



POLICY  
CASE  
STUDY

# **Case study on programmes to promote spin-offs at Fraunhofer- Gesellschaft, Germany**

Contribution to the OECD TIP Knowledge Transfer  
and Policies project

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## **Case study on programmes to promote spin-offs at Fraunhofer-Gesellschaft, Germany: Contribution to the OECD TIP Knowledge Transfer and Policies project**

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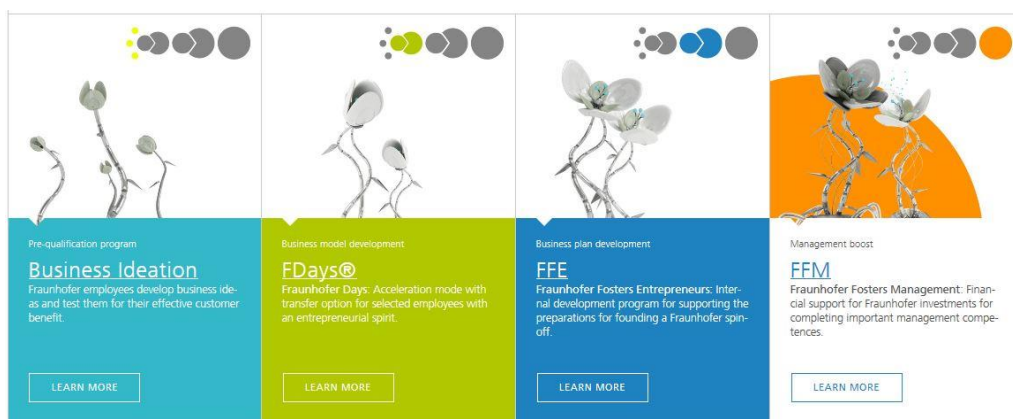
## 2. Development of the initiative

### 2.1. Rationale of the spin-offs implementation

Spin-offs contribute substantially to the implementation of outstanding research results in new products and services. Therefore, Fraunhofer Venture has been created as a dedicated department in 2001 with the purpose of providing comprehensive support for Fraunhofer spin-off projects. Today, the aim of Fraunhofer Venture still is to activate and maximize the transfer potential of the Fraunhofer-Gesellschaft by actively connecting IP and technologies, entrepreneurs, investors and industry partners. It does so with a team of 25 people comprising venture managers, lawyers and company building experts. In the bigger picture, Fraunhofer Venture acts as the central point of contact for both, the Fraunhofer institutes as well as the international startup ecosystem.

The spin-off support system basically consists of 4 phases (s figure 1: Business Ideation, FDays®, FFE and FFM) and three key components: programs, coaching and funding. The deliberate interplay of those three components paves the way for successful technology transfer via spin-offs on a larger scale.

**Figure 2 a cleverly worked out support structure from technology to business**



#### 2.1.1. Business Ideation

The business ideation phase serves two purposes: firstly and most importantly, bridging the geographical and cultural gap between Fraunhofer Venture in Munich and the 72 research institutes. Secondly, translating technological competencies into business ideas. In order to achieve these objectives, the business ideation phase offers lean and easy to digest workshops formats that can be run at the institute. A typical workshop would last 0.5-1.5 days and may include networking and awareness-generating elements, such as fireside chats with entrepreneurs. From a methodological point of view, those workshops addressed two fundamental ideation approach: technology push and market pull:

- The “application discovery” workshop helps researchers to identify different areas of application for a given technology and to assess and elaborate the most promising ones in detail (technology push).
- The “customer discovery” teaches researches to explore customer needs and to derive technological solution potential from them.

In this stage, there is no funding involved. However, no participation fee will be charged from participants. A tandem on internal and external experts usually run these workshops and coach the teams together. Business ideation is an important first step to get in touch with researchers, their projects and to help finding a pain in the market that can be addressed via Fraunhofer technology.

### **2.1.2. FDays® accelerator**

The FDays® have become the flagship program of Fraunhofer Venture and one of the most prominent hightech accelerators in Germany. With 180+ project in 17 batches within 5 years, a tech transfer rate of almost 40% and several innovative features built in, FDays® are a fundamental success factor and dealflow generator at Fraunhofer.

FDays® is a 12-weeks stress test, intense team experience and business acceleration vehicle. The nature of this program is a highly entrepreneurial training for researchers. It has been developed based on many international best practices, such as the Lean Launchpad, the I-Corps program of the National Science Foundation, Design Thinking and Business Model Generation methodologies as well as many others. FDays® are deliberately organized in batches. Three times a year between 10-15 teams are picked from different Fraunhofer institutes and selected partners (e.g. Helmholtz, RWTH Aachen University, TU Munich). These teams had to apply with a short 3 minutes video explaining their business idea, technology and team motivation.

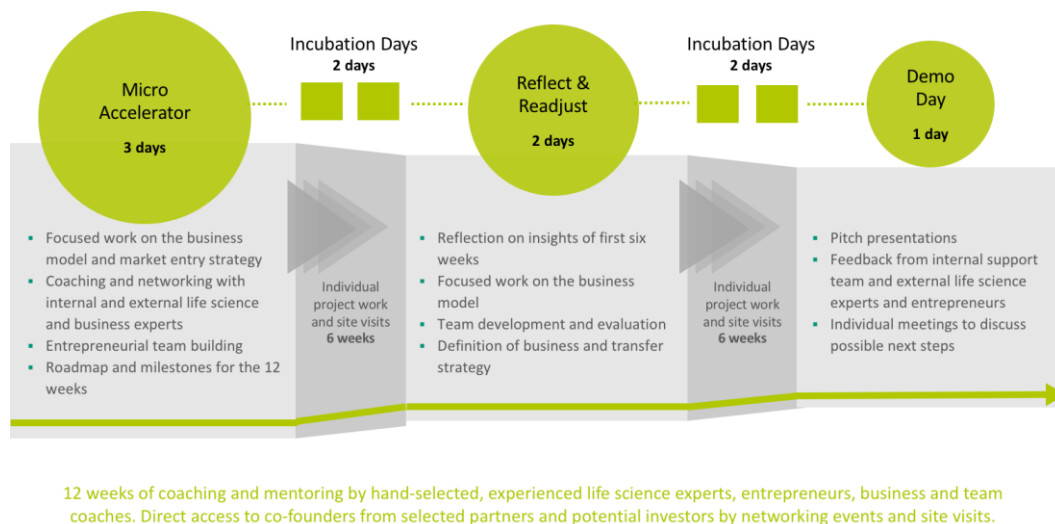
Starting from there into the 12-weeks endeavour, the 3-days kick-off teaches the fundamentals of modern innovation processes (customer interviews, business model design, evidence-based innovation), creates a lot of space for intense coaching (on business and on the team itself) sessions and ends with a hypothesis-based roadmap for every single team. Subsequently, the teams meet every three weeks for two days in order to report their learnings, get additional business and team coaching, learn from their peers and attend networking events organized by Fraunhofer Venture. FDays® end with a demo day that invites investors, corporate representatives and Fraunhofer top management. However, in contrast to classic accelerator demo days, the expectation is not to present a shiny startup pitch, but to focus on the key insights from an intense 12-weeks market and customer interaction as well as comprehensive team reflections regarding their mission, team structure and overall ambition. Also, most teams are not investment-ready after 12 weeks, yet hopefully achieved 100% clarity whether they are addressing a real market problem, are aligned as a team and how the technology and IP roadmap looks like in order to reach the market. Reducing options and bringing clarity is the core value proposition of FDays®.

FDays® are a first of its kind at Fraunhofer due to the sophisticated program structure in combination with internal funding. Each selected team received a funding of 25,000 € which mainly covered labor and travel costs for the 10 on-site days, some additional yet minor budgets for hiring business students and the costs of the program itself. Obviously, the teams are “underfunded” during the 12 weeks, which is on purpose since this will reveal the genuine entrepreneurial nature of the teams. The best of the best found ways to shift their daily attention to their FDays® project. All in all, FDays® is a comparably low investment for the Fraunhofer-Gesellschaft when considering the benefits for each and every team and the information gained about the real potential of the project. Since FDays® are entrepreneurial by nature, but take place in parallel to the daily research work and Fraunhofer-internally, it is best described as an intrapreneurship accelerator.

FDays® have always served as a platform for experimenting with new methodologies, formats and partnerships. Here are two selected examples that point to how Fraunhofer Venture will operate their incubation programs in the future:

- Company building: inviting external entrepreneurs to complement FDays® teams or to build a whole team around a Fraunhofer technology is a focus of several experiments as part of the team development efforts.
- Vertical tracks: since FDays® is confronted with the full heterogeneity of technologies and industries (“verticals”), providing very specific insights and network during the program is very hard. Especially life science projects typically follow a different innovation process. Hence, in close cooperation with the Sartorius AG, Fraunhofer Venture ran a “FDays® Life Sciences” (s.figure 2) batch with 7 teams from Fraunhofer and university partners.

**Figure 3 The basic structure of FDays Life Sciences as an example for a well-working intrapreneurship accelerator**



### 2.1.3. Fraunhofer Fosters Entrepreneurship (FFE)

For FDays® alumni, but also other projects possessing a pre-validated business model, a founding team and a mature technology, FFE is opportunity to execute a spin-off plan. FFE has no program structure, yet up to 150,000 € (50:50 split between Fraunhofer headquarters and the Fraunhofer institute) as funding and offers an intense 2-on1-coaching. For every spin-off project there is a tandem of an investment manager and a lawyer for coaching and guiding the team. Therefore, the aim of FFE is especially to provide project-specific support for technology transfer through spin-offs. The focus is clearly on the execution of a market-entry strategy that has already been developed during FDays®, or prior to the FFE application. The project budget is available to create a detailed transfer concept (business plan) and realize final development activities, accordingly. The process evaluates whether and how the relevant Fraunhofer technology may make a promising transfer through a spin-off – possibly with an investment by the Fraunhofer-Gesellschaft.

Since the level of uncertainty (market-, technology- and team-wise) is usually much lower for FFE projects than for FDays® projects, the funding commitment is much higher. In return, there is the clear expectation that the future founding team devotes the absolute majority of its time to the project. Of course, full access to the Fraunhofer Venture network is available as additional support for the ideal preparation of the spin-off.

FFE has been a central pillar of spin-off support at Fraunhofer Venture for many years. On the one hand, it offers an appropriate funding and on the other hand, it nurtures the cumulative experience of 350+ spin-offs by tying the funding to a dedicated coaching team and schedule.

#### ***2.1.4. Fraunhofer Fosters Management (FFM)***

Sophisticated technology, a good business model, and a strong as well as convincing team of founders are the three most important factors for winning investors and, thus, for establishing a high-tech start-up on the market. Especially during the very critical start-up phase of a company, an experienced director can make the decisive difference between success and failure. This is where the funding program Fraunhofer Fosters Management (FFM) starts.

In particular, in the venture capital market a professional and convincing team of founders in combination with sophisticated Fraunhofer technologies is a powerful argument. In the early post-formation phase, FFM completes the entrepreneurial skills of the team with important management competences. The support is tailored to the individual needs of each start-up and may include coaching measures for the existing team of founders or even additional team members, e.g. an initial manager. Up to €100,000 are provided to the spin-off in the scope of the program.

This initiative is an uncomplicated and flexible possibility for Fraunhofer spin-offs to raise financial means to be well prepared for the way to successful first-round financing. Due to a sophisticated system consisting of anti-dilution and revenue preference, there are neither adverse effects on the balance sheet nor on the company's liquidity. This makes the FFM measure attractive for spin-offs, but still, the Fraunhofer-Gesellschaft receives corresponding consideration in case of a positive development.

#### **Facts:**

- All spin-offs Fraunhofer invests in may apply for FFM funding.
- The subsidy amount is paid directly to the spin-off in several tranches with a maximum of €25k per tranche.
- The Fraunhofer-Gesellschaft provides advance payment to not impede the spin-off's liquidity.
- Interests for the subsidy amount become due only 12 months after payment of the subsidies. There is no due date for repaying the interest nor the amount received.
- Corresponding consideration is only due to the Fraunhofer-Gesellschaft after a successful financing round in the form of anti-dilution or by means of a revenue/liquidation preference.
- With jointly defined milestones and short contractual relationships, funding may be adapted systematically and immediately.

- The existing team of founders should be supported by external experts (e.g. strategy, sales, internationalization) or services (e.g. marketing, SEO).
- The spin-off is the direct contractual partner of the coach/manager/director and free to choose this person together with the Fraunhofer Venture partner.

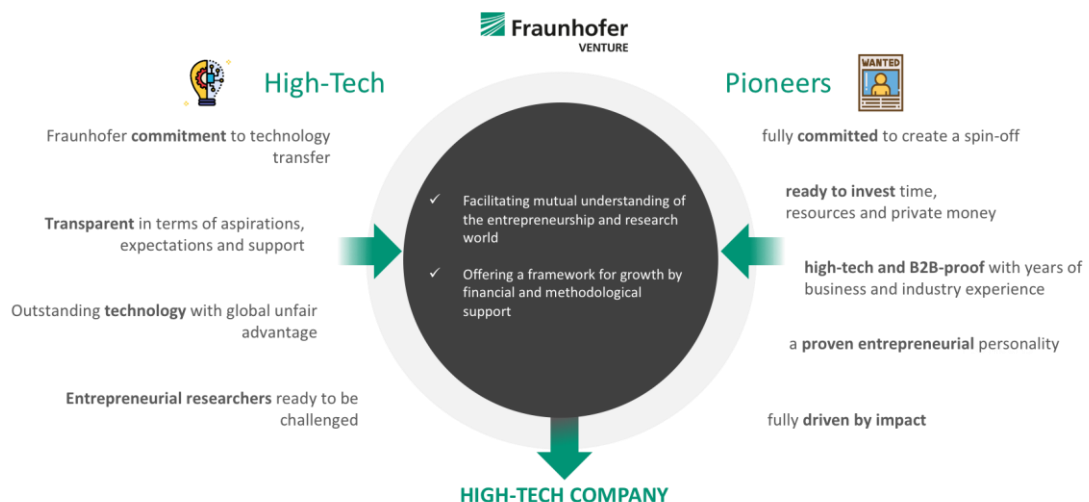
## 2.2. AHEAD: Taking the leap into the future

As of 2019, the already successful funding and support structure, as outlined from 2.1.1-2.1.4, undergoes a deliberate transformation and a complete relaunch. The Executive Board of the Fraunhofer-Gesellschaft has developed the Fraunhofer 2022 Agenda: its goal is to further increase the impact on business and society through excellence and synergies. In terms of its spin-off activities, the Fraunhofer-Gesellschaft not only aims at reaching a ratio of 2 spin-offs per 1,000 researchers and year, but also to significantly increase of the returns from their spin-offs. These ambitious aims challenge the current support system in terms of its scalability. Hence, Fraunhofer Venture decided to create AHEAD.

AHEAD was envisioned early 2018 based upon a global best practice analysis (e.g. The Engine, MIT, USA; Startup Runway Program, Cornell Tech, USA; Cyclotron Road, Berkeley, USA; T3 accelerator, Technion, Israel; Yes!Delft, Netherlands) and by incorporating the major learnings from a 17 years track record of spin-off activities at Fraunhofer Venture. The DNA of AHEAD can be best described by the following five maxims:

1. **Entrepreneurs first:** the driving force behind every high-performing spin-off is a high-performing team of entrepreneurs. It is the most important resource and the most critical success factor. Therefore, AHEAD will put sophisticated team building and development mechanisms in place in order to identify entrepreneurs inside and outside of Fraunhofer, help them to build a team and develop it to high-performance. Dedicated team coaches will take care of these processes. In addition, external entrepreneurs can apply with their own business ideas, will be matched with apt Fraunhofer researchers and then jointly apply for a spin-off project.

**Figure 4 uniting two worlds by matching external entrepreneurs and Fraunhofer technology**



2. **Focus and simplification:** creating one single brand and program enables a more effective marketing inside and outside of Fraunhofer. It also removes a lot of artificial barriers that existed in the past when transitioning from one program to the other: new application, new program managers, new rules, new structure and expectations. These differences emerged due to the organic growth of the support system, were flattened over the years, but still existed. With AHEAD a team gets access to the whole word of spin-off support with one application. Furthermore, by combining the strengths of different programs, especially the FDays® program and process structure as well as the individuality of FFE, into one single company building & incubation program creates synergies.
3. **Need-based program structure:** Every single spin-off project has its very specific challenges. A one-size-fits-all program is not able to address these. Consequently, the program structure itself will react according to the needs of its project with on-demand workshops, coaching, network, etc. From the get-go of the program, the coaches will define a tailored roadmap with every project and put the needed program elements into it.
4. **Market interaction:** AHEAD will demand and foster market interaction from day one: conducting customer interviews, doing co-creation, testing minimum viable products and negotiating letters of intent is of the same importance as developing and protecting technologies. Customer and market validation are also at the core of jury decision. Via “vertical tracks” AHEAD will offer industry-specific program elements, such as networking and pitching events with corporates, industry-specific mentors, or special trainings.
5. **Transparent deals:** negotiating the terms around a spin-off deal can be highly complex. This is mainly due to many variables and stakeholders with sometimes conflicting motivations and objectives. As for AHEAD, major building blocks of a typical term sheet have to be negotiated before significant resources will be invested. And in addition, the conditions with regard to shareholdings will be standardized to a large extent.

AHEAD will give spin-off projects the opportunity to become market- and investment-ready within a maximum of two years. Each team receives the funding, workshops and training, coaches, contacts to potential co-founders, networking as well as business intelligence support as needed. From the get-go, the team will be coached and guided by an experienced venture manager, who also supports with creating the individual roadmap and decides upon “jury readiness”. Zooming in (see also figure 4), there is a 4-days bootcamp as a starting point that assesses the project and makes them ready for the first jury meeting. In case of a positive jury decision (the jury consists of Fraunhofer management, Fraunhofer institute directors, venture capitalist and industry experts), the project receives initial 50,000 € in phase 1 for validating their market, building the full founding team and negotiating the deal with the institute. Afterwards, they can apply for phase 2 and execute on the market-entry roadmap.

**Figure 5 AHEAD: overall structure and phases**

An additional and very important step has been the recent inception of the Fraunhofer Tech Transfer Fund (FTTF), who acts as a dedicated investment fund for Fraunhofer spin-offs. It is a critical means to overcome the valley of death for many spin-off projects and helps to accelerate them already at pre-seed and especially speed stage. With a volume of €60 million the FTTF completes the picture of a continuous spin-off support system

### 3. Interactions with policy mix

#### 3.1. Policy instruments in line with the Fraunhofer-Gesellschaft's objectives

The Fraunhofer-Gesellschaft is deeply embedded into the national economic ecosystem and has been a role model for decades in terms of creating win-win-interactions between R&D and industry. As for startups, these interactions are of the same importance. Here is some example how the Fraunhofer spin-off support system is deliberately connected to the national ecosystem:

For many years now, there is a continuous interaction and matching of roadmaps with the BMBF (German Ministry of Education and Research) to explore, develop and facilitate new means for technology transfer. FDays®, FFE and FFM had been derived from and piloted through research projects in collaboration with the BMBF.

More is yet to come:

- Needless to say that there is more relevant technologies for startups available inside a research organization Fraunhofer, than there is entrepreneurs to spin them off. That is why the “Hightech Pioneers” initiative (also funded by the BMBF) started to tap into the German ecosystem in order to identify and win over experienced entrepreneurs as well as entrepreneurial talents for Fraunhofer spin-off projects. As part of the company building efforts at FDays® and AHEAD, those entrepreneurs complement Fraunhofer teams, or build completely new ones. Establishing close ties with the relevant networks, such as business schools, entrepreneurship centers at leading universities, entrepreneurs clubs, is key for this initiative.

- Similarly, the “Tech Bridge” project (funded by the BMBF as well) connects existing startups with Fraunhofer research with the aim of collaborative projects. Through so-called “tandem camps” both parties develop a joined roadmap and can get access to an initial funding for mostly technology development. Again, the underlying rationale is that there is additional entrepreneurial power outside Fraunhofer that should be connected with the existing pool of technological competencies.
- Besides individual entrepreneurs and existing startups, a third BMBF-funded project aims at finding new ways of collaborating between Fraunhofer and incumbents. “Venture connect” does not substitute existing ties between Fraunhofer and industry, yet explores new ground for both parties by bringing technology and markets insights together with the aim of testing radically new business models via startups. Incumbents therefore act as sparring partners and investors alongside the incubation process instead of contract research partners.

The overall idea is to create best practices together with the BMBF and subsequently incorporate them into AHEAD. This will take place step-by-step and make the program even more effective over time.

As for the BMWi (Federal Ministry for Economic Affairs and Energy), the Fraunhofer-Gesellschaft is also successful in connecting its support system with instruments run by the BMWi. The German funding programme EXIST is a very good example of supporting research-based innovation and spin-offs. Many spin-offs have been funded and supported by EXIST alongside FDays®, but also through direct collaboration with a Fraunhofer institute. In addition, several spin-off projects became EXIST-ready only through FDays®.

Furthermore, the BMWi-initiated “Digital Hubs” are relevant partners for regional ecosystem collaborations. At twelve locations in Germany, the Digital Hub Initiative connects medium-sized enterprises and larger firms with new innovative partners from scientific and start-up communities. Fraunhofer Venture is currently running experiments on how to connect to these hubs in an effective way.

With regard to policy recommendations, the following should be considered:

- Whereas startups in general and digitization in particular received a lot of public and media attention in Germany over the last years, which has been and still is of utmost importance, research-based startups have rather been treated as an orphan in the public. The perception in the ecosystem is that these startups are too complex to scale, too hard to negotiate and require more efforts in order to become rich. However, this seems to change now, since the dominant web-, eCommerce-, “low tech”-based startups already have left behind the peak of their hype cycle. Hightech startups have to be perceived as “sexy” again and more can be done to tell the success stories and to put decent role models on stage (the Falling Walls initiative is doing a great job here). This would also help to raise awareness for this type of startups among a new generation of researchers, engineers and alike. The backbone of sustainable high-tech startup development has been and still is being built by the Federal ministries and research institutions.
- The consolidation and transformation that took place within Fraunhofer from 2018 to 2019 when switching from Business Ideation + FDays® + FFE + FFM to AHEAD, has to take place on a broader national scale as well. The abundance of different initiatives and support means in Germany is a strength on the one hand, but hard to navigate for entrepreneurs on the other hand. Combining, for example,

AHEAD with its sophisticated program structure as well as network and EXIST in a more systematic way, would help to support research-based spin-offs even better than today. Fraunhofer Venture already partnered up with Helmholtz Enterprises and its connected partner, KIT as well as the DLR tech transfer offices, who sent selected teams also through FDays® and will do so with AHEAD in the future. This helps dramatically to create the critical masses needed for highly effective spin-off support systems.

### 3.2. Interactions with the international / European context

Coming from the domestic context, zooming out on a European level is critical. The competitive landscape for high-tech startups is as global as today's economy. Although every new company starts very small, an international, almost global vision is necessary to being able to scale to point where it can ultimately create a significant impact in terms of job creation, taxes and strategic levers. Too often, national policies and many startups neglect this bigger picture.

At first glance, this view contradicts the notion of the previous chapter in terms of critical masses as a foundation of effective startup support. Regional ecosystems, such as the Silicon Valley, Boston and Tel Aviv benefit from an outstanding density of entrepreneurial talent, venture capital, research facilities, corporate attention, etc.

Attempts to combine activities of RTOs on a European level quite often require startups and entrepreneurs to artificially move across Europe for attending workshops, events, or similar activities without adding significant value. Virtual collaborations often lack the efficacy of on-site means. Therefore, there might be three promising trajectories for European cooperation between RTOs:

1. Where the RTO is deeply embedded into its domestic startup ecosystem, it can serve as a host organisation for helping later stage startups to scale into new countries and/or at the same nurturing labs and research facilities.
2. Especially individual entrepreneurs in the early years of their career might be more prone to moving to different parts of Europe. The “Erasmus for Young Entrepreneurs” program already positions its lever at the right place. Enhancing this support towards a “European Entrepreneur in Residence” (EEiR) model that provides the opportunity for young entrepreneurs to being hosted at a research institution, doing tech scouting and being supported in developing spin-offs, may unlock a huge potential. Similar mechanisms are popular for example in Israel as well as in the US. Programs such as the Cyclotron Road (Berkeley, US), or the Startup Runway Program (CornellTech, US) also show that this model might be applied to post-doc level as well.
3. Sharing best practices among RTOs paves the way for an overall effective spin-off support system in Europe. The TTO Circle meeting already has been providing a great platform for this exchange for many years now.

Each ecosystem has its unique context variables, but on an abstract level, a lot can be learned from each other. Whatever facilitates knowledge exchange between European RTOs on a regular basis, adds great value to the ecosystem. To develop this abstract knowledge exchange into a concrete pooling and scaling initiative of Europe's most promising deep-tech start-ups would lead to greater global visibility and allows to better focus on European champions.

## 4. Impacts

### 4.1. Fraunhofer-Gesellschaft impact evaluation

By leveraging a cumulated experience of 350+ supported spin-offs, 150+ shareholdings and more than 70 exits, spin-off teams not only benefit from this expertise during the company building and incubation stages. They also turn out to perform significantly above average: 97% of Fraunhofer spin-offs still exist after three years, which is far above the 72% reported in the “Deutsche Startup Monitor” when looking at Germany-wide data between 2006-2015. In addition, 47% of the spin-offs achieved revenues 500,000+ € per year as compared to 30% for other, Germany-based startups. When it comes to raising capital beyond 1 mio. €, it is 40% against 26%. This data shows especially that the Fraunhofer spin-off support system is very capable at de-risking spin-off projects internally before spinning them off. There are probably two factors leading to these results: Firstly, as already outlined, Fraunhofer Venture serves as the central hub of spin-off expertise and is able to apply that to the projects going through the funnel. And secondly, the strong ties between Fraunhofer institutes and industry lead to high-quality business idea generation since technology development projects very often are rooted in real market insights.

In 2017 and 2018 the Fraunhofer-Gesellschaft spun-off 25 and 25+ (as of today, the final number is not yet publicly available) new companies, respectively. Considering that among the 25,000 employees, about 18,000 are actually researchers, this leads to a ratio of about 1.4 spin-offs per 1,000 researchers per year. This is a comparably strong ratio.

Here are the numbers of relevant peers for 2016<sup>1</sup>:

- Helmholtz: 0,48
- Leibniz: 0,48
- Max-Planck: 0,36
- TNO: 0,72
- VTT: 0,81
- Fraunhofer: 1,23

This success stems to a considerable extent from a comprehensive, highly entrepreneurial and consistent support system operated by Fraunhofer Venture. However, the data also shows that there is definitely potential for all RTOs to better nurture their research staff.

Zooming into the spin-off support system reveals more insights: a research study<sup>2</sup> conducted in 2018 among 145 FDays® alumni projects and 402 alumni researchers shows a technology transfer rate of 38,6%. This rate accounts for both, spin-offs and licensing deals, since FDays® supports both paths into the market. Moreover, there is twice as many spin-off successes than licensing deals resulting from FDays®. When looking at a conversion rate from FDays® to FFE the data shows a number of 80% for 2017, which is deemed as a very successful interplay between the two programs.

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<sup>1</sup> Pakt für Forschung und Innovation, Monitoring-Bericht 2016, spin-offs 2006-2015; own research.

<sup>2</sup> Schimke, A. (2018): Team Success Study.

Looking into the future, the first AHEAD batch will be kicked-off with 30+ projects in late February 2019. Having one brand and channel into a company building and incubation system already seems to work. Furthermore, the network of so-called “promoters”, who are Fraunhofer Venture evangelists at a Fraunhofer institute, has grown to a number of 59 promoters from 46 different institutes. This network accounts for over a third of the applications and definitely can be seen as a key pillar for dealflow generation.

In terms of exits, Novaled (sold to Samsung in 2013) and Exocad (sold to Carlyle Group in 2016) have been the most successful ones in the history of Fraunhofer. Promising spin-off such as doks.innovation, mojin robotics, or visometry might reach the same level and have been significantly shaped by Fraunhofer Venture’s support system from early ideation workshops, through FDays® and FFE as well as the 2-on-1 coaching by experienced Fraunhofer Venture staff.