on testing the technical feasibility of innovations, and for Business Development (BD) activities that help build a viable business.

Incubation:

- **Yes!Delft[36]**: Yes!Delft is the top tech incubator in Netherlands and in Europe. It has two main programmes that can be considered as incubation. Validation Lab is a 10-week program focused on finding a problem-solution fit and later Accelerator Programme is 3-months programme that help startups to gain market traction. Although the programme is open for all tech startups, there are many deep tech ventures incubated in Yes!Delft, especially those spun-off from TU Delft.
- **4TU TTT Circular Economy Pillar 2:** After Pillar 1, TTT Circular Technology provides an initial financing for young spin-offs, usually through convertible loans aimed at making them investor-ready. SHIFT Invest manages this support, providing funding along with hands-on guidance through their expertise and networks in the financial and industrial sectors.
- **PLNT[37]:** PLNT is Leiden Center for Innovation and Entrepreneurship in Leiden. Amongst their several different startups support programmes, unlock_Incubation programmes is particularly tailored to deep tech startups in Life Science & Health sector. They get help with their sectoral specific topics such as regulatory frameworks, IP protection & monetisation strategies, and healthcare financing & reimbursement pathways.
- **Delft Enterprise[38]:** They support startups that spun-off based on TU Delft IP to speed up their development. Although it is not designed as programme, Delft

[34] www.tudelft.nl/innovatie-impact/ondernemerschap/impact-studio
[35] www.tech-transfer.nl/en/services/circular-technology
[36] www.yesdelft.com
[37] www.plnt.nl
[38] www.delftenterprises.nl

Enterprise provide spin-offs with investment, advice and a broad network of investors and experts.

Acceleration:

- **Academic Startup Competition[39]:** It is an annual program designed to accelerate the growth of promising academic ventures from Dutch universities and research institutes. It aims to help founders focus on key challenges and unlock new opportunities. The program starts with 40 nominated teams from across scientific fields, who receive guidance from experienced founders, scientists, and investors. Through multiple rounds focusing on IP, execution, and team dynamics, teams pitch their progress. The top 10 teams are selected to join ScaleNL, a mission to Silicon Valley, where they meet entrepreneurs, investors, and ecosystem leaders. Two of the five domains are specifically dedicated to sustainability and energy transitions.
- **Pole Positioning Programme[40]:** Targets deep tech founders aiming to transition from successful pilots to commercial deployment and speed up towards Series A funding. Focuses on ventures with scaling potential, combining advanced hardware and digital technologies.

While not complete, these examples highlight the region's ongoing initiatives. A list of incubators, accelerators and other support organisations can be found at the project website in the asset mapping document[41].

iii. HIGHLIGHTS FROM VALIDATION AND INTERVIEWS

The Netherlands has a well-established support ecosystem for deep-tech ventures, particularly during the incubation phase, where startups receive guidance through their formation and early growth stages. This ecosystem is vital for fostering innovation and entrepreneurship across the region. However, despite the strengths of the current system, the interview insights pointed out that there are certain gaps and areas that require improvement to better support deep-tech ventures, especially as they scale and face new challenges. Addressing these shortcomings will be essential to enhancing the ecosystem and ensuring that deep-tech ventures can scale effectively and overcome the unique challenges they face.

Missing elements/improvement areas

One major issue is **the fragmentation of resources and expertise across various organisations, each offering different programs**. This fragmentation leads to inefficiencies and a lack of cohesiveness, making it difficult for startups to navigate the

[39] www.academicstartupcompetitfion.nl
[40] www.getinpoleposition.nl
[41] www.dtlaunchpad.eu/netherlands-asset-map

landscape. A more integrated and efficient overview of available support and guidance is essential to help founders and their teams access the right resources at the right time.

Another significant gap is **the lack of funding for first-of-a-kind large-scale field tests and scale-up facilities**. These are critical stages in the development of deep tech ventures, where the transition from laboratory to market-ready products occurs. Without sufficient funding, many promising innovations may never reach commercial viability. Additionally, there is **a need for more accessible lab space and university facilities that can support startups in their early stages**, providing them with the infrastructure necessary to test and refine their technologies.

Mentorship is another area where improvements are needed. A transparent and accessible network of mentors is crucial for startups, yet such networks are often difficult to find. **The challenge lies in ensuring that these networks are open and available to all**, rather than limited to those with the right connections. Leveraging alumni networks could be a potential solution, but strategies are needed to effectively trigger and engage these networks.

The founder's journey in deep tech is inherently challenging, requiring significant patience and perseverance for long-term success. Role models within the community who can share their experiences and offer insights are invaluable in this regard. However, there is **a need for more systematic interventions within the research community to ensure that these role models and other support structures are readily available and effective**.

There is also **a risk that deep tech ventures may become too focused on the technology itself, neglecting the client perspective**. This can lead to resistance from the market if the technology does not align with customer needs or if there is insufficient market pull to complement the technology push. A balanced approach that considers both the technological innovation and market demand is necessary to ensure that deep tech ventures can successfully bring their products to market.

Finally, the several support structures are available for spin-off creation and support, but **more could be done to systematically support more researchers and ensure that the educational programs lead to tangible outcomes in terms of startup creation and development**.

Overall, while there are several promising initiatives in place, there is a clear need for more cohesive support, even more funding opportunities, accessible mentorship, and a balanced focus on both technology and market needs that can be taught by educational programmes tailored to researchers.

c. Common Barriers and Enablers of Deep Tech Commercialisation in The Netherlands

i. Overview

A numerous barriers, challenges, and enablers for Deep Tech Commercialisation in the Netherlands identified during the interviews and roundtable sessions. However, most of these barriers are not necessarily special to the deep tech climate in the Netherlands but rather tied to the nature of deep tech entrepreneurship.

ii. Barriers and Challenges

Founder Commitment: Founders of deep tech ventures face a complex journey that demands extraordinary patience and perseverance. Unlike other startups, where success can sometimes come quickly, deep tech ventures typically require a long-term commitment to navigate through the complexities of developing, testing, and bringing highly innovative products to market. This long-haul approach often means that founders must be prepared for years of hard work and uncertainty before they see any significant returns.

Talent Shortage: A major challenge for deep tech ventures is the shortage of talent willing to embark on the entrepreneurial path. The availability of more immediate and attractive opportunities in established companies often draws skilled individuals away from the risks associated with startups. This talent drain makes it difficult for deep tech ventures to build the strong, multidisciplinary teams needed to tackle the complex challenges they face.

Unencumbered IP: Intellectual property (IP) is a critical asset for deep tech ventures, but much of it is already tied up in public-private partnerships (PPP). This situation limits the availability of unencumbered IP that startups can leverage to build their products and businesses. As a result, deep tech ventures may struggle to secure the foundational IP necessary to differentiate themselves and protect their innovations.

Client Perspective: Balancing a strong focus on technology with a keen understanding of market needs is essential for deep tech ventures. While the technological breakthroughs that define deep tech are crucial, they must also address real-world problems and customer needs to avoid resistance. Without this balance, there is a risk that the technology may not gain the necessary traction in the market, leading to potential failure despite its innovative nature. Researchers lacks understanding of business perspective.

Development and Validation Costs: The development and validation phases in deep tech ventures are both critical and costly. Prototyping and testing require significant financial resources and specialized expertise, which can be prohibitively expensive. These high costs present a major hurdle for startups, particularly when combined with the already challenging task of raising sufficient funding in the early stages of development.

Funding Gap for Scaling Up: One of the most significant challenges for deep tech ventures is the funding gap that exists when scaling up from prototype to large-scale production. Local investments for such large-scale development are often insufficient, leading to under-investment in these critical stages. Without adequate equity and capital, the impact of mentorship and other forms of support is limited, making it difficult for ventures to reach their full potential.

Technological Complexity: Deep tech ventures operate at the cutting edge of technological innovation, often developing products or systems that combine complex hardware and software. This technological complexity introduces significant risk, as the successful application and scaling of new technology in industrial settings are fraught with challenges. The intricate nature of these technologies requires a deep understanding of multiple disciplines, adding layers of difficulty to the development process.

Long Time-to-Market: Deep tech ventures are characterized by long development cycles, often taking five to seven years or more to reach the market. This extended timeline necessitates substantial investments, both financial and human, over a prolonged period. The long time-to-market can strain resources and test the endurance of founders and their teams, who must remain committed to the venture's success despite the long wait for potential returns.

Collaborative Risk: The success of deep tech ventures often depends on extensive collaboration across an innovation ecosystem that includes suppliers, distributors, and other stakeholders. This reliance on multiple parties introduces collaborative risk, as the venture's value proposition can only be realized if all stakeholders are committed and aligned. Securing this level of commitment is challenging, especially when each party has its own interests and priorities.

Ecosystem Complexity: The ecosystem in which deep tech ventures operate is highly complex, involving a diverse array of actors, standards, and regulations. Resources and expertise are often fragmented across different organisations, making it difficult for startups to access the support they need in a cohesive manner. Navigating this fragmented landscape requires a deep understanding of the ecosystem and the ability to connect the dots between various players.

Physical Space Limitations: In the Netherlands, finding suitable space for factories and production facilities poses a significant challenge for deep tech ventures. The country’s limited physical space, coupled with stringent environmental regulations and the need for licenses, creates barriers to scaling up production. These constraints can slow down the venture's progress and add additional layers of complexity to the development process.

University and Bureaucracy: Universities play a crucial role in the development of deep tech ventures, providing access to research, facilities, and talent. However, the

bureaucracy associated with university resources can either enable or hinder venture development. Navigating the administrative processes within academic institutions requires time and effort, and the effectiveness of these interactions can significantly impact the success of a startup.

iii. ENABLERS AND SUCCESS FACTORS

Public-Private Partnerships: Public-private partnerships play a crucial role in the success of deep tech ventures by distributing risk across multiple stakeholders and fostering a supportive environment. These collaborations increase trust among participants, providing the ventures with a more stable foundation from which to develop and scale their innovations. By pooling resources and expertise, these partnerships help mitigate the high risks associated with deep tech development, making it more feasible for startups to navigate the complex journey from research to commercialisation.

Role Models and Coaching: The presence of successful deep tech ventures within the community serves as a powerful source of inspiration and guidance for new entrepreneurs. These role models demonstrate the potential for success and provide valuable insights into the challenges and opportunities within the deep tech space. Active mentorship from experienced entrepreneurs and industry veterans is essential, as it offers practical advice, encouragement, and strategic direction to those just starting out, helping them to avoid common pitfalls and build resilient businesses.

Startup Competitions: Startup competitions offer deep tech ventures an important platform for gaining visibility and credibility. These events provide peer recognition, showcasing the innovative potential of deep tech startups to a broader audience, including investors, industry leaders, and potential customers. The recognition gained from such competitions can significantly boost a startup's profile, opening doors to new opportunities and partnerships that are critical for growth and success.

Short-Term Milestones: For deep tech ventures, achieving and displaying short-term milestones is a key strategy for building legitimacy and attracting further support. These milestones serve as tangible proof of progress, helping to demonstrate the venture's capacity to develop and bring innovative technologies to market. By consistently hitting these targets, startups can build confidence among investors, partners, and other stakeholders, securing the resources needed to continue their long-term development journey.

Knowledge Brokers: Knowledge brokers play a strategic role in the deep tech ecosystem by translating complex scientific discoveries into useful and accessible knowledge that can be applied in practical, commercial contexts. These individuals or entities bridge the gap between academia and industry, ensuring that scientific advancements are effectively communicated and leveraged to create new products,

services, and business models. Their work is essential for turning theoretical innovations into market-ready technologies.

Ecosystem Orchestration: Effective coordination within the innovation ecosystem is critical to the success of deep tech ventures. Ecosystem orchestration involves ensuring seamless collaboration among the various heterogeneous actors involved, including researchers, startups, investors, industry partners, and regulators. This coordination helps to align goals, streamline processes, and foster an environment where deep tech ventures can thrive, overcoming the complexities that often arise in fragmented innovation ecosystems.

Alumni Networks and Tech Scouting: Leveraging alumni networks and systematic tech scouting are powerful tools for supporting deep tech developers. Alumni networks provide access to a wealth of experience, advice, and connections, helping startups navigate the challenges of the deep tech landscape. Systematic tech scouting, on the other hand, ensures that emerging technologies and innovations are identified and supported early, providing startups with the competitive edge needed to succeed in a fast-evolving market.

Incumbent Absorptive Capacity: The ability of established firms to absorb and integrate new technologies, known as absorptive capacity, is crucial for facilitating collaboration and technology transfer in the deep tech space. When incumbent firms have high absorptive capacity, they are better equipped to partner with startups, providing the resources and market access needed to bring new technologies to scale. This collaboration is mutually beneficial, as it allows established firms to stay at the cutting edge while providing startups with the support needed to commercialise their innovations.

Industry-Specific Knowledge: Navigating the deep tech landscape requires a deep understanding of industry-specific regulatory pathways and requirements. This knowledge is essential for startups to comply with regulations, avoid legal pitfalls, and successfully bring their products to market. Understanding these complex regulatory environments allows deep tech ventures to plan their development strategies more effectively, ensuring that they can meet industry standards and gain the necessary approvals.

Professionalism in Incubators and Accelerators: The success of deep tech ventures is often bolstered by the support of highly skilled staff in incubators and accelerators. These professionals provide essential services, from business development to technical support, that help startups grow and scale. Their expertise and experience are invaluable in guiding ventures through the various stages of development, ensuring that they have the resources and strategic direction needed to succeed.

Clear IP and Spin-Off Policies: Transparent policies on equity, IP ownership, and university support are critical for encouraging academic entrepreneurs to commercialise their technologies. A clear IP strategy, often favouring trade secrets due to the fundamental nature of deep tech discoveries, helps to protect innovations while allowing for successful commercialisation. These policies provide a framework that supports the transition from academic research to viable business ventures, ensuring that founders can navigate the commercialisation process with confidence.

The Netherlands has introduced transparent principles for transferring intellectual property (IP) from universities to academic spin-offs. These new guidelines are designed to simplify and accelerate the negotiation process between universities and spin-off companies, ensuring fairness and clarity. They outline how universities manage IP and share ownership when a researcher leaves to start a spin-off. Initially, the university retains a minority stake in the spin-off in exchange for the transfer of IP, but this share diminishes as more investors come on board, allowing the entrepreneur to assume greater control. This structure aims to safeguard spin-offs during their early stages while making them more appealing to investors.

Universities also have the flexibility to negotiate alternative arrangements such as licensing or royalty agreements. The implementation of these deal terms will be periodically reviewed by Knowledge Transfer Offices (KTOs) and Technology Transfer Offices (TTOs), in partnership with TechLeap, entrepreneurs, and investors, to ensure ongoing improvements. These guidelines were developed collaboratively by universities, investors, entrepreneurs, and supported by Techleap.nl.

Academic Pay Scale: The relatively lower pay scales in academia can drive some researchers to commercialise their technologies as a means of achieving financial compensation. This incentive, combined with the desire to see their innovations have a real-world impact, motivates academics to pursue entrepreneurial ventures. By creating startups, these researchers can bridge the gap between their academic work and its application in industry, providing them with both financial rewards and the satisfaction of contributing to society.

Intrinsic Motivation: Many researchers are intrinsically motivated by the desire to see their work applied in real-world contexts, where it can have a positive impact. This motivation drives them to commercialise their technologies, transforming theoretical discoveries into practical solutions that address pressing challenges. This sense of purpose is a powerful force behind many deep tech ventures, inspiring founders to persevere through the long and difficult journey of bringing new technologies to market.

Senior, Experienced Individuals: Having senior, experienced individuals as part of a deep tech venture team enhances the startup's credibility and increases its chances of success. These individuals bring valuable knowledge, networks, and strategic insights that are crucial for navigating the complexities of the deep tech landscape. Their

involvement can also help to attract investors and partners, providing the startup with the resources needed to grow and scale.

Specialized Labs: Specialized labs, often integrated with universities and knowledge institutions, provide deep tech ventures with the infrastructure and resources necessary for advanced research and development. These labs offer access to cutting-edge equipment, expertise, and collaborative opportunities that are essential for the development of innovative technologies. By working within these specialized environments, deep tech startups can accelerate their R&D processes, moving more quickly from concept to prototype.

Peer Support Networks: Establishing peer support networks is crucial for deep tech startups, as these networks provide a platform for learning and sharing experiences. Such mentorship is most effective when it comes from current deep tech entrepreneurs who are facing similar challenges, rather than from consultants or former entrepreneurs who may not fully understand the current landscape. Peer networks offer practical advice, encouragement, and the opportunity to collaborate, helping startups to overcome obstacles and achieve success.

Committed Investment and Infrastructure: Deep tech ventures require substantial investment in hardware and infrastructure before they can generate revenue. This necessity means that highly committed investors and robust infrastructure support are critical to the success of these startups. The willingness of investors to commit long-term capital, along with the availability of suitable infrastructure, ensures that deep tech ventures have the resources needed to develop and scale their innovations effectively.

iii. HIGHLIGHTS FROM VALIDATION AND INTERVIEWS

There was a consensus that the foundation of successful deep-tech ventures often lies in either a groundbreaking scientific discovery or a significant engineering innovation. These core elements provide the competitive edge that distinguishes deep-tech startups from other types of ventures. The focus on deep science or advanced engineering underpins the venture's potential to bring about substantial advancements or disruptive changes in their respective industries.

However, there are several challenges and strategies associated with turning these innovations into viable businesses. One discussion centred around the concept of a minimum viable ecosystem and how it might function in practice. This concept involves creating a network of necessary stakeholders and resources that can sustain the early stages of a venture. In this context, stakeholder mapping emerges as a useful tool for identifying and engaging with the various parties involved in these ecosystems. This could include customers, suppliers, investors, and other key partners who are essential for the venture’s success.

Intellectual property (IP) protection is another critical aspect of deep-tech venturing. Given the highly specialized nature of the technology involved, safeguarding IP

becomes a crucial determinant of a startup's value and future prospects. For scientific founders, who often juggle their venture with academic or research responsibilities, managing IP based businesses can be a complex and demanding side job.

Another significant challenge in the early stages of deep-tech ventures is finding customer partners who are willing to test and validate the innovation. This process is often arduous due to the novel and unproven nature of the technology. Establishing advisory boards composed of professionals from diverse backgrounds can be instrumental in navigating these challenges. These boards provide insights, guidance, and connections that are invaluable for the strategic growth of the venture.

Moreover, maintaining existing and ongoing connections with the market is highly beneficial. These connections can offer early insights into market needs and trends, which are essential for refining the innovation and ensuring its relevance. Direct support from the scientific founder's affiliated organisation, such as a university faculty or department, also adds significant value. Such support can provide resources, credibility, and access to networks that are crucial for the venture's early development and long-term success.

d. Knowledge, Skills and Attitudes for Talent to Pursue Deep Tech Commercialisation

i. TECHNICAL COMPETENCIES

Technical competencies encompass the knowledge and skills necessary for understanding and applying deep technology, as well as navigating the legal and regulatory frameworks critical to the development of deep tech ventures. These include:

- **Deep Technology Knowledge**: A thorough understanding of the specific scientific and technological foundations of the venture is essential. This includes both the technical details of the product or service being developed and the broader context in which it operates.
- **Market Knowledge**: Understanding the market dynamics, including customer needs, competitive landscape, and market trends, is crucial for aligning technological innovations with real-world applications.
- **Legal Knowledge and Intellectual Property Rights**: Knowledge of intellectual property rights, including the challenges of co-development and how to conduct IP searches, is vital for protecting and leveraging innovations. Additionally, understanding the regulatory pathways, permissions, and licensing requirements for pre-production ensures that the venture can navigate the legal landscape effectively.

- **Theme-Specific Knowledge**: Having in-depth knowledge of the specific theme or industry in which the venture operates allows entrepreneurs to address niche challenges and leverage opportunities unique to that domain.
- **Regulatory Pathways**: Entrepreneurs must understand the regulatory environment, including the necessary permissions and licensing required to move from pre-production to market entry. This includes knowledge of how to navigate complex legal requirements that can impact product development and commercialisation.

ii. ENTREPRENEURIAL COMPETENCIES

Entrepreneurial competencies are the skills and attitudes required to successfully launch, manage, and grow a startup. These include:

- **Finance & Fundraising**: The ability to manage finances and secure funding is critical. Entrepreneurs must be skilled in raising capital through various channels, including venture capital, crowdfunding, and grants, as well as managing budgets and financial planning.
- **Product Development and Value Creation**: Developing a product that meets market needs and delivers value is a core entrepreneurial skill. This involves not only the technical development of the product but also the strategic planning necessary to bring it to market successfully.
- **Communication with Industry Experts, Investors, and Customers**: Effective communication is essential for building relationships with key stakeholders. Entrepreneurs need to convey their vision, value proposition, and progress to industry experts, investors, and customers in a clear and compelling way.
- **Crowdfunding**: Mastery of crowdfunding platforms and strategies allows entrepreneurs to raise capital from a broad base of supporters, often providing early validation of the product or service.
- **Team Building**: Building a strong, multidisciplinary team is critical for the success of any venture. Entrepreneurs must be able to attract, motivate, and manage talent across various domains to drive their startup forward.
- **Science Communication**: The ability to translate complex scientific concepts into understandable and engaging content is crucial for securing support from non-technical stakeholders, including investors, customers, and the public.

iii. TRANSVERSAL COMPETENCIES

Transversal competencies are attitudes and behaviours that enhance the ability to adapt, learn, and thrive in various contexts. These include:

- **Passion for Applying Tech Solutions to Problems**: A deep-seated passion for using technology to solve real-world problems drives entrepreneurs to overcome obstacles and remain committed to their vision.

- **Confidence, Perseverance, and Ability to Raise Capital**: Entrepreneurs must possess the confidence and perseverance to persist through challenges, especially when raising capital and convincing investors of the venture's potential.
- **Awareness of Skill Gaps and Openness to Different Domains of Expertise**: Recognizing one's own limitations and being open to learning from others is crucial for personal and professional growth. Entrepreneurs must seek out and incorporate expertise from different domains to build a well-rounded venture.
- **Coachability and Ability to Learn from Feedback**: The willingness to receive and act on feedback is essential for growth and success. Entrepreneurs who are coachable can adapt and improve their strategies based on the insights and experiences of others.
- **Consolidating Researcher Identity with Entrepreneurial Identity**: Successfully integrating a researcher's identity with that of an entrepreneur requires a shift in mindset. This involves embracing the challenges of commercialisation and the business aspects of bringing scientific innovations to market.

4 | RESEARCH INTO PRACTICE: SUPPORTING DEEP TECH

This section presents recommendations aimed at developing an ideal incubation training and support programme specifically designed for deep-tech startups. These recommendations are grounded in insights gained from existing deep-tech programmes in the Netherlands, as well as common themes identified through interviews and roundtable discussions conducted during the project. By integrating these key learnings, the recommendations outline best practices for delivering training, mentorship, peer-to-peer learning, and specialised incubation services that can effectively support the unique challenges and growth trajectories of deep-tech ventures.

a. Recommendations on How Training, Mentorship, Peer-to-peer Learning and Deep Tech Incubation Support Tools can be Utilised to Support Deep Tech

i. Deep Tech Training Programs

- **Entrepreneur education**: A deep tech training program should focus on educating both potential deep tech entrepreneurs and training mentors and peers for better participation in the ecosystem.
- **Alumni networks**: Involvement of alumni networks can result in a larger and more talented pool of support profiles for the ecosystem.
- **Entrepreneurial journey navigation**: Training entrepreneurs on how to navigate the entrepreneurial journey is essential. This can include the following areas: collaborative skills**,** dealing with uncertainty**,** executive skills**,** entrepreneurial identity.

ii. Deep Tech Learning Components

- **Problem-customer orientation**: Training on understanding and defining the problem and matching it with customer needs.
- **Product development models**: Exploring models such as DBTL (Design-Build-Test-Learn), Radical Innovation, Product vs. Process Innovation, and Competence-Destroying vs. Competence-Enhancing Innovations.
- **Industry dynamics and business models**: Key topics include value creation, scaled sustainable economics, strategic alliance building, IP rights, valley of death dynamics, collaborative risk, capital management, invisible to end-users integration across hardware and software
- **Institutional dynamics**: Understanding dominant norms and expectations, regulatory topics like IP protection, entrepreneurial communication, and logics around investment and support.

iii. Mentorship for Deep Tech Ventures

- **Tailored support for different venture stages**: An effective mentorship program must offer tailored support across the various lifecycle stages of a deep tech venture.
- **Integrated resources**: Incorporating integrated resources such as physical assets, expertise, and skilled support staff is vital.
- **Ecosystem mapping & technology scouting**: Mentors should assist in ecosystem mapping, technology scouting, finding partners, and providing knowledge brokering services.
- **Active mentorship & peer learning**: Active and accessible mentorship is essential, and the establishment of peer support networks where startups can learn from others facing similar challenges is recommended.

iv. 4. Role Models and Coaching

- **Incorporating role models**: Successful deep tech ventures can serve as role models, providing guidance, mentorship, and inspiration to new entrepreneurs.
- **Industry-specific mentorship**: Mentorship should be specific to the industry, providing practical advice, encouragement, and collaborative opportunities for deep tech startups.

v. 5. Peer-to-Peer Learning

- **Establish peer networks**: Startups can benefit from peer learning through networks that connect entrepreneurs facing similar challenges within the deep tech space.

vi. 6. Strategies for a Successful Incubation Environment

- **Skilled staff**: Providing highly skilled staff in incubators and accelerators to offer key services such as business development and technical support.
- **Role models and mentorship**: Ensuring the presence of successful deep tech ventures as role models and mentors within the community.
- **Tailored programs and funding**: Offering programs and funding opportunities specific to the different stages of deep tech entrepreneurship.

5 | CONCLUSION

This report has provided a snapshot of the state of Deep Tech commercialisation in the Netherlands, with a particular focus on South Holland and the energy and sustainability sectors. The analysis reveals that while the Netherlands has a strong foundation for supporting innovation, there are several areas where additional efforts could accelerate the commercialisation of Deep Tech ventures. While the report primarily focused on South Holland, it is important to recognise that the Netherlands benefits from a collaborative national ecosystem. The proximity of stakeholders across the country fosters partnerships and strengthens the overall innovation landscape, making it well-suited for deep-tech entrepreneurship. The unique collaboration between regions, such as within the 4TU network, highlights the potential for national synergies to support the growth of Deep Tech ventures.

One of the key findings is the critical role of a cohesive ecosystem in supporting Deep Tech startups. The Netherlands benefits from a well-developed network of stakeholders, including universities, government agencies, incubators, and industry partners, all of which play a part in nurturing innovation. However, the fragmentation of resources across different organisations can create challenges for startups trying to navigate the system. A more integrated and coordinated approach is necessary to ensure that startups can easily access the support they need at different stages of their development. TechLeap's initiative incubators united[42] aims to ensure this connectedness and coherency.

Another important finding is the necessity of providing deep tech startups an ongoing support over their long time-to-market journey of Deep Tech ventures. Unlike standard tech startups, Deep Tech innovations often require extensive research, development, and testing before they can be brought to market. This necessitates sustained investment and long-term commitment from both entrepreneurs and investors. The

[42] www.incubatorsunited.com

Dutch government's initiatives, such as the Deep Tech Fund and the National Growth Fund, provide crucial financial support for these ventures. However, filling the funding gap for large-scale field tests and scaling activities remains a challenge. Without sufficient funding at this critical stage, many promising technologies risk being stalled in development.

The report also highlights the importance of knowledge transfer and intellectual property (IP) management. The transition from research to commercialisation often hinges on effectively protecting and managing IP. Dutch universities and research institutions have been instrumental in supporting startups with IP-related challenges. But clearer and more accessible frameworks (e.g. Deal Term) will hopefully further ease the process for entrepreneurs. Additionally, fostering a culture of entrepreneurship within academic environments—where researchers are encouraged and supported to commercialise their innovations—remains vital for the growth of the Deep Tech sector.

Mentorship and industry partnerships are also identified as critical enablers of Deep Tech commercialisation. The complexity of these ventures requires access to experienced mentors who can provide practical and strategic guidance. Building stronger industry connections is equally important, as partnerships with established companies can offer startups the resources, infrastructure, and market access they need to scale. This is of course limited by the availability of the experts who are familiar with the unique nature of Deep Tech entrepreneurship.

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APPENDIX A

Interviewee and Roundtable Discussion's Profiles

Name Surname	Role	Organisation	Expertise	Participated to
Alissa van der Voort	Coach at TU Delft Impact Studio	TU Delft – Impact & Innovation Center	Running and coaching at TU Delft pre-incubation programmes for TU Delft spin-offs	Roundtable
Akos Wetters	Co-founder, Coach & Trainer	Kimitisik	Running & coaching tech-based startups programmes	Roundtable
Arthur Tolsma	Head of 'Region of the Future' program	YesDelft	Entrepreneur and mentor at tech-based startups	Interview
Bram Spitzer	Energy Innovation and Funding Officer	Province Zuid-Holland	Impact Venturing, Startup Acceleration and Funding, Sustainable Innovative Disruption in Government, Energy and Mobility	Interview Roundtable

Charlie Wulff	Incubation Lead	PLNT Leiden	Tech-based startup programs including research-based academic spin-offs	Interview
Dap Hartmann	Associate Professors in Tech-based Entrepreneurship	TU Delft – Delft Centre for Entrepreneurship	Researcher and educators for tech-based entrepreneurship, particularly for patent/invention-based ventures	Interview
Freek Smoes	Head of Incubator	Yes!Delft	Incubation and acceleration of tech-startups	Interview
Jan Geert van Hall	Investment Director	Yes!Delft	Tech entrepreneurship and startup investment	Interview
Jan-Henk Welink	Secretary and Initiator, Project Leader	Knowledge Platform Sustainable Resource Management, TU Delft	Sustainability Impact Metrics, Sustainable Resource Management	Interview
Martine Nieuwenhuizen	Senior Investment Manager	TU Delft – Delft Enterprise	Startup Funding, University Spin-offs	Roundtable
Marouschka Blahetek	Co-founder	Carapacebio	Startup Funding, Business Development, University Spin-offs	Roundtable
Maurits Burgering	Program Director, Thematic Technology Transfer: Circular Technology	Wageningen University & Research	Circular Technologies, University Spin-offs	Interview
Maurits Westerik	Partner IP/IT - Attorney-at-law	Coupry	Intellectual Property, University Spin-offs	Interview Roundtable
Robert van Roijen	Project Manager Water Innovations	TU Delft – Impact & Innovation Center	Pilot testing for Sustainable tech solutions	Roundtable
Roland Schmehl	Associate Professor, Co-founder & advisory board member	TU Delft – Faculty of Aerospace, Kitepower	Wind energy, Academic entrepreneurship	Roundtable
Willem Hulsink	Erasmus Universiteit Rotterdam School of Management	Erasmus University Rotterdam School of Management	Entrepreneurship and Innovation	Interview