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TNO report

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Financing field labs

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Contents

1 Introduction

Regions can make an effective contribution to the acceleration of (Smart Industry) field labs. There are opportunities to achieve more impact with the field labs based on improved coordination on international, national and regional level.

Brainport Development and the Economic Board Zuid-Holland (EBZ) has asked TNO to come up with a more specific characterization of field labs and link them to financing options for field labs. The goal is to be more efficient in supporting field labs, and to position the field labs in a more appropriate way (in different sectors, regional, national and at European level).

The field labs are classified in 4 types in the report called “Typologie en standaard voor fieldlabs”. Each of these 4 field lab types have different activities, costs and revenues. In this report, we present potential financing options for these field lab types.

This report will address the following question: **“How do we finance the sustainable development and growth of the field lab infrastructure?”** The report does not cover potential business cases that constitute the revenue model of field labs.

2 Factors that determine the financing of a field lab

The report “Typologie en standaard voor fieldlabs” mentions a number of factors that influence the financing for field labs such as the type of field labs, and their development stage. This section summarizes this report, as to make a clear link between these factors and the financing options. We introduce a typology with 4 field lab types and their related activities, followed by their respective development stages and growth strategies.

2.1 Field lab typology

All field labs have in common that they are constituted by knowledge institutes and / or education institutes and companies. However, the field lab types differ in their focus (see Figure 2):

- **Type 1** is driven by **knowledge and technological innovation:** the focus is on knowledge development and technological innovation, knowledge institutes play a dominant role, the initiator is often a knowledge institute and the main activities are (scientific) research and development activities.
- **Type 2** is **demonstration**: the focus is on demonstration, upscaling and commercial activities. Firms are dominant within this type of field lab and the initiator is often a firm or a group of firms.
- **Type 3** is **education driven**: the focus is on education, educations institutes have a dominant role and are often the initiator, the main activities are training and skills development.
- **Type 4 combines the focus of the previous three field lab types**: these field lab types have a focus on knowledge development and technological innovation, demonstration, upscaling, commercial activities, and education.

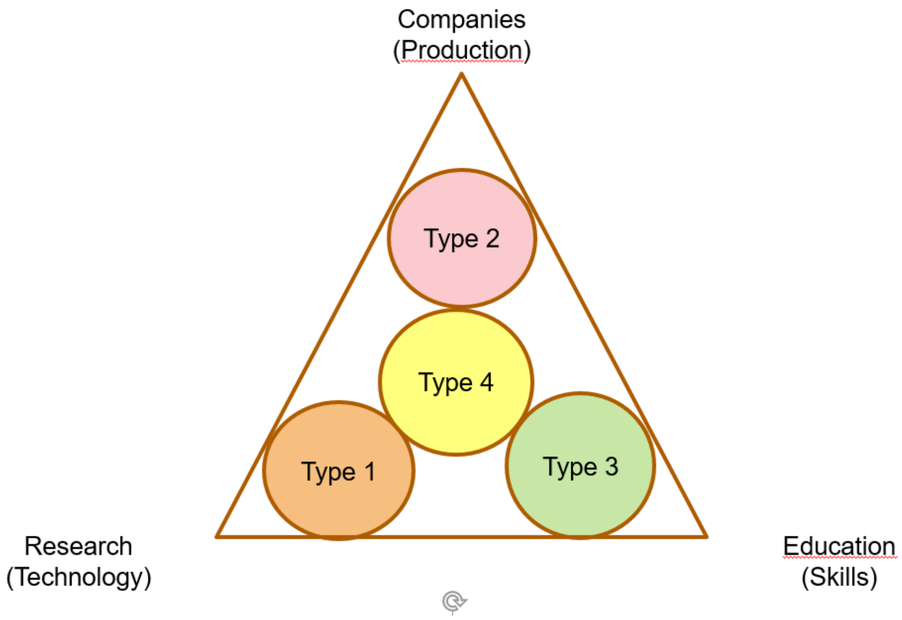

Figure 1 Field lab typology

2.2 Field lab activities

The field lab activities differ per field lab type. Subsequently each field lab type has different revenues, costs and potential corresponding funding instruments. This section gives an overview of field lab activities per field lab type. Chapter 3 provides a description of the rationale for field lab involvement by the partners. Chapter 4 addresses costs; and chapter 5 describes the related revenues and funding instruments.

Field lab type 1 has a focus on (scientific) research and development activities (see Table 1).

Table 1 Field lab type 1 Knowledge and technological innovation

Market studies
(Scientific) research,
Early phase development (up to TRL 3)
Development, demonstration, prototyping and validation of products (TRL 3-7)
Pre- of Micro–production (TRL 8)
Hiring / renting out equipment / infrastructure
Information sharing and awareness creation
Network activities
Consultancy and other commercial activities

Field lab type 2 has a focus on demonstration, upscaling and commercial activities such as spin-off stimulation and valorisation (see Table 2).

Table 2 Field lab type 2 Demonstrators (business driven)

Market studies
Development, demonstration, prototyping and validation of products (TRL 3-7)
Pre- of Micro–production (TRL 8)
Scaling up activities (TRL 9), development and preparation of the production organization (market readiness), market development
Hiring / renting out equipment / infrastructure
Spin-offs/stimulation of valorisation incubator activities
Information sharing and awareness creation
Network activities
Consultancy and other commercial activities
Public projects

Field lab type 3 pays specific attention to training and skills development (see Table 3).

Table 3 Field lab type 3 Education driven

Development, demonstration, prototyping and validation of products (TRL 3-7)
Hiring / renting out equipment / infrastructure
Information sharing and awareness creation
Network activities
Consultancy and other commercial activities
Support, training and education
Public projects

Field lab type 4 conducts all 15 activities and is therefore seen as the "ideal" type (see Table 4).

Table 4 Field lab type 4 Combined

1. Market studies
2. (Scientific) research
3. Early phase development (up to TRL 3)
4. Development, demonstration, prototyping and validation products (TRL 3-7)
5. Pre- of Micro–production (TRL 8)
6. Scaling up activities (TRL 9), development and preparation of the production organization (market readiness), market development
7. Hiring / renting out equipment / infrastructure
8. Spin-offs/stimulation of valorisation incubator activities
9. Information sharing and awareness creation
10. Network activities
11. Consultancy and other commercial activities
12. Support, training and education
13. Public projects
14. Policy development
15. Activities focused on the development of legislation

There is some overlap between the activities of the field lab types. This means that some activities occur in more than one field lab type, such as for example "development, demonstration, prototyping and validation of products".

2.3 Field lab development stages and growth strategies

Although many Dutch field labs are still at the beginning of their development stage, they will pass through a number of stages to realize their growth strategies. We first describe the development stages, followed by possible growth strategies. During these stages, various types of activities take place. The development of a field lab and its related activities can be divided in 5 stages (see Figure 1). The related financing will be discussed in chapter 5.

1. **Initial design and viability check:** Ideas are created and tested about the technology, partners and the potential clients. Focus is on technologies that are beneficial for society, and cannot be efficiently developed by individual firms or innovations that are ahead of the market.
2. **Detailed, design and investment planning:** The detailed design will be made and an investment planning is prepared.
3. **Set-up or installation/ start-up:** To validate the technology and potential clients a market analysis will be conducted and there are meetings with potential clients. The consortium will be build and a business plan, proposals for funding, working programme and research agenda will be written. The infrastructure will be build and installed.
4. **Operation:** The (R&D&I) projects are implemented and various activities can be conducted such as development, demonstration, prototyping, and validation of products, network activities, consultancy and commercial activities etc. Field labs start in general with the more technical and research related activities and shift after a while to activities related to ecosystem building and business support/commercial activities. The activities are described in more detail in the report “Typologie en standaard voor fieldlabs”.
5. **Renewal or upgrade:** Infrastructure can be renewed or improved and new technology development initiatives might occur.
6. **Integration or termination:** The field lab will be terminated if does not have an added value anymore. This is the case when the field lab reached its goal.

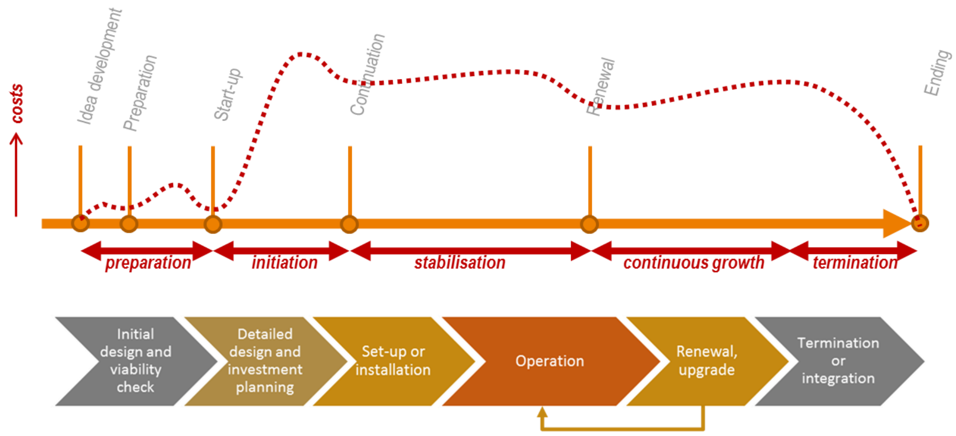

Figure 2 Field lab stages, source: EU-GREAT! Project

Growth strategies for field labs

There are various growth strategies for the four field lab types. In this section, we describe the specific choices that need to be made per growth strategy:

1. **Regional strategy:** Field labs can choose to become the **accelerator of the region**, this requires a focus on the development of a technology with regional relevance, to accelerate the regional ecosystem and contribute to job creation and networking in the region. This requires cooperation with local partners such as SMEs.
2. **National strategy:** Field labs can also choose to become a **national icon** by focusing on a technology with national relevance. Linking the various regional ecosystems is crucial for this strategy to create a critical mass. Based on this approach impact and knowledge spill-overs can be generated at national level (e.g. in various regions).
3. **International strategy:** Field labs can develop into an **international centre**, focusing on a niche and on technology development which is of international importance. It is crucial for this strategy to cooperate with international top players.
4. **Strategic shift:** Field labs can also choose to change their strategy over time and switch from a regional to a national or international strategy.

After field labs have matured, through several stages of a respective growth strategy, various exit or transformation options arise:

1. **Development into (or becoming part of) a commercial entity** when a product is launched on the market, and risks concerning technological feasibility and market acceptance have diminished. This is particularly relevant for field labs of type 2.
2. **Development into (or becoming part of) a research or innovation institute**, when a field lab increasingly focusses on research / early stages of innovation, and not so much on scaling up or other close-to-market activities. This is particularly relevant for type 1 field labs.
3. **Development into (or becoming part of) an education institute**, when a field lab increasingly focusses primarily on skills development. on research / early stages of innovation, and not so much on scaling up or other close-to-market activities. This is particularly relevant for field labs of type 3.
4. **Termination**, when a field lab has achieved, or will not obtain, its innovation objectives.

Note that it is possible that only part of the field lab transforms an entity according to the options as described above.

3 Rationale for field lab involvement of partners

This chapter introduces the rationale for participation of the different actors in a field lab.

3.1 Rationale for firms

Previous research indicates that individual firms experience difficulties when investing in the innovation process at the stages from research to micro production (activities 2-5 of Table 5).[1] Assessment of the underlying rationale for a negative investment decision indicates that firms estimate that the uncertainty of the outcome of the innovation process is such that the required investment cannot be recovered.[2] Field labs can contribute to solving this "economic risk problem" as follows:[3]

1. Field labs reduce the required investments in the innovation process since cost can be shared among partners.
2. Field labs provide access to know-how, networks and training and increase the probability of success of the innovation process.
3. Field labs reduce uncertainty about the potential impact of the innovation. Especially when potential clients and lead users are involved, since they are able to provide information about market opportunities.
4. Rationale of research institutes and education institutes.

3.2 Rationale for knowledge institutes

RTOs (and universities involved in research) are motivated to participate in a field lab since this gives them the possibility to test and apply their research and bring their technological innovations to market. Field labs provide the opportunity to show the applications to customers which contributes to the market articulation. It also provides them insight in the relevance of research subjects, and allows them to build up a knowledge base that attracts demand for additional contract research.

3.3 Rationale for education institutes

Education institutes have the following rationale to join a field lab:

1. Field labs contribute to a better match between what education institutes offer and firms require.
2. The technology developed in a field lab is usually not present at an education institute. A field lab subsequently provides the facilities that students and teaching staff can use to gain or update practical experience.

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[1] De Heide M., 2016, The financing of field labs in the Netherlands, TNO. See thttp://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[2] De Heide M., 2016, The financing of field labs in the Netherlands, TNO. See thttp://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[3] De Heide M., 2016, The financing of field labs in the Netherlands, TNO. See http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.

3.4 Rationale for public support

Forms of market failure provide a rationale of public intervention to support field labs. These types of market failure contribute to the gap between the expected costs of the innovation process, and the profit in case the innovation process is finalized in a successful way.

The following types of market failure can be distinguished according to the state aid rules:[4]

1. Positive externalities/knowledge spill-overs*: "R&D&I often generate benefits for society in the form of positive spill-over effects, for example knowledge spill-overs or enhanced opportunities for other economic actors to develop complementary products and services. However, if left to the market a number of projects might have an unattractive rate of return from a private perspective, although they would be beneficial for society, because profit seeking undertakings cannot sufficiently appropriate the benefits of their actions when deciding about the amount of R&D&I they should carry out".*

Field labs address this type of market failure in the following ways:[5]

- Field labs encourage knowledge spill-over through joint projects, networking and training.
- Field labs address innovations that are beneficial to society at large, but cannot be sufficiently appropriated by individual companies.
- Field labs work on innovations that are "ahead of the market".

2. Imperfect and asymmetric information: *"Under certain circumstances, due to imperfect and asymmetric information, private investors may be reluctant to finance valuable projects and highly-qualified personnel may be unaware of recruitment possibilities in innovative undertakings. As a result, the allocation of human and financial resources may not be adequate and projects that could be valuable for the economy or society may not be carried out".*

Field labs address imperfect and asymmetric information by helping companies to assess and reduce uncertainties and creating awareness.[6]

3. Coordination failure: *"The ability of undertakings to coordinate with each other or to interact to deliver R&D&I may be impaired for various reasons, including difficulties in coordinating among a large number of collaboration partners where some of them have diverging interests, problems in designing contracts, and difficulties in coordinating collaboration due for example to sensitive information being shared."*

Field labs address coordination failure by bringing actors together and facilitating cooperation.[7]

[4] State aid for research and development and innovation: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2014:198:FULL&from=EN
[5] De Heide M., 2016, The financing of field labs in the Netherlands, TNO. See thttp://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[6] De Heide M., 2016, The financing of field labs in the Netherlands, TNO. See thttp://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[7] De Heide M., 2016, The financing of field labs in the Netherlands, TNO. See thttp://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.

4 Field lab costs

In this chapter, we describe the costs related to the various field lab activities. We divided the field lab costs in to 4 main categories, which will be discussed in the following sections:[8]

1. start-up costs;
2. costs related to the infrastructure;
3. project costs;
4. other operational costs.

These costs occur in principle within each field lab type. However, their amounts differ. This chapter illustrates some of these costs, based on prior analysis, of field labs such as DOC, Holst Centre, Solliance, etc.[9]

4.1 Start-up costs

Start-up costs arise in the start-up stage of all field lab types and ranges between 250.000 Euro and 1 million Euro. Previous research indicates that financing in the start-up phase can be divided into two stages. During the first stage, several parties explore the possibility to set up a field lab. This stage is characterized by informal talks, and background research. Resources required to this stage usually range between 30.000 to 50.000 Euro (this concerns T-2-T-1 in Figure 3). At the end of this stage a ‘go’ or ‘no-go’ decision is taken on whether the idea of setting up a field lab will be continued. The second stage is characterized by the effort to develop a business plan/programme for the field lab and obtain funding for the planned activities. To obtain public funding field labs usually have to submit proposals. Also negotiations with private parties on financial commitment (e.g. annual participation fees) take place during this phase. The costs for this second stage of the start-up process can differ, from 200.000 euro to up to 1 million Euro (this concerns T-1-T0 in Figure 3).

[8] De Heide M., 2016, The financing of field labs in the Netherlands, TNO. See http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[9] De Heide M., 2016, The financing of field labs in the Netherlands, TNO. See thttp://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.

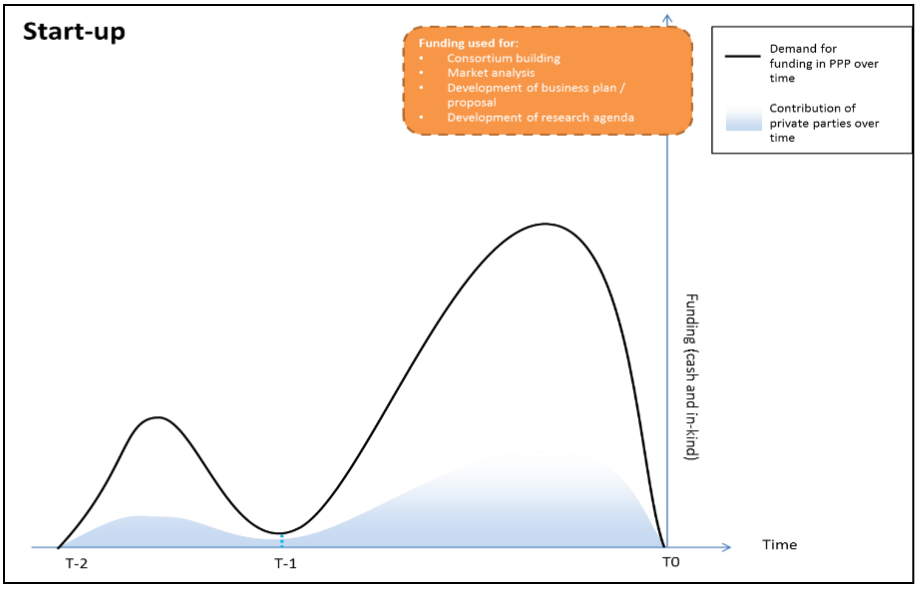

Figure 3 Start-up costs, source: The financing of field labs in the Netherlands, TNO report.

4.2 Infrastructure costs

Infrastructure costs result from the purchase of buildings, equipment, etc. (See Figure 4). These costs differ per field lab, financing required to address infrastructure costs can vary between 5 and-50million euro at the start-up phase of a field lab.[10] Additional funding will be needed to keep updating the infrastructure or for a major change after 5 to 10 years.

Individual firms are often not willing or able to cover the total investments required to purchase the infrastructure and equipment, as the resulting benefits of their use are often not sufficient to cover all the costs.[11]

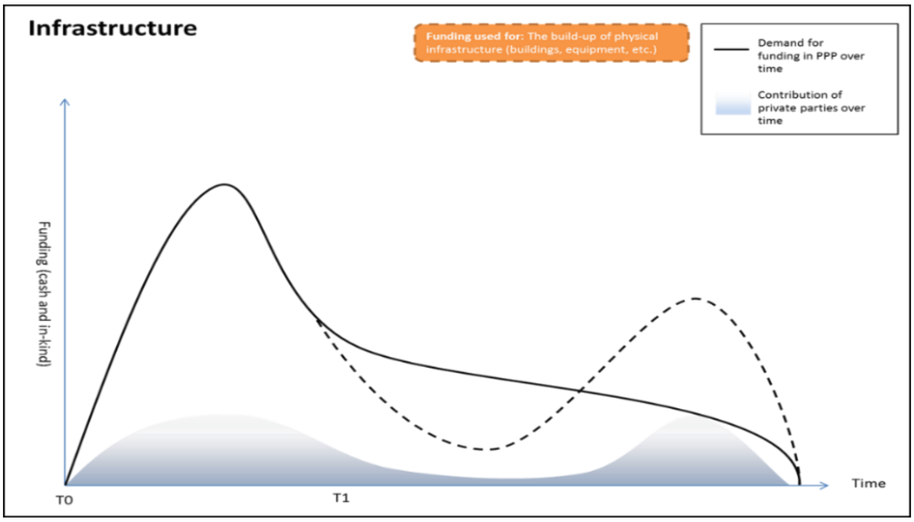

Figure 4 Costs for the infrastructure, source: The financing of field labs in the Netherlands, TNO report.

[10] Based on the input from field lab experts
[11] De Heide M., 2016, The financing of field labs in the Netherlands, TNO. See http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.

4.3 Projects costs

Implementation of projects incurs costs such as salaries of research staff, for organizing a project-specific event, for project management, etc. Project costs occur in principal in all field lab types. Project costs usually account for about 80% of a field lab's annual budget and can amount to 5-10- million[12] euro per year. The total project costs increase during the first years after the start of a field lab until a kind of 'steady state' is reached after 5 to 7 years (see Figure 5).

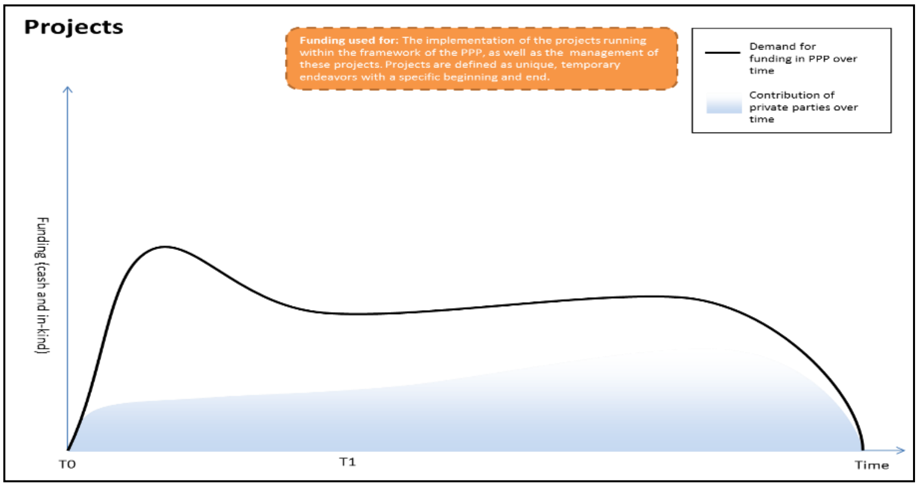

Figure 5 Project costs, source: The financing of field labs in the Netherlands, TNO report.

4.4 All other operational costs

Running a field lab leads to additional operational costs such as salaries for staff that do not work directly on projects (like business developers and managers), but also rent for buildings, maintenance of infrastructure, organization of regular meetings and networking events (see Figure 6). Operational costs are usually 10% to 20% of a field labs total annual budget. Operational costs are high in the beginning, as field labs have to build up their project portfolio. In later stages, operational costs become a function of project costs. This means that the amount of operational costs will first increase and afterwards decrease with the increasing number of projects a field lab is carrying out. The largest part of these costs concern acquisition and monitoring of projects.

[12] Based on the input from field lab experts.

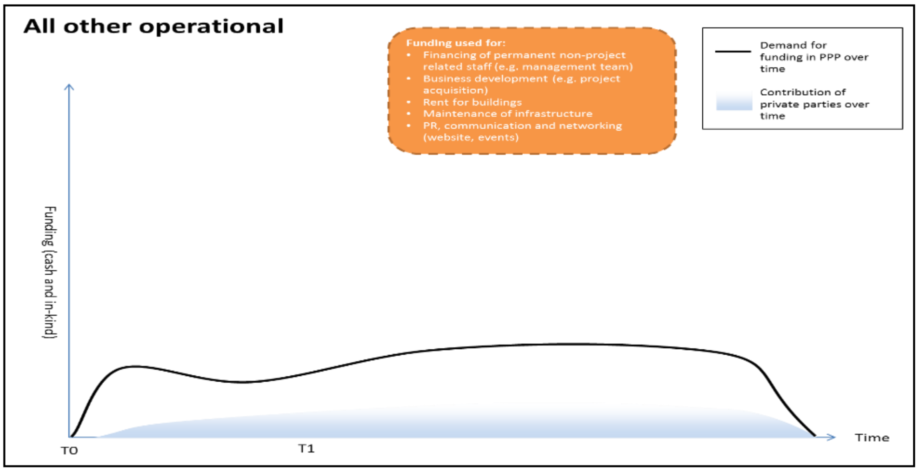

Figure 6 Other operational costs, source: The financing of field labs in the Netherlands, TNO report.

5 Field lab revenues

In this chapter, we show how revenues result from field lab activities and additional funding instruments per field lab type (see Table 5). The focus of this report is on the revenues for R&D&I activities, as our analysis seems to suggest that those activities result in the highest financing gaps for field labs. These activities mainly occur in field lab type 1. The financing gap will be discussed in section 6.2.

5.1 Revenues from activities and funding instruments per field lab type

- **Field lab type 1: Most of the revenues generated by field lab type 1 originate from R&D&I related activities,** conducted within projects.[13]
  - Many of these projects result from **co-funded shared work-programmes or roadmaps** that have been set-up by the field labs and their partners (e.g. industry, and universities / RTOs). The contribution by the industrial partners is often in the form of a membership or participation fee. Public support as well as the contribution by the participating RTOs and universities is often in the form of basic funding for the field lab. Public support can be split in EU level (e.g. H2020), national level (e.g. MIT, PPS toeslag), regional (e.g. EFRO).
  - Besides co-funded shared R&D&I projects, field lab type 1 also focus on **contract research** on behalf of industrial partners.
- **Field lab type 2:** Offers mainly **commercial services**, such as lab services, testing validation and consultancy services, (workshops, incubator services) and licensing of IPR. These activities are mainly financed by contributions in the project costs by firms, EFRO, regional instruments, MIT etc.
- **Field lab type 3: Focusses on training activities and skills development**, mainly funded by special training funds such as NWO, STW, RIF and tax deduction. These instruments are mainly on EU and national level. However, decentral governments may also contribute in the training of employees.
- **Field lab type 4**: Focusses on all 15 activities conducted in the other three field lab types. These activities are financed by combinations of funding and financing solutions used for the previous three field lab types.

This indicates that field lab types are financed by public and private contributions. However, the current financing options are not sufficient to cover costs required to execute the field lab strategies. This has to do with certain bottlenecks described in chapter 6.

5.2 Revenues and financing options at different field lab stages

Revenues and financing options also differ per field lab stage. Chapter 3 shows that the activities are mainly R&D&I related in the early stages, while the later stages have a stronger focus on commercial activities. The related financing sources will change subsequently. Chapter 4 indicates that the costs (e.g. start-up costs, infrastructure costs, project costs and other operational costs) are higher in the early field lab stages than in the later field lab stages. It is more challenging in these

[13] See De Heide, M.J.L., and M. Butter (2016). *Deliverable 5.3 Report assessment match/mismatch and issues with combined funding*. EU H2020 project EU-GREAT.

early stages for field labs that have just started to obtain private financing, as they first have to “prove their added value”. Once field labs can prove this by referring to successful projects, firms are more willing to contribute to projects. That means that the early field lab stages require more public funding, as it is more complicated to attract private financing in the earlier stages compared to the later field lab stages. That implies that the private financing will be higher in the later stages than in the early stages.

1	2	3	4	Activities	RTOs / Education	Firms	EU	National	Regional
X	X		X	Consortium building				Funding	funding regional government
X			X	1. Market studies		contribution study costs		MIT feasibility grant (individual SME), STW take-off funding, SBIR	BOM Haalbaarheidssubsidie
X			X	2. Scientific research:					
X			X	(co-funded) research and development programme's / roadmaps & specific	(in-kind) contribution	participation fees (also in-kind)	funding H2020, Eureka (=transnational), regional government	MIT R&D cooperation projects, IPC ("Innovatie Prestatie Contracten SME"), WBSO, SBIR, "PPS toeslag" (TKI before)	EFRO
X			X	Specific research projects (individual or collaborative)	(in-kind) contribution	participation fees (also in-kind)	funding H2020 (RIA), Eureka (=transnational), regional government	MIT (across borders), IPC (InnovatiePrestatieContracten MKB), WBSO, "PPS toeslag" (TKI before)	EFRO
X			X	Contract research		contribution project costs			
X			X	Public procurement of R&D&I			contribution project costs		
X			X	3.Early phase development (tot TRL 3)		contribution project costs	H2020 (Business Innovation grants, Innovation action, RIA), ECSEL, Eniac, EIT	"PPS toeslag" (TKI before), WBSO	EFRO
X	X	X	X	4.Develoment, demonstration, prototyping and validation products (TRL 3-7)		contribution project costs	H2020 (Innovation Action), ECSEL, Eniac, EIT	MIT-R&D-cooperation projects, Subsidy for demonstration RVO, "PPS toeslag" (TKI before), WBSO, Innovation box	EFRO, BOM Ontwikkelfonds Pre-Seed (prove of concept)
X	X		X	5.Pre- of Micro–production (TRL 8)		contribution project costs	H2020 (Innovation Action)		EFRO
	X		X	6. Scaling up activities (TRL 9) Development and preparation of the production organization (market readiness) Market development		contribution project costs	H2020 (Innovation Action,)		EFRO, SER Brabant Impulsinstrument
X	X	X	X	7. Hiring/renting out equipment / infrastructure		contribution project costs and rent		Loan "Toekomstfonds" / funding infrastructure RVO, WBSO, Innovation box,	EFRO (for infrastructure facilities), Ad-hoc grants, SIR (debt funding)
	X		X	8.Spin-offs/stimulation of valorisation incubator activities		Contribution project costs, Rabo pre-seed fund	Various instruments via start-up Europe	Pre-seed funding (like Rabo pre-seed fund of Agenschap.nl and Rabo)	Regional government
X	X	X	X	9. Information sharing and awareness creation	in-kind	in-kind or financial contribution organisation costs	H2020 (CSA)		EFRO
X	X	X	X	10.Network activities	in-kind	contribution organisation costs	H2020 (CSA), Interreg	MIT: Network activities, "PPS toeslag"	Regional funding
X	X	X	X	11. Consultancy and other commercial activities		Consultancy fee			
		X	X	12.Support, training and education		Contribution training costs	H2020 (Marie Curie, international), free of charge business coaching	PhD national funding (NWO, STW), RIF funding MBO	Funding decentral government education firms / NWO: KIEM - Smart Industry, decentral government, tax deduction to train employees
	X	X	X	13.Public projects				Funding projects	
			X	14. Policy development					
			X	15. Activities focussed on the development of legislation					
	X		X	Participation	profit				
	X		X	IPR	licence fees				

Table 5: Revenues, including income and funding instruments

6 Bottlenecks related to the current financing options

Chapter 5 shows that there are many activities based on which a field lab can generate income. There are also a lot of funding instruments on EU, national and regional level that a field lab can apply for. However, private financing and the current funding instruments have some bottlenecks and related financing gaps. In table 5, those activities that are most difficult to finance, according to our analysis and experience, are marked in yellow.

This chapter describes these bottlenecks and the financing gaps related to private financing and the current funding instruments. Debt and equity financing were not included as options in chapter 5 since they have limitations, to be discussed in this chapter.

6.1 Key bottlenecks related to private financing

The bottlenecks of private financing relate to a variety factors:[14]

- ***Early stage in the lifecycle:*** It is challenging for field labs that have just started to obtain private financing, as they first have to “prove their added value”, while they do not have anything to prove yet. Once field labs can prove this based on concrete projects they finalized, firms are more willing to contribute financially.
- ***Position in the innovation chain (lower TRL levels):*** Field labs that address lower TRL levels generally receive less private financing than field labs that focus on higher TRL levels. Investing in high-TRL projects is more attractive for firms as the projects’ results are closer to the market.
- ***Sector structure:*** Field labs favour cash contributions, while firms prefer in-kind contributions. In sectors with a lot of SMEs, obtaining cash for projects can be very complicated.

6.2 Key bottlenecks in the current funding instruments

The most important bottlenecks of the funding instruments are[15]:

- **Shortage of funding in the current instruments:** The total budget for public instruments addressing public private partnerships in R&D&I has decreased over the last years (i.e. since 2010). While in the past large subsidies were available to fund public-private research, in the form of the ‘Technological Top Institutes’ or FES funding, most of the public funding for research and innovation is currently allocated via tax incentives, such as the WBSO,[16] or the ‘Innovation Box.[17] The public resources devoted to generic subsidies, such as

[14] De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf. The report also refers to an additional reason for difficulties in attracting private financing: goal of the field lab. In practice the willingness of firms to get involved in R&D&I projects is lower if it relates to “Science for Science” and “Science for Society” in comparison to “Science for Competitiveness”. For field labs, this seems however less relevant.

[15] See http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.

[16] See http://www.rvo.nl/subsidies-regelingen/wbso.

[17] See http://www.atlas.tax/en/news/item/178-new-innovationbox-regime-in-the-netherlands.

"PPS toeslag" or the EFRO are much smaller than the resources devoted to tax incentives:[18]

- The "PPS toeslag" has a budget of 75 million euro per year,[19] and the EFRO fund has a total budget 83 million euro per year (in the period 2014 -2020),[20] compared to the 1.2 billion euro of the WBSO budget, and 1.4 billion of the Innovatiebox in 2017.[21]
- The EFRO budget decreased with 40% compared to the former EFRO period (in the period 2007-2013).[22]

RTOs that are often partners in the field lab also do not have enough resources to contribute due to the reduction of their budgets.[23, 24, 25]

Revolving instruments such as the "Toekomstfonds" are available. But the disadvantage is that revolving instruments are temporary funds, which must be paid back and that is very difficult for a field lab, especially in the start-up stage since the income is not ensured.

- **Fragmentation of funding instruments:[26]** Field labs may be financed through a wide variety of funding instruments.
  - Therefore field labs are forced to seek and combine various instruments and have to deal with various application and reporting cycles with different requirements. This is very time consuming since these instruments are **difficult to combine and understand.**
  - Field lab partners are often not familiar with these instruments and have to deal with **high acquisitions costs,** since they have to invest a lot of time to get a better understanding of the instruments. This time investment also

[18] Prior research suggests that the besides budget constraints, also the reallocation of public support from subsidies to tax measures has limited the availability of financial resources for PPPs such as field labs (see De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf). The (theoretical) explanation lies in the investment behaviour of firms. Research suggests that the investment decision of a firm can be modelled such that involvement in an R&D&I project is defined by: the foreseen impact a successful innovation process has on the company result; the probability of success of such a process; and the related costs. These elements are different for co-funded innovation within the framework of a PPP such as a field lab, and innovation supported by fiscal measures. As an example: the costs for an innovation process within the framework of a field lab are lower than in case of tax-funded R&D&I. In the latter case, these costs (for equipment, R&D personnel) are covered by the individual firm, and not shared within the framework of a PPP. The expected impact in case of an innovation project supported by fiscal measures however is higher, as the project results do not have to be shared. In the overall investment decision, the assessment of the factors defining the behaviour of the firms are such that in general firms seem to prefer to implement R&D&I supported by fiscal measures over projects conducted within the framework of PPPs such as field labs. This has further limited the financing of such field labs.
[19] See http://www.rvo.nl/subsidies-regelingen/pps-toeslag-onderzoek-en-innovatie/mogelijkheden/pps-programmatoeslag-voor-het-tki.
[20] See https://www.europa-nu.nl/id/vga3f1usj7zg/europees_fonds_voor_regionale.
[21] See https://www.hezelburcht.com/wbso-subsidie/?gclid=CJj6l6Hw6NQCFQUq0wodqDcPWA.
[22] See https://www.europa-nu.nl/id/vga3f1usj7zg/europees_fonds_voor_regionale.
[23] Werkgroep WOOI (2016) Rapport werkgroep Wetenschap, Onderzoek, Ontwikkeling en Innovatie ten behoeve van de Studiegroep Duurzame Groei. Den Haag: Rijksoverheid (juli 2016)
[24] https://www.tno.nl/media/8806/de_staat_van_nederland_innovatieland_2016.pdf
[25] De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[26] De Heide M., 2016, The financing of field labs in the Netherlands, TNO. See http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.

distracts them from their daily business (such as doing research, providing demonstrator activities and conducting business development activities).[27]

- **Problems relating to funding modalities:**[28]
  - Project-funding makes it **complicated to work towards an ambitious and long-term goal.**
  - The existing funding instruments have some **inflexibility** due to the fixed deliverables for instance in H2020 and the PPS-toeslag (before TKI). That makes it difficult to work on new findings and innovation opportunities that occur within an existing project.
  - EU funding instruments have relative **low chances of success.** Therefore relatively more time must be invested in successful acquisition.
  - EU instruments (e.g. H2020) **require international cooperation,** which is limited in the Dutch field labs.
  - Application for funding within the framework of national MIT funding instrument and the regional EFRO funding is "**in competition"** (i.e. several project proposals compete for a limited amount of funding). In general, these instruments receive too many applications. That decreases the probability for a field lab to get funding from these instruments.

6.3 Financing gap

The current field labs (29 in total) cannot execute all their planned activities due to the limited financing of field labs (see Figure 7). The limited financing of field labs is confirmed by various (literature) sources. First of all the Rathenau Institute describes in the TWIN 2015-2021[29] that the total support (direct support and indirect tax support) of the government for R&D&I activities as percentage of the GDP show a decrease in the period 2016-2021 (from 0.93% to 0.82 %). The financing of field lab report[30], the PPS 5050 working group[31] and the Midterm review Smart Industry 2017 also indicate the limited financing for field labs.

Previous research shows that the annual budgets of the studied field lab related initiatives average at circa 25 million Euros per year, and cover a range from 1 million (DITCM) to 50 million (NanoNextNL).[32]

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[27] Based on the feedback from various field lab representatives.
[28] De Heide M., 2016, The financing of field labs in the Netherlands, TNO. See http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[29] https://www.rathenau.nl/nl/publicatie/totale-investeringen-wetenschap-en-innovatie-2015-2021
[30] De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[31] De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[32] De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf. Field lab Campione and field labs ROSF are exceptions and received large amounts of funding based on which they can accelerate. Campione received € 6 million from OPZuid and field lab Region of Smart Factories received €11 million from the provinces and the Ministry of Economic Affairs. Note that these numbers are intended to provide a high-level overview of the range of annual budgets of field labs. They are rough estimates and not calculated according to a consistent methodology.

Our analysis indicates that field labs often have to deal with a gap in their multi-annual (operating) budget, if they want to come to fulfil their growth strategies. There are two types of budget deficit:[33]

- **A start-up financing gap** arises when investments required to start-up the field lab cannot be pre-financed, because revenues are not generated yet.

  Previous research provides some examples in which firms contribute cash (e.g. such as in the case of DITCM where each of the twelve partners provided 10.000 euro, or in the case of Biorizon where two companies provided 20.000 euro each to carry out a market analysis). However, private investment during the start-up phase is hardly ever sufficient to cover all costs. Previous research also indicates that financing of collaborative research projects by private parties does not start immediately once a field lab is set up; For example, the Holst Centre started with approximately 15% private financing in its first year. This had developed to circa 45% after 8 years. While the exact ratio differs between field labs, previous research has shown that obtaining more than 50% private financing for projects is almost never possible. This suggests a start-up financing gap.

  Start-up difficulties may imply that some field labs stay longer in the start-up stage than expected since they do not have enough financial sources to cover all the costs required for execution of their activities during the start-up stage.

- **A structural financing gap** arises when the overall field lab budget suggests a shortage in income over the costs of the multi-annual budget. This is not a surprise given the forms of market failure (as mentioned in section 3.3) that prevent the establishment of field labs without additional structural funding by a government. However, the ratio between public and private funding for operational costs (the structural gap) differs between field labs and is difficult to generalize.

These financing gaps mainly result in (see the yellow marked lines in Table 5):

- Lack of project funding for R&D projects TRL 3-7 (this is mainly a problem for field lab type 1).
- Lack of funding for consortium building / ”kwartiermakersfase” (in all field lab types).
- Problems with financing of the infrastructure (in all field lab types).

[33] See De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.

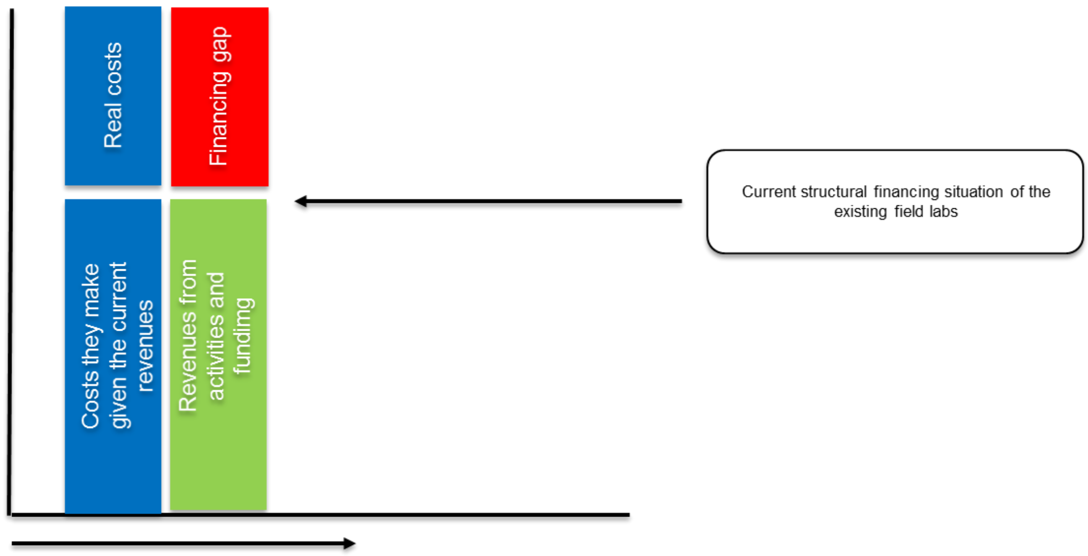

Figure 7 Structural financing situation of the current field labs

6.4 Limitations of Debt and Equity financing

Previous research suggests that the actual use of debt and equity financing is limited, because of specific considerations concerning the investment decision of the investors.

Debt financing
The Financing of field labs report[34] shows that the **role of debt financing is limited** to addressing the start-up financing gap. Debt financing is not considered as an effective solution[35]. Many field labs have a non-commercial character, and the income generated, especially at the beginning, is not ensured. This limits the willingness to commit to the loan requirements. For more information see the Financing of field labs report,[36] and the H2020 project EU-GREAT! Report.[37]

The Financing of field labs report also shows that the use of **not-institutionalized ad-hoc support from the government as basic funding** for a field lab to balance the budget (i.e. to address the structural financing gap) is for most commercial banks an **indication of high risk** with respect to the long-term continuation of the field lab.

Banks are especially interested in projects that are "close to market". However, funding R&D&I projects by banks is also complicated since **it is difficult to determine the potential failure rate and impact of R&D&I** (because of information asymmetries).

[34] De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[35] De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[36] See De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[37] See De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.

Equity financing
Previous research indicates that equity financing is another option which has some limitations. First, equity financiers require a return on investment, which means that the income needs to exceed the costs.[38] So it does not solve the structural financing gap according to the Financing of field labs report.

The EU-GREAT! Project indicates furthermore that private equity firms usually only invest in a field lab if there is a **potential for rapid growth**. The potential scaling-up of the concept from a single market to multiple markets (like Uber) is an important aspect in the assessment of the growth possibilities of a field lab. However, the EU-GREAT! Project suggests that a field lab is not interesting for private equity firms to invest in, since the concept underlying the field lab is not directly scalable and does not have a rapid growth potential.

An important condition to involve venture capital is the possibility of an **exit strategy** to capitalize on the increased value.[39] An exit strategy is a way to transition the ownership of a firm. However, an exit strategy seems very complicated according to the Financing of field lab report, since the Intellectual Property resulting from activities conducted within the field lab is often shared over different partners (especially in the case of co-funded collaborative research), which makes it difficult to transfer the ownership.[40]

A field lab might be interesting for other actors involved in private equity financing and real estate that adopt another strategy for the weighted risks in their portfolio of participations. Condition to get them involved would be a certain level of assets and return on investment (with low risk).

[38] See De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[39] See De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.
[40] See De Heide, M.J.L., and M. Butter (2016). *Deliverable 5.3 Report assessment match/mismatch and issues with combined funding*. EU H2020 project EU-GREAT.

7 Financing options to address the identified gaps

In this chapter, we provide some financing options for the start-up and structural financing gaps. However, since the largest financing gaps relate to R&D&I activities and the start-up stage we mainly focus on the shortage of financing for:

- consortium building / ”kwartiermakersfase”;
- the infrastructure;
- R&D projects (TRL 3-7).

In principle, all field lab types are affected by this shortage of financing. Especially field lab type 1, since this field lab type has the strongest involvement in R&D&I activities, and is less involved in commercial activities to attract private financing.

7.1 Private financing

The level of private financing differs significantly between the different types of field labs.[41] The commitment of the national or regional government to fund a field lab incentivises private parties to step in. As previous research put it: “Money attracts money” (“geld trekt geld”).[42]

7.2 Public funding

Public support is governed by the State Aid rules on R&D&I. Based on the table with the maximum aid intensities for field labs, it should be concluded that under certain conditions, aid intensities of more than 50% are allowed (for national and regional funding, see Table 6). According to previous research the implicit policy objective generally adopted by many governments is to limit public funding to 50%.[43] This might be related to uncertainties about how to interpret the State Aid rules, and the subsequent assessment of aid for field labs. However, a percentage of **50% pubic and 50% private financing is recommended** to match public and private financing. The Competence Centre’s for Excellent Technologies COMET in Austria (they are 45 in total) use similar financing percentages for a period of 8-10 years (e.g. 40%-55% public funding, 5% is in-kind contribution of the knowledge institutes and the other part is paid by the firms).[44]

[41] See De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf. Some field labs, such as Holst and ESI, have been very successful in attracting private financing, reaching a share of about 50%. For many other field labs, the share of private funding is much lower (i.e. ca. 30% to 40% for DITCM, 25% to 30% for NanoNextNL).

[42] See De Heide M., 2016, The financing of field labs in the Netherlands, TNO report; http://publications.tno.nl/publication/34623736/CHnLkb/TNO-2016-R11435.pdf.

[43] See De Heide, M.J.L., and M. Butter (2016). *Deliverable 5.3 Report assessment match/mismatch and issues with combined funding.* EU H2020 project EU-GREAT.

[44] Seehttps://www.ffg.at/sites/default/files/allgemeine_downloads/strukturprogramme/comet_programmedocument_2013_en.pdf.

Table 6 Maximum aid intensities Source: State aid rules[45]

State Aid rules for R&D projects	Small enterprise	Medium-enterprise	Large enterprise
Industrial research	70%	60%	50%
Subject to effective collaboration between undertakings (for large enterprises, cross-border or with at least one SME) or between an undertaking and a research organisation, or subject to wide dissemination of results	80%	75%	65%
Experimental development	45%	35%	25%
Subject to effective collaboration between undertakings (for large enterprises, cross-border or with at least one SME) or between an undertaking and a research organisation, or subject to wide dissemination of results	60%	50%	40%
Aid for feasibility studies[46]	70%	60%	50%
Aid for the construction and upgrade of research infrastructures	50%	50%	50%

Our analysis indicates that the cooperation between national and regional governments plays an important role in financing a sustainable development and growth of the field lab infrastructure. Cooperation between national and regional governments contributes to a better alignment of national and regional funding policy. Regional policymakers are motivated by the generation of positive field lab externalities in the region (e.g. job creation, eco-system building, creation of new start-ups, etc.). National policymakers are motivated by the generation of knowledge spill-overs on national level.

Further coordination on a national level enables mergers or cooperation of field labs that develop similar technologies. Such mergers limit the number of field labs that needs to be financed and subsequently contributes to a more efficient financing system.

Additional funding suggestions on regional, national and EU level will be discussed in the following sections.

7.3 Regional funding

Our analysis suggests that funding provided by regional government **to purchase the field lab infrastructure** would stimulate positive effects in the region such as job creation, eco-system building, creation of new start-ups, employees spending their salary etc. (the so-called “rippling effect” of investments that are allocated regionally).

Public support could be **based on ad-hoc funding from the regional government**. PPP Solliance for instance received 28 million Euro in ad-hoc funding from the province of Noord-Brabant to purchase infrastructure.[47] At the Solliance research location, science and industry work together to further improve the production processes. Solliance created positive effects in the region since 250 employees from the partners currently work for Solliance, and various other partners are involved to whom Solliance for instance rents out equipment.

[45] See http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52014XC0627(01).
[46] The focus of a field lab are the pilot activities. However, these types of studies can be conducted in the start-up stage of a field lab to get better insights in the market.
[47] See http://solliance.eu/organisation/.

7.4 National funding

An **extension of the national funding instrument called "PPS toeslag"**[48] (TKI before) from 25% to 50% would contribute **to close the financing gap related to R&D projects TRL 3-7.** [49] That means an increase from 0.25 Euro "PPS toeslag" to 0.50 Euro for each Euro private cash R&D contribution from a firm to a research institute," to reuse this in R&D.[50] The advantage of this solution is that it will stimulate private financing. It might also contribute to create knowledge spill-overs on national level and to addresses various forms of market failure.

Another national funding instrument that would stimulate private financing is a **launching customership**.[51] This instrument was often used in the past and could be reintroduced. A launching customership is based on the principle that the national **government buys innovative products or services and acts as a custome**r. The government creates a market for specific products or services. At the same time the government functions as early adopter and example for other customers. This might stimulate private customers to buy the product or service. The goal of the government as launching customer is to stimulate innovation and spread of innovative products and services by increasing the demand for these products and services. This often concerns products and services which might contribute to societal topics and sectors such as health, safety, mobility and environment.

However, (large) firms can also act as launching customer in later field lab stages. In later stages field labs had the chance to prove themselves by referring to successful projects, which makes other firms more willing to act as launching customer.

Long term basic funding from the national government is essential to close the structural gap (like for QuTech). The Catapults in UK also have long term and predictable funding. It will be crucial that this long term basic funding:

- Finds a balance between the competitive element in application process, and total availability of funding, such that enough initiatives are supported. This should limit the acquisition costs and increase the success rate for field labs.
- **Provides the field labs with the possibility to choose how to spend this money**. Avoiding strict deliverables increases the flexibility to work on new findings.

The advantage of the long term basic funding is that:

- Such a structural funding encourages the realization of an ambitious and long term goal.
- It stimulates field labs to fulfil their national assignment to accelerate the Smart Industry Programme.
- It stimulates knowledge spill-over of field labs on national level stimulates portfolio management of field labs on national level (e.g. merging similar field

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[48] The 'Werkgroep WOOI' mentions that the PPS-toeslag (called TKI-toeslag before) is currently too low.
[49] See http://www.rvo.nl/subsidies-regelingen/pps-toeslag-onderzoek-en-innovatie/mogelijkheden/pps-programmatoeslag-voor-het-tki.
[50] See http://www.rvo.nl/subsidies-regelingen/pps-toeslag-onderzoek-en-innovatie.
[51] See https://www.vno-ncw.nl/forum/overheid-als-launching-customer-zo-werkt-dat-dus, and http://www.overijssel.nl/thema%27s/economie/innovatie-0/launching/.

lab initiatives to join forces, and creating a more efficient field lab infrastructure and field lab financing).

7.5 EU funding

The use of the current **EU funding instruments by the Dutch field labs is limited and could be stimulated up to 10% - 20%** of the total field lab budget.[52] The advantage of EU funding instruments (as listed in par. 5.2) is that they stimulate international cooperation and knowledge exchange across country borders as these instruments require cross-border cooperation. However, the disadvantage of this type of funding are the low success rate and the high acquisitions costs. Therefore, EU funding requires a combination with regional and national funding.

Adding a **new EU fund** for which the applicants do not have to compete and that support the creation of the **field lab innovation infrastructure** would be very helpful. Such a programme would mainly cover the funding gap related to the building of the infrastructure, but it could intervene also to some extent for the costs (operating costs of the demonstration platform) that would not fall under specific demonstration projects (e.g. overhead, depreciation, maintenance). Vanguard tries to stimulate this funding instrument. The **Vanguard Initiative** aims at stimulating Industrial Modernisation in its participating regions, mainly through the smoother and more effective deployment of new technologies.[53] More in particular, the initiative aims at providing industrial companies easier access to (networked) facilities for demonstration (see the 'Typologie en standaard voor fieldlabs' report for some examples).

[52] Our analysis suggests that this currently lies between 1% - 2%.
[53] See http://www.s3vanguardinitiative.eu/ambitions.

8 Conclusions

Brainport Development and the Economic Board Zuid-Holland (EBZ) have asked TNO to come up with a more specific characterization of field labs and link them to financing options for field labs. The goal is to be more efficient in supporting field labs, and to position the field labs in a more appropriate way (in different sectors, regional, national and at European level).

This report analyses how to finance the sustainable growth and development of field lab infrastructure. Based on our assessment of the current modalities of financing, we conclude that:

- Field labs address the following types of market failure:
  - **Positive externalities/knowledge spill-overs (**R&D&I often generate benefits for society in the form of positive spill-over effects, if left to the market a number of projects might have an unattractive rate of return).
  - **Imperfect and asymmetric information.**
  - **Coordination failure.**

- The **financing of the 4 field lab types is currently problematic** and limits field labs in the implementation of their activities and growth strategies.
- The financing is especially complicated for **field lab type 1** for two reasons:
  - Field lab type 1, has the strongest involvement in R&D&I activities which is difficult to finance by private parties.
  - Field lab type 1 has a limited involvement in commercial activities to attract private financing.

- **Private financing of all field labs is limited (25% - 50%)** due to the fact that:
  - Most field labs are in the early development stages.
  - Some field labs address lower TRL levels.
  - Some field labs focus on “Science for Science” and “Science for Society”.

- **Private financing needs to be mobilized** by public funding as public funding attracts private financing.

- Current funding instruments have **some bottlenecks that needs to be solved such as:**
  - **Shortage of funding**, which relates to a reduction in direct funding of PPS initiatives since 2010.
  - **Fragmentation of existing funding instruments,** which makes it complicated to combine and understand the instruments.
  - **Problems relating to funding modalities** (e.g. inflexible instruments, low chances to get the funding, too much applications, application in competition for instruments like EFRO, budgets are relative low).

- **These bottlenecks result in two types of financing gaps that needs to be filled:**
  - The **start-up gap** plays a role in all field lab types, and concerns the start-up costs. Start-up costs can amount up to 1 million euro.

- The **structural funding gap** (e.g. operational activities) also plays a role in all field lab types. The size of the structural gap differs a lot per field lab type, so it is difficult to provide and average estimate.

- **These financing gaps mainly result in:**
  - **Lack of project funding for R&D projects (TRL 3-7):** occurs in all field labs but mainly in field lab type 1. Costs of projects can amount up to 5-10 million[54] per field lab per year.
  - **Lack of funding for consortium building / "kwartiermakersfase":** occurs in all field lab types (and especially for field labs that needs to start from scratch).
  - **Problems with financing of the infrastructure:** occurs in most field labs and can amount up to 50 million[55] euro per field lab.

To bridge these financing gaps more public funding and private financing is required (see Figure 8).

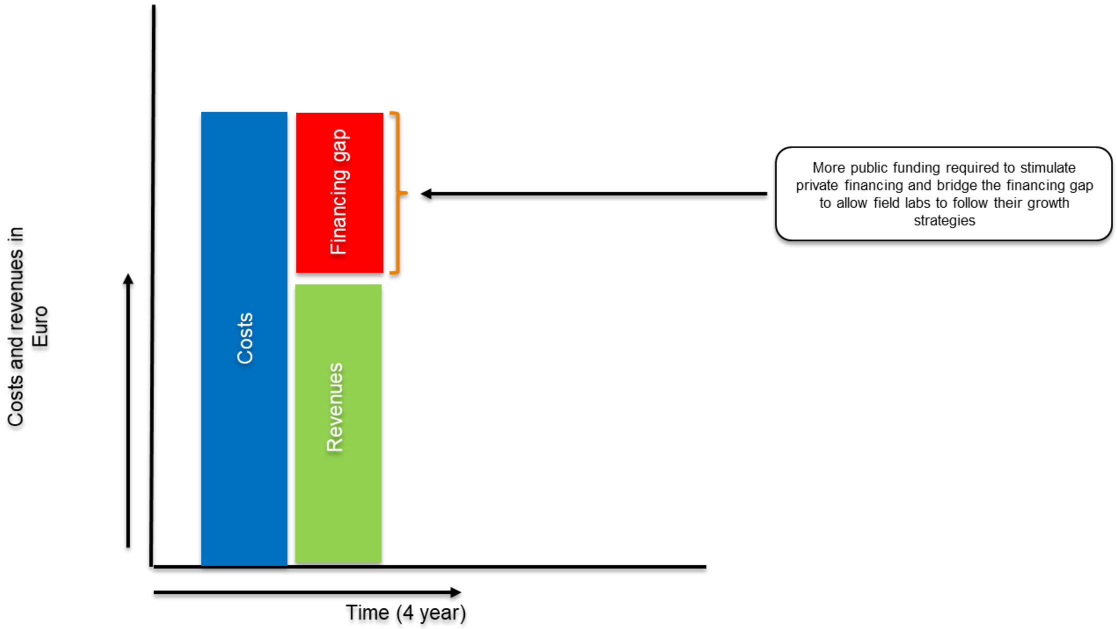

Figure 8 Financing gap

Financing differs per field lab stage:

- The **required percentage of public financing** of the total field lab budget is higher in the early field stages than in the later field lab stages. It is challenging for field labs that have just started to obtain private financing, as they first have to "prove their added value".
- The **percentage of private financing** of the total field lab budget is lower in the early field stages than in the later field lab stages. In the later stages field labs already had the chance to prove themselves, which makes it easier to attract private financing.

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[54] Based on input from experts in the field.
[55] Based on input from experts in the field.

9 Recommendations

The goal of this study was to identify options for improving the public support of field labs. This support concerns the financing of field labs and the way it is organized. Below, recommendations will be provided specifically for regional governments, but also within the perspective of their cooperation with companies, the national government and the EU.

1. Field labs have a big potential for economic development and solving societal challenges but address market failures at the same time. It is recommended to governments (regional, national and EU) **to invest public funding in field labs.** Field labs require about 50% percent public funding and 50% private financing. Amongst others, public funding is needed to mobilize private financing for two reasons:
    a. Field labs needs initial funding to prove themselves to attract private financing.
    b. The (long term) commitment of the government to fund a field lab incentivises private parties to step in.

2. Given the role and contribution of field labs, and the current lack of public funding available for these entities, **additional public funding is required** (EU, national and regional). It is recommended to explore the following options to solve this lack of funding:
    a. **Ad-hoc funding from the regional government** for initial start-up funding and for the funding of technological, physical located, infrastructure (labs etc.). The infrastructure costs can amount up to 50 million euro per field lab.
    b. An **extension of "PPS toeslag"**[56] (TKI before) from 25% to 50% to cope with **financing gaps for R&D projects (TRL 3-7**).[57] The extensions means an increase from 0.25 Euro "PPS toeslag" to 0.50 Euro for each euro private cash R&D contribution from a company to a research institute. The advantage of the increase of the "PPS toeslag" is that it will stimulate private financing. The project costs differ per field lab, but can amount up to 5-10 million per field lab per year.
    c. A form of **long-term basic** funding from the **national government** can help to close the **structural gap** and to encourage the realization of an ambitious and long term field lab goal. However, the regional government could also contribute to close this structural gap. Especially, when the field lab pursue a regional growth strategy.
    d. **Launching customership,** which is based on the principle that the regional or national **government buys innovative products or services and acts as a custome**r. The government creates a market, functions as early adopter and example for other customers. The advantage of this instrument is that this might also attract private financing as private customers might follow.[58] (Large) firms are also recommended to act as

[56] Regarding PPS meeting and documents spring 2016, De rode olifant, The Hague
[57] See http://www.rvo.nl/subsidies-regelingen/pps-toeslag-onderzoek-en-innovatie/mogelijkheden/pps-programmatoeslag-voor-het-tki.
[58] See https://www.vno-ncw.nl/forum/overheid-als-launching-customer-zo-werkt-dat-dus, or http://www.overijssel.nl/thema%27s/economie/innovatie-0/launching/.

launching customer in later field lab stages, as it is easier in these stages to attract private financing compared to the early field lab stages.

e. It is recommended to **combine EU funding instruments with national and regional instruments** for additional funding (for about 10-20% of the total budget of the field lab). However, practical experience learns that EU funding is not the main solution since the success rate is low and in the acquisition costs are high.

f. Adding a **new EU fund** (stimulated by Vanguard) for which the applicants do not have to compete and that support the creation of the **field lab innovation infrastructure** would be very helpful. We recommend the regions to support this new EU fund.

3. It is suggested to the regions to **use the 'Typologie en standaard voor fieldlabs' to accredit field labs**. This special status will be used to give field labs an easy entrance to funding instruments and aid intensities.[59]

4. **An intensive cooperation between** the regional, national and European **governments to align their funding policy** is recommended for an efficient support of field labs. Exploring this alignment, the specific interest of different government levels should be considered:
   a. Regional funding for accelerating the regional ecosystem, for building infrastructures and for regional jobs.
   b. National funding for stimulating national cooperation between field labs and for focussing and enlarging R&D efforts.
   c. European funding for stimulating international cooperation and for focussing and enlarging R&D efforts at European level.

5. This can be combined with a simple and **straightforward system of policy delivery** (acquisition as well reporting) to save time and costs.

6. To ensure effective alignment of funding for field lab activities by regional, national and European sources (governments, private) it is recommended to combine as much as possible **different financial instruments**[60] (at regional, national, EU level) **to avoid fragmentation of funding as much as possible**. Good examples from the Netherlands are the former 'Pieken in de Delta'[61] programme and the new IPC pilot EZ-PZH. In the UK the Catapults have developed strategies to integrate different funding sources and at EU level the EC support a combined funding instrument for the Digital Innovation Hubs (see Report Typologie and Standaard voor Fieldlabs).

7. To **ensure integration at European level** and to facilitate access to European funding opportunities **it is recommended that the field labs participate actively in the pan-European Network of Digital Innovation Hubs** promoted by the European Commission (see Report Typologie and Standaard voor Fieldlabs) .

[59] TNO 2017, Typologie en standaard voor fieldlabs
[60] Based on the "Tinbergen rule" that each instrument serves its own goal/type of market failure. See j. Tinbergen, On the Theory of Economic Policy; Amsterdam, North Holland. 1956.
[61] https://www.rvo.nl/subsidies-regelingen/pieken-de-delta-pid

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