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Evaluation Valorisation Programme NanoNextNL

Lessons for future valorisation programmes



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Management summary

This evaluation study of the Valorisation Programme of NanoNextNL is intended to look back to the past and ahead to the future, to learn from the programme and to identify lessons for future valorisation programmes. The lessons for future valorisation programmes may be of interest to policymakers that active in the field of science and innovation.

The Valorisation Programme was intended to “identify, nurture and develop product and business ideas emerging from the science and technology in NanoNextNL”. The programme consisted of several stages in which participants receive funding to further develop their business case with the help of business tools and coaching. Participants who developed a strong, potentially successful business case were awarded funding to further develop their business. In four calls, over 3.1 million euros of funding was allocated to the programme’s participants, of which almost 2.8 million euros was direct subsidy.

The Valorisation Programme has resulted in the creation of 44 business cases using the Lean Business Model Canvas of which 28 were awarded a subsidy in the final stage of the programme. The average success rate of the programme’s calls was 65%. The programme has resulted in many elaborated business plans; in new products, new IP, new clients and diversification of existing business activities; and in some start-ups, new services, financing from external investors and successful participation in other valorisation or incubation programmes. Furthermore, during the programme, business cases increased on average 2 TRLs and their value increased in total with 59 million euros. Participants were able to acquire a total 4.4 million euros of new funding.

Technopolis Group positively assessed the effectiveness and added value of the programme. Participants were generally quite positive about many aspects of the programme. The level and quality of support were assessed best, while the used tools were assessed least. The programme was said by most participants to have helped successfully commercialise the knowledge developed within NanoNextNL. The phased approach was valued, as well as the received assistance and funding.

Participants who were awarded a subsidy in the final stage of the Valorisation Programme seem to generally show some better results and seem to be somewhat more positive about aspects of the programme than those who were not awarded. This observation is however based on a limited number of respondents and therefore only a soft indication.

The Valorisation Programme was benchmarked with two other valorisation programmes: the Dutch Take-Off and the European SME Instrument. The Valorisation Programme is different in being the smallest of all in terms of overall budget, number of participants and duration. It provides subsidies only, has integrated stages and is directly related to a research programme and consortium. The overall success rate is high and the selection procedure is sufficiently selective. The Valorisation Programme was less rigid with internal coaching, while still having a similar relative support budget.

Some aspects of the Valorisation Programme may be considered innovative. These are the tooling to develop and assess business cases (LMBC and GEC), the stage-gate approach, the coaching and training ecosystem within NanoNextNL (including the additional Training Programme), the explicit evaluation of safety and society aspects and the fact that it was developed and executed by a public-private consortium itself.

The main strengths and successes of the programme are the link with the research programme, the type of funding, the support received, the limited administrative burden, the programme’s entrepreneurial focus, the assessment process and the accessibility of the programme (due to the stage-gate approach). Furthermore, the programme helped to strengthen business cases, even before awarding a subsidy, which improved the quality of awarded business cases.

The main weaknesses of the programme are: the programme was too short, the GEC should improve, the programme was partly developed and crystallised during its execution and investors, incubators and other funding programmes were not strongly involved.

The recommendations for *future* valorisation programmes are based on lessons learned from the Valorisation Programme and benchmark. Recommendations based on lessons learned from NanoNextNL are:

- Connect a valorisation programme and a research and technology programme from the start.
- Extend the valorisation programmes until one/two years after the connected research programme.
- Stimulate interactions of researchers with industry, investors or society at large and from interactions across disciplines.
- Make a strong connection with other valorisation and incubation initiatives and with funds or financiers for the next stages of development.
- Explicitly include safety and society aspects (RATA) in future valorisation programmes.
- Make a strong division in markets, to optimally cover these expertise for coaching and selection.
- Consider the stage-gate approach for future valorisation programmes, as it is valuable both in terms of management and in terms of quality.
- Online tooling can be useful for selection processes in future valorisation programmes, although some tooling might need to be further developed.
- Develop upfront clear and attributable KPIs, with associated targets, for the valorisation programme.
- Make sure that the Programme Officers of valorisation programmes are business minded and have some experience in business.

Recommendations based on lessons learned from the benchmark are:

- Focus valorisation programmes more on the phase of participants, such as their TRL, and the type of participants to be able to better coach participants.
- Either limit the number of potential applicants or increase the available budget to prevent discouragingly low success rates and a too low selectivity.
- Better embed valorisation programmes in the (national) innovation landscape to improve uptake of business cases by other programmes or investors at the end of the programme.
- Make coaching and training an integral part of valorisation programmes.

In this report, we have incorporated these lessons into a checklist for future valorisation programmes.

1 Introduction

This report contains the results of the evaluation study that Technopolis Group has performed on the Valorisation Programme of NanoNextNL. The study was commissioned by NanoNextNL and executed over the period March-June 2017. The evaluation study looked back to the past and ahead to the future, to learn from the Valorisation Programme and to identify lessons for future valorisation programmes. This study fits into the action of sharing good practices that the ministry of Education, Culture and Science and NWO recently have formulated¹.

For this study Technopolis Group relied on a solid study approach consisting of desk research, data analysis, interviews with selected stakeholders, a questionnaire among participants and an international benchmark. The research questions and the research methods used for each question are listed in Table 1.

Table 1 Research questions and research methods

Research questions	Research methods
1. What are the goals, means and activities of the Valorisation programme?	Desk research and data analysis
2. What are the expected effects and results (effectiveness) of the Valorisation programme?	Desk research and data analysis
3. What are the experiences of stakeholders with the Valorisation programme?	Desk research, data analysis and interviews
4. What are the most important lessons learned from the Valorisation programme according to stakeholders?	Desk research, data analysis and interviews
5. What are the most important successes of the Valorisation programme according to stakeholders?	Desk research, data analysis, interviews
6. How do awarded and not awarded applicants assess the Valorisation programme?	Data analysis and questionnaire
7. What results has the Valorisation programme delivered to its participants?	Data analysis and questionnaire
8. Is there a difference in successful valorisation between awarded and not awarded applicants to the Valorisation programme?	Data analysis and questionnaire
9. How does the Valorisation programme differ from other comparable valorisation programmes (setup and approach)?	Benchmark and interviews
10. To what extent is the Valorisation programme innovative as compared to other comparable valorisation programmes?	Benchmark and interviews
11. What lessons can NanoNextNL learn regarding valorisation from other comparable valorisation programmes?	Benchmark and interviews

Technopolis Group, 2017

In this report, we have formulated several lessons for future valorisation programmes that may be of interest to policymakers that are active in the field of science and innovation. The report is therefore intended for a wider public to build up a valorisation knowledge base and to improve future valorisation programmes in the Netherlands. Dutch organisations to which this study may be of interest are the Dutch Research Council (NWO), the National Taskforce for applied research (SIA), the university's Knowledge/Technology Transfer Offices (KTTOs/TTTOs), the Regional Development Agencies (ROMs), the DG Business and Innovation of the Ministry of Economic Affairs, the Netherlands Enterprise Agency (RVO), StartupDelta and organisations executing other national or local valorisation and incubation

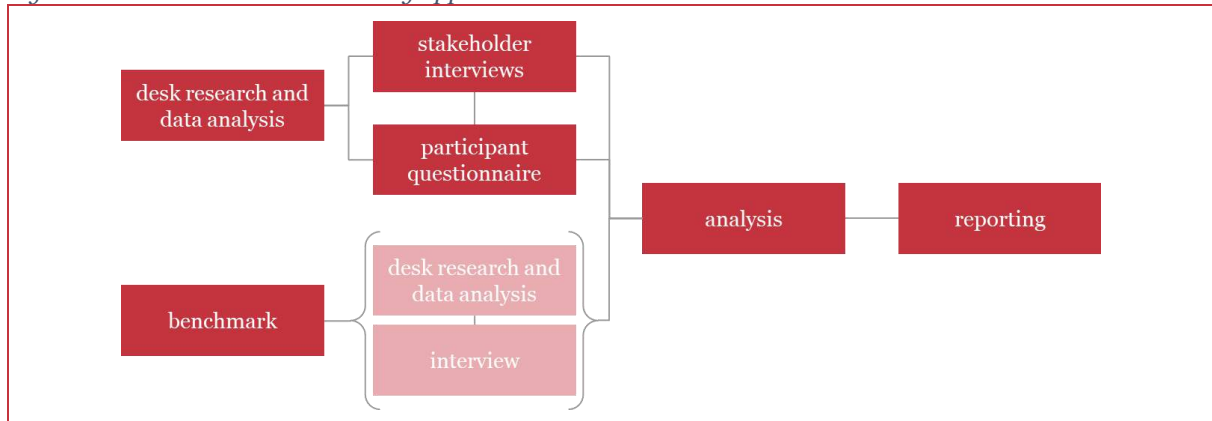
¹ Ministry of Education, Culture and Science (2017). Letter to Parliament on Science with Impact (Kamerbrief over wetenschap met impact). 19 January 2017.

programmes or that are planning to do so. Organisations abroad executing valorisation or incubation programmes may also be interested in this report.

1.1 Research methods and study approach

In this section, we give a short description of the research methods and study approach used for this study. The used approach, including the methods used, is schematically depicted in Figure 1.

Figure 1 Research methods and study approach



Technopolis Group, 2017

The first part of the study concerned desk research and data-analysis. The desk research focused on literature that described the programme and its organisation. We relied on grey literature such as annual reports, mid-term and end-term evaluations and documents for the calls for proposals and the website of NanoNextNL. The data-analysis concerned data that we received from the management of the Valorisation Programme and that were used for the monitoring of the programme. Some of the data supplied was acquired through a survey held by NanoNextNL in 2017.

Interviews were held during the study to deepen our understanding of the Valorisation Programme and collect experiences and lessons learned from relevant stakeholders. In total six stakeholders were interviewed, including the involved programme management and members of the Valorisation Committee and Business Council. Notes of the interviews have been analysed for this report.

We have send out an online questionnaire to the participants of the Valorisation Programme. Both participants that were awarded and were not awarded a subsidy in the final stages of the Valorisation Programme have been invited. Both groups were included in the survey to make a distinction between those who were and were not awarded a subsidy. In total 44% of the invited participants have responded to the survey. Most of the respondents were awarded a subsidy, while a small group of respondents were not awarded a subsidy. The response rate among the awarded group is 62% and among the not-awarded group 22%. The first is considered sufficient for quantitative analysis, the second not, but is sufficient for a qualitative analysis. More details on the background of the questionnaire can be found in section of the appendix of this report.

We performed a benchmark on two other valorisation programmes of which one is Dutch and the second is European. We selected the Take-Off valorisation programme of the Dutch Research Council NWO and the SME Instrument of the European Commission's Horizon 2020 programme. For each programme, we did a case study in a predefined format to make a comparison between the programmes. The case studies relied on desk research, data-analysis and an interview with a relevant stakeholder. For the desk research, we used grey literature such as previous evaluations, reports, websites and documents of the calls for proposals. The data was provided by the organisation hosting the valorisation programme or derived from previous reports. The interviews focussed on the experiences with the valorisation

programme and the lessons that have been learned. Furthermore, they provided additional information on the programme and its context.

In these four parts of the study we organised all data collection. The information was assessed, analysed and in aggregated form incorporated into this report. We indicate throughout the report when relevant data could not be obtained. Whenever relevant we complemented the obtained information with our assessments and experience in the field of valorisation. The result of this process is the current report.

1.2 Reading guide

This first chapter of the report introduced the study to the reader. The second chapter introduces NanoNextNL and its Valorisation programme. In the third chapter, we look back at the Valorisation programme and detail on its results and effects. In the fourth chapter, we look around at leading international valorisation programmes and compare them with NanoNextNL's Valorisation programme in a benchmark. In chapter five we look ahead with lessons and experiences that can be useful for future valorisation programmes and we formulate the recommendations of this study. The last chapter is devoted to the conclusions and of this study.

2 About NanoNextNL and the Valorisation Programme

NanoNextNL was a Dutch national public-private research and technology programme in the field of micro- and nanotechnology in the period 2010-2016. In the programme universities, medical centres, knowledge institutes and industry collaborated to “accelerate the creation of durable economic and societal value by developing and commercialising innovative micro- and nanotechnology, and by forming a sustainable ecosystem of researcher entrepreneurs and policy makers”². NanoNextNL focussed on five key aspects³:

- **Top Science:** doing excellent research with public and private partners in the field of micro- and nanotechnology.
- **Innovation:** developing new technologies, products and services from the excellent research within the research and technology programme.
- **Responsible Research and Innovation:** giving attention to risk analysis and technology assessment of micro- and nanotechnology.
- **Education:** training highly skilled scientists, technologists and innovators in the field of micro- and nanotechnology.
- **Added value through the NanoNextNL approach:** aligning R&D agendas of public and private partners in the programme to create a leading organisation in micro- and nanotechnology and to create a national ecosystem in this field in the Netherlands.

The research and technology programme consists of 28 sub-programmes divided over 10 themes in which the individual projects are executed. Aside the 28 programmes a separate Training Programme and a Valorisation Programme have been set up. NanoNextNL is led by an Executive Board and supported by a Programme Office, that is responsible for the management of the programme.

NanoNextNL was funded by the Dutch government with a subsidy of 125 million euros from the former ‘*Fonds Economische Structuurversterking*’ (FES). The subsidy was matched by the academic (69 million euros) and industrial (58 million euros) partners within the research and technology programme. A total of 143 partners participated in NanoNextNL, of which were 13 universities, 8 medical centres, 12 knowledge institutes and 110 industry and business partners. In total, over 1,100 people have been actively involved in NanoNextNL.

This evaluation concerns the evaluation of the Valorisation Programme of NanoNextNL. This programme was part of the ‘innovation’ key aspect of NanoNextNL’s, taking care of the commercialisation of the micro- and nanotechnology R&D within the programme. The Valorisation Programme was only open to the partners within the research and technology programme.

2.1 The mission of the Valorisation Programme

In 2014, half-way during the NanoNextNL research and technology programme, the Valorisation Programme was initiated. The initiation followed after the recommendation of NanoNextNL’s International Advisory Council to improve the business focus of the programme. This recommendation was given in the Midterm Review of NanoNextNL⁴. The Valorisation Programme ran from August 2014 until December 2016.

The mission or goal of the Valorisation Programme is to “identify, nurture and develop product and business ideas emerging from the science and technology in NanoNextNL”⁵. The Valorisation

² NanoNextNL (2016). End Term Report. Towards completion of the NanoNextNL programme 2010-2016. Utrecht: NanoNextNL.

³ NanoNextNL (2016). Research Appendix to End Term Report 2010-2016. Utrecht: NanoNextNL.

⁴ NanoNextNL (2014). Midterm Review Conclusions International Advisory Council & Response Executive Board. Utrecht: NanoNextNL.

⁵ NanoNextNL (2016). Conclusions by IAC of End Term Review (ETR) of NanoNextNL. Utrecht: NanoNextNL.

Programme had to ensure that the results from the research and technology programme of NanoNextNL would contribute to the Dutch economy through commercialisation of knowledge by businesses. It was the formal route to valorisation within NanoNextNL. The informal route had existed before 2014 and consisted of valorisation through companies and researchers working together in research projects – enabling companies to directly use the research results for their product innovation.

2.2 The governance of the Valorisation Programme

The **Programme Office** was responsible for the management of the programme and consisted of the Business Director and Business Developer of NanoNextNL. They developed and managed the programme. The Business Developer was in close contact with the applicants and provided support on business case development. They had however no direct vote in the selection of business cases. For the assessment of the business cases, two committees were created: a Valorisation Committee and a Business Council.

The **Valorisation Committee** existed of seven members that held bi-weekly meetings. Members of the Valorisation Committee were asked to decide on:

- the need for extra funding in the first stage of the programme (stage 1, after development of the Lean Business Model Canvas);
- approval for the start of the second stage of the programme (between stage 1 and 2, before the deployment of the Golden Egg Check); and
- the need for extra support during the second stage of the programme (phase 2, while deploying the Golden Egg Check).

The Valorisation Committee had three to four days to study the relevant information and to individually make a judgement on the business cases. In the bi-weekly meetings decisions were made on the remuneration of the request.

The **Business Council** consisted of around five external expert members, and had a different composition for every session. In every session, the council should at least have the following fields of expertise represented:

- content expertise (technical-scientific: two members);
- societal expertise (RATA/ Safety & Society: one member); and
- business expertise (knowledge of the market, interest of potential investors: two members).

The Business Council was supported by the Business Director as technical chair and Business Developer as advisor who both had no vote on the proposed business cases.

The **Executive Board** of NanoNextNL appoints the Business Council and is advised by the Business Council on the budget to be made available for the cases in the fourth stage.

2.3 The activities of the Valorisation Programme in each of the five stages

The activities in the Valorisation Programme were staged and spread over four calls of proposals. A stage-gate approach was used, in which successful completion of one phase allowed entrance into the next stage. Each successful participant of the programme had to go through a process of up to five different stages. These stages are shown in Figure 2. This section describes the four calls for proposals and the stages of the programme.

Figure 2 An overview of the stages in the Valorisation Programme



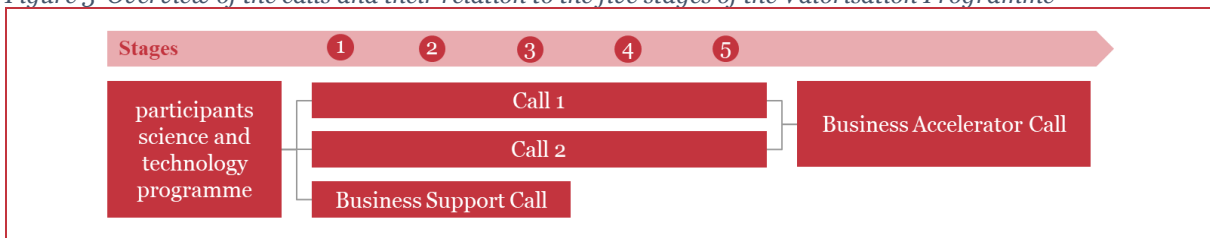
Technopolis Group, 2017

2.3.1 Four calls for proposals

The Valorisation Programme was organised in four calls for proposals. The first call was from August 2014 until May 2015 and was followed by a similar second call that ran from June 2015 until December 2015. Two different calls followed in 2016: the Business Case Support call and the Business Accelerator call. The first three calls were open to all partners involved in NanoNextNL that had signed at least one Programme Consortium Agreement. The last call was only open to those that had been awarded a grant in the first two calls of the Valorisation Programme. Participants were allowed to cooperate with or finance external partners and service providers for each call.

The described five stage process of the Valorisation Programme was used for the two regular calls of the programme. Two other calls did not or not fully cross all stages of the programme. Figure 3 schematically shows the different calls and their relation to the five stages. The lines indicated the streams of applicants that would be eligible to participate in the call.

Figure 3 Overview of the calls and their relation to the five stages of the Valorisation Programme



Technopolis Group, 2017

The **Business Case Support call**, which ran from April-October 2016, only used stages 1-3 and focused on the business support for developing a business case. Applicants to this call were not awarded a direct subsidy, but received only financing for business case development in stages 1-3. At the end of stage 3 participants could participate in a ‘pitch-day’ for potential investors (organised as an Investor Council).

The **Business Accelerator call**, which ran from March-December 2016, did not use the five-stage process at all. The call was open exclusively to business case owners that had been awarded a grant in call one or two and thus already went through all five stages. This call was focused on acceleration of the business cases with additional funding. The participants had to draft a business acceleration proposal and align it with their business case. The business acceleration proposal had to demonstrate how the time to market, earnings potential and/or valuation of the business case would be improved and what the impact would be on the business case. The Valorisation Committee ranked the submitted cases and the Executive Board decided on the allocation of funds. Business cases that scored less than 40% were automatically disqualified. The Valorisation Committee monitored the progress of the business case development.

The next subsections describe all five stages of the stage-gate approach and the activities therein.

2.3.2 Stage 1: submission, development and evaluation

After applying for the programme, the applicant received support from their NanoNextNL Programme Office to develop a business case based on the **Lean Business Model Canvas** (LBMC). This canvas

consists of a single page containing the essence of the business case, including potential safety and societal risks (RATA) and IP status. An impression of the LBMC and an overview of its elements are given in Figure 4. In this stage, the Programme Officer could request and allocate a small budget (in the order of €1k) from the Valorisation Programme for the engagement of external experts and service providers to help improve the business case.

After completion of the canvas, the LBMC could be submitted to the Valorisation Committee, who then decided whether the business case provided enough perspective and was of sufficient quality to start with the next stage.

Figure 4 The Lean Business Model Canvas (LBMC) used in the Valorisation Programme



NanoNextNL, 2014

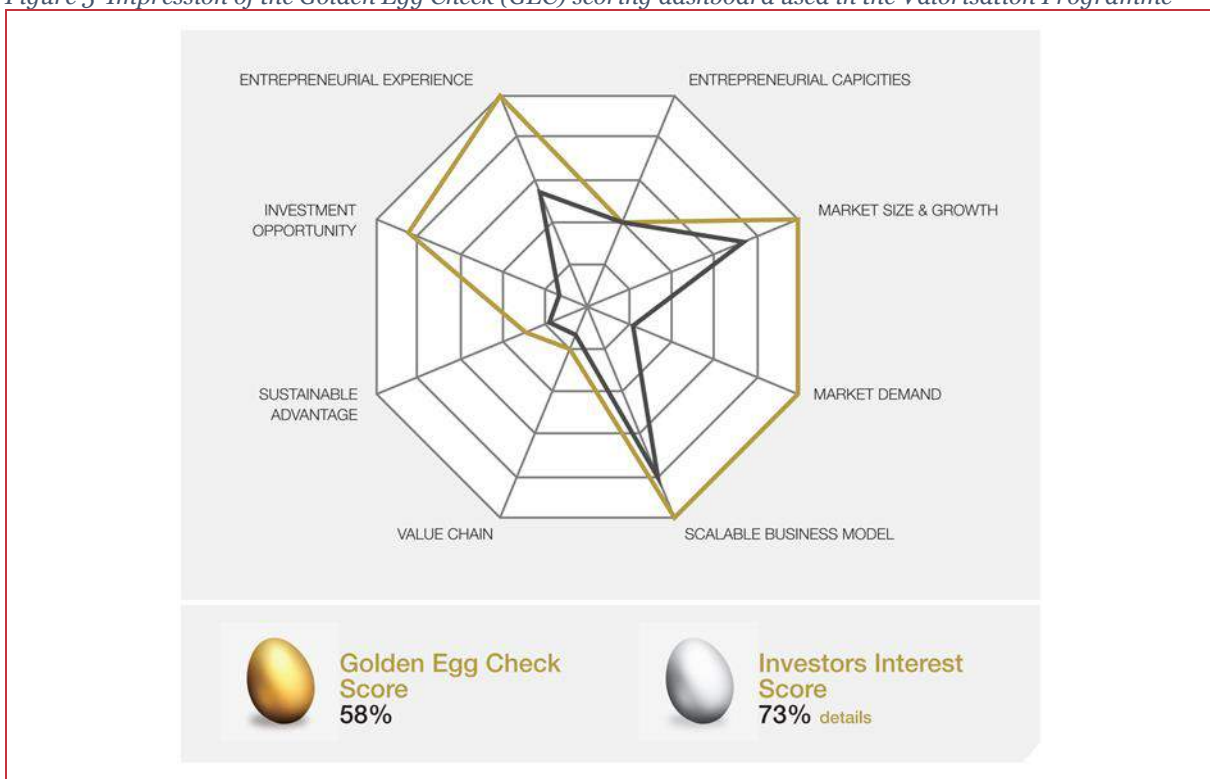
2.3.3 Stage 2: development of business cases in Golden Egg Check

After a positive decision by the Valorisation Committee, the Programme Officer would make arrangements with the participant to develop the business case in greater detail and to test it by means of a **Golden Egg Check**. In this stage, budget (in the order of €10k) was available for the involvement of external experts and service providers.

The Golden Egg Check (GEC) is an online business toolset that is based on the Lean Business Model Canvas (LBMC) and that allows for further development, testing and rating of the business case by the participants themselves as well as by (external) coaches and experts. In the GEC, the participant had to answer a fixed set of questions based on which the quality of the business case could be determined (**Golden Egg Check Score**) and visualised in a spider diagram. An example of such a diagram is shown in Figure 5. The outcome of the business case quality score was compared with a database of profiles of both national and international investors, resulting in an **Investor Interest Score**. Furthermore, an indication of the societal aspects and economic value of the business case was also given.

Based on the outcome of the GEC, the participant can decide to apply for assessment by the external Business Council. In the second call for proposals, business cases that scored less than 40% on the GEC were automatically disqualified. When a participant applies, the information was sent to the Business Council, together with a clarification containing a project plan with intended milestones and deliverables and the required contribution by NanoNextNL.

Figure 5 Impression of the Golden Egg Check (GEC) scoring dashboard used in the Valorisation Programme



NanoNextNL and Golden Egg Check, 2014

2.3.4 Stage 3 and 4: pitches for the Business Council and decision by the Executive Board

The third stage consisted of a **short presentation** of 15 minutes to the Business Council, followed by discussion with the council members. The Business Council assessed the business case in a separate GEC and advised the Executive Board on the size of the contribution and spending of funding.

In the fourth stage, when a positive advice was given by the Business Council, the Executive Board decided on **funding allocation** in the board meeting. This funding had the form of a direct subsidy (in the order of €100k). The Executive Board would make a prioritisation of business cases per session. The board generally followed the selection and advise of the Business Council. The financial support that was allocated needed to be matched in kind or in cash by the participants.

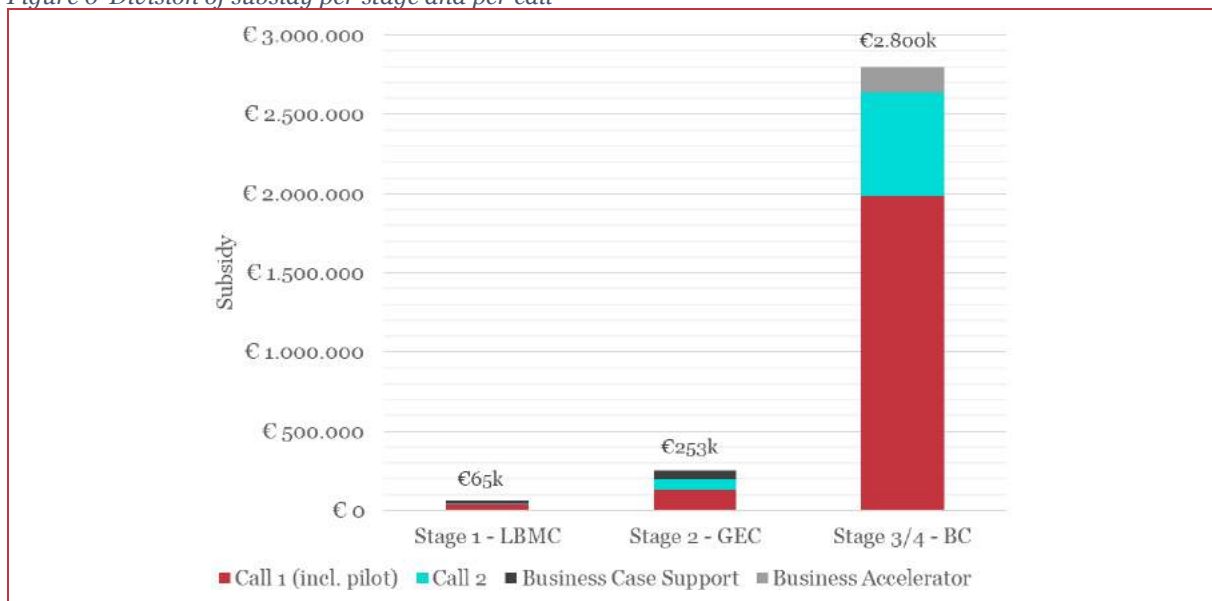
2.3.5 Stage 5: monitoring

The final stage consisted of the **monitoring** of awarded projects by the Valorisation Committee. This monitoring focused on the progress of business case development compared to the anticipated and realised milestones and deliverables that participants had defined. The monitoring took place every three months. If the realisation of the business case lagged disproportionately behind the expectations, the Valorisation Committee could advise the Executive Board to suspend or terminate support. This has not happened during the programme.

2.4 The budget of the Valorisation Programme

The Valorisation Programme had a total budget of 5.4 million euros⁶. The funding was distributed over the respective stages of the Valorisation Programme. In each stage, an increasing amount of funding was available to the participant, as can be seen in Figure 6. Small amounts of funding (order of €1k) were available in the first stage of the programme to develop the business case using the Lean Business Model Canvas (LBMC). A slightly higher amount of funding (order of €10k) was available in the second stage of the programme, when the business case needs to be further developed and tested with the Golden Egg Check. External support could be funded for 100%. However, the final subsidy in stage 4 was the real deal. Those that were awarded a subsidy in this phase of the programme received funding in the order of €100k that was intended to work on the realisation of the proposed business case. Around 50% of the financial support had to be matched in kind or in cash by the applicants. In the Business Accelerator call the funding was in the order of €10k.

Figure 6 Division of subsidy per stage and per call



Technopolis Group, 2017 – based on figures supplied by NanoNextNL

During the Valorisation Programme, over 3.1 million euros has been allocated to the programme’s participants, of which almost 2.8 million euros was direct subsidy. This funding was allocated through four calls. In the first call the amount of funding was the largest. The first two calls included funding in all stages of the programme. The Business Case Support call only allocated funding in the first two stages and the Business Accelerator Call only allocated funding in the last stages to those participants that successfully completed all stages in the first two calls. The distribution of funding over the stages and calls is given in Table 2.

⁶ NanoNextNL (2016). End Term Report. Towards completion of the NanoNextNL programme 2010-2016. Utrecht: NanoNextNL.

Table 2 Subsidy provided through the Valorisation programme per stage and per call

	Stage 1 - LBMC	Stage 2 - GEC	Stage 3/4 - BC	Total
Call 1 (incl. pilot)	€45,000	€131,178	€1,986,457	€2,162,635
Call 2	€2,500	€64,023	€650,768	€717,291
Business Case Support	€17,500	€57,670	-	€75,170
Business Accelerator	-	-	€162,750	€162,750
Total	€65,000	€252,871	€2,799,975	€3,117,845

Technopolis Group, 2017 – based on figures supplied by NanoNextNL

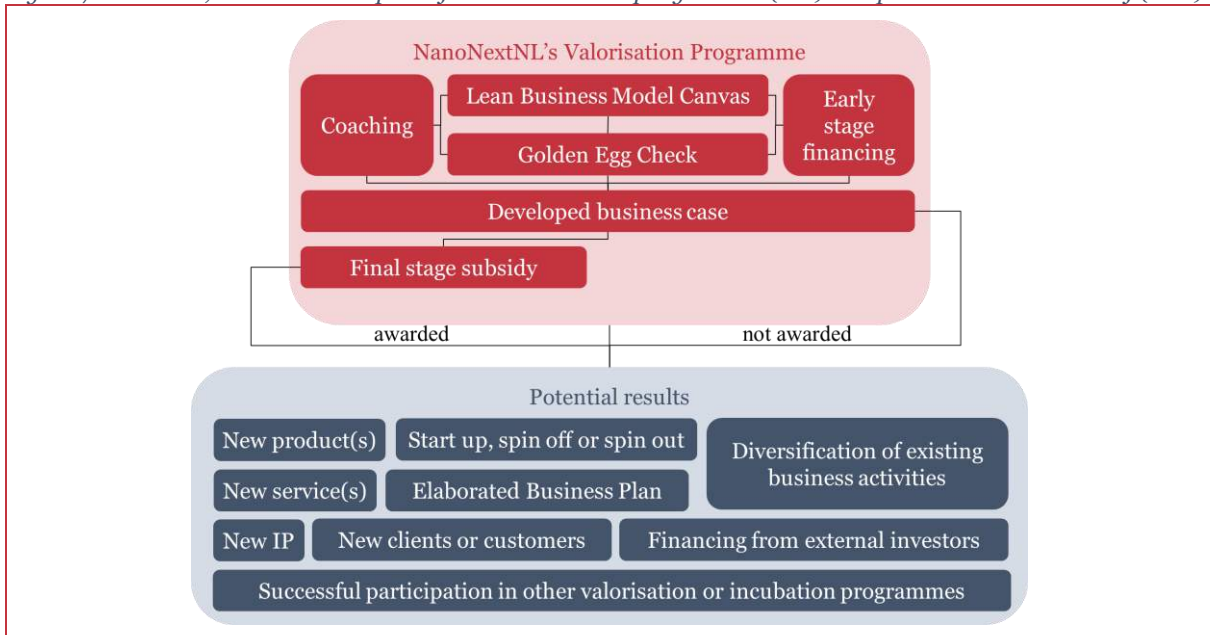
3 Looking back: Results and effects

In this chapter, we look back at the Valorisation Programme to answer research questions, 2, 5, 7 and 8. We first evaluate the results and effects that the Valorisation Programme has realised. In the last section, we list the added value that the programme has had to its participants.

3.1 Framework for the analysis of results and effects

For the evaluation of the results and effects of the Valorisation Programme we use an analytical framework in which inputs, throughputs (intermediary outputs), outputs and outcomes (results) are discerned. In this chapter, we do not focus on the inputs of the Valorisation Programme as these are discussed in the previous chapter. Figure 7 gives a schematic overview of the analytical framework.

Figure 7 Activities, means and outputs of the Valorisation programme (red) and potential results thereof (blue)



Technopolis Group, 2017

The Valorisation Programme consisted of projects: business cases that were developed in the programme. We call the results of the Valorisation Programme the combined results of all individual projects. In Figure 7 the red area concerns the Valorisation Programme and the blue area the potential results of the programme.

Upfront, the Valorisation Programme had not defined specific expected results for the Valorisation Programme – no specific (attributable) Key Performance Indicators (KPIs) had been formulated for the programme itself. In our framework, we have defined potential results for the valorisation activities in the programme to perform a structured evaluation.

The inputs of the programme were the budget of the programme and the people involved. Within the programme, on project level, the inputs were the coaching and the staged funding awarded to the participants.

The throughputs were the Lean Business Model Canvas (LBMC) and the Golden Egg Check (GEC). These concern intermediary outputs that in the end resulted in a developed business case.

The output of the Valorisation Programme were the developed business cases after the GEC. Some of those were awarded with a subsidy in the final stage of the Valorisation Programme and some were not awarded. Those that have been awarded can be considered the final output of the programme.

The outputs of the programme lead to outcomes. These are the potential results of the programme, which are listed in the blue area of Figure 7. The actual results of the Valorisation Programme are presented in this chapter.

3.2 The outputs and throughputs of the Valorisation Programme

The direct outputs of the programme were the **business cases** that have been developed in the first two stages of the programme. In total 44 participants have developed a Lean Business Model Canvas of which 40 were considered to have potential for further development using the Golden Egg Check. Of the 40 Golden Egg Checks that have been filled out and rated, 28 were awarded with a subsidy. These business cases were deemed to have the potential to lead to successful new products, new services or new businesses in general. Table 3 gives an overview of the number of **participants** per stage and per call in the Valorisation Programme.

Table 3 Applications and participants per stage and per call including success rates per call

	Applications	Stage 1 - LBMC	Stage 2 - GEC	Stage 3/4 - BC	Withdrawn/ inadmissible	Success rate ⁷
Call 1 (incl. pilot)	38	26	23	17	12/3	74%
Call 2	16	10	10	7	-/4	58%
Business Case Support	8	8	7	-	-/-	88%
Business Accelerator	10	-	-	4	-/-	40%
Total (average per call)	72 (18)	44 (15)	40 (13)	28 (9)	12/7	(65%)

Technopolis Group, 2017 – based on figures supplied by NanoNextNL

The Valorisation Programme received in total 72 applications. Seven of these did not meet the application criteria (inadmissible). Of those applicants that did meet the application criteria two thirds (67%) led to successful enrolment into the programme. At each stage, some participants dropped out of the programme, either due to withdrawal from the programme (12) or due to rejection by the Valorisation Committee or Business Council. The success rate for receiving a subsidy in the final round of the call was different for every call and ranged between 40%-88%. On average, the (overall) success rate for the Valorisation Programme was 65%.

The Business Council used the **scores of the Golden Egg Check** (GEC) in their assessment and selection process. In the first and second call, projects received an average GEC score of 62%. With a lowest score of 16% and a highest score of 86%. In terms of Investors Score, that the GEC also provided, projects received an average of 73% with the lowest investors score of 0% (second lowest was 33%) and the highest investors score 100%. The Business Council members subsequently scored the projects with the GEC as well, resulting in an average GEC score of 65% from the council members. The lowest Business Council GEC score was 0%, the highest 100%. The projects that were not awarded a subsidy in the final stage of the Valorisation Programme received a business council GEC score of 50% or less.

The business cases that have been developed during the programme were the starting point for further results than can be attributed to the Valorisation Programme.

⁷ The success rate is defined as the ratio between the number of participants in the last stage of the call (final subsidy awarded) and the number of applicants for the call corrected for those who withdrew from the programme and for those who were inadmissible.

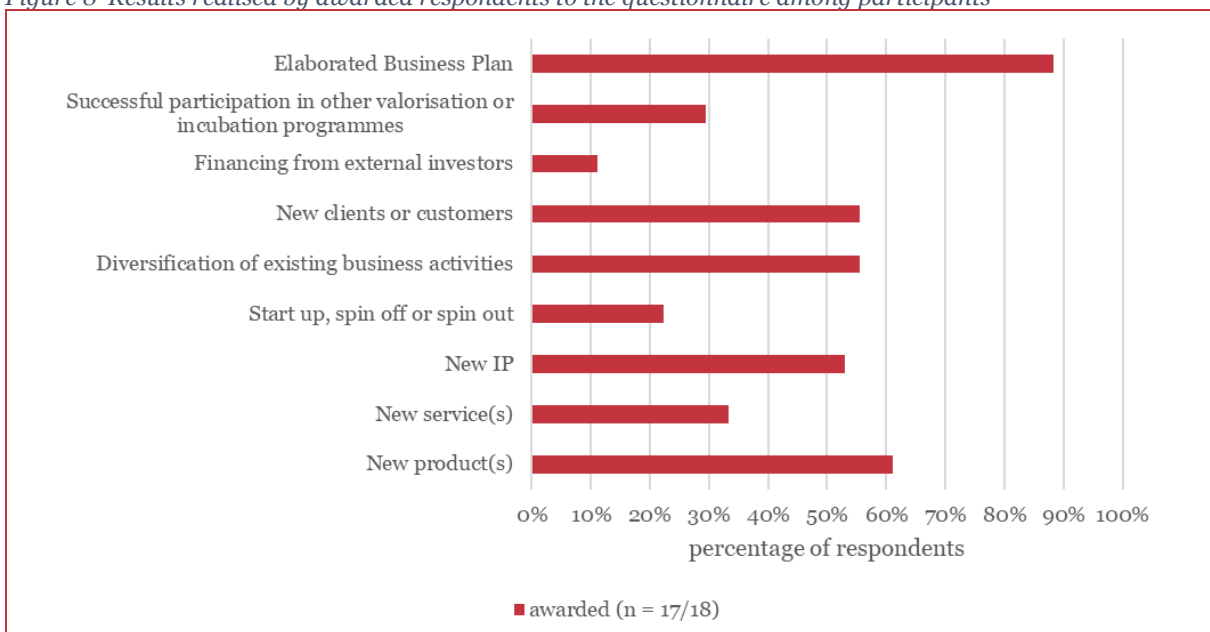
3.3 The results of the Valorisation Programme

3.3.1 Main results

A questionnaire on achieved results was held among participants of the Valorisation Programme. To the question “Has the project proposal you submitted to the Valorisation Programme led to any of the following results?”, we received 22 answers, of which 4 were not awarded. For each result, at least two awarded respondents indicated to have realised this result. The awarded respondents most often indicated their project resulted in an elaborated business plan (88% of respondents). New product(s) (61%), new clients or customers (56%), diversification of existing business activities (56%) and new IP (53%) were also mentioned by most awarded respondents. Awarded respondents least mentioned to have received financing from external investors (11%). Figure 8 depicts the results that were indicated by respondents to the questionnaire who were awarded a subsidy in the final stage of the Valorisation Programme.

Only a small number of respondents to the questionnaire were not awarded a subsidy. These respondents more often mentioned to have received financing from external investors and to have developed new services. The first result is quite strong, as non-awarded respondents mentioned this result more often in both absolute (4 versus 2) as well as relative numbers (100% versus 11%). For new services, the observed difference is less strong. All other results were more often mentioned by awarded than non-awarded respondents, apart from successful participation in other valorisation or incubation programmes. The latter seems to make sense, as those who were not awarded could have used (an adapted version of) their business case in another valorisation programme, while those who were awarded stayed within NanoNextNL’s Valorisation Programme. Due to the low number of non-awarded respondents these effects should however be carefully stated.

Figure 8 Results realised by awarded respondents to the questionnaire among participants

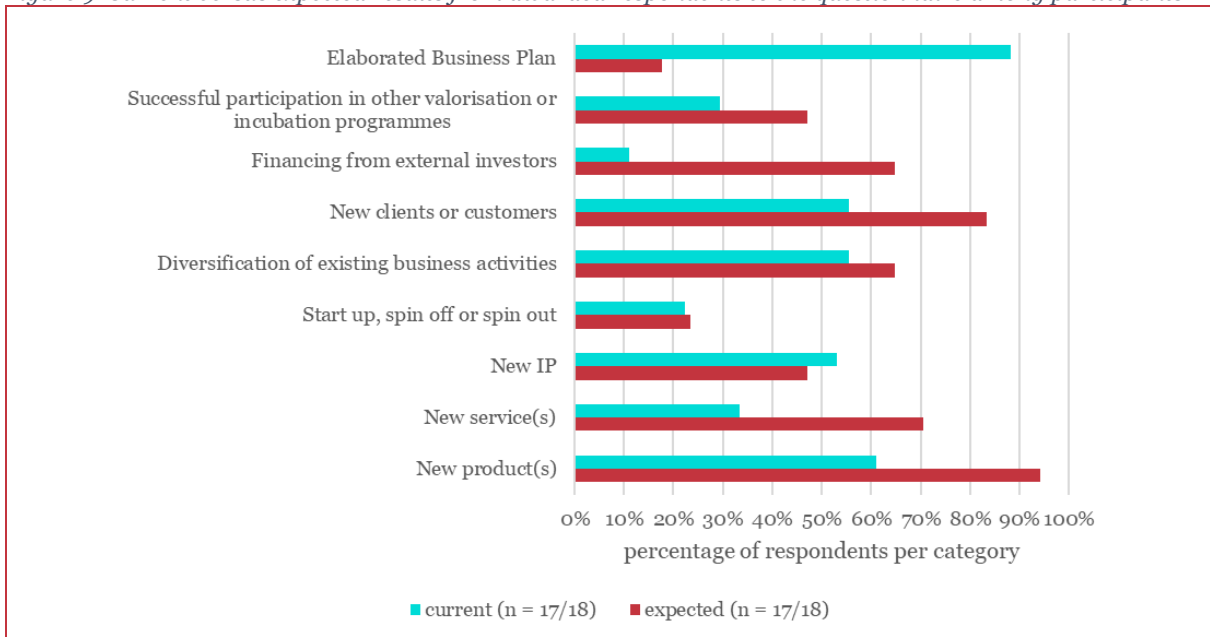


Technopolis Group, 2017

Results and effects of a valorisation programme usually appear to full extent sometime after the programme has ended. As the Valorisation Programme has ended only less than a year ago, we also asked participants whether they expect any of the listed **results over the next five years**. In the questionnaire, 22 participants of the Valorisation Programme responded to the question “Do you expect any of the following results for the project proposal you submitted to the Valorisation programme over the next 5 years?”. Of these respondents only four were not awarded a subsidy in the final stage of the

Valorisation Programme. In Figure 9 we show the difference between the current and the expected results for those respondents who have been awarded.

Figure 9 Current versus expected results from awarded respondents to the questionnaire among participants⁸



Technopolis Group, 2017

Most results are expected to be realised by more respondents over five years. This means that for most future results we see an increase of respondents as compared to current results – this also means more results. We observe the strongest increase for financing from external investors. Over five years significantly more respondents think to have received financing from external investors. We observe another strong increase in new service(s). More than 80% of respondents expect to have new clients or customers over five years. There is however a decrease in the number of elaborated business plans⁹ and new IP over five years, as these are typical results that will be realised early during business development.

From the small number of non-awarded respondents to the questionnaire, we observe that these respondents more often expect to have an elaborated business plan over five years than awarded respondents do. This expected result shows an increase as compared to the reported current situation. This might suggest that those that have not been awarded in the Valorisation Programme are a step behind in setting up their business as compared to those that have been awarded a subsidy in the Valorisation Programme. Not awarded respondents mention all other expected results equally or less often than awarded respondents. They also expect a stronger increase in the diversification of business results compared to the current situation than awarded respondents do (both in absolute as well as in relative numbers). For most other results, we see a decrease in mentioning by non-awarded respondents.

3.3.2 Key Performance Indicators

NanoNextNL has also defined some Key Performance Indicators (KPIs) that were monitored during the overall programme. Four of these KPIs can be related to valorisation:

⁸ This figure combines the results of two questions from this study’s questionnaire to facilitate comparison: current results (as in Figure 8) and results expected to be achieved in the next five years. For each result, the percentage of the blue and red bar do therefore not add up to 100% - it is the percentage of respondents per result for each question (current or expected).

⁹ Respondents probably interpreted future expected results here as *new* elaborated business plans, as the number is lower than the reported current number of elaborated business plans.

- demonstrators, prototypes or products (result 2017: 86 – no target defined);
- new start-ups or spin-off companies exploiting IPR created in this programme and its predecessors (result 2017: 24 – 160% of target);
- patents filings (first filing) (result 2017: 127 – 110% of target); and
- licenses to parties not participating in the license programme (result 2017: 16 – 133% of target 2016).

The KPIs, for which targets were defined for the end of the programme in December 2016¹⁰, were all more than met in 2017. These indicators are however not monitored separately for the Valorisation Programme and can therefore not be fully attributed to the Valorisation Programme. Nevertheless, interviewees have stated that the Valorisation Programme resulted in several (successful) start-ups.

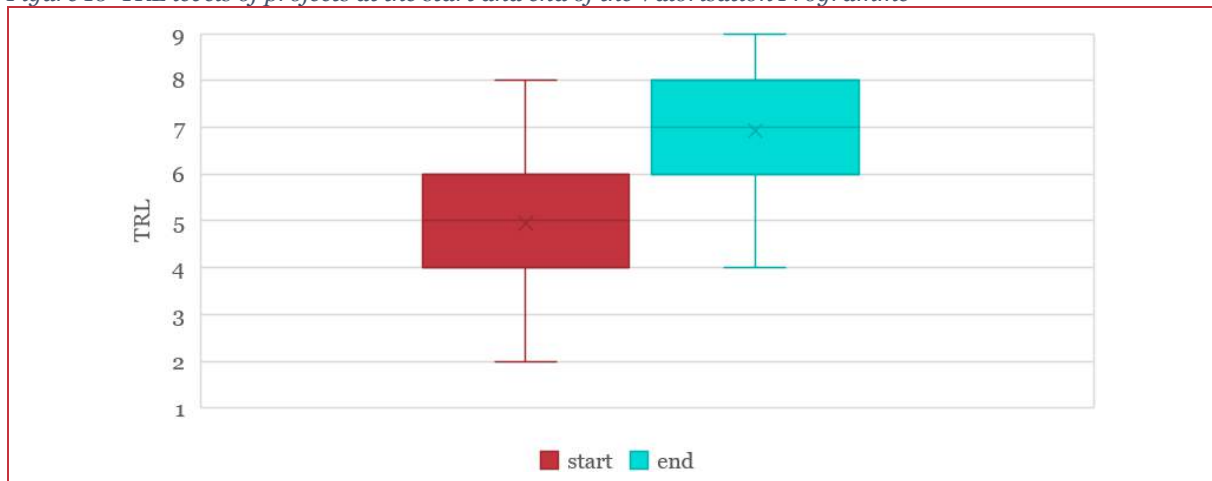
3.3.3 Technology Readiness Levels

The Technology Readiness Level (TRL) of the projects in the Valorisation Programme increased during the programme on average two levels. At the start of the programme the average TRL was 5, meaning that technology is validated in a relevant environment. At the end of the programme the average TRL was 7, meaning that there has been a system prototype demonstration in an operational environment. Figure 10 shows the distribution of TRLs at the start and end of the Valorisation Programme.

The lowest TRL at the start was 2 (technology concept formulated) and the highest was 8 (system complete and qualified) – a wide range. At the end of the programme the lowest TRL was 4 (technology validated in lab) and the highest 9 (actual system proven in operational environment) – this is the maximum TRL attainable. The highest TRL increase was 200%, from TRL 3 to 9. Three surveyed projects (15%) had no increase in TRL at all.

The TRL level change was obtained from the 2017 questionnaire that NanoNextNL send out to the participants of the first two calls of the Valorisation Programme¹¹ and the monitoring data provided by NanoNextNL. From 20 projects, the change in TRL could be analysed.

Figure 10 TRL levels of projects at the start and end of the Valorisation Programme



Technopolis Group, 2017 – based on figures from the 2017 participant survey by NanoNextNL

¹⁰ NanoNextNL (2016). Research Appendix to End Term Report 2010-2016. Utrecht: NanoNextNL.

¹¹ The results of this questionnaire were not published, but we were provided with the anonymised raw results by NanoNextNL.

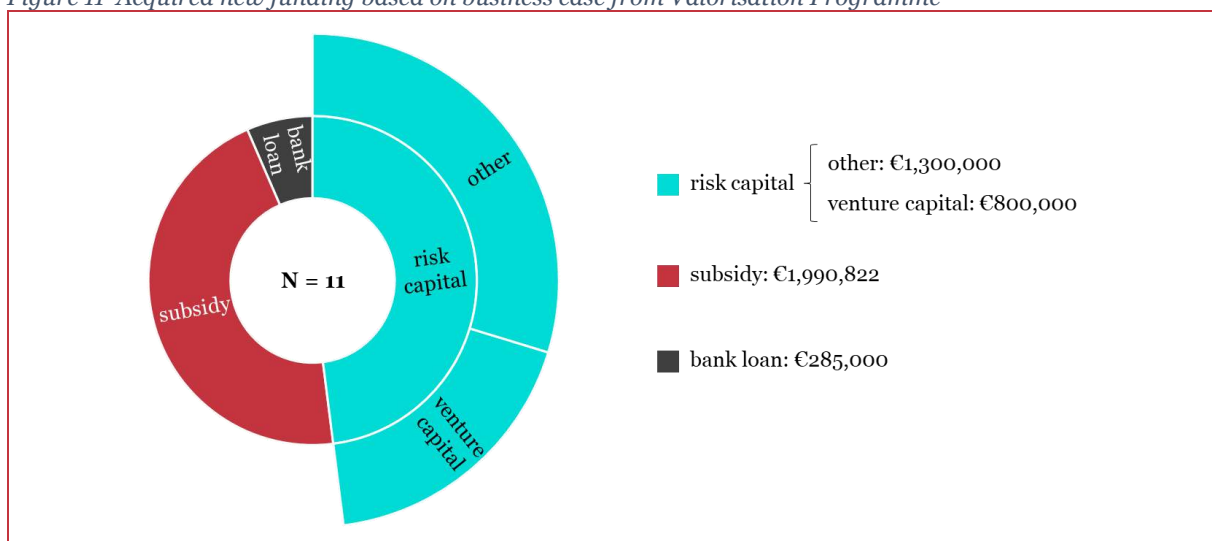
3.3.4 Acquired new funding

More than 4.4 million euros of new funding was acquired based on the business case that participants developed during the Valorisation Programme. This amount is based on figures provided by 22 participants of the programme of which half acquired new funding.

Of the funding that these 11 participants acquired most was risk capital (€2.1m), closely followed by subsidies (€2.0m). A more detailed breakdown of the new funding awarded participants acquired based on their business case developed during the Valorisation Programme is given in Figure 11.

The amount of acquired new funding was obtained from the 2017 questionnaire of NanoNextNL among participants who were awarded a subsidy in the first two calls of its Valorisation Programme. In this survey 22 respondents answered the question “Were you able to acquire new funding (partially) based on your business case?”. Half of the respondents answered this question positively and mentioned the type and amount of acquired new funding.

Figure 11 Acquired new funding based on business case from Valorisation Programme



Technopolis Group, 2017 – based on figures from the 2017 participant survey by NanoNextNL

3.3.5 Value of business cases

At the end of the Valorisation Programme the average estimated business case value was 14,4 million euros – an increase of 32%. The total estimated business case value at the end of the programme was at least 244 million euros based on 17 reported projects. Figure 12 shows the distribution of the estimated business case value at the start and end of the Valorisation Programme.

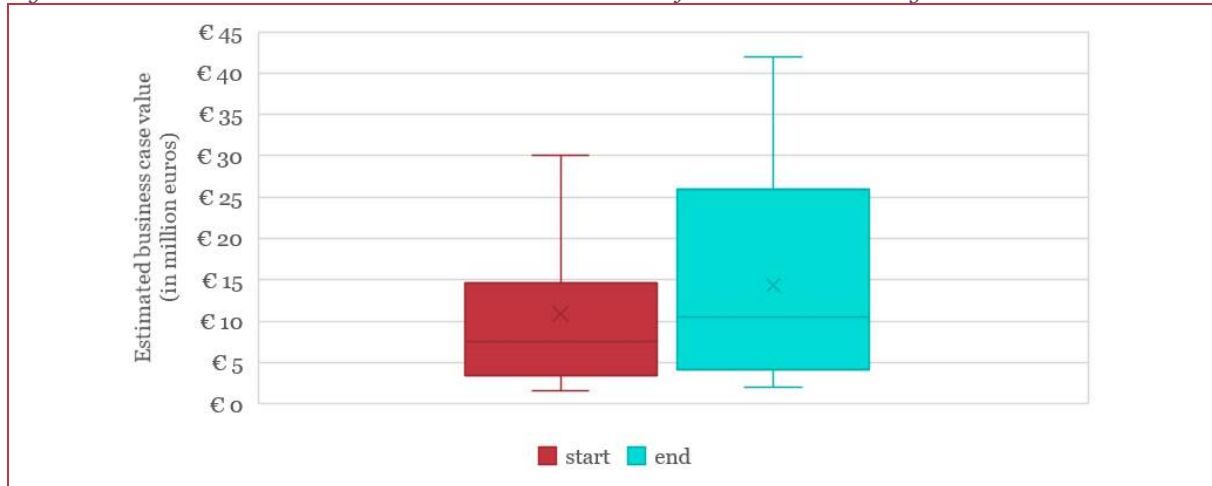
At the start of the Valorisation Programme the average estimated business case value was 10,8 million euros. The lowest reported value at the start was 1,5 million euros and the highest was 30,0 million euros. The lowest reported value at the end was 2,0 million euros and the highest was 42,0 million euros. For two projects the estimated business case value decreased and for six projects the estimated business case value remained the same, all others increased. The largest reported increase in estimated business case value was 171% (+€18,9m).

The value of the business cases is partly due to signed contracts and launching customers. In 2017, 8 out of 22 respondents (36%) that were awarded a subsidy in the final stages of the first two calls indicated that they have a launching customer for their business case. These participants have one or more contracts signed with customers – the highest reported number of signed contracts by an individual respondent was three.

The reported estimates were made with the Golden Egg Check for the business case value in 5-7 years. An estimate of the current value, the number of contracts and the existence of a launching customer

were asked in the 2017 survey that NanoNextNL sent out to awarded participants in the first two calls. An analysis could be made over 17 projects. We compared the estimated value at end and the beginning of the Valorisation Programme.

Figure 12 Estimated business case value at the start and end of the Valorisation Programme



Technopolis Group, 2017 – based on figures from the 2017 participant survey by NanoNextNL

3.4 The effectiveness of the Valorisation Programme

Considering the aspects of the goal of the Valorisation Programme and the associated results (outputs), we assess the Valorisation Programme to have been effective. It seems to have effectively contributed to its goal. The effectiveness seems best (and most thorough) for the aspect of developing product and business ideas from science and technology within NanoNextNL.

The effectiveness of a programme is how well the results of the programme correspond to its goals. The goal of the Valorisation Programme was to “identify, nurture and develop product and business ideas emerging from the science and technology in NanoNextNL”¹². To assess the overall effectiveness, we must assess the effectiveness of the programme on the three aspects in its goal. The goal is however rather vaguely formulated, making a clear assessment of the effectiveness of the Valorisation Programme difficult.

First, the effectiveness of identifying product and business ideas emerging from the science and technology programme of NanoNextNL. Identifying is a process of which the outcome is in this case the number of applications. We have seen that 72 applications have been filed for the Valorisation Programme, of which 62 are unique. These 62 valorisation projects correspond to 26% of the 241 research projects¹³ in the research and technology programme of NanoNextNL. It is unclear whether potential valorisation projects have not been identified, however, in each call the number of applications reduced, indicating some sort of saturation. Interviews with stakeholders confirm the impression that the valorisation potential was reaped within the NanoNextNL science and technology programme.

Second, the effectiveness of nurturing product and business ideas emerging from science and technology in NanoNextNL. Nurturing can be understood as the support and coaching of the business cases that enrolled in the Valorisation Programme. This support and coaching in the first stages of the programme is a process of which the outcome is the number of awarded participants – as the coaching is intended to improve business cases. We have seen that 28 participants have been awarded a subsidy in the final stage of the Valorisation Programme. This corresponds to an average success rate of 65%. The support

¹² NanoNextNL (2016). Conclusions by IAC of End Term Review (ETR) of NanoNextNL. Utrecht: NanoNextNL.

¹³ NanoNextNL (2016). End Term Report. Towards completion of the NanoNextNL programme 2010-2016. Utrecht: NanoNextNL.

and coaching has thus led in 65% of the cases to a successful nurturing of participants so that they were awarded a subsidy. Coaching has been provided internally and could be acquired externally with the received funding. In a questionnaire among participants of the Valorisation Programme the support has been assessed good to very good by most respondents (see section 3.6.1) and comments of respondents and interviewees give an overall positive impression of the coaching and support during the programme.

Third, the effectiveness of developing product and business ideas emerging from science and technology in NanoNextNL. Developing is a process that can be understood as the creation of successful valorisation from the projects that enrolled in the Valorisation Programme. The outcomes of this process are best exemplified by:

- the number of developed business cases: 28 business cases were successfully developed to receive funding in the final stage of the Valorisation programme, whereas 44 business cases were initially developed in the first few stages of the programme.
- the number of elaborated business plans: 19 elaborated business plans have been reported in the questionnaire, corresponding with 88% of awarded respondents to the questionnaire.
- The increase in TRL: during the programme, the average TRL increased with 2 stages, from an average of TRL 5 at the beginning to an average of TRL 7 at the end of the Valorisation Programme.
- The increase in estimated business case value: during the programme, the total estimated business case value increased with 59 million euros, from 185 million euros at the beginning to 244 million euros at the end of the Valorisation Programme.
- New product(s) and new service(s): 11 new products and 6 new services have been reported in the questionnaire, corresponding with 61% and 33% of awarded respondents to the questionnaire respectively.
- Start up, spin off or spin out: 4 start-ups, spin-offs or spin-outs have been reported in the questionnaire corresponding with 22% of awarded respondents to the questionnaire. This could be more as the overall NanoNextNL KPI reported 12 new start-ups or spin-off companies exploiting IPR created in this programme and its predecessors, although this could not be fully attributed to the Valorisation Programme.

These outcomes suggest an effect of the Valorisation Programme on developing product and business ideas from the science and technology in NanoNextNL.

3.5 The added value of the Valorisation Programme

Added value can be considered on two levels:

- On micro level: the added value of the Valorisation programme to participants, i.e. what did the programme contribute to the participant that otherwise would not have happened?
- On macro level: the added value of the Valorisation Programme to the valorisation landscape, i.e. what did the programme contribute to the valorisation landscape that would otherwise not have existed?

On both levels, the added value is hard to assess, as no information is available of what would have happened if the Valorisation had not existed.

The results and effects in the previous section give an indication of the added value of the Valorisation Programme on micro level. However, we have also asked participants in a questionnaire what for them was the added value of participating in the Valorisation Programme. Their answers provide a qualitative understanding of the added value of the programme. The reported added value mostly lies within the realms of financing, coaching, networking and improving valorisation through better business cases.

Participants mention that the Valorisation Programme has enabled them to further develop the technology that they have been developing in the research and technology programme of NanoNextNL that would otherwise most likely not have happened. The main focus of NanoNextNL is on top science with public and private partners. This has led to valorisation in itself: the application of new technology

by the business partners in the programme. However, with the subsidy of the Valorisation Programme participants had resources to further develop that technology to higher TRL levels. The connection between both programmes is very much appreciated by the respondents. Participants acknowledge the Valorisation Programme's subsidy as it fills the gap between R&D funding and venture capital. By filling this gap participants indicate that they were able to build a product and to develop a business case for their product.

During the programme, the coaching and support is considered of added value. The funding during the first two stages of the programme can be used to acquire external coaching and advise. Participates like the experienced freedom in choosing the external coach or advisor and to be able to purchase these services themselves. They also value the coaching and support they received from the programme office during the development of their business case. They felt that the programme provided them with valuable support to do market analyses, feasibility studies, certification and IP filings, business case development and product and prototype development. This support was both financially, as well as support with (externally acquired) knowledge through the programme.

Networking was also seen as of added value, as they acquired new contacts that otherwise most likely would not have been established. The programme supported this networking by bringing them into contact with potential investors and partners. The involved Business Council, Investor Council and Valorisation Committee provided them with some of these contacts. The interaction with these committees and with the programme office helped them to rethink priorities and processes or even their overall approach to valorisation. That contributed to improved business cases.

The programme's focus on business cases stimulated valorisation through the creation of new businesses. The funding from the Valorisation Programme was said to have helped to progress these new businesses until it gets interest from external investors, partners or in-company funding. Regarding to the latter, the programme was said to generate resources for doing product and business development in small existing companies without the need to bring in upfront customer financing (e.g. launching customer). This was said to have fastened the market introduction of new products.

On macro level, the Valorisation Programme added to a limited extent to the valorisation field in terms of size, but added some novelties to the field. The size and the pool of potential applicants is rather limited as compared to other more general and open valorisation programmes. However, some novelties were introduced to the field of valorisation. For instance, the tooling used, such as the LBMC and the online GEC may be considered innovative. The use of the GEC in selection and award procedures is also innovative. This has introduced some objectivity to the procedure. The stage-gate approach is also different from many other valorisation programmes, that may use phasing, but these phases are often characterised by slightly different schemes.

3.6 The experiences with the Valorisation Programme

We have asked participants and stakeholders to assess the Valorisation Programme on several aspects to understand what were considered the strong and less strong aspects of the Valorisation Programme. In this section, we present and discuss these results.

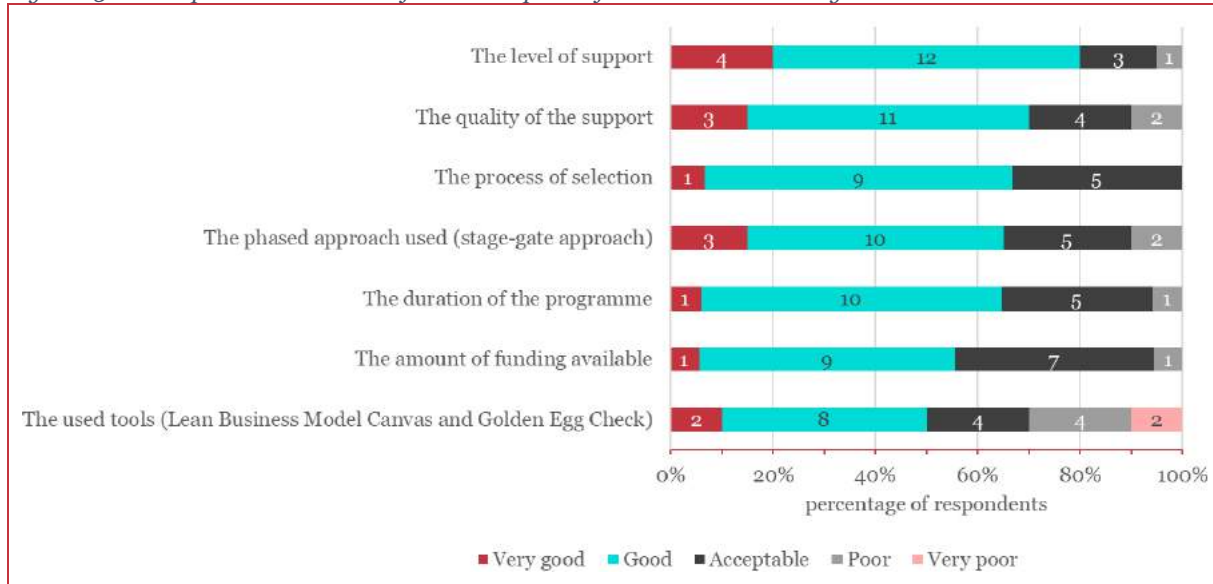
3.6.1 Assessment of the Valorisation Programme by participants

From the questionnaire, we observed that respondents were generally positive about many aspects of the Valorisation Programme.

We asked participants to assess some of the characteristic and important aspects of the Valorisation Programme. These aspects and the assessment of respondents to the questionnaire is given in Figure 13. Most aspects of the programme were assessed as good or very good by most of the respondents. The level of support was assessed best (80% good-very good), followed by the quality of support (70% good-very good) and the process of selection (67% good-very good and rest acceptable). Only the used tools, such as the LBMC and the GEC, were assess good or very good by just 50% of respondents. Almost 30% of the respondents gave a poor or very poor assessment to this aspect. However, other results show that

the assessment of the used tools is mainly based upon critiques regarding the GEC – the LBMC is well-received by most respondents (cf. Figure 14). All other aspects received only by 10% of respondents or less a poor assessment.

Figure 13 Participant’s assessment of several aspects of the Valorisation Programme



Technopolis Group, 2017 – numbers inside the bars indicate the number of respondents to each category

Respondents who were awarded were generally more positive about the phased approach used (stage-gate approach) and the process of selection than those that were not awarded a subsidy in the final phase of the Valorisation Programme. On the other hand, those who were not awarded did not assess any aspect very poor, nor did they assess any aspect very good. Their more negative assessment of the process of selection may very well be biased by the fact that they were not awarded a subsidy in the final phase of the Valorisation Programme. These observations are however based on a limited number of respondents who were not awarded a subsidy in the final phase of the Valorisation Programme.

Figure 14 shows all statements that we have presented to the respondents of our questionnaire and their level of agreement to these statements. To most statements a majority of respondents agreed or strongly agreed.

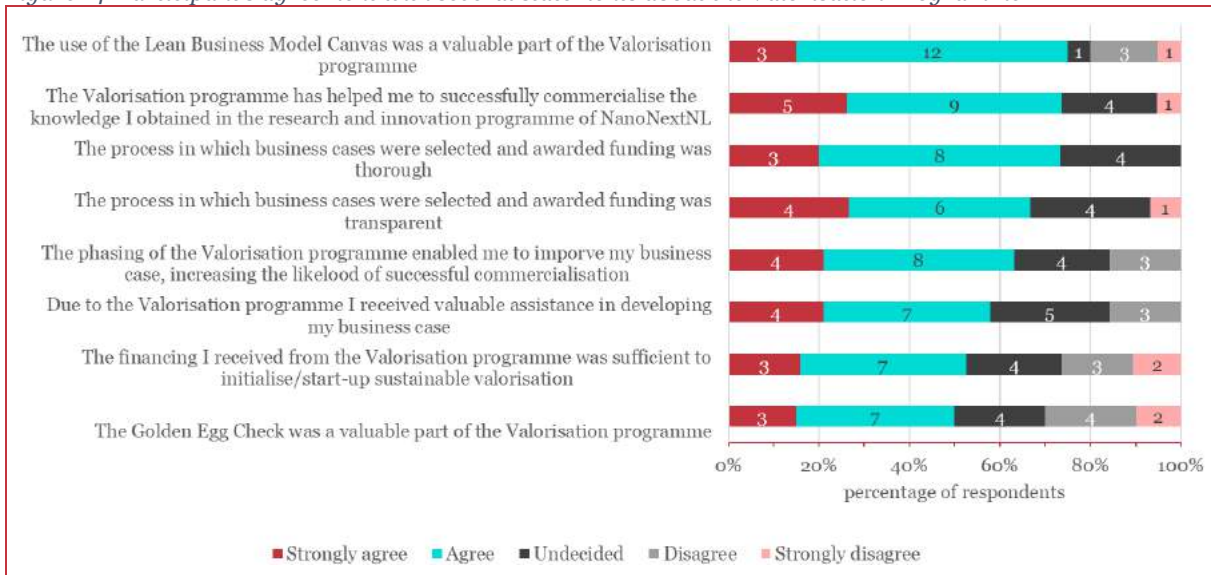
The use of the LBMC was considered by a majority of respondents as a valuable part of the Valorisation Programme (75% agreed or strongly agreed), even though the used tools were least assessed by respondents in Figure 13. This statement was most agreed with. However, the GEC was much less considered as a valuable part of the Valorisation Programme (50% agreed or strongly agreed). This statement was least agreed with. This difference explains the lowest assessment on tools in Figure 13 – being mainly due to their less positive assessment of the GEC.

About 74% of respondents agreed or strongly agreed with the statement that the Valorisation Programme has helped to successfully commercialise the knowledge obtained in the research programme of NanoNextNL. Only one respondent strongly disagreed, however, this respondent was not awarded a subsidy in the final stage of the Valorisation Programme and may very well not have succeeded in successful valorisation. Overall the response to this question is thus positive. This is an important result, as it indicates that the Valorisation Programme was successful according to respondents.

The phased approach (stage-gate approach) of the Valorisation Programme was generally considered positively (63% agreed or strongly agreed), although some respondents (15%) disagreed with the statement. The processes for selection and awarding during this process were by a majority considered

thorough (73% agreed or strongly agreed) and transparent (67% agreed or strongly agreed), however the latter was strongly disagreed with by one of the non-awarded respondents.

Figure 14 Participant’s agreement with several statements about the Valorisation Programme



Technopolis Group, 2017 – numbers inside the bars indicate the number of respondents to each category

The assistance received during the Valorisation programme was by a majority of respondents considered valuable (58% agreed or strongly agreed), although a minority disagreed with that statement (15%). The financing received during the programme was only by a small majority (53% agreed or strongly agreed) considered sufficient to initialise/start-up sustainable valorisation. A minority disagreed or strongly disagreed (25%) with this statement of which two respondents were not awarded a subsidy in the final stage of the Valorisation Programme. Some comments made during the questionnaire indicate that higher funding would have been appreciated. As the funding quite substantially differed over the calls, it is unclear whether this statement applied generally to the Valorisation Programme or more specifically to one of the calls with fewer budget.

Those who were awarded a subsidy in the final stage of the Valorisation Programme agreed more with the statement “The process in which business cases were selected and awarded funding was thorough”. Those who were not awarded disagreed more with this statement and the similar one on transparency of the selection process, as well as with “The financing I received from the Valorisation Programme was sufficient to initialise/start-up sustainable valorisation”. These observations should however be stated with care, as the number of non-awarded participants that responded to the questionnaire was small.

3.7 Conclusions on results and effects

The Valorisation Programme has resulted in the creation of 44 business cases with the Lean Business Model Canvas of which 28 were awarded a subsidy in the final stage of the programme. This direct output of the Valorisation Programme has in turn led to a range of results (outcomes) that contributed to the goal of the Valorisation Programme. A summary overview of the main results is given in Table 4.

We observed some differences between the results of participants that were awarded and those that were not awarded. This could however not be strongly quantified, as only a limited number of respondents to the questionnaire were not awarded a subsidy in the final stage of the Valorisation Programme. Generally, we observed some better results for those who were awarded than for those who were not awarded, however, observations suggest that those who were not awarded did somewhat better in participating in other valorisation/incubation programmes, in receiving funding from external investors and in developing new service(s). These are however only soft indications.

Table 4 Overview of the main results and effects

Results	Effects
Acquired new funding (total)	€4.4m
Increase in TRL (average)	+2 levels (+33%)
Increase in estimated business value (total)	€59m (+32%)
Success rate (average)	65%
Elaborated business plan	++
New products, new IP, new clients and diversification of existing business activities	+
Start up, spin off or spin out, new services, financing from external investors and successful participation in other valorisation or incubation programmes	+/-

Technopolis Group, 2017

We positively assessed the effectiveness of the programme. The results of the Valorisation Programme contributed to its goal: to “identify, nurture and develop product and business ideas emerging from the science and technology in NanoNextNL”¹⁴.

Both on micro and macro level the Valorisation Programme has been of added value. To participants the added value has been related to financing, coaching, networking and improving valorisation through better business cases. To the field of valorisation, the added value lies in some novelties that were introduced in the Valorisation Programme, such as the GEC, both for business case development as well as for selection procedures.

Participants were generally quite positive about many aspects of the Valorisation Programme. Most aspects of the programme were assessed as good or very good by most of the respondents to our survey. The level of support was assessed best, followed by the quality of support and the process of selection. Only the used tools, such as the LBMC and the GEC, were assessed least, mainly due to some initial issues with the GEC and its perceived inflexibility for certain business cases. The programme was said by a majority to have helped successfully commercialise the knowledge developed within NanoNextNL. The phased approach was valued, as well as the received assistance and funding.

Respondents who were awarded were generally more positive about the phased approach used (stage-gate approach) and the process of selection than those that were not awarded a subsidy in the final phase of the Valorisation Programme. These observations are however based on a limited number of respondents who were not awarded a subsidy in the final phase of the Valorisation Programme.

¹⁴ NanoNextNL (2016). Conclusions by IAC of End Term Review (ETR) of NanoNextNL. Utrecht: NanoNextNL.

4 Looking around: International benchmark

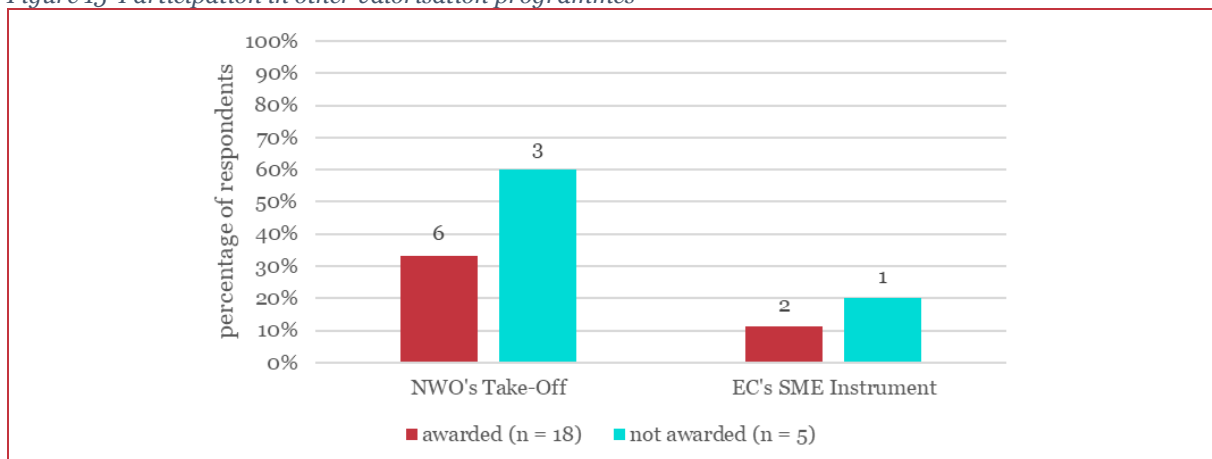
In this chapter, we look around in the world of valorisation at two other valorisation programmes in Europe and compare these with the Valorisation Programme of NanoNextNL. The goal of this international benchmark is to see to what lessons can be learned from the differences between the Valorisation Programme and other valorisation programmes. With this chapter, we answer research questions 9, 10 and 11.

We have selected two valorisation programmes for this benchmark: Take-Off and SME Instrument. Take-Off is the Dutch national valorisation programme of the Dutch Research Council (NWO). It has a long history in valorisation with an origin in the technical sciences and strongly focuses on academic researchers. The SME Instrument is the EC's valorisation programme of Horizon 2020 and strongly focuses on SMEs. Both programmes are open to participants of NanoNextNL.

The two benchmarks together cover all main aspects/characteristics of the Valorisation Programme of NanoNextNL. They are similar in some respect and different in others, giving us the opportunity to learn from them for future valorisation programmes.

Some participants in NanoNextNL have participated in one of these benchmarked programmes as well. Our questionnaire asked participants to the Valorisation Programme whether they have participated in any of the two benchmarked programmes. Figure 15 shows the response. Of the 23 respondents to this question, nine have been involved in Take-Off and three in the SME Instrument. Relatively, more non-awarded respondents seem to have participated in these two valorisation programmes than awarded respondents – we state this with care, as the number of non-awarded respondents is small. It is however unclear whether they have participated in these other programmes before or after their participation in the Valorisation Programme of NanoNextNL.

Figure 15 Participation in other valorisation programmes



Technopolis Group, 2017

In the first section of this chapter we will describe the Take-Off valorisation programme and in the second section the SME Instrument valorisation programme. In the third section, we will make a comparison between the benchmark programmes and the Valorisation Programme on several aspects. The detailed benchmarking studies of each programme can be found in Appendix B. We end this chapter with a section in which we draw some conclusions regarding the international benchmark.

4.1 Dutch national valorisation programme: Take-Off

The Take-Off programme is a Dutch national valorisation programme that stimulates the commercial application of scientific results and valorisation through entrepreneurship. The programme is executed by the Netherlands Organisation for Scientific Research (NWO) and runs from 2014-2021. The goal of

the Take-Off programme is to create economic and entrepreneurial activity from knowledge developed at Dutch research institutes.

The Take-Off programme is an open call (twice a year) and is structured in two phases: (1) financing of feasibility studies and (2) early-phase financing. The feasibility study of phase 1 a requirement for submission for phase 2. Dutch universities, universities of applied sciences and research institutes that are recognised by NWO can apply for the programme. Funding for phase 1 is in the form of a subsidy of max. 40,000 euros, phase 2 is a loan between €50k-€250k. For the last call, a total of 1 million euros was available for phase 1 and 2 million euros for phase 2. The budget of the Take-Off programme is insufficient to grant all suitable projects. Participants are selected based on formal submission criteria and technical criteria. These criteria differ per phase.

Unique aspects of the Take-Off programme are the fact that it is open to all fields of science and that it is also available to universities of applied sciences, which is a novelty in the Netherlands. The many years of experience that Take-Off is built on is considered as a strength of the programme, as well as its phased approach. Several opportunities for improvement are the visibility of Take-Off in the valorisation landscape and the monitoring of the programme.

Further details on the Take-Off programme can be found in Appendix B.1 .

4.2 European valorisation programme: SME Instrument

The SME Instrument is an EU-funding programme for high potential small and medium-sized enterprises (SMEs) that stimulates the marketing and scaling of innovation in SMEs. The programme is hosted by the European Agency for Small and Medium-sized Enterprises (EASME) and identifies thirteen domains for which SMEs can apply, including nanotechnology and materials (NMP). The programme should result in a strong boost of breakthrough innovations in Europe, which result in the generation of growth and jobs.

The SME Instrument is an open call, and SMEs can apply for three phases: funding for; (1) a concept and feasibility assessment; (2) demonstration, market replication and R&D; and (3) commercialisation. Only companies with TRL 6 or higher can participate. Funding of the programme can be used for 70% of the total costs, the rest is co-funding. A total of 400 million euros per year is available for the period 2014-2020.

The SME Instrument has a success rate between 6% and 8%. During the first two years of the SME Instrument, selected participants on average had been on the market for 10.8 years and had an annual turnover of 4 million euros. Participants are selected by a group of four independent expert evaluators against the criteria excellence, impact and implementation.

Unique aspects of the SME Instrument are its scale and scope and the specific focus on companies with a high TRL level. The large amounts of funding available is a strength of the programme, as well as the fact that despite the high number of applicants, the programme also has a relatively quick application process. Several opportunities for improvement are the low success rate of the programme, the attraction of younger businesses and the capacity of the supporting National Contact Points.

Further details on the SME Instrument and its effects can be found in Appendix B.2 .

4.3 Comparison with the Valorisation Programme

We have made a comparison between the benchmarked valorisation programmes. A summary of the key aspects of the valorisation programmes is given in Table 5. In this section, we discuss some of the main differences between the programmes, the innovative aspects of the Valorisation Programme when compared to the other benchmarked programmes and the lessons to be learned from this benchmarking exercise.

Table 5 Comparison of valorisation programmes on key aspects

	NanoNextNL's Valorisation Programme	NWO's Take Off	EC's SME Instrument
Start programme (year)	2014	2014	2014
End programme (year)	2016	2018	2020
Geography	The Netherlands	The Netherlands	EU 28 + H2020 associated countries
Theme or domain focus	10 themes within the domain of micro- and nanotechnology	No theme or domain, open to all sciences	13 themes that cover a wide range of domains, giving the programme a general focus
Type of funding organisation	Public-private programme consortium	National Research Council (incl. National Taskforce for applied Research)	EU government agency
Goals	To identify, nurture and develop product and business ideas emerging from the science and technology in NanoNextNL	To create economic and entrepreneurial activity from knowledge developed at Dutch research institutes	<ul style="list-style-type: none"> • Generate growth and jobs • Find solutions to societal challenges in Europe
Type of candidates	Academics, start-ups and SMEs (but restricted to members NanoNextNL consortium)	Academics, start-ups and SMEs that have a formal relation with a Dutch knowledge institute (including UAS/HBO)	seed/start-up/scale-up/mature
TRL requirement or improvement	No TRL requirement, TRL +2 improvement (average)	No requirement	TRL 6 or higher required for applications
Number of applications received (per year)	72 / 3 years	100 / year	1,930 / 2 year
Number of applications funded (per year)	28 / 3 years	39 phase-1 and 8 phase-2 in 2016	1,444 / 2 year
Success rate (overall)	65% (average)	47,6% (phase 1) and 56,4% (phase 2) on average	7%
Number of calls (per year)	4 / 3 years	2 calls / year	open call (4 cut-offs a year)
Budget per call	€779k (average), min. €75k, max. €2.2m	€1m (phase 1) and €2.3m (phase 2) on average	€400m a year
Budget per funded application (average)	€100k (average) in final stage of programme	max. €40k (phase 1) and max. €250k loan (phase 2)	€50k - €5m
Total budget programme	€3.1m direct funding (subsidy)	€21.6m (2014-2017)	€1.3b
Ratio support budget versus total funding approved (efficiency)	>5%	9.6%	unknown
Total of external investments	€4.4m additional funding (2017)	unknown	unknown
Number of start-ups	KPI not attributable	unknown	unknown
Survival rate start-ups (average)	unknown	unknown	unknown
Number of IP registered	KPI not attributable	unknown	unknown
Number of IP licensed	KPI not attributable	unknown	unknown

	NanoNextNL's Valorisation Programme	NWO's Take Off	EC's SME Instrument
Number of academics involved	20 (36% of participants)	all participants are affiliated to knowledge institution	unknown
Number of companies involved	36 (64% of participants)	unknown, but companies affiliated to knowledge institutions participated	1,640 selected SMEs between 2014-2015
Number of investors involved	unknown	unknown	unknown

Technopolis Group, 2017

4.3.1 Main differences with the Valorisation Programme

Clear differences with the Valorisation Programme can be observed in terms of **number of applicants, the amount of budget and the duration**. The Valorisation Programme is the smallest or shortest in all respects. It is a fairly short programme, two instead of six years, with fewer budget than the others and fewer applicants. This makes sense for a valorisation programme that is a part of a research and innovation programme. The duration is however something that could have been longer – from the start of NanoNextNL – to improve valorisation within the overall programme.

The **goal** of the Valorisation Programme is rather vague compared to the goals of the other valorisation programmes. They all strive to valorisation with a specific focus. Most concrete and clear is the goal of the SME Instrument. A goal like that of Take-Off would have been useful for the Valorisation Programme.

A main difference of the Valorisation Programme with the other valorisation programmes is the **type of funding**. Take-Off provides a loan in Phase 2; the SME Instrument only provides free-of-charge services in Phase 3. In all other phases subsidies are given. NanoNextNL only provided subsidies, which is essential for pre-start-up and early phased start-ups. This was valued by the participants. For the higher TRLs within the Valorisation Programme and the vested SMEs one could have considered a loan as well.

The **success rate** of applicants to the Valorisation Programme is quite high compared to the other Valorisation Programmes. The success rate of the SME Instrument is only 7% and very low, the success rate of Take-Off is up and above 50%. Just like the SME Instrument, Take-Off has issues with too many good applications. The selection process is therefore criticised, as too many applications pass the selection and thus selection is based on nuances. The did not happen with the Valorisation Programme, partly due to the stage-gate approach during which the proposal can be improved, as well as due to a better balance between the amount of available funding and the number of applicants.

The other valorisation programmes consist of two **phases**, which may almost be considered different programmes. The SME Instrument has three phases, Take-Off two and NanoNextNL just one with a stage-gate approach. In terms of focus, the first phase of the SME Instrument and of Take-Off are similar to the Valorisation Programme. In each of the programmes feasibility studies are undertaken to verify the viability of the business cases. The second phases are all dedicated to early phase financing for start-ups, however the design of the phases is quite different and the SME Instrument selects more developed businesses than the other two programmes. Take-off and SME Instrument both provide the possibility for testing, piloting, market replication and scale-up. In the Valorisation Programme, the Business Accelerator call had a somewhat similar focus as the second stages in the other programmes.

The Valorisation Programme was **less rigid** than the other valorisation programmes. During the Valorisation Programme, several changes to the programme have taken place, based on new insights and available budgets. This flexibility is both a strength – as it incorporates organisational learning – as well as a weakness – as it is less clear to the applicants. For applicants of the other valorisation

programmes, they exactly know that whenever they apply the call will be similar in scope, structure and rules.

Unlike Take-Off, the Valorisation Programme and the SME Instrument are directly **related to a research programme** – NanoNextNL and Horizon 2020 respectively. This stimulates valorisation of research within the specific programme. Horizon 2020 and NanoNextNL's science and innovation programme are in most aspects not comparable. The link with the valorisation programme is less strong than in NanoNextNL, which is partly caused by the fact that the SME Instrument is executed by a separate EC agency.

The **relative support budget** for Take-Off and the Valorisation Programme seem rather similar. For NanoNextNL the overall support budget versus the total funding approved is 5%. The Valorisation Programme had however a higher ratio, due to the more intensive guidance of participants. For Take-Off, the ratio is around 9%, which is also higher than 5%, although with less intensive guidance of participants. In that respect, the Valorisation Programme might even be rather efficient.

4.3.2 *Innovative aspects of the Valorisation Programme*

From the differences between the valorisation programmes we have identified five aspects that we consider innovative. These are the tooling to develop and assess business cases, the stage-gate approach, the coaching and training ecosystem (including the additional Training Programme), the explicit evaluation of safety and society aspects and the fact that it is developed and executed by a public-private consortium itself.

The **tooling used to develop and assess business cases** is rather innovative and not used in a similar manner in the other valorisation programmes. Especially the online GEC is innovative, even more so as it has been used in assessment procedures. The assessment procedure in Take-Off, for instance, is criticised because more participants pass the selection than that can be funded, so that selection afterwards is on details. Some have suggested a different procedure. With the GEC, the assessment was more objectivised and clear to applicants, as they also used the GEC. Other valorisation programmes may use tools like the GEC in their selection procedures as well. Such tools also provide insights to participants on the strengths and weaknesses of their business case, so that they can improve certain aspects to strengthen their business case.

NanoNextNL is one of the few **public-private consortia that developed its own valorisation programme**. The former Netherlands Genomics Initiative (NGI), which was also funded by the FES, used to have a valorisation programme as well. However, generally valorisation programmes are developed and executed by a government agency, public institute (such as a university) or related to an investor's programme. It may thus be considered somewhat innovative that a collaboration of universities, research and technology organisations and small to large companies together developed their own programme for valorisation.

We consider the **stage-gate approach** as an innovative element as well. The other programmes do have some phases in their programme, but these phases have their own goals, procedures and activities and are open to new applicants as well. In that respect, they may be considered a separate programme within the overall framework of the valorisation programme. The stage-gate approach is a series of stages that applicants go through with in between gates in which is decided whether a business case in its current form can continue to the next stage. The feedback at the gates can be used to improve the business cases, except for the Business Council stage. The stage-gate approach allows for feedback, quality improvements and better monitoring and management. This reduces risks from the side of the programme organisation.

NanoNextNL overall provides a **unique internal ecosystem for valorisation** by offering entrepreneurial trainings in the Training Programme and internal and external coaching in the Valorisation Programme. Coaching and training can be obtained in Take-Off, but must be acquired externally by participants themselves – the programme officers can give some suggestions. The SME Instruments provides some coaching in the first phase and free-of-charge trainings in the third phase.

These are external and seem less ‘intimate’ as within the Valorisation Programme, with coaching provided by the Business Developer and the Valorisation Committee.

A last innovation introduced in the Valorisation Programme is the **explicit evaluation of safety and society aspects**. Safety and society aspects were included in the adapted LBMC and as such evaluated during selection processes. Throughout the NanoNextNL programme much attention was given to risk assessment and technology assessment (RATA) of nanotechnologies developed. This RATA was translated into safety and society aspects to be considered during valorisation, as these aspects can indeed severely weaken a business case. The inclusion of these aspects shows also commitment to responsible innovation. Safety and society aspects were not explicitly found in the benchmarked valorisation programmes.

4.3.3 *Lessons to be learned from other valorisation programmes*

Focus valorisation programmes more on the phase of participants, such as their TRL, and the type of participants. Within the Valorisation Programme we observed quite a spread over TRLs, ranging from 2 to 8, and a diverse set of participants, ranging from academic pre-start-up to established SMEs. Furthermore, the domains were quite broad, as nanotechnology crosses domains as broad as life-sciences to materials sciences. This makes the assistance of business cases very difficult, as needs, knowledge, skills and business trajectories are very different for each participant. The SME Instrument has tried to focus most of all benchmarked programmes, as participants should work on the valorisation of technologies with TRL 6 or higher and participants should be SMEs. The domains are still quite broad. Take-Off has less focus, although participants should have a strong academic relation, resulting in participants with lower TRLs. For a small programme, such as the Valorisation Programme, focus is more important than for larger programmes, as more resources can be made available to effectively cover this range.

Either limit the number of potential applicants or increase the available budget. The Valorisation Programme did rather good in this respect: it has a fairly high overall success rate and did not have to reject well-assessed applicants. Take-Off and the SME Instrument do worse in that respect and are criticised for that. The overall success rate of the SME Instrument is discouragingly low (7%) and Take-Off successfully assess more applicants than can be funded so that additional selection on details is needed. This is discouraging for participants as well. Stricter selection procedures or limiting eligibility could prevent these effects, increased budgets could do that as well, but that is generally more difficult.

Better embed valorisation programmes in the (national) innovation landscape. One of the lessons from Take-Off is that working closer together with StartupDelta, KTOs/TTOs, incubators, investors, ROMs and regional valorisation programmes, could improve the visibility of the programme, the quality of the approved projects and the support that participants in the programme receive. It helps in constructing a stronger innovation landscape. The SME Instrument is best embedded, as it has connections with Horizon 2020, the Executive Agency for SMEs (EASME), the European Enterprise Network (EEN) and the National Contact Points (NCPs), for example at the Netherlands Enterprise Agency (RVO). The Valorisation Programme is connected with the research and technology programme of NanoNextNL, but has no strong relations with other elements of the Dutch innovation landscape. Better embedment could result in a better uptake in other programmes or by investors at the end of the valorisation programme and could improve successful valorisation in the landscape as whole.

Make (business) coaching and training an integral part of valorisation programmes. Results from the SME Instrument have shown that Instrument coaching combined with a grant has a positive effect on the results of SMEs. Within the Valorisation Programme the coaching was valued as well and is especially important for the less experienced (academic) entrepreneurs. The separate Training Programme provided relevant trainings for valorisation as well, such as an IP and Valorisation Awareness course and an Entrepreneurship course. In Take-Off, this is not so much formalised and fully externally organised. Coaching and entrepreneurship trainings embedded in the programme or aligned with the programme could improve results. The coaching and entrepreneurship trainings can be better

monitored within the programme and could become a compulsory element if during selection this is deemed relevant to the participant. This is something to consider in future valorisation programmes.

4.4 Conclusions on the international benchmark

The Valorisation Programme is in many respects different from the benchmarked valorisation programmes. It is the smallest of all three in terms of overall budget, number of participants and duration. It provides only subsidies no loans, has integrated stages instead of separate phases and is just like the SME instrument related to a research and technology programme. The overall success rate is high, much higher than the SME Instrument, and the selection procedure is sufficiently selective. The Valorisation Programme was less rigid than the benchmarked programmes with internal coaching, while still having a similar relative support budget as Take-Off.

Compared to the benchmarked programmes, the Valorisation Programme has some aspects that we consider innovative. These are the tooling to develop and assess business cases (LMBC and GEC), the stage-gate approach, the coaching and training ecosystem within NanoNextNL (including the additional Training Programme), the explicit evaluation of safety and society aspects and the fact that it is developed and executed by a public-private consortium itself.

The benchmarking exercise led to several lessons. Focus valorisation programmes more on the phase of participants, such as their TRL, and the type of participants to be able to better coach participants. Either limit the number of potential applicants or increase the available budget to prevent discouragingly low success rates and a too low selectivity. Better embed valorisation programmes in the (national) innovation landscape to improve uptake of business cases by other programmes or investors at the end of the programme. Make (business) coaching and training an integral part of valorisation programmes, as it is valued by participants and seems to have a positive impact on results (e.g. with the SME Instrument).

5 Looking ahead: Lessons learned and recommendations for the future

This chapter is dedicated to the future based on the lessons that were learned during the Valorisation Programme or that can be drawn from the comparison with other valorisation programmes and recommendations that follow from them. With this chapter, we will answer research questions 3, 4 and 6. In the first section we discuss the strengths and weakness of the Valorisation Programme. In the next section, we state some recommendation for improving future valorisation programmes based on the lessons that can be learned from the Valorisation Programme. The last section contains a checklist for setting up future valorisation programmes that incorporates the lessons learned from this study.

5.1 Strengths and weaknesses of the Valorisation Programme

In this section, we give an overview of the strengths – or successes – and the weaknesses of the Valorisation Programme. We have identified some of these strengths and weaknesses during the study, while others were mentioned by participants or stakeholders.

5.1.1 Strengths of the Valorisation Programme

One of these strengths of the Valorisation programme was that it was tightly **linked to the research and technology programme** of NanoNextNL. The research and technology programme, the Training Programme and the Valorisation Programme of NanoNextNL were aligned. The fact that trainings on entrepreneurship, IP and technology and risk assessment were given, had the potential to strengthen the knowledge base of participants to the Valorisation Programme – although these programmes were separately managed. Due to this link, it could act as a fast track to valorisation of the programme's research. This is indeed an aspect that is not much seen in other valorisation programmes, as they are often stand-alone, dedicated programmes for valorisation.

The **amount of funding**, and especially the **type of funding**, was considered a strength of the Valorisation Programme. The fact that the funding was a subsidy instead of a loan was highly valued by participants. This can be understood by the fact that there is a general trend in valorisation that funds become revolving and are thus supplied as a loan. A connected strength that was mentioned was the fast payments within the programme. Start-ups and young R&D intensive companies often have limited cash flow and appreciate fast payments to finance their activities.

The **support** to participants during the programme was a strength. Good internal and external support helped participants in developing a thorough business case. The funding helped to acquire external support, for e.g. market and IP research, without too many restrictions. The structure of the programme was good and helpful for inexperienced (academic) entrepreneurs. With the coaching, the submitted business cases to the Business Council were ensured of a higher quality (better chance of eligibility and better business prospects). This should have contributed to a better output (higher quality) of the Valorisation Programme. Moreover, participants valued the feedback and learning through involved experienced business partners or entrepreneurs in the Valorisation Committee and Business Council.

The programme had a **limited administrative burden** on participants, which was considered as a strength. The application and selection process was efficient. The contact with the programme management was mentioned to be friendly and through short communication lines. The progress checks were said to be good, with only a limited reporting burden.

The Valorisation Programme helped participants to assess new areas of business and to develop technology to a higher TRL. The programme was said to have a clear focus on the long-term development of a business and towards the commercialisation of real products – a focus that was valued by participants. The programme helped to **strengthen the business case** and allowed to reapply once the business case has improved, so that improved quality is rewarded. The Business Accelerator Call, in which additional funding was available, was mentioned as a strength as well.

Another strength was the approach in which the programme improved the **entrepreneurial focus** of participants. Having a Business Developer at the programme contributed and stimulated the

entrepreneurial focus. Interviewees consider the academic aspects of the proposals to have been of good quality, but state that there was a clear need to improve the entrepreneurial focus of the proposals. The Valorisation Programme helped candidates to consider their proposition and to check this with the GEC. Interviewees also indicate that this support could be extended even further, concerning markets and bringing people in contact with potential partners or investors.

The **assessment process** of the programme is considered honest, transparent and innovative by the interviewed stakeholders. Especially the use of the GEC is considered an innovative method of assessment that enabled a more objective assessment process. This tool, as well as the LBMC, has been adapted to the Valorisation Programme. These tools were considered a successful aspect of the approach used in the Valorisation Programme by stakeholders.

Another strength was the use of the stage-gate approach, which led to an **accessible programme**. It contributed to better management and monitoring of projects and improvement of business cases before they apply for the subsidy in the final stage of the Valorisation Programme.

5.1.2 Weaknesses of the Valorisation Programme

One main weakness was the fact that the Valorisation Programme ended at the same time as NanoNextNL's research and technology programme ended. Valorisation often follows after the research so that the need for a valorisation programme would be more prominent after the research programme has ended. Similarly, a **longer programme** would be needed to also observe the true impact of the Valorisation Programme – two years is too short for that. It is therefore that participants mention that estimates made about the future company are too far out to be reliable. During the programme, this was too early to assess.

Although we consider the GEC as a useful tool for valorisation, it is in some cases too inflexible. This should be improved when used in valorisation programmes that have a diverse group of participants. Some participants **found the GEC to have too limited options** to adapt to specific situations and therefore not a very useful tool. An example was the problematic use of the GEC for existing companies. These problems seem to have been more prominent at the beginning of the programme when the GEC was less developed.

The Valorisation Programme was more or less **developed during the time it ran**. This is observed in the differences between the calls. The development was based on lessons learned from the previous calls, including a pilot project, and based on remaining funding within the programme. The Business Case Support call and the Business Accelerator call were both introduced after some funding remained from the first two calls. Although this gives some flexibility to the programme, which can be seen as an advantage, it reduces consistency, predictability and clarity to the participants.

Some weaknesses were reported on **processes** in the Valorisation Programme as well. The decision process was considered too slow for the initial small amounts of funding in the first few stages of the programme. This was said to slow down time to market. Although some liked the GEC, others Regarding programme management, it was mentioned that there could have been a stronger focus on substance and impact than on formal criteria. We also found no clear KPIs formulated upfront for the Valorisation Programme specifically. Attributable KPIs with associated targets help in monitoring on results and on evaluating the performance of the programme.

The Valorisation Programme had no direct relation with incubators or a strong (regional) embedment into the innovation landscape. A **stronger involvement of investors, incubators or programmes** in which participants could continue could have been valuable to secure the impact of the business cases developed in the Valorisation Programme. Another follow-up call, like the well-received Business Accelerator Call, could have helped as well in helping more successful participants in setting the first stage to accelerate their business. More coaching, specifically on entrepreneurship, was mentioned in that respect as well. This could better help those participants with limited entrepreneurial experience to well-develop their business case outside the Valorisation Programme.

A last weakness was the **amount of funding**. Although participants liked that the funding was a subsidy, they would have liked more funding for valorisation. This is also reflected in Figure 13, where only a small majority of respondents (56%) indicated that the amount of funding was good to very good.

5.2 Recommendations based on lessons learned

We have formulated the lessons learned from the Valorisation Programme as recommendations for *future* valorisation programmes. This has resulted in ten recommendations, which are discussed in this section. At the end of this section we also state four recommendations for *future* valorisation programmes based on the lessons learned from the benchmark exercise in the previous chapter.

One of the main lessons from NanoNextNL is to **connect the valorisation programme and the research and technology programme from the start**. The current programme was initiated after the mid-term review in 2014 and was connected to the research and technology programme since then. If the Valorisation Programme would have started at the beginning of NanoNextNL, there could have been a stronger focus on valorisation during the first half of NanoNextNL. It could have attracted business-minded PhD's, if they knew at the beginning that business opportunities from their research could be supported within a connected valorisation programme. However, for valorisation research results are needed. These lack at the beginning of a research programme. Therefore, the focus of valorisation should be in the first part of such a programme on awareness (information) and skills development (training) and on scouting projects that have potential for valorisation. In interviews, it was also suggested to make valorisation aspects, such as the entrepreneurial focus of applicants or the valorisation potential of the project, part of the application procedure for the research and technology programme for NanoNextNL. This could have improved valorisation during the overall programme as well.

Extend valorisation programmes until one or two years after connected research and technology programmes. Valorisation is often initiated by the results of a research projects, which are clear to full extent at the end of the study. Within NanoNextNL the commercialisation of knowledge ended at the same time as the research projects ended. In this phase, it would be good to still have a valorisation programme to valorise the results and to stimulate (and measure) impact. Indeed, valorisation programmes should be long-term to reap the full benefits of the developed business cases.

Stimulate the interaction of researchers with industry, investors or society at large and from interactions across disciplines, as valorisation often originates from such interactions. A public private consortium such as NanoNextNL, with a large range of themes, is well positioned for that. Interaction between different public and private partners within the consortium that extends beyond the participant's own project could be valuable in that respect. Also, interaction with researchers from other domains could lead to new ideas. Such interactions could also have been stimulated by the Valorisation Programme in the first half of the research and technology programme of NanoNextNL.

Future valorisation programmes should try to **make a strong connection with other valorisation and incubation initiatives and with funds or financiers for the next stages of development**. During the Valorisation Programme valorisation in the Netherlands received more attention and some ideas and practices in valorisation has changed. Involvement of the Dutch HBO's – like in Take-Off – could be valuable and a strong connection with StartupDelta, regional Fieldlabs and the Regional Investment Agencies (ROMs). The connection with the universities Technology Transfer Offices (TTOs) and with investors could be stronger. Guiding participants to next stage financing and bringing them in contact with relevant investors could help in further nurturing of the business cases after the Valorisation Programme and could contribute to their success. For the Valorisation Programme, the TechNano Fund could have been relevant to build a strong connection with.

Explicitly include safety and society aspects (RATA) in future valorisation programmes. With the Valorisation Programme is was included in its design, which may be considered innovative and responsible – a good practice. Risk assessment and technology assessment (RATA) has been an important aspect throughout NanoNextNL and thus also in the Valorisation Programme. It was incorporated in the LBMC and was as such explicitly evaluated to understand the impact on the business

case. This makes sense from a business perspective as well: a product with health and environmental safety or risk issues, will not be viable in the long run.

In future valorisation programmes, it is wise to **make a strong division in markets, to optimally cover these expertise for coaching and selection**. Although the Valorisation Programme focussed on micro- and nanotechnologies, the range of targeted markets in the business cases was very broad. Business models and company growth trajectories in these markets are very different. For instance, start-ups in the life sciences experience completely different dynamics than start-ups in the materials sciences. This diversity has been dealt with by installing a special Business Council for the life sciences. However, comparing and coaching business cases in all these different markets is difficult and demands a very broad range of expertise at the programme management. In the specific case of NanoNextNL the programme was too small to make this division.

The stage-gate approach is a valuable approach for future valorisation programmes, both in terms of management as well in terms of quality. With the stage-gate approach funding is divided over stages, with the largest amount of funding in the latest stage. During the stages, the quality of the business case is improved, so that at the final selection in the latest stage business cases of higher quality and with better potential can be funded. It additionally provides a mechanism for coaching, monitoring and steering on quality and expected impact. The stage-gate approach has therefore been a useful approach for the management of the programme. It also reduced the risk of start-ups going bankrupt in the end, preventing the loss of large amounts of funding due to bankruptcy.

Online tooling can be useful for selection process in future valorisation programmes as well, although some tooling might need to be further developed. The LBMC and the GEC have been used in the Valorisation Programme to improve business cases and as outputs for assessment by the Valorisation Committee and the Business Council. This has helped in more objectivising the selection procedure. Most participants responding to our questionnaire positively assessed the LBMC, but were critical about the GEC. However, comments revealed that disliking of the GEC was mainly due to its inflexibility for some business models and/or markets and due to some problems in the beginning. Further development of the GEC as a tool for valorisation programmes may be useful.

Develop upfront clear and attributable KPIs, with associated targets, for the valorisation programme. KPIs are an important tool to monitor outputs and outcomes of the programme and are valuable for evaluating its performance. They also help in thinking of expected results and the needed activities for that in the designing phase of a valorisation programme.

Make sure that the Programme Officers of valorisation programmes are business minded and have some experience with business. A business minded setting with knowledge and experience in business on board is important for a valorisation programme. Most Programme Officers, for instance at NWO, usually have a PhD degree and are mainly experienced in and focused on science. NanoNextNL also had such Programme Officers for each theme of its science and technology programme. As the focus in valorisation is on business, the Valorisation Programme introduced an experienced Business Developer as a sort of Programme Officer for the Valorisation Programme. The role of the Business Developer is however more intensive than that of the thematic Programme Officers, as he also coaches the programme's participants next to the programme management. Interviewees stated that with the introduction of the Business Developer, sometime after the first start of the programme, the business focus of the programme has improved. It also contributed to the business experience and knowledge within the programme.

The lessons learned from the benchmark exercise in chapter 4, resulted in the following recommendations for *future* valorisation programmes:

- **Focus valorisation programmes more on the phase of participants, such as their TRL, and the type of participants.** The Valorisation Programme had quite a spread over TRLs, diverse types of participants/organisations and covered quite a few domains. This makes the assistance of business cases very difficult, as needs, knowledge, skills and business trajectories are very different for each participant.

- **Either limit the number of potential applicants or increase the available budget to counter low selectivity and low success rates.** Stricter selection procedures or limiting eligibility could prevent a discouraging low success rate and better selectivity, increased budgets could do that as well, but that is generally more difficult. The Valorisation Programme performed good on the success rate, but the benchmarked programmes did worse.
- **Better embed valorisation programmes in the (national) innovation landscape.** Better embedment could result in a better uptake in other programmes or by investors at the end of the valorisation programme and could improve successful valorisation in the landscape as whole.
- **Make (business) coaching and training an integral part of valorisation programmes.** Results from the SME Instrument have shown that Instrument coaching combined with a grant has a positive effect on the results of SMEs. Within the Valorisation Programme the coaching was valued as well and is especially important for the less experienced (academic) entrepreneurs. NanoNextNL provided a Training Programme to its participants that was to some degree aligned with its Valorisation Programme (e.g. courses on IP and Valorisation Awareness and Entrepreneurship).

5.3 Checklist for future valorisation programmes

In Figure 16 we have incorporated the strengths, recommendations and lessons learned in this study into a comprehensive checklist for organisations or policymakers that wish to set-up a future valorisation programme. This checklist may help to improve the quality and success of future valorisation programmes in the Netherlands.

The Dutch government has the ambition to stimulate and strengthen valorisation in the Netherlands up to 2025¹⁵. Current and future valorisation programmes strongly contribute to this ambition. The ministry of Education, Culture and Science has recently identified six challenges in valorisation:

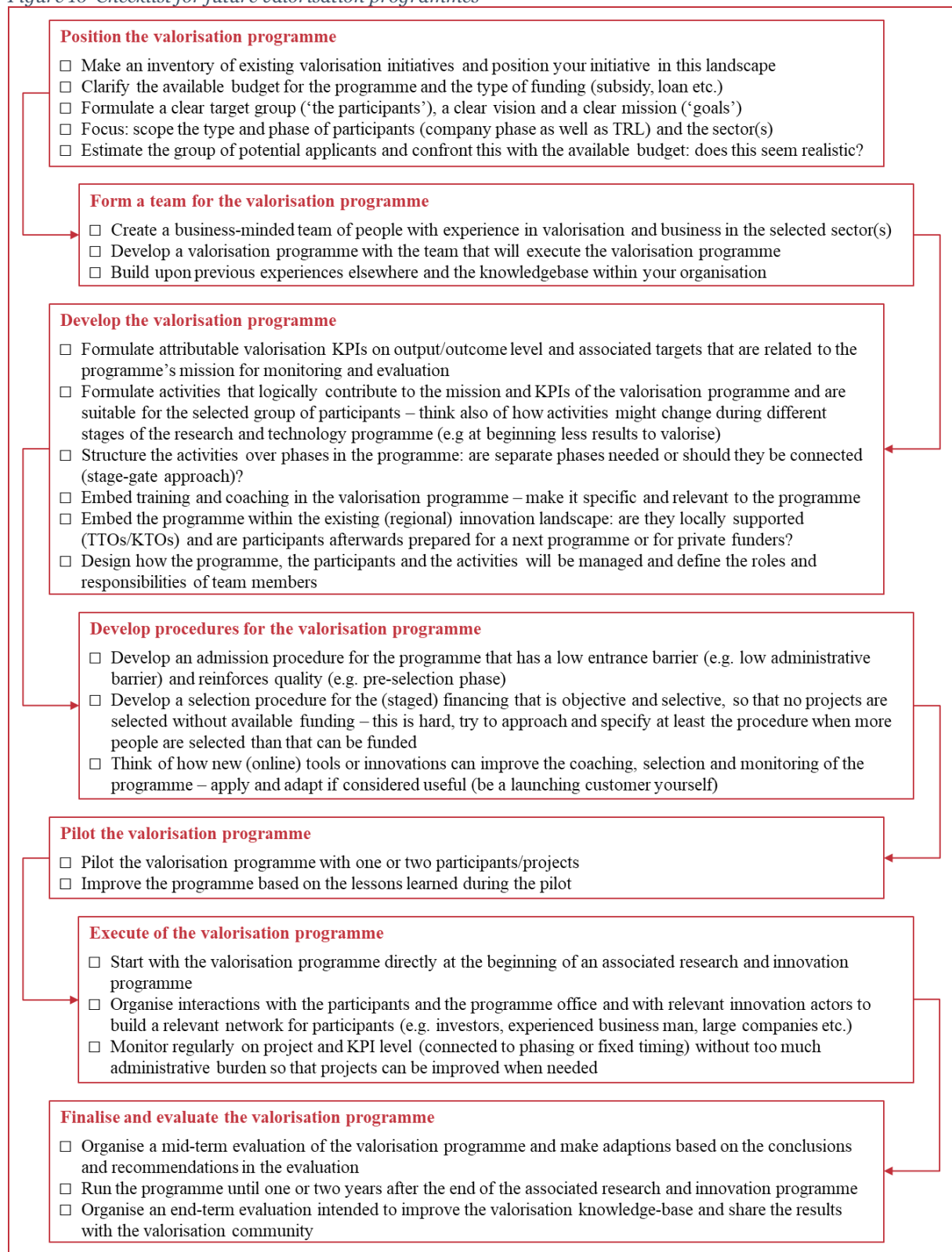
1. value scientific research more on societal and economic impact;
2. strengthen public private cooperation;
3. resolve barriers for academic start-ups;
4. strengthen and broaden TTOs/KTOs;
5. better use regional networks and; and
6. better monitor valorisation.

In addition, entrepreneurship education and learning from ‘good practices’ in valorisation have been defined as actions.

The checklist is intended to help policymakers or professionals in the field of valorisation to contribute to several of these actions and challenges defined by the ministry. It contributes to the learning from ‘good practices’.

¹⁵ Ministry of Education, Culture and Science (2017). Letter to Parliament on Science with Impact (Kamerbrief over wetenschap met impact). 19 January 2017.

Figure 16 Checklist for future valorisation programmes



5.4 Conclusions on lessons learned and recommendations for the future

We have identified several successes, or strengths of the programme, with the help of participants and stakeholders. These strengths were: the link with the research and technology programme, the type of funding, the support received, the limited administrative burden, the programme's entrepreneurial focus, the assessment process and the accessibility of the programme (due to the stage-gate approach). Furthermore, the programme helped to strengthen business cases, even before awarding a subsidy, which improved the quality of awarded business cases.

Similarly, we have identified several weaknesses of the programme. These are: the programme was too short, the GEC should improve, the programme was partly developed and crystallised during its execution and investors, incubators and other funding programmes were not strongly involved. Furthermore, some participants believed that the amount of funding should have been more and that processes could have been faster.

Overall, we have identified ten lessons that *future* valorisation programmes can learn from the Valorisation Programme as studied in this report. These lessons concern an early start and a longer ending of the valorisation programme, stimulating cross-domain interactions between researchers, industry, investors and society; building strong connections with other valorisation, incubation and funding programmes; focus participant groups to cover the expertise for coaching and selection; consider using a stage-gate approach; consider and develop online tooling for selection and business case development; include safety and society aspects; develop upfront clear and attributable KPIs; and make sure to have business minded and business experienced Programme Officers on board.

We have incorporated these lessons into a checklist for organisations and policymakers that wish to set-up a future valorisation programme (see Figure 16) based on good practices.

6 Conclusions

In this final chapter, we formulate the answers to this study's research questions. The answers are based on the body of research presented in the previous chapters of this report. We present our conclusions here integrally. This study's research questions are:

7. What are the goals, means and activities of the Valorisation programme?
8. What are the expected effects and results (effectiveness) of the Valorisation programme?
9. What are the experiences of stakeholders with the Valorisation programme?
10. What are the most important lessons learned from the Valorisation programme according to stakeholders?
11. What are the most important successes of the Valorisation programme according to stakeholders?
12. How do awarded and not awarded applicants assess the Valorisation programme?
13. What results has the Valorisation programme delivered to its participants?
14. Is there a difference in successful valorisation between awarded and not awarded applicants to the Valorisation programme?
15. How does the Valorisation programme differ from other comparable valorisation programmes (setup and approach)?
16. To what extent is the Valorisation programme innovative as compared to other comparable valorisation programmes?
17. What lessons can NanoNextNL learn regarding valorisation from other comparable valorisation programmes?

6.1 Conclusions about the Valorisation programme

The mission or goal of the Valorisation Programme is to “identify, nurture and develop product and business ideas emerging from the science and technology in NanoNextNL”. For that NanoNextNL has developed a Valorisation Programme consisting of several stages in which participants submit and further develop a business case.

Participants develop a Lean Business Model Canvas for their business case which is improved with the help of internal and external coaching. After evaluation by a Valorisation Committee, successful participants continue to further develop their business case using the online Golden Egg Check tool, which gives insights in the strengths, weaknesses and potential of the business case. In these stages, small budgets (order €1k-€10k) were available for the engagement of external experts and service providers to help improve the business case. After these first stages, the Business Council assessed the business cases, with the help of the GEC, and if successfully assessed participants were awarded a subsidy (order €100k) for further development of their business.

Participation to the Valorisation Programme was possible through four calls for proposals that were open to the NanoNextNL consortium members. The two regular calls followed all stages of the programme. The Business Case Support call followed most stages without a subsidy in the final stages of the programme and the Business Accelerator call only provided additional subsidy to selected successful participants of the first two calls to accelerate their business. In these four calls together, over 3.1 million euros has been allocated to the programme's participants, of which almost 2.8 million euros was direct subsidy, which had to be matched in-kind or in-cash by participants. Participants could use the funding for 100% of the external support for the development of their business cases, and had to match the funding for realisation of the business case around 50% in-kind or in cash.

With these means and activities, the Valorisation Programme intended to develop business cases. However, no clear KPIs specifically for the Valorisation Programme had been defined upfront, so that it is unclear which results were specifically expected. In this study, we have shown a framework of potential

results. Some valorisation KPIs have been defined for NanoNextNL overall, however these were not attributable to the Valorisation Programme.

The Valorisation Programme has resulted in the creation of 44 business cases with the Lean Business Model Canvas of which 28 were awarded a subsidy in the final stage of the programme. This direct output of the Valorisation Programme has in turn led to a range of results (outcomes) that contributed to the goal of the Valorisation Programme. A summary overview of the main results is given in Table 4.

Table 6 Overview of the main results and effects

Results	Effects
Acquired new funding (total)	€4.4m
Increase in TRL (average)	+2 levels (+33%)
Increase in estimated business value (total)	€59m (+32%)
Success rate (average)	65%
Elaborated business plan	++
New products, new IP, new clients and diversification of existing business activities	+
Start up, spin off or spin out, new services, financing from external investors and successful participation in other valorisation or incubation programmes	+/-

Technopolis Group, 2017

We observed some differences between the results of participants that were awarded and those that were not awarded. This could however not be strongly quantified, as only a limited number of respondents to the questionnaire were not awarded a subsidy in the final stage of the Valorisation Programme. Generally, we observed some better results for those who were awarded than for those who were not awarded, however, observations suggest that those who were not awarded did somewhat better in participating in other valorisation/incubation programmes, in receiving funding from external investors and in developing new service(s). These are however only soft indications.

We positively assessed the effectiveness of the programme. The results of the Valorisation Programme contributed to its goal: to “identify, nurture and develop product and business ideas emerging from the science and technology in NanoNextNL”¹⁶.

Both on micro and macro level the Valorisation Programme has been of added value. To participants the added value has been related to financing, coaching, networking and improving valorisation through better business cases. To the field of valorisation, the added value lies in some novelties that were introduced in the Valorisation Programme, such as the GEC, both for business case development as well as for selection procedures.

Participants were generally quite positive about many aspects of the Valorisation Programme. Most aspects of the programme were assessed as good or very good by most of the respondents to our survey. The level of support was assessed best, followed by the quality of support and the process of selection. Only the used tools, such as the LBMC and the GEC, were assessed least, mainly due to some initial issues with the GEC and its perceived inflexibility for certain business cases. The programme was said by a majority to have helped successfully commercialise the knowledge developed within NanoNextNL. The phased approach was valued, as well as the received assistance and funding.

Respondents who were awarded were generally more positive about the phased approach used (stage-gate approach) and the process of selection than those that were not awarded a subsidy in the final phase

¹⁶ NanoNextNL (2016). Conclusions by IAC of End Term Review (ETR) of NanoNextNL. Utrecht: NanoNextNL.

of the Valorisation Programme. These observations are however based on a limited number of respondents who were not awarded a subsidy in the final phase of the Valorisation Programme.

The Valorisation Programme is in many respects different from the benchmarked valorisation programmes. It is the smallest of all three in terms of overall budget, number of participants and duration. It provides only subsidies no loans, has integrated stages instead of separate phases and is just like the SME instrument related to a research and technology programme. The overall success rate is high, much higher than the SME Instrument, and the selection procedure is sufficiently selective. The Valorisation Programme was less rigid than the benchmarked programmes with internal coaching, while still having a similar relative support budget as Take-Off.

Compared to the benchmarked programmes, the Valorisation Programme has some aspects that we consider innovative. These are the tooling to develop and assess business cases (LMBC and GEC), the stage-gate approach, the coaching and training ecosystem within NanoNextNL (including the additional Training Programme), the explicit evaluation of safety and society aspects and the fact that it is developed and executed by a public-private consortium itself.

The benchmarking exercise led to several lessons. We have phrased these as recommendations for *future* valorisation programmes in the benchmark chapter. These are:

- Focus valorisation programmes more on the phase of participants, such as their TRL, and the type of participants to be able to better coach participants.
- Either limit the number of potential applicants or increase the available budget to prevent discouragingly low success rates and a too low selectivity.
- Better embed valorisation programmes in the (national) innovation landscape to improve uptake of business cases by other programmes or investors at the end of the programme.
- Make (business) coaching and training an integral part of valorisation programmes, as it is valued by participants and seems to have a positive impact on results (e.g. with the SME Instrument).

We have identified several successes, or strengths of the programme, with the help of participants and stakeholders. These strengths were: the link with the research and technology programme, the type of funding, the support received, the limited administrative burden, the programme's entrepreneurial focus, the assessment process and the accessibility of the programme (due to the stage-gate approach). Furthermore, the programme helped to strengthen business cases, even before awarding a subsidy, which improved the quality of awarded business cases.

Similarly, we have identified several weaknesses of the programme. These are: the programme was too short, the GEC should improve, the programme was partly developed and crystallised during its execution and investors, incubators and other funding programmes were not strongly involved. Furthermore, some participants believed that the amount of funding should have been more and that processes could have been faster.

Overall, we have identified nine lessons that can be learned from the Valorisation Programme and the benchmark as studied in this report. We have phrased these as recommendations for *future* valorisation programmes in the previous chapter. These lessons are:

- Connect a valorisation programme and a research and technology programme from the start.
- Extend valorisation programmes until one or two years after connected research and technology programmes.
- Stimulate the interaction of researchers with industry, investors or society at large and from interactions across disciplines.
- Make a strong connection with other valorisation and incubation initiatives and with funds or financiers for the next stages of development.
- Explicitly include safety and society aspects (RATA) in future valorisation programmes.

- Make a strong division in markets, to optimally cover these expertise for coaching and selection.
- The stage-gate approach is a valuable approach for future valorisation programmes, both in terms of management as well in terms of quality.
- Online tooling can be useful for selection processes in future valorisation programmes as well, although some tooling might need to be further developed.
- Develop upfront clear and attributable KPIs, with associated targets, for the valorisation programme.
- Make sure that the Programme Officers of valorisation programmes are business minded and have some experience with business.

In this report, we have incorporated these lessons into a checklist for future valorisation programmes.

Appendix A Supplementary information

In this appendix, we list supplementary information from the interviews, questionnaire and Valorisation Programme. We first list the persons we have interviewed for this study and then share some details about the questionnaire that we have send to participants of the Valorisation Programme. In the last section, we give more details on the selection criteria used in the Valorisation Programme.

A.1 List of interviewees

For this study, we have interviewed several stakeholders of the Valorisation Programme and benchmark programmes. Below we have listed these interviewees with their affiliation.

- Dick Koster (NWO), Business Director at NanoNextNL
- Raoul Oostenbrink (NWO), Business Developer at NanoNextNL
- Jaap Lombaers (TNO), member Executive Board NanoNextNL and member Valorisation Committee
- Frans Kampers (WUR), member Executive Board NanoNextNL and member Valorisation Committee
- Karel van der Mast (Solveigh Corporate Development), member International Advisory Council NanoNextNL and member Business Council
- Willem van den Berg (Value Creation Capital), member Business Council
- Wouter Segeth (NWO), senior Programme Officer Take-Off
- Jean-Luc Eggen (RVO), National Contact Point SMEs

A.2 Background on the questionnaire

The online questionnaire contained twelve questions and was open to respondents for four weeks. We included all unique participants that have been selected for the Valorisation Programme in any of the four calls. We have updated all e-mail addresses that were bounced during the e-mail invitation. This resulted in 52 invitations to the business case owners that participated in one of the stages in the programme. To each of them we have sent one initial invitation and two reminders. After the second reminder, we observed saturation (i.e. very limited activation after the last reminder), indicating that further bothering of invited participants is not effective.

We have made a division between those who have and have not been awarded a subsidy in the final round of the Valorisation Programme to study differences in the responses of these two groups. In Table 7 we have listed some figures on the respondents to the questionnaire.

Table 7 Details about the participation in the questionnaire

	Invited	Responded	Response
Awarded	29	18	62%
Not awarded	23	5	22%
Total	52	23	44%

Technopolis Group, 2017

Table 7 also shows the response rate from the two groups of respondents to the questionnaire, as well as the overall response rate. The response rate for those who were awarded a subsidy in the final phase of the Valorisation Programme is considered sufficient for the analysis of the results. For those who were not awarded the response rate is considered insufficient. Therefore, it is not possible to do a substantial quantitative analysis to compare both groups (awarded vs. not awarded). However, some careful

qualitative statements (observations and impressions) can be made about both groups based on the results of the questionnaire. This approach is used to answer research questions 6 and 8 (see Table 1). The overall (total) response rate is considered sufficient to do an analysis about the participants of the Valorisation Programme in general, although the results are likely to be positively biased since most respondents were awarded a subsidy in the final phase of the programme.

The respondents to the questionnaire were mainly affiliated with SMEs (16). This is also the largest group of participants in the Valorisation Programme (29), followed by universities (15). In our questionnaire, the second largest group of respondents were affiliated with universities as well (5). Research organisations and industry are the smallest groups of participants (resp. 5 and 3) and respondents (both 1). From each group, at least 20% respondent to the survey, with the highest response rate from SMEs (55%). The distribution over organisational type thus reflects to a fair extent the distribution of participants.

A.3 The used assessment criteria in the Valorisation Programme

The **Valorisation Committee** assessed the business cases based on the information submitted by the business case owners. Assessment criteria for the financial support for the **LBMC** were:

- the quality of the information in the Canvas and the provided explanations;
- the quality of the IP-position; and
- the possible risks and societal acceptance (RATA/Safety & Society aspects) when commercially exploiting.

When assessing the access to the **Golden Egg Check**-phase, the criteria were:

- the quality and completeness of the business case;
- the quality and completeness of the RATA/Safety & Society data;
- the perspective of the business case;
- the track record of the business case owner in the area of valorisation;
- the track record of the team members of the business case in the area of valorisation;
- possible previously received financing (scope, kind, source);
- the quality of the collaboration set up by the business case owner; and
- the possibility of the business case to work as an example for the field of micro- and nanotechnology.

The above criteria were included in a rating form to be used by the Valorisation Committee. With these forms, each member of the Valorisation Committee rated the business cases on four categories (innovation/scientific quality; business perspective; societal value; the quality of the team). These scores were discussed within the Valorisation Committee and resulted in a substantiated assessment of the business cases.

The **Business Council** assessed the business cases based on the available information about the business case, the presentation and the question answers by the team members. This judgement is documented in a Golden Egg Check by the Business Council. The criteria contained in the GEC are:

- entrepreneurial experience;
- entrepreneurial capacities;
- market size & growth;
- market demand;
- scalable business model;
- value chain;
- sustainable advantage; and

- investment opportunity.

The GEC resulted in a GEC-score and an Investors Interest Score. Cases with a GEC-score of below 40% were disqualified. Apart from this, GEC-scores and Investor Interest Scores were informative, but not leading in the final decision by the Business Council.

The assessment by the Business Council consisted of each member scoring a project either as accepted (2), in doubt (1) or rejected (0). The average of these scores was multiplied by five. Projects that scored a six or higher were accepted. The final judgement of the Business Council was communicated to the Executive Board of NanoNextNL, who followed the judgement of the Business Council.

Appendix B Detailed benchmark programmes

This appendix contains the detailed descriptions of the benchmark programmes that have been summarised in chapter 4. The first section in this appendix is devoted to NWO's Take-Off and the second to the EC's SME Instrument. Both sections have an identical structure to facilitate comparison.

B.1 Dutch national valorisation programme: Take-Off

Take-Off is a Dutch national valorisation programme that is executed by the Netherlands Organisation for Scientific Research (NWO) since 2017. The programme already exists for a long time but has undergone some changes in recent years. First, it used to be a valorisation programme under the former Dutch Research Council for the Technical Sciences (STW), but this organisation was incorporated in NWO in 2017. In recent years the programme broadened from a focus on valorisation in the technical sciences to the non-technical sciences as well. Before 2014 the programme was slightly different and known as the Valorisation Grant.

For this benchmark programme, we first describe the valorisation programme in terms of its organisation, goals, structure, activities, participants and budget. Next, we discuss the effects of the valorisation programme by identifying its outputs and outcomes. We will end this benchmark with some lessons that can be learned from Take-Off by discussing its strengths, identifying opportunities for improvements of other valorisation programmes and by listing its unique or innovative aspects.

B.1.1 Organisation

Take-off is hosted by NWO since 2017, after the merger of STW into NWO. STW founded this valorisation programme that was initially launched under the name Valorisation Grant. After some changes to the programme it continued in 2014 as Take-Off.

There are mainly four differences between Take-Off and the previous Valorisation Grant¹⁷:

- Take-Off is largely based on a ministerial regulation from the Ministry of Economic Affairs, meaning that the Ministry is the client of NWO and responsible for a part of the funding.
- NWO is the contractor. The domain Applied and Engineering Sciences (TTW, formerly STW) coordinates Take-Off for the whole of NWO. The Valorisation Grant was only available for the applied and engineering sciences within STW.
- The second phase of Take-Off is a loan, which used to be a subsidy in the Valorisation Grant.
- Since 2016 Take-Off became also open to universities of applied sciences. The first phase of Take-Off for universities of applied sciences is coordinated by the National Taskforce for applied research SIA, which is also part of NWO.

NWO is the national research council of the Netherlands, which is an independent directive body under the responsibility of the Ministry of Science, Culture and Education. The mission of NWO is related to its four legal tasks¹⁸. First and foremost, the organisation promotes scientific research and initiates and stimulates new developments in scientific research (1). To do this NWO provides grants (2). To make society benefit from research, NWO stimulates the transfer of knowledge from research that it has initiated or stimulated (3). The focus of NWO is on academic research, for which it assists and promotes coordination (4). It is within the third task of NWO that the current Take-Off valorisation programme can be positioned.

The organisation is divided in domains, cross-domain taskforces and institutes. The four domains of NWO are: (1) Science, (2) Applied and Engineering Sciences (TTW, formerly STW), (3) Social Science and Humanities and (4) The Netherlands Organisation for Health Research and Development

¹⁷ STW (2016). Zelfevaluatie STW 2011-2015. Utrecht: STW.

¹⁸ The Dutch law "Wet op de Nederlandse organisatie voor wetenschappelijk onderzoek" as applicable on May 2017.

(ZonMW). The coordination of Take-Off is still at the former STW domain Applied and Engineering Sciences (TTW), although policy offers from the other domains are involved as well.

Take-Off was created as a bottom-up instrument to stimulate the commercial application of scientific results and valorisation through entrepreneurship. The programme intends to bridge the gap between science funding and private investments. Take-Off intends to do this for the whole scientific domain, beyond the applied and engineering sciences on which the Valorisation Grant focussed. The instrument consists of a subsidy in the first phase and a loan in the second phase. The idea of this loan is that when the valorisation is successful, the company can pay back their initial investment.

B.1.2 Goals

The goal of Take-Off is to create economic and entrepreneurial activity from knowledge developed at Dutch research institutes. This activity may be related to all sorts of innovations, be it products, processes or services. The financing that is provided in the programme is intended to bridge the gap between research and market. The early phase of bringing new knowledge to the market is associated with high risks and therefore investors and banks do generally not provide financing to these kind of (pre) start-ups. This is called the funding gap. Take-Off is intended to bridge this funding gap, so that at the end of a project funded by Take-Off investors can fund the next stage of the company.

The goals of Take-Off are directed at Dutch research institutes and are therefore limited to the Netherlands. The only exception to this geographical limitation is the Dutch Dubble beamline at the European Synchrotron Radiation Facility (ERSF) in Grenoble (Swiss) of which researchers are also eligible to participate. The goal of Take-Off is general and not bound to a specific theme. In fact, participants may be related to all fields of sciences.

B.1.3 Structure and activities

Take-Off is a separate programme within NWO that is open through calls. It is not related to any thematic programme within NWO. The current programme runs from 2014-2021 and consists of two calls annually. The programme is structured into two phases to which one can separately apply: (1) feasibility studies and (2) early phase financing. The second phase can be applied for without going through the first phase if a feasibility report can be shown. This feasibility report can however be a result of the first phase of the Take-Off valorisation programme.

Phase 1 is dedicated to feasibility studies for which a subsidy can be obtained. In a feasibility study the team studies the feasibility of the commercial application of the knowledge obtained from research. The study includes an analysis of the commercial potential (including potential clients and investor) and practical aspects of a start-up. This should be reported within six months after awarding the grant. The funding that is available in this stage (order €10k) may be used to buy training on entrepreneurial skills, on the development of research-based tools or for IP. The feasibility study from this phase (or obtained elsewhere) is needed to apply for Phase 2 of Take-Off.

Phase 2 is dedicated to early phase financing for start-ups (younger than 5 years) that rely on innovation from knowledge developed at Dutch research institutes or HBO. In this phase, a loan (order €10k-€100k) is available for activities that make the start-up's business case commercially viable so that the product or service will reach the market in order to scale-up the start-up to a profitable business. Many activities can be financed with the loan in this phase, such as non-commercial prototypes, market and competitor analysis, value chain analysis, IP assessment and arrangements with investors or launching customers. After two years max, the result of this phase is a validated business case that can be used to attract financing for the next phase of business development.

The programme recognises that for successful valorisation certain knowledge and specific skills are needed within the team. However, NWO does not offer trainings or coaching themselves to improve these skills. Instead, the Take-Off commission decides whether the team has sufficient entrepreneurial and commercial skills among its members to bring the valorisation to a success. The commission can decide that some of these skills need to be acquired through trainings. Suggestions of suitable training

programmes are available to the participants in the programme. The budget of Take-Off may be used for these trainings.

During the period 2014-2017 a total of six calls have been launched in the Spring and Autumn of each year. Additionally, three calls have been launched for Universities of Applied Sciences between 2016 and 2017 (Take-Off HBO). Each of the calls provided funding for phase 1 (feasibility studies) and phase 2 (early-phase financing).

The amount of awarded funding per phase to universities is given in Table 8. Universities of Applied Science only received funding for phase 1. For the first call for Universities of Applied Sciences, a total of 507,919 euros was awarded, for the second call this was 399,203 euros.

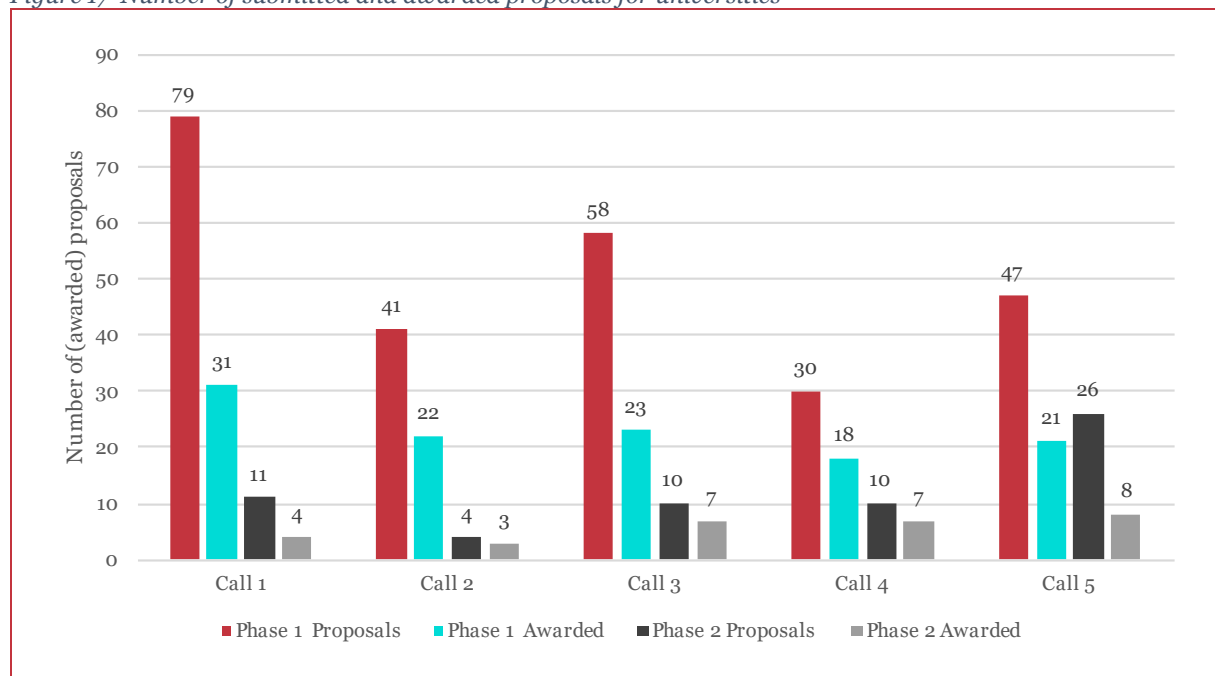
Table 8 Awarded funding per phase to universities

Call	Financing Phase 1	Awarded Phase 1	Financing Phase 2	Awarded Phase 2
1	€925,000	€1,226,199	€2,400,000	€1,997,778
2	€925,000	€873,459	€2,400,000	€750,000
3	€925,000	€914,467	€2,550,000	€1,749,800
4	€1,000,000	€720,000	€2,500,000	€1,750,000
5	€1,000,000	€824,038	€1,900,000	€1,650,000*
6	€1,000,000	n.a.	€2,000,000	n.a.

Data provided by NWO (*= budgeted amount)

Figure 17 displays the number of proposals submitted by universities and the number of awarded proposals. The average success rate is 47.6% in phase 1 and 56.4% in phase 2.

Figure 17 Number of submitted and awarded proposals for universities

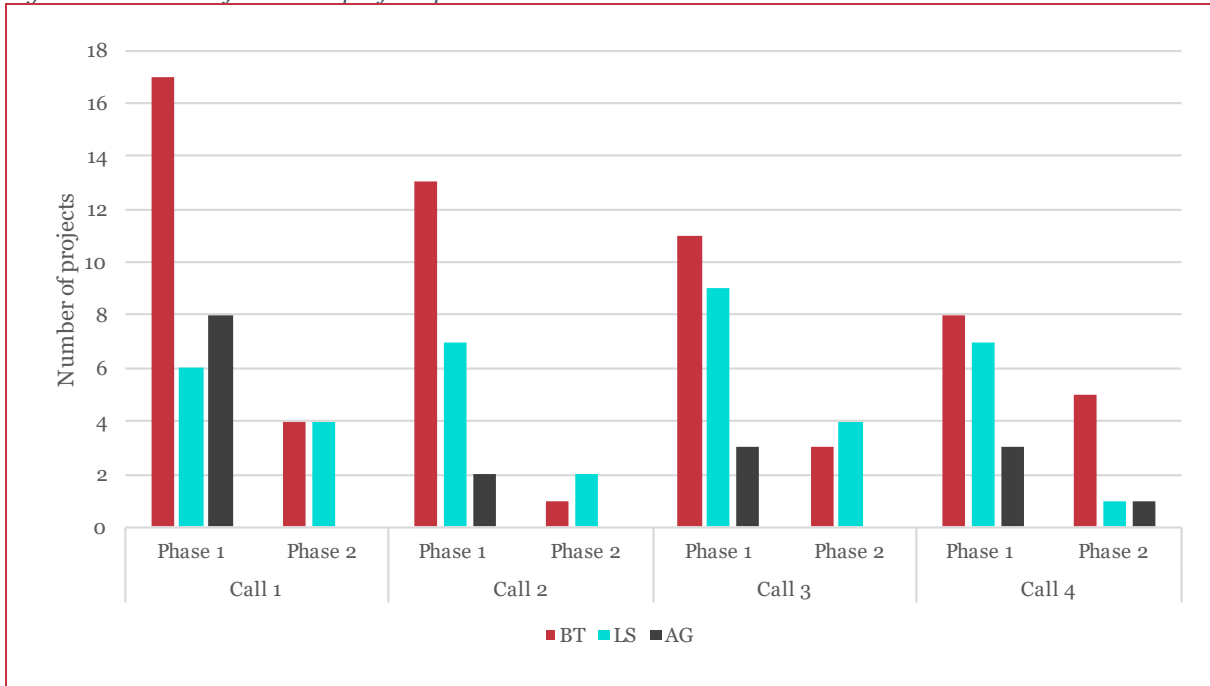


Technopolis Group, 2017 – based on data provided by NWO

Error! Not a valid bookmark self-reference. displays the awarded funding per domain (beta-technology – BT, life science – LS, alpha-gamma – AG). It appears that in phase one projects in the

domain beta-technology (BT) were awarded most. In phase 2, it is striking that projects in the alpha-gamma domain are absent in the first three calls. For the Universities of Applied Sciences, the distribution is slightly different. In their first call, seven projects in beta-technology were awarded, six in life science and two in alpha gamma. In their second call, five life sciences projects were awarded, four beta-technology projects and one alpha-gamma project.

Figure 18 Number of awarded projects per domain



Technopolis Group, 2017 – based on data provided by NWO

B.1.4 Participants

Funding through the Take-Off programme is available for the early phase of innovations and commercialisation thereof at Dutch universities, universities of applied sciences and research institutes that have been recognised by NWO. These are: all Dutch universities and academic medical centres, the research institutes from NWO and the Dutch Academy of Sciences (KNAW), the Netherlands Cancer Institute (NKI), the Nijmegen-based Max Planck Institute for Psycholinguistics, the Dubble beamline at the European Synchrotron Radiation Facility (ERSF) in Grenoble, Naturalis Biodiversity Center (NBC Naturalis) and the Advanced Research Centre for NanoLithography (ARCNL).

The STW Board (now the TTW domain of NWO) is responsible for the Take-Off programme. When assessing the proposals, the STW Board receives advice from an Advisory Committee. The Advisory Committee is supported by independent experts, including scientists from different fields of science, entrepreneurs and private investors. The experts and the proposals are divided over the clusters beta-technology, life sciences and alpha-gamma by the Take-Off Bureau. The budget for the feasibility studies is divided based on a ranking per cluster.

The first step in the assessment procedure is an eligibility check by the Take-Off Bureau. This is based on formal requirements such as: is the proposal submitted before the deadline, is it submitted correctly and is it complete, is it based on previously executed scientific research within a knowledge institute, etc.

The second step is the interview round, during which the applicants get the opportunity to present their proposal to the Advisory Committee and the independent experts of the cluster. After a round of questions, the members of the Advisory Committee and the independent experts individually score the proposals on the selection criteria given in the next paragraph, together with a short motivation. The

average scores are used for the ranking. The ranking and the advices are discussed by the Advisory Committee, after which the Committee makes a final ranking. After this, the Advisory Committee provides the board of STW with an advice on awarding, after which the STW board makes the final funding decision.

Phase 1 and 2 of Take-Off have different selection criteria. For both phases can be applied separately. The selection of proposals in phase 1 is based on formal submission criteria and four technical criteria:

- Knowledge base and innovativeness: an assessment of the knowledge that forms the foundation of the business case and a rating of innovative aspects in the proposal.
- Commercial potential: an assessment of the commercial applicability and added value of the proposed business case and the perceived commercial and market perspectives for the business case.
- Quality of the team: an assessment of the scientific expertise and the entrepreneurial and commercial skills within the team.
- Project approach: an assessment of the plan of activities, budget per activity and whether the approach is practical and economical.

All criteria are evenly weighted in the selection.

The selection of proposals in phase 2 are slightly different. The first technical criterion is identical, but the other three are different:

- Commercial perspective: an assessment of the economic activities of the knowledge-based start-up, market need, certainty of repayment of the loan, IP position and commercial viability.
- Quality of the knowledge-based start-up and its team: an assessment of the commercial, entrepreneurial and technical skills and knowledge needed, motivation and ambition and involvement of experienced entrepreneurs or financiers (as coaches).
- Quality of the early phase project plan: an assessment of the quality and feasibility of the project and a solid budget plan.

The commercial perspective criterion is weighted twice, all others are weighted equally.

In the first phase, 22% of the selected participants were technical universities and 78% other universities. In the second phase, 51% of selected participants were technical universities.

B.1.5 Budget

Take-Off is financed by the Dutch ministry of Education, Culture and Science (OCW) and the ministry of Economic Affairs (EZ). The feasibility studies in phase 1 are financed by OCW through NWO. In this phase, the financing is a subsidy. The early phase financing in phase 2 is a loan from EZ. TTW has the mandate to allocate this loan to academic and innovative starters.

Take-Off received almost 14 million euros from the ministry of EZ and about 7,6 million euros from the ministry of OCW in the period 2014-2017. The total budget in this period was almost 21,6 million euros.

For each call, a fixed total budget is available. For the last (sixth) call¹⁹ this amounted to 1 million euros for phase 1 and 2 million euros for phase 2. Each applicant in phase 1 can apply for a subsidy of max 40.000 euro's. In phase 2 each applicant must apply for a loan of at least 50.000 euros up to a maximum of 250.000 euros. The loans have an interest of 5% plus the European base rates for the Netherlands defined by the European Commission (during the last call this was +0.34%, but currently is -0.10%²⁰).

One critique regarding the budget of Take-Off is that it is insufficient to grant all applicants that passed the selection procedure: good was not always good enough. Take-Off receives quite a lot of applications of which quite some get through the selection procedure. In fact, for some calls in recent years the

¹⁹ NWO (2017). Take-off. Call for proposals. Ronde 6 – voorjaar 2017. Utrecht: NWO

²⁰ EC (2017). Base rates for the 28 Member States. http://ec.europa.eu/competition/state_aid/legislation/reference_rates.html. May 2017.

number of applicants that passed the selection commission was higher than the funding available. This led to a further selection on details, which participants may perceive as unfair. Proposals that are good enough to be funded, and would potentially lead to successful valorisation, did not receive funding. This led to a lot of critique of participants, calling for either more budget or a better selection procedure.

The support budget amounts to 9.6% of the total funding approved (€1.2m versus €12.5m).

B.1.6 *Effects of the valorisation programme*

The expected direct results (outputs) of the Take-Off **feasibility studies** are strategic reports for each of the participants that are based on a systematic analysis with realistic estimation of the practical and commercial opportunities of a start-up. The effects would be the realisation of a start-up or the attracting of external financing. The latter could be done through a success full application in phase 2 of Take-Off. The goal of the **early phase financing** is to reach a point where public and private funders are willing to invest in further company development and that the company is ready to enter the market. Projects that received early-phase financing are expected to result in the establishment of a valid business case. This direct result (output) includes:

- a mission of the enterprise;
- a production process;
- market research;
- a value chain description;
- a marketing plan;
- a budget plan; and
- a SWOT-analysis.

Funders should also express their interest in funding the next phases of development. Acquiring funding for the next stage of development would be a desired effect of phase 2, as is growth of the start-up to a next phase (ideally becoming a scale-up).

Information on realised outputs for the programme was only available for the Universities of Applied Sciences (who participated in phase 1: feasibility studies)²¹. The outputs they realised were: completed business cases, expansion of the network, marketing concepts, realisation of the feasibility study, clear elaboration on commerce, business models and legal aspects, insight in the market and an excellent learning environment for students.

Project leaders of phase 1 projects for Universities of Applied Sciences indicated that Take-Off accelerated the development of their projects, with faster prototyping, more attention to business cases and the attraction of external financing. The next step for most project leaders is finding external funding for their project.

On average, stakeholders are satisfied with the execution of the programme. More attention could be given to the scoping of the programme's target (this is sometimes a bit unclear to participants) and streamlining of the procedure. According to the evaluation of the Take-Off HBO programme (cf. footnote 21), also more attention for the specific alpha-gamma side of projects is desirable.

Project leaders were positive about the usability and recognisability of the feedback of the advisory committee and the diversity of the committee.

²¹ O. Bieleman, M. Gielen, P. van Oss (2017). Evaluatie Pilot Take-Off HBO – Fase 1. Driebergen: Birch.

B.1.7 *Strengths*

One of the strengths of Take-Off is that it builds on many years of experience with a similar valorisation programme within NWO/STW – the Valorisation Grant. The valorisation programme has improved with growing experience into the Take-Off programme that is currently running.

Take-Off receives each round quite a lot of applications, more than can be awarded. In that respect, it can be considered successful as it seems to be well-found by applicants. The financing available motivates researchers to valorise their knowledge.

The phased approach can be considered as a strength. In the first phase feasibility can be studied and needs to be demonstrated before one can apply for a second phase. The second phase can be applied for separately, if feasibility can be sufficiently demonstrated. Once feasibility is demonstrated, valorisation can be considered as a commercial risk for a company. Within that philosophy it is smart to allocate a subsidy to the feasibility phase alone and a loan for early phase financing – stimulating an entrepreneurial (risk-taking) mindset.

B.1.8 *Opportunities and improvements*

The Netherlands has many initiatives related to valorisation. Most of them are regionally organised, for example by the provinces or at the universities. Special Technology Transfer Offices (TTOs) exist at the universities to stimulate valorisation by helping researchers with acquiring IP, incubation of start-ups and offering support for business development. TTO's also direct researchers to valorisation programmes such as Take-Off.

Take-Off is however not very visible in the valorisation landscape and not much promoted, although it is quite well-known in the beta-technical sciences and the life-sciences. Promotion and integration within the national valorisation landscape would be an opportunity for improvement. Working closer together with TTOs, incubators, investors and regional valorisation programmes, could improve the visibility of the programme, the quality of the approved projects and the support that participants in the programme receive.

Training and coaching could be better organised within Take-Off. Currently the programme does not offer coaching or training – not by NWO nor by or any other contracted organisation. Instead, the commission can advise the participants of the programme to acquire knowledge or skills through training or coaching. The funding from Take-Off can be used for that. Suggestions for suitable training and coaching professionals or courses are available to the participants. These focus specifically on commercial knowledge and skills related to entrepreneurship. For other aspects, for example IP and legal issues, the participant is referred to the TTO of its affiliated knowledge institute.

Although Take-Off is open to all scientific domains, approved projects still mainly focus on the beta-technical sciences and the life-sciences. This is ascribed to the fact that the predecessor of Take-Off – the Valorisation Grant – within the former STW focussed on these domains. The beta-technical sciences and the life-sciences are therefore already familiar with these kind of valorisation programmes. NWO is trying to improve the participation of the alpha-gamma domains in Take-Off and expects that this needs some time before participation is increasing. On the other hand, one could argue that for many years valorisation in general has been more prominent in the beta-technical and life-sciences domains and that the knowledge of these domains generally lent itself more obviously to new products and start-ups.

The monitoring of the results of the Take-Off programme is organised ad-hoc and not aligned with the monitoring of other valorisation programmes. The last time a thorough monitoring exercise was performed on a valorisation programme within NWO/STW was in 2014 – before the current Take-Off programme. This monitoring was done for the Valorisation Grant and consisted for example of an analysis of the status of the start-ups (operational/bankrupt), the number of people they have employed etc.

The selection commission of Take-Off selects more participants than can be funded, which might necessitate a changing selection procedure or more funding. Take-Off receives quite a lot of applications

of which quite some get through the selection procedure. This means that some proposals are good enough to be funded, but not enough funding is available. The proposals that scored highest will then be selected, but this might be on details. Therefore, some potentially successful valorisation cannot be stimulated. This might necessitate to improve the procedure for stricter selection – a selection that is not relying on details – or to increase the budget of the programme to stimulate more valorisation.

B.1.9 *Unique or innovative aspects*

One of the most unique aspects of Take-Off is the fact that it is open to all fields of science. Most other valorisation programmes focus on a specific field, often life-sciences, IT or technical sciences. The fact that alpha and gamma sciences can apply for a valorisation programme as well is rather unique. Take-Off has organised a special selection committee for these sciences, as the programme is non-domain specific, but the valorisation in each domain is very different. In total, Take-Off has three selection committees, one for the beta-technical sciences, one for the life-sciences and one for the alpha-gamma sciences. The selection commission must therefore understand the scientific domain but also how valorisation is organised in these domains. After selection the participants are rather free to do their valorisation.

Take-Off is connected to the early phase financing for SMEs of the ministry of Economic Affairs. Phase 2 of Take-Off concerns a loan from the ministry of Economic Affairs (EZ) to eligible and selected companies that have a relation with a Dutch knowledge institute – e.g. that valorise knowledge from research at any of these institutes. Almost exactly similar to this Phase 2 from NWO's Take-Off, EZ's RVO – the Netherlands Enterprise Agency – has a programme for SMEs and start-ups that are innovative, but not connected to any of the Dutch knowledge institutes. Although the selection is differently organised and done by RVO, the programme has very similar conditions, such as a minimum loan of 50.000 euros at the same interest rate. This connection is rather unique and opens the instrument to a larger group of innovative companies.

Take-Off is also available to universities of applied sciences (HBO), which may be considered a novelty in the Netherlands. Valorisation in the Netherlands used to be primarily focused on scientific research and thus on universities or academic institutes. Universities of applied sciences do research that is much more applied and therefore not necessarily scientific – in fact it is generally not. It does however lead to new applied knowledge that can indeed be valorised. This recognition has led to opening Take-Off to applicants affiliated to universities of applied sciences. This is organised through SIA, the National Taskforce for applied research, that is also part of NWO. For these applicants, a stronger focus is put on the knowledge base of their application, as it must adhere to certain standards to be qualified for the programme.

B.2 European valorisation programme: SME Instrument

The SME Instrument is part of the European Union's current Framework Programme for Research and Innovation, named Horizon 2020. The European Commission states that while most top innovations come from small and medium-sized enterprises (SMEs), there is insufficient funding available in Europe for high potential SMEs to market and scale their innovative ideas. The SME instrument therefore provides tailored support to stimulate innovation in SMEs.

The SME Instrument focuses on thirteen thematic topics: open disruptive innovation, **nanotechnology and materials**, space, health, food, security, eco-innovation, energy, blue growth, biotech, new business models, transport and e-government. In this benchmark, we will describe and characterise the SME Instrument with a specific focus on the nanotechnology and materials (NMP) theme.

For this benchmark programme, we first describe the valorisation programme in terms of its organisation, goals, structure, activities, participants and budget. Next, we discuss the effects of the valorisation programme by identifying its outputs and outcomes. We end this benchmark with some lessons that can be learned from the SME Instrument by discussing strengths, identifying opportunities for improvements of other valorisation programmes and by listing unique or innovative aspects.

B.2.1 Organisation

The SME Instrument is hosted by the European Agency for Small and Medium-sized Enterprises (EASME) and is part of the Horizon 2020 programme of the European Union. The EASME was set up by the European Commission as an executive agency to manage several EU programmes, including the pillars Industrial Leadership and Societal Challenges of the Horizon 2020 programme and the SME Instrument. It also manages the EU programme for the Competitiveness of Enterprises and SMEs (COSME), the Fast Track to Innovation (FTI) pilot and parts of several other EU programmes.

The vision of the EASME is to “help create a more competitive and resource-efficient European economy based on knowledge and innovation” (European Commission, 2017). The related mission of the EASME is therefore to provide high quality support to its beneficiaries by turning EU policy into action.

The SME instrument was set up to create the right conditions and opportunities for SMEs engaged in research and innovation. Valorisation of knowledge should result in innovative solutions that seize European and global business opportunities. This way, the programme should accelerate company development and growth and contribute to the sustainable improvement of the innovation eco-system of SMEs in Europe.

B.2.2 Goals

The SME Instrument aims to ensure a strong boost to breakthrough innovation: it is expected to boost the competitiveness of Europe in cutting-edge innovative areas and should generate growth and jobs. Furthermore, the programme invests in SMEs to find solutions to current societal challenges in Europe. The programme also contributes to the priorities of the Societal Challenges pillar and the objective ‘Leadership in Enabling and Industrial Technologies’ of the Horizon 2020 programme.

SMEs can apply for grants under thirteen thematic topics. These are: **Nanotechnology and materials (NMP)**, Space, Open and Disruptive innovation (ODI), Biomarkers and related diagnostics (Health), Blue growth, Energy, Food and food-related applications (Food), Transport, Critical infrastructures (Security), Eco-innovation and raw materials (Eco-innovation), Industrial biotechnology (Biotech), New Business Models (INSO-10) and E-government (INSO-9).

B.2.3 Structure and activities

The SME Instrument is part of the Horizon 2020 programme by the European Commission and falls under the pillars Societal Challenges and Industrial Leadership (specifically “Leadership in Enabling and Industrial Technologies”).

The SME Instrument is structured in **three phases**:

- The first phase (**concept & feasibility assessment**) provides a grant of 50,000 euros to SMEs for the development of a business proposal and a feasibility assessment to verify the viability of the proposed disruptive concept or innovation. This could include risk assessment, design or market studies or intellectual property exploration. Phase one takes around six months.
- The second phase (**demonstration, market replication, R&D**) provides between €0.5m-€2.5m to SMEs for innovative activities such as testing, demonstration, pilot lines, market replication and scale-up studies. SMEs also receive tailor-made business innovation coaching in addition to their grants. Phase two lasts for one to two years.
- The third phase (**commercialisation**) provides no additional grant funding but instead focuses on amplification of the economic impact of the funding. This is done by providing free-of-charge additional services to SMEs such as participation in trade fairs, networking, exchanging experiences and finding new partnerships and customers. Furthermore, there is the possibility to use several innovation support services (including training and mentorship) and access to risk finance. Coaching is provided by experienced business coaches that were selected through the EEN.

The SME Instrument is an **open call**. Applicants can therefore submit their proposals at any time. During the year, there are four cut-off dates on which the submitted project proposals are gathered and

evaluated. Applicants can submit proposals for phase one and two. SMEs are however encouraged to start from phase one. Only SMEs that are already participating in previous phases can benefit from phase three. The services of phase 3 are provided in parallel with phase 1 and 2.

B.2.4 Participants

For-profit small and medium-sized enterprises (SMEs) in any EU-28 country or country associated to Horizon 2020 can apply for funding under the SME Instrument. A for-profit SME, as defined by the EU recommendation 2003/361, should have no more than 250 employees with a turnover that is lower than 50 million euros. Several specific rules apply regarding the companies' autonomy. Only companies having projects with Technology Readiness Level 6 (TRL 6) or higher may participate. Companies at TRL 6 have demonstrated their technology in an (industrially) relevant environment. SMEs can submit a proposal by themselves or as part of a consortium. Larger companies or research organisations, possibly from outside the EU, can be involved as subcontractor. The proposal should be submitted under one of the thirteen different thematic calls, such as nanotechnology and materials (NMP). A company can only be involved in one SME Instrument proposal or project at the same time.

The SME Instrument looks for highly innovative firms that have the potential to develop and grow and can have impact at an international or European level. Participants were selected by a group of four independent expert evaluators, consisting of business coaches, serial entrepreneurs and investors. These experts have a good understanding of the topic areas and the market. A proposal is evaluated against the award criteria²²:

- **Implementation:** the work plan is coherent and efficient
- **Excellence:** the project has high innovation potential and is beyond the state-of-the-art
- **Impact:** the innovation meets the needs of European and international markets

The expert evaluators score the projects by answering 21 different questions related to these criteria. An overall score is established by adding up the median scores for each criterion, across the four evaluators. Based on the normalised score (with a weight of 1.5 for the criterion impact), a ranking list is established. If proposals receive the same score for impact, the score for excellence and subsequently implementation are used to rank the proposals. The number of honoured projects is dependent on the available budget per topic. Applicants receive an evaluation summary report (ESR) that states the score of the project on the three criteria and an assessment on how well the 21 questions were addressed by the proposal.

In the period 2014-2015, a total of 19,320 projects were submitted for the whole Instrument, of which 1,444 projects were selected. A total of 1,640 SMEs took part in these projects (Table 9).

Table 9 Projects submitted, evaluated and selected²³

	Phase 1	Phase 2	Total
Projects submitted	14,485	4,835	19,320
Eligible projects evaluated	14,300	4,738	19,038
SMEs in submitted projects	15,614	6,157	21,771
Projects selected	1,166	278	1,444
SMEs in selected projects	1,284	356	1,640

EASME, 2016

²² Further elaboration on the criteria can be found in Annex H of the SME Instrument Work Programme: http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2016-2017/annexes/h2020-wp1617-annex-ga_en.pdf.

²³ Since phase 3 was first started in 2016-2017, there were no numbers available this phase during the writing of this report.

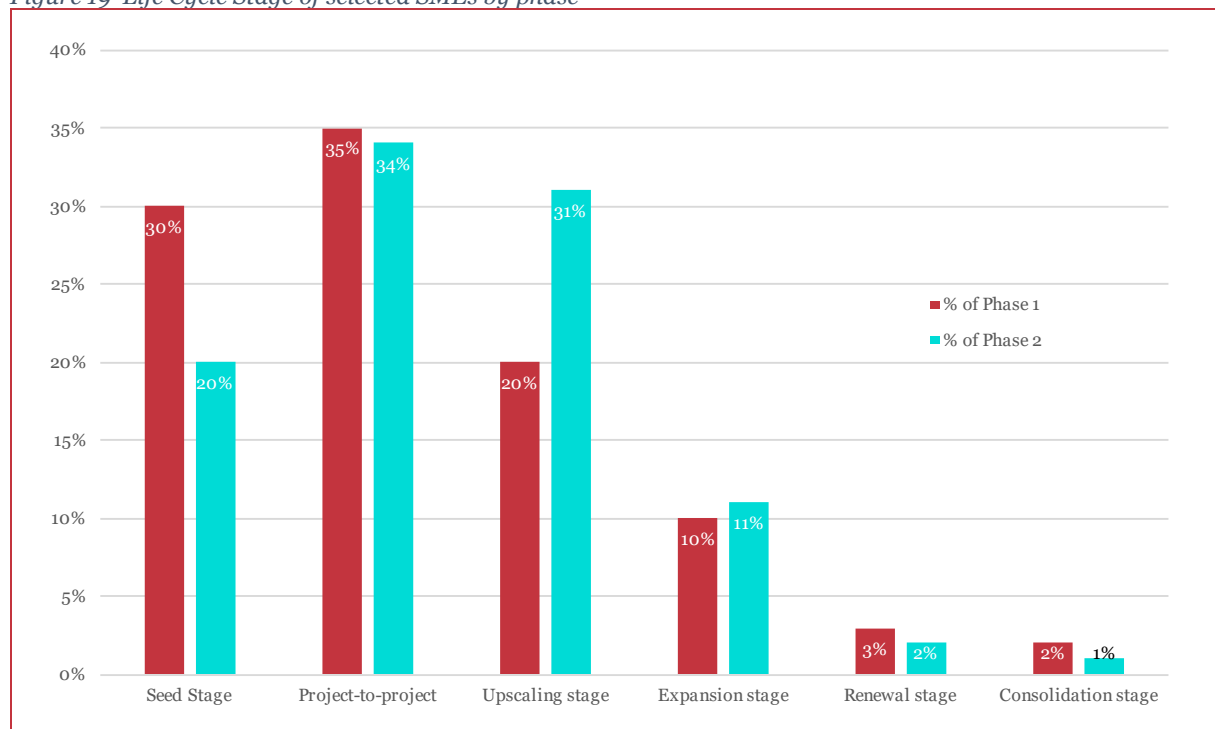
In the period 2014-2015, a total of the 14,300 projects were eligible for funding in the first phase. Of these, a total of 1,166 projects were selected. This corresponds to a success rate of 8%. In phase two, 4,738 projects were evaluated, of which 278 projects were selected. The corresponding success rate is 6%.

For **nanotechnology**, the success rate in the first phase was 7%, slightly lower than the overall success rate in this phase. For these projects, a total budget of 5,350,000 euros was available. A total of 1,607 projects were evaluated. In the second phase, the success rate was 5% - again slightly lower than the overall success rate of phase 2. In this phase 521 projects evaluated that had a topic related to nanotechnology. The total budget available was 4,128,000 euros with projects receiving an average grant of 152,000 euros.

Over time, the share of projects that submitted proposals and were above the selection threshold granting eligibility for funding, increased. On average, in 2014-2015, 15% of the proposals reached the threshold. This percentage was higher in the second phase, where on average 35% of the proposals reached the threshold. Given the success rates, less than half of the projects that reached the threshold could be awarded. This means that even though a project is of good quality and reaches good score, it is not necessarily funded.

The programme permitted companies to resubmit their projects for evaluation. In both phases, 90% of the submissions are resubmitted once or twice. Resubmissions therefore count for about 40% of all submissions. With each resubmission, a project is evaluated by a different group of experts with potentially a different mix of nationalities.

Figure 19 Life Cycle Stage of selected SMEs by phase



Technopolis Group, 2017 – based on EASME, 2016

Of the selected participants for the SME Instrument programme in 2014-2015, the three most occurring stages of development were (Figure 19):

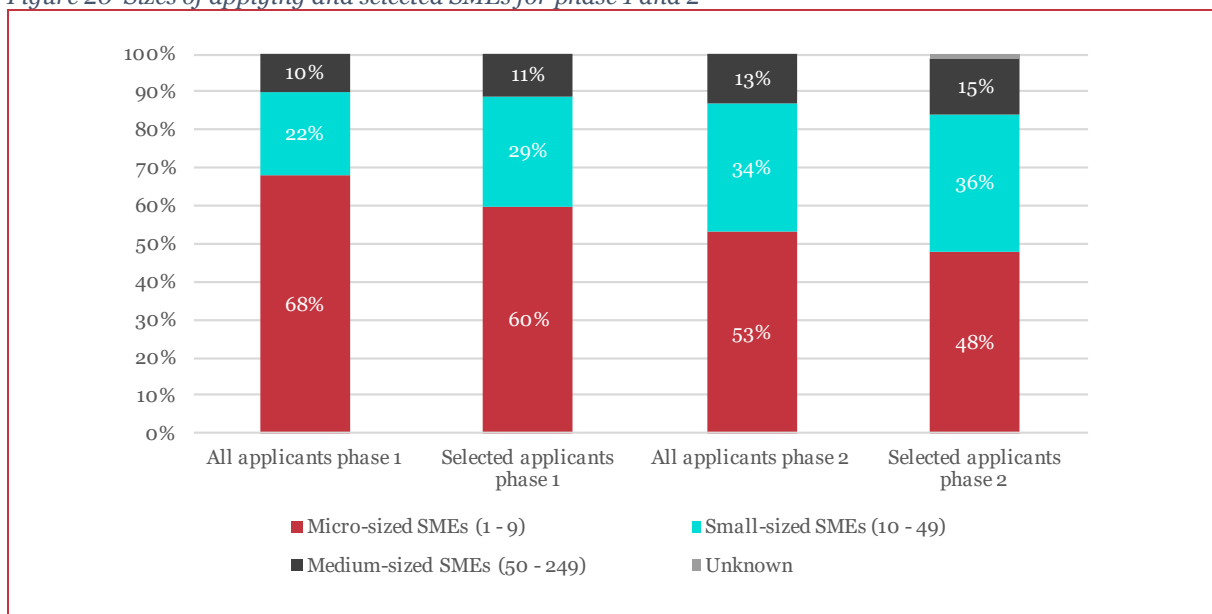
- The **seed stage**: companies have a concept and are looking for their first clients and round of financing

- The **project-to-project stage**: the stage where companies have already won several customers and are developing their project delivery with each individual customer
- The **upscaling stage**: companies want to segment to potential client groups, adapt their product and organise the supply chain, production and distribution and reach economies of scale.

These are the lowest stages of the development and maturation of a company. Only a minority of all SMEs awarded are in a more mature phase.

The selected participants for the SME Instrument programme in 2014-2015 on average had been on the market for 10.8 years and had an annual turnover of 4 million euros. The average amount of staff was 21 people. In phase one predominantly micro-sized SMEs – those having a staff of 1-9 people – applied and were selected. In phase two micro-sized SMEs constitute the largest group, but small-sized SMEs – those having a staff of 10-49 people – form also a fair portion of those that applied and those that were selected. Larger medium-sized SMEs are only a minority in both phases. See Figure 20.

Figure 20 Sizes of applying and selected SMEs for phase 1 and 2



Technopolis Group, 2017 – based on EASME, 2016

For **nanotechnology**, in the first phase: 26% of the participants were up to three years old, 29% between four and ten years old and 42% more than eleven years old. In the second phase, 15% was up to three years old, 29% between four and ten years old and 56% more than eleven years old. Of all the different topics, nanotechnology had the highest share of small and medium sized companies (53%) and had the highest share of companies with more than eleven years of trading.

B.2.5 Budget

Funding of the SME Instrument comes from two Horizon 2020 pillars: Societal Challenges and Industrial Leadership (specifically the objective “Leadership in enabling and industrial technologies”). A total of 1.3 billion euros is available for the entire duration of the programme, amounting to 400 million euros per year for the period 2014-2020. The indicative budgets for the different themes in the period 2014-2017 are given in Table 10.

Table 10 Indicative budgets SME Instrument per topic

Topics	2014	2015	2016	2017
ICT (ODI)	€45m	€43m	€60m	€66m
NMP	€21.8m	€23.8m	€31.83m	€35.32m
BIOTEC	€3.8m	€2.4m	€7.5m	€7.5m
SPACE	€8.5m	€8.55m	€11.37m	€12.6m
HEALTH	€66.1m	€45m	€53m	€92.5m
FOOD	€10m	€17m	€25.46m	€37.87m
BLUE GROWTH	€4m	€5m	€9.5m	€12.42m
ENERGY	€33.95m	€34.76m	€46m	€50m
TRANSPORT	€35.87m	€38.96m	€57.57m	€61.23m
ECO-INNOVATION	€17m	€19m	€25m	€36m
INSO-09	-	€4m	€10.8m	€11.4m
INSO-10	-	€11m	-	-
SECURITY	€7m	€7.4m	€15.37m	€14.67m
TOTAL	€253.02m	€259.87m	€353.4m	€437.51m

EASME, 2016 and European Commission, 2017

In the first and second phase, participants receive funding in the form of a grant. The third phase does not provide additional grant funding, but consists of free-of-charge services that can be provided to the applicants.

In the first phase, the grant is fixed to 50,000 euros for all selected projects. This can be used for up to 70% of the total costs needed for the feasibility study. The other 30% is co-financing by the SME. In phase two, companies are asked to present the actual costs of the innovation project, and therefore the grant amount can differ. SMEs can apply for a grant between €0.5m-€2.5m, depending on the topic. In this phase, the grant can again cover up to 70% of the total project cost. One exception is made for health topics, where the grant can cover 100% of the total cost and can be up to 5 million euros.

The SME Instrument was financed through the pillar Societal Challenges and the topic Leadership in Enabling and Industrial Technologies (part of the pillar Industrial Leadership). Seven percent of the budget from these pillars was reserved for the SME Instrument. Selection had to take place, since this funding was insufficient for the number of applications.

B.2.6 Effects of the valorisation programme

At the end of the grant, the different project participants of phase one had to provide data on the effects of the feasibility study and coaching, their plans to push ahead with their project and the expected growth of the company that was calculated in the feasibility study. This data was provided in the form of a final report by 759 SMEs.

The SME Instrument expected to stimulate the market uptake and distribution of innovations, increase private investment (especially the leverage of private co-investment and follow-up investments) and to enhance the growth and profitability of SMEs. The programme also expected to be able to substantiate impact in terms of turnover, employment, IP management, market size, sales, profit and return on investment. The results on these performance indicators that were reported in the two-year report on the SME Instrument by the EASME (2016) are presented below.

The aim of the SME Instrument was to have supported 7,500 SMEs by the end of Horizon 2020. In the first period 2014-2015, 1,640 SMEs were supported.

In terms of output, **the first phase** of the SME Instrument results in a technical and commercial feasibility study that also contains a business plan. The phase 1 SMEs that provided a final report were asked to rate their progress resulting from the feasibility study and coaching. The SMEs rated ten effects, that were scored between 7 and 9 on a scale from 1 to 10. SMEs scored the effect on better understanding of the client's needs the highest, followed by the better understanding of technical issues, better knowledge of competitors, more strategic approach to risk management and better company reputation. A difference was also registered between companies that benefited from coaching and those that did not. In the case of the latter, companies rated the ten effects between a 6 and 8. It can therefore be assumed that the SME Instrument coaching combined with the grant has a positive effect on SMEs.

After SMEs had performed the feasibility study, 99 percent of the companies wanted to continue with their project idea. 3 companies indicated they would not continue with their project. Most companies also hope to receive funding in the second phase of the SME instrument (96%). Other options for funding are: through their own resources and through venture capital.

Projected outcomes for phase 1 SMEs are high growth in turnover and employment. The projected median turnover growth over the three years after introduction to the market is 371%, equal to 13,6 million euros per company. The median employment growth is 100%. For **nanotechnology** projects, the projected median turnover growth over three years is 300% and a median employment growth of around 85%.

The **second phase** should result in the following outcomes: a new process, product or service that is market-ready and a business innovation plan that contains a detailed commercialisation strategy and a financing plan foreseeing market launch. No information is yet available on the outcomes of phase two.

Before receiving the SME Instrument grant, SMEs on average attracted 35 million euros private investment a year over a period of 15 years. In the 1,5 years after the programme, 31 SMEs received an average investment of 108 million euros a year – 20 of these companies were from phase 1 (1,6% of SMEs in phase 1) and 11 from phase 2 (3% of SMEs in phase 2).

B.2.7 *Strengths*

There are many European companies that apply for a grant from the SME instrument. The large amounts of funding that is available – in the form of a grant – makes it an attractive programme. Despite the high number of applicants, the SME instrument also has a relatively quick application process. According to interviewees, the period between application and the decision for funding takes around five weeks. Furthermore, participants have the possibility to apply for funding four times a year, which is relatively often. When receiving funding, this is often a high amount that is sufficient for a company to enable scaling.

The coaching provided by the SME Instrument to SMEs of accepted projects is considered a strength of the programme. The SME Instrument maintains a database with coaches with expertise in a specific market that can be allocated to a participant of the programme. The National Contact Points, based on interviews, also try to determine what the needs of participants are and what kinds of coaching could be beneficial for them.

B.2.8 *Opportunities and improvements*

While the SME Instrument attracts a lot of businesses, the interviewee states that there is also a relatively high number of businesses that hold misconceptions about the programme or that are unsuited to apply for the programme. The National Contact Points try to provide advice to the different applicants on whether the SME Instrument is suitable for them and how they should approach their application process. The interviewee indicates that the programme could improve by better sorting of companies and better informing its audience on the requirements for funding. The programme itself continues to work on increasing the quality of incoming project proposals while decreasing the number of SMEs

sending applications just to try their luck. In the upcoming year, a more bottom-up approach regarding the selection process will be taken and interviews with a selection of the candidates will be performed. It is questionable if this will have an effect, since the budget does not allow for the acceptance of more proposals, even when these are of higher quality.

Because the SME instrument is a highly competitive programme (as can be seen from its success rates), businesses must compete with others – the top businesses in the different market areas – throughout Europe. To be successful, it is necessary that companies come with a good business plan, preferably checked multiple times. The interviewee states that currently, at least ten years of company experience is necessary before someone will be able to submit a successful proposal. This is clearly an opportunity for improvement, where valorisation of knowledge from innovative, young companies could be stimulated more. Another possibility for improvement is the level of support available to companies in different countries. At the moment, the amount of support companies receive with submitting a proposal differs per country.

The National Contact Points (NCPs) for different thematic areas often work together with universities that have a back-office with researchers. This is quite well-organised. For the National Contact Point for SMEs, it is more difficult to reach out to relevant businesses, since these are much more fragmented than researchers at universities. Therefore, the National Contact Points for SMEs try to work together with innovation-hubs, consultants and network partners. A possibility for improvement is the capacity of NCPs. The current lack of capacity adds to the difficulty of finding relevant businesses and being findable for businesses.

B.2.9 *Unique or innovative aspects*

What makes the SME Instrument unique compared to other valorisation programmes is the fact that it is the only scheme in the EU of this scale and scope. Initiatives at member state level have less budget available to award large grants to businesses for the commercialisation of innovative products.

The specific focus on developed companies that could scale-up is therefore also innovative. The SME Instrument is available for businesses that are already in a later stage of development, where their products are finished and possibly already on the market. In that respect, it also differs from other European programmes such as Eurostars, in the sense that it focuses on scaling a business instead of developing a technology.

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