June 26, 2012

Effects of NGI investments

Study commissioned by the Netherlands Genomics Initiative
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technopolis [group], June 2012

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Summary

This report presents the results of a study on the ‘multiplier effect’ of the NGI investments in the 16 NGI centres, at midterm (2008-2010) of the second phase of the national genomics programme that runs until 2013. The main goal of public support of scientific and technological research, which is the core of NGI, is stimulating research and the development of technologies to be used by companies and others resulting in benefits for economy and society. This study focuses on the economic benefits of the NGI programme.

To calculate the multiplier effect a distinction is made between the effect of NGI investments on the participating research organisations (the internal outcomes) and the effect on the companies’ participation in the 16 NGI centres’ consortia (external outcomes). The model that is used relates these different types of outcomes to the inputs: the NGI investments. Following the distinction between the types of outcomes, two multiplier variants are calculated: the internal multiplier (both including and excluding the matching funds of the participating research organisations) and attempts were made to calculate the external multiplier.

The 16 NGI centres belong to five clusters: Health, Agrofood, Sustainability, Safety and Enabling Technologies. For each of these clusters the internal and external outcomes are investigated based on data provided by the centres and by a survey amongst the companies that participate in the NGI centres’ consortia.

The NGI investments (budgeted) in the centres for the period 2008-2013 varies between 16.8 M€ (Sustainability) and 77.9 M€ (Enabling Technologies). These NGI funds have to be matched with other public and private funds for a minimum of 50%. The public and private matching funds that have been generated by the centres in the period 2008-2010 vary accordingly due to the size of the NGI investments. The other income for the centres is derived from new projects with industry partners (contract research), public funded projects and patents and spin-offs. The Agrofood (28.4 M€) and Health Clusters (19.8 M€) received the largest income from new contracts with industry. The income from public grants (e.g. NWO/ZonMw/STW, European Framework Programmes, ERC and Wellcome Trust) is considerable for the Health (116.3 M€), Sustainability (68.8 M€) and Agrofood (44.6 M€) Clusters. The income from patents and spin-offs is limited compared to the other sources.

The results of measuring the quantitative external outcomes (benefits for companies involved in the genomics consortia) are rather poor, as data have been received from only a small number companies.

The results of the multiplier calculations show considerable differences between the clusters. The internal multiplier including the matching funds varies from 1.1 for the Enabling Technologies Cluster to 7.1 for the Sustainability Cluster, which means that for each euro that is invested by NGI the research groups in the cluster have generated another 1.1 to 7.1 euro to be used for its research activities. Without matching funds the multiplier drops and varies between 0.4 for the Enabling Technologies Cluster and 5.8 for the Sustainability Cluster.

Compared to the internal multipliers the data for the external multiplier are too soft. While economic benefits (for instance in terms of increase of turnover or more jobs) are the main goal of many public funded research programmes, measuring these external multiplier effects appeared very difficult. This is not only because of the fact that there are hardly any of such effects to be measured during the period the programme runs, but also because it is rather difficult to quantify the multi-dimensional character of the benefits for companies to determine the specific attribution of the programme against other factors. In addition to these methodological issues, the response rate of the survey amongst the companies participating in the NGI consortia turned out to be relatively low.
For these reasons also a qualitative method was included that measured the effects of participating in the NGI centres' consortia on three main impact factors: the company's R&D-activities, cooperation and networking activities and output performance, each consisting of a number of specific parameters. The most important impact on the R&D-activities of companies of participating in the NGI programme mentioned is that they become aware of the newest developments in genomics research and technologies. This is especially the case for the companies participating in genomics consortia within the Enabling Technologies Cluster. Overall (taking all R&D-activities parameters into account) this type of impact is the highest for the Agrofood Cluster and the lowest for the Safety Cluster. In terms of networking and cooperation effects, participating in the NGI centres' consortia has the largest benefit for companies in the Agrofood and Enabling Technologies Clusters and the least for the Health and Safety Clusters. With respect to the impact on the companies' output performance, the contributions to the company's reputation and visibility and to the development of new products, services or processes of the company are the most important effects. Contrary to the other two impact factors, the companies in the Health Cluster report relatively the high benefits for this impact factor.
Introduction

The Netherlands Genomics Initiative (NGI) was founded in January 2002, with a view to advancing the performance and application of genomics research in the Netherlands. After a first phase (2002-2007) the Dutch government decided to provide finance for a second phase (2008-2013). NGI obtained a budget of €280 million for this second phase.

NGI aims to promote both the performance of genomics research in the Netherlands and its application by developing an excellent research infrastructure consisting of leading Dutch research groups in the Netherlands. By embedding this infrastructure in Dutch economy and society, NGI aims to establish innovative genomics research that will generate a continuous flow of new economic activities.

Based on an extensive selection process, sixteen NGI centres have received funding in the second phase: in 2008 ten centres (CGC, CMSB, CBSG, KC, NMC, NTC, CSG, NCSB, FGCN, NCHA), in 2009 two centres (NBIC, NPC) and in 2010 four centres (CDC, VIRGO, EC, NNC). Most centres that started in the first phase have been continued in the second phase; some new centres (FGCN, NCSB) started during the second phase of NGI.

NGI centres are virtual public-private partnerships (consortia). In these centres research groups from different research organisations (universities and research institutes) work together, generally with few or more companies operating as private partners.

Technopolis has been asked by NGI to perform a study on the so-called ‘multiplier effect’ of the NGI investments in the 16 NGI centres for the period 2008-2010. A distinction is made between the internal multiplier and the external multiplier. The internal multiplier relates to the internal outcomes of the research of the NGI centres. The external multiplier relates to the benefits for the companies participating in the NGI centres' consortia: the external outcome of the NGI centres’ research.

This report presents the results of the study. Chapter 1 introduces the methodology that was used to calculate the multiplier effect. Chapter 2 presents the results for the internal outcomes and Chapter 3 for the external outcomes. In Chapter 4 conclusions are drawn on the internal and the external multipliers.
1. Introduction to multiplier of public R&D investments

In this chapter the concept of multiplier of public R&D investments is defined and operationalised as is the methodological approach on how it is measured.

1.1 Framework for measuring the effects of public programmes

As for the NGI program, the main goal of public support for excellent scientific and technological research is the stimulation of the development of new knowledge that yields both social and economic value. NGI aims to create social and economic value from genomics in the fields of health, agro-food, sustainability and safety and society, by means of close collaboration between the genomics research centres, companies and other stakeholders. Health, agro-food, sustainability and safety are not only relevant social themes, but also represent industrial sectors of significant and economic importance in which genomics enables new applications by new as well as existing companies.

In order to measure these benefits, methods have been developed for monitoring and assessment (evaluation) of the progress and products of research programmes. The method underlying such monitoring and assessment is based on a framework for analysing public policies and programmes that is displayed in the scheme in Figure 1.

Based on the demand for policy intervention (needs, problems, issues), a policy initiative (e.g. a publicly funded research programme like NGI) is developed, with clear defined objectives. For the realisation of these objectives a certain amount of financial resources is provided (inputs).

Figure 1 Public policy evaluation framework

![Diagram of public policy evaluation framework]

Source: Technopolis Group.

The effects of the use of these resources are divided into three subsequent categories:

- *Outputs* are directly linked to the use of the financial resources, in this case performing genomics research. Examples of typical outputs are scientific peer-
reviewed publications, technology-platforms, transfer of knowledge to the private sector, communication activities, et cetera.

- **Results** (or **Outcomes**) are the effects on the performance and competences of individuals and organisations that use the outputs. It concerns for instance the use of scientific knowledge by research groups in formulating new research proposals and gaining new funds for their research, and the use by companies or other appliers outside academia for new product or process development.

- **Impacts** are the effects or externalities for the economy and society at large, based on the results, e.g. increase of the Dutch innovation performance, productivity, employment and a healthier population.

Although the latter types of effects are the main argument for public intervention in terms of introducing public policy programmes, they are very difficult to assess. Making such assessments or evaluations, is not only difficult after a certain period of time when the programme’s results could have led to economic outputs in terms of productivity and jobs, but assessment even becomes increasingly difficult the shorter the period between start of the programme and the point in time the effects are measured. It even is rather impossible in the period the policy initiative still runs. The main reason is that it takes some time for the scientific outputs to be transformed into practical results, not to speak about economic and societal impacts in getting realised.

A second complication relates to the so-called attribution problem. Once these intentional economic and social impacts might have been realised; it is rather difficult to determine what has been the contribution of the policy initiative and what have been other factors that have influenced the realisation of the impacts. For that reason this study focuses on the outcome effects or results and not on the impacts.

Although the benefits of an application-oriented programme might be easier to measure than those of fundamental and basic research programmes as they have a shorter implementation period, institutions as the Netherlands Bureau for Economic Policy Analysis (CPB) have acknowledged that it is hardly possible to measure the external economic effects of innovation policy measures in quantitative terms. Nevertheless, there is an increasing pressure on policy makers (in the Netherlands) to legitimise the introduction of policy instruments in the field of innovation by cost-benefits i.e. by economic arguments. Also they have to proof the so-called ‘additionality’ of their policies. The concept of additionality has been widely used by government policy makers and administrators in justifying and rationalising public support for science, technology and innovation activities. Additionality basically answers the question ‘What difference does it - the public programme - make?’.

There are several types of additionality. The most common used distinction is between:

- Input additionality: the additional resources acquired to be spent on the public policy programme;
- Output additionality: the outputs produced that would not have been achieved in the absence of the public support through the policy programme;
- Behavioural additionality: the change in an organisations way of undertaking R&D that can be attributed to the public policy programme.

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In this study all three types of additionality are relevant: the first one relates to the extra inputs for the NGI centres. Output additionality relates directly to the outcomes of the NGI programme for the research groups that would not have been generated without the programme. The third type of additionality deals with the benefits for the companies involved in the NGI consortia.

### 1.2 Model for measuring the multiplier of NGI investments

In our model we distinguish between the effects of a public research program on the research organisations that are involved in the NGI program and on the companies’ participation in the 16 NGI centres’ consortia. The first is referred to as internal outcome and is related to input and outcome additionality; the latter is referred to as external outcomes, and also includes behavioural additionality.

The concept of multiplier comes into play when the benefits of the programme – the sum of relevant additionalities – are related to the costs of the programme (the public investments made through the policy instruments). In our model the internal and external outcomes of NGI investments (nominator) are related to the input i.e. the NGI investments (denominator) defining the internal multiplier and the external multiplier. For the internal multiplier we distinguished between the multiplier including and excluding matching funds. The equations to calculate the different multipliers are shown in Figure 2.

**Figure 2  Multiplier equations**

\[
\text{Internal multiplier (including matching)} = \frac{\text{Matching funds} + \text{Income from new research projects} + \text{Income from patents and spin-offs}}{\text{NGI Funding}}
\]

\[
\text{Internal multiplier (excluding matching)} = \frac{\text{Income from new research projects} + \text{Income from patents and spin-offs}}{\text{NGI Funding}}
\]

\[
\text{External multiplier} = \frac{\text{Extrapolated benefits to companies}}{\text{NGI Funding}}
\]


Our definition for multiplier is derived from the multiplier definition that is used in macroeconomics, where the multiplier is defined as the growth of the national income resulting from the changes in government spending that it causes\(^5\).

The concept of multiplier is also used for measuring the effects of government policies on other levels. Hulsink et al (2011)\(^6\) in their study on the multiplier of Mibiton (a public - revolving - fund for start-up company’s for investments in R&D facilities and

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\(^5\) In economics, the fiscal multiplier is the ratio of a change in national income to the change in government spending that causes it. More generally, the exogenous spending multiplier is the ratio of a change in national income to any autonomous change in spending (private investment spending, consumer spending, government spending, or spending by foreigners on the country’s exports) that causes it. When this multiplier exceeds one, the enhanced effect on national income is called the multiplier effect (Source: www.wikipedia.org).

facilities) have applied the definition of multiplier as the so-called ‘direct effects’ (including turnover, jobs, publications, patents, cost-reductions) and ‘indirect effects’ (including reputation, networks, entrance to new markets, new research projects) of a project investment on the company and the induced effects for its suppliers and clients, other sector, the economy and society at large. They measured the effect on the project level and within one company.

In our model we work with the concepts of internal and external outcomes; they are presented in more detail in the next paragraphs.

1.2.1 Internal outcomes

In the model for determining the multiplier effect of NGI investments we distinguish between different types of internal outcomes: matching, new public and contract research projects, patents and spin-offs.

The matching income relates to the terms and conditions of the NGI subsidy:

- Matching funds of the research organisations active in the genomics centres that are responsible for the research to be conducted. Amongst others ICES/KIS and FES funding, NWO, ZonMw and STW subsidies are eligible.
- Matching contributions of companies participating in the NGI centres' consortia. These might consist of several components: financial ('in-cash') contributions and contributions 'in kind' such (as the delivery of services, and the provision of equipment and material of research purposes).

The matching funds relate to the input additionality as without the programme these funds would never have been made available for the genomics research programme.

The income from new public funded projects generated by the research groups in the centres in the period 2008-2010 relates to projects based on results of the research funded by NGI, which can be expected after a certain start-up period. However, given the fact that the research programmes of the centres at the time the centre started was based on a specific body of scientific and technological expertise, this expertise has also led to other research proposals in the same field for other funding authorities of programmes. For this reasons the new projects from the three years of the midterm review have been included in the nominator of the internal multiplier. The funding of these new public funded projects can come from different sources such as national (e.g. NWO, ZonMw, STW), European (e.g. Framework Programmes, ERC, ESF) and international research programmes (e.g. the Wellcome Trust, NIH).

Income from the new contract research projects for companies, patents and spin-offs have been included also for the three years of the midterm review, based on the same arguments as above.

1.2.2 External outcomes

The external outcomes are defined as the outcomes for the companies involved in the consortia of the NGI centres. It relates to all the gaining that companies yield when participating in a centre and profit from it. These benefits can be rather divers in character. In order to get a sound quantitative figure representing the external multiplier effect we preferred to get precise figures on the benefits in euro from the participating companies. However, it was also decided to collect qualitative information on outcomes for the companies and we had two reasons to do this. Firstly, due to both the multi-dimensional character of the benefits and the rather elaborated and probably also not very punctual methods for quantifying this (also dealing here with attribution problems), it seemed rather unlikely to expect from companies to do such calculations. Secondly, we also wanted to show the wide variety of benefits that participation in a centre has, as the benefits are expected to be more in the realm of R&D and networking than in terms of extra turnover or more jobs. After all, the NGI programme is on precompetitive research and this is more fundamental and less
applied character as compared to an innovation programme. These outcomes relate to behavioural additionality.

1.3 Methods for data collection and presentation of results
In this study the following sources of information have been used:

- Information from the NGI centres.
- Information from companies participating in the genomics consortia:
  - A number of interviews with key companies participating in one or more of the genomics consortia.
  - A web-based survey amongst all companies participating in the NGI consortia.

1.3.1 Information from the NGI centres
The NGI centres have provided the data on all types of internal and external outcomes. Most of these data came from annual reports of the centres to NGI. Missing information was gathered by contacting the centres directly.

1.3.2 Information from companies participating in NGI centre’s consortia
Prior to the web-based survey amongst all companies that participate in the NGI centres’ consortia, a number of interviews were held with key players (selected on size of the company’s financial contribution or its participation in multiple consortia). The main goal of the interviews was to find out the most important types of effects of participating in a NGI centre’s consortium. For each cluster one or more companies were interviewed to investigate the potential outcome effects. The results of the interviews have been used to design the questions for the web-based survey. Statements from the interviews are used in this report to illustrate the results of the quantitative multiplier analyses (Appendix C gives an overview of the interviewees).

The web-based survey was distributed to the companies that participate in the NGI centre’s consortia, except for two centres. CBSG and VIRGO (with 18 companies in the consortia of the two centres) have recently performed a similar study by themselves.

Figure 3 shows that overall, 53% of the 64 companies involved in the eight NGI consortia have responded. However, the response rate varied for individual questions.

<table>
<thead>
<tr>
<th>NGI centre</th>
<th>Number of consortium companies</th>
<th>Number of responses</th>
<th>Response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celiac Disease Consortium</td>
<td>6</td>
<td>5</td>
<td>83%</td>
</tr>
<tr>
<td>Netherlands Consortium for Healthy Ageing</td>
<td>6</td>
<td>3</td>
<td>50%</td>
</tr>
<tr>
<td>Netherlands Nutrigenomics Centre</td>
<td>9</td>
<td>1</td>
<td>11%</td>
</tr>
<tr>
<td>Kluyver Centre</td>
<td>17</td>
<td>12</td>
<td>71%</td>
</tr>
<tr>
<td>Ecogenomics Consortium</td>
<td>3</td>
<td>1</td>
<td>33%</td>
</tr>
<tr>
<td>Netherlands Toxicogenomics Centre</td>
<td>14</td>
<td>6</td>
<td>43%</td>
</tr>
<tr>
<td>Netherlands BioInformatics Centre</td>
<td>6</td>
<td>4</td>
<td>67%</td>
</tr>
<tr>
<td>Netherlands Metabolomics Centre</td>
<td>3</td>
<td>2</td>
<td>67%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>64</strong></td>
<td><strong>34</strong></td>
<td><strong>53%</strong></td>
</tr>
</tbody>
</table>

The survey was used to collect information about the benefits to the companies of participating in the NGI centre’s consortia as well as the resources that the companies invested in NGI. The survey questions are included in Appendix D.

1.3.3 Presentation of results per cluster

The results of the study are presented by cluster. There are five clusters: Health, Agrofood, Sustainability, Safety en Enabling Technologies. Figure 4 presents the five clusters and the NGI centres and the research organisations and companies (if applicable) in the NGI centres’ consortia, for each cluster.

Figure 4  Composition of the NGI Centres’ consortia, by cluster

<table>
<thead>
<tr>
<th>Cluster</th>
<th>NGI centres</th>
<th>Consortium partners</th>
<th>Companies**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer Genomics Centre (CGC)</td>
<td>NKI, Erasmus MC, Hubrecht Institute</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Centre for Medical System</td>
<td>Leiden University, Leiden University</td>
<td>Leiden University Medical Centre, Erasmus Medical Centre, Vrije Universiteit VU</td>
<td>DSM, Galapagos, McRoberts, Pfizer,</td>
</tr>
<tr>
<td>Biology (CMSB)</td>
<td>Medical Centre, Vrije Universiteit VU</td>
<td>University, University of Amsterdam, Wageningen University</td>
<td>Philips, Unilever</td>
</tr>
<tr>
<td>Netherlands Centre for</td>
<td>Leiden University Medical Centre,</td>
<td>DSM, Galapagos, Eurodiagnostica, Europroxima, Genome Diagnostics, Limagrain</td>
<td></td>
</tr>
<tr>
<td>Healthy Aging (NCHA)</td>
<td>Erasmus Medical Centre, Vrije</td>
<td>University Medical Centre, University Medical Centre Utrecht, Wageningen University,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University, Wageningen University,</td>
<td>TNO, Erasmus Medical Centre, University Medical Centre Groningen, VU Medical Centre,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TNO</td>
<td>De Halm, DSM, Eurodiagnostica, Europroxima, Genome Diagnostics, Limagrain Nederland</td>
<td></td>
</tr>
<tr>
<td>Celiac Disease Consortium</td>
<td>Erasmus MC, Utrecht University,</td>
<td>Abbott Healthcare Products, Intervet / Schering-Plough, Animal Health, ViroNovative</td>
<td></td>
</tr>
<tr>
<td>(CDC)</td>
<td>Radboud University Nijmegen, UMC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIRGO Consortium</td>
<td>TI Food and Nutrition, Wageningen</td>
<td>DSM, FrieslandCampina, NIZO, Purac Biochem, Sensus, Unilever</td>
<td></td>
</tr>
<tr>
<td>Nutrigenomics Centre (NC)</td>
<td>University and Research Centre</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGROFOOD</td>
<td>Maastricht University, University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centre for BioSystems</td>
<td>Wageningen University and Research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genomics Centre (CBSG)</td>
<td>Centre, University of Utrecht,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Amsterdam, Radboud</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Nijmegen, University</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>of Groningen, University of Groningen</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Groningen, UMC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Effects of NGI investments
<table>
<thead>
<tr>
<th>Cluster</th>
<th>NGI centres</th>
<th>Consortium partners</th>
<th>Research organisations*</th>
<th>Companies**</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUSTAINABILITY</strong></td>
<td>Kluyver Centre for Genomics of Industrial Fermentation (KC)</td>
<td>Utrecht University&lt;br&gt;NIZO food research&lt;br&gt;Delft University of Technology&lt;br&gt;TI Food and Nutrition&lt;br&gt;Utrecht University&lt;br&gt;University of Amsterdam&lt;br&gt;Leiden University&lt;br&gt;Wageningen University</td>
<td>Applikon Biotech&lt;br&gt;Bird Engineering&lt;br&gt;CELLution Biotech&lt;br&gt;CSK Food Enrichment&lt;br&gt;Danisco Genencor&lt;br&gt;Danone&lt;br&gt;DSM&lt;br&gt;Dyadic&lt;br&gt;FrieslandCampina&lt;br&gt;Genedata&lt;br&gt;Heineken&lt;br&gt;Lifewizz&lt;br&gt;Nestlé&lt;br&gt;NIZO&lt;br&gt;Purac Biochem&lt;br&gt;Tate &amp; Lyle</td>
<td></td>
</tr>
<tr>
<td><strong>SUSTAINABILITY</strong></td>
<td>Ecogenomics Consortium (EC)</td>
<td>Vrije University Amsterdam&lt;br&gt;Wageningen University and Research Centre&lt;br&gt;NIOO-KNAW&lt;br&gt;RIVM National Institute for Public Health and the Environment</td>
<td>Bioclear BV&lt;br&gt;Biodetection Systems&lt;br&gt;Microlife Solutions</td>
<td></td>
</tr>
<tr>
<td><strong>SAFETY</strong></td>
<td>Forensic Genomics Centre Netherlands (FGCN)</td>
<td>Netherlands Forensic Institute&lt;br&gt;Leiden University Medical Centre&lt;br&gt;Erasmus Medical Centre</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SAFETY</strong></td>
<td>Netherlands Toxigenomics Centre (NTC)</td>
<td>Maastricht University&lt;br&gt;Leiden University, Leiden UMC&lt;br&gt;Wageningen University&lt;br&gt;Erasmus University&lt;br&gt;RIKILT Institute of Food Safety&lt;br&gt;RIVM National Institute for Public Health and the Environment&lt;br&gt;TNO Quality of Life</td>
<td>BioDetection Systems&lt;br&gt;DNage&lt;br&gt;Galapagos&lt;br&gt;Genedata&lt;br&gt;GeneGo&lt;br&gt;Henkel&lt;br&gt;Janssen Pharmaceutica&lt;br&gt;MSD Oss / Schering Plough&lt;br&gt;Nikon Instruments&lt;br&gt;PamGene&lt;br&gt;Service XS&lt;br&gt;Thermo Fisher Scientific&lt;br&gt;Unilever&lt;br&gt;Vitramics</td>
<td></td>
</tr>
<tr>
<td><strong>ENABLING TECHNOLOGIES</strong></td>
<td>Netherlands Consortium for Systems Biology (NCSB)</td>
<td>Netherlands Institute for Systems Biology&lt;br&gt;Top Institute Food and Nutrition</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ENABLING TECHNOLOGIES</strong></td>
<td>Netherlands Proteomics Centre (NPC)</td>
<td>Utrecht University, UMC Utrecht&lt;br&gt;University of Groningen, UMC&lt;br&gt;Leiden UMC, Leiden University&lt;br&gt;Wageningen University&lt;br&gt;Delft University of Technology&lt;br&gt;Erasmus Medical Center&lt;br&gt;Amsterdam Medical Center&lt;br&gt;University of Amsterdam&lt;br&gt;Radboud University Nijmegen</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ENABLING TECHNOLOGIES</strong></td>
<td>Netherlands Metabolomics Centre (NMC)</td>
<td>Wageningen University and Research Centre&lt;br&gt;University of Amsterdam&lt;br&gt;Leiden University, Leiden UMC&lt;br&gt;UMC Utrecht&lt;br&gt;TNO</td>
<td>DSM&lt;br&gt;Schering Plough&lt;br&gt;Unilever</td>
<td></td>
</tr>
<tr>
<td><strong>ENABLING TECHNOLOGIES</strong></td>
<td>Netherlands Bioinformatics Centre (NBIC)</td>
<td>11 universities&lt;br&gt;7 medical university centres&lt;br&gt;10 research institutes</td>
<td>DSM&lt;br&gt;Keygene&lt;br&gt;MSD Oss&lt;br&gt;NIZO Food Research&lt;br&gt;Philips&lt;br&gt;Plant Research&lt;br&gt;International</td>
<td></td>
</tr>
<tr>
<td><strong>ENABLING TECHNOLOGIES</strong></td>
<td>Centre for Society and Genomics (CSG)</td>
<td>Radboud University of Nijmegen</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Source: Technopolis Group analysis based on data reported by NGI centres (2011).
2. Results: internal outcomes

The internal multiplier deals with the effects of the NGI investments (2.1) on the research organisations in terms of extra income to perform research. In addition to the required matching by the consortium partners (2.2), this includes also the extra income from public and private sources (2.3).

2.1 NGI investments

The NGI investments in the five clusters of centres, per year for the period 2008-2010 is presented in Figure 5. The data on NGI investments in the NGI centres of the first phase of NGI (2002-2007) can be found in Appendix A.1.

Figure 5 NGI investments in the NGI centres, 2008, 2009 and 2010 (realised)

<table>
<thead>
<tr>
<th>Year</th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability</th>
<th>Safety</th>
<th>Enabling technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>8,588 k€</td>
<td>2,524 k€</td>
<td>3,861 k€</td>
<td>1,864 k€</td>
<td>27,471 k€</td>
</tr>
<tr>
<td>2009</td>
<td>12,077 k€</td>
<td>3,870 k€</td>
<td>4,508 k€</td>
<td>4,860 k€</td>
<td>20,811 k€</td>
</tr>
<tr>
<td>2010</td>
<td>10,946 k€</td>
<td>4,922 k€</td>
<td>4,502 k€</td>
<td>6,896 k€</td>
<td>22,434 k€</td>
</tr>
<tr>
<td>Total</td>
<td>31,611 k€</td>
<td>11,316 k€</td>
<td>12,871 k€</td>
<td>13,620 k€</td>
<td>70,716 k€</td>
</tr>
</tbody>
</table>

Source: Technopolis Group analysis based on data reported by NGI centres (2011).

The NGI investments differ considerably per cluster. The Enabling Technologies Cluster receives most funding, followed by the Health Cluster. The table also shows the growth in investments in the Safety Cluster. In 2008 - the year the NGI centres in this cluster were established - the cluster received a relatively small amount of funding. In 2010, however, the funding has grown significantly and ranks as the third largest cluster in terms of total NGI funding.

2.2 Matching funds from consortium partners

2.2.1 Matching conditions

In this section the matching conditions are presented. Section 2.2.2 presents the matching by public sources, while Section 2.2.3 presents the matching by private sources. We focus on the period of the Midterm review of the second phase (2008-2010); the data on the first phase of NGI can be found in Appendix A.

The funding that is provided by NGI has to be matched: in principle NGI funding will not exceed 50% of the total project costs. The other 50% of the project costs have to be funded by funds that are provided by other public administrative bodies (such as NWO or the EU), by private partners of the consortia (including charities) or by the research groups in the consortia themselves.

A minimum of 10% of the funding has to come from private partners of the consortia. The combined funding of NGI and other public administrative bodies is not allowed to exceed 65%. In case the minimum level of private funding is not obtained, the NGI funding will be decreased by the same amount. For example if a consortium has to fund 3 M€ from private sources, but only obtains 2 M€, NGI funding will be decreased by 1 M€ (Source: Subsidievoorwaarden NGI Tweede Fase, vs. 3/12/2007).

2.2.2 Research organisations

Figure 6 shows the matching funds provided by the research organisations for the period 2008-2010.
Figure 6  Matching by research organisations in the NGI centres, for period 2008-2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability</th>
<th>Safety</th>
<th>Enabling technologies*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>6,824 k€</td>
<td>3,716 k€</td>
<td>3,415 k€</td>
<td>5,378 k€</td>
<td>13,658 k€</td>
</tr>
<tr>
<td>2009</td>
<td>10,109 k€</td>
<td>3,542 k€</td>
<td>3,771 k€</td>
<td>8,130 k€</td>
<td>13,485 k€</td>
</tr>
<tr>
<td>2010</td>
<td>10,452 k€</td>
<td>4,113 k€</td>
<td>3,869 k€</td>
<td>8,343 k€</td>
<td>13,601 k€</td>
</tr>
<tr>
<td>Total</td>
<td>27,385 k€</td>
<td>11,372 k€</td>
<td>11,055 k€</td>
<td>21,851 k€</td>
<td>40,745 k€</td>
</tr>
</tbody>
</table>

Source: Technopolis Group analysis based on data reported by NGI centres.

*: This is not including CSG as this centre has no matching obligations.

In terms of its public matching, the Enabling Technologies Cluster is again the largest cluster, followed by the Health and Safety Clusters. It should be noted here that the Centre for Society and Genomics (part of Enabling Technologies Cluster) does not have a matching obligation. As a result the matching of this cluster is lower than the other clusters.

The Health, Agrofood and Sustainability Clusters have been able to match the NGI funding for about 100%, while the Safety Cluster received more public matching than the amount of NGI funding.

2.2.3 Matching funds from companies in the NGI centre’s consortia

As was already mentioned above, ten of the sixteen centres have companies in their consortium: the other six centres only have research organisations in their consortium. Figure 7 shows the matching funds of the participating companies for the period 2008-2010 (see Appendix A.3 for the period 2002-2007).

Figure 7  Matching by companies in the NGI centres’ consortia, for the period 2008-2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability</th>
<th>Safety</th>
<th>Enabling technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>5,111 k€</td>
<td>360 k€</td>
<td>1,486 k€</td>
<td>639 k€</td>
<td>3,160 k€</td>
</tr>
<tr>
<td>2009</td>
<td>10,567 k€</td>
<td>862 k€</td>
<td>1,894 k€</td>
<td>692 k€</td>
<td>2,918 k€</td>
</tr>
<tr>
<td>2010</td>
<td>8,694 k€</td>
<td>854 k€</td>
<td>1,952 k€</td>
<td>1,700 k€</td>
<td>3,200 k€</td>
</tr>
<tr>
<td>Total</td>
<td>24,372 k€</td>
<td>2,076 k€</td>
<td>5,332 k€</td>
<td>3,031 k€</td>
<td>9,278 k€</td>
</tr>
</tbody>
</table>

Source: Technopolis Group analysis based on data reported by NGI centres.

The table shows that also the amount of private matching differs considerably. The Health Cluster received the largest amount of private matching, which is about two thirds of the NGI funding of this cluster. The Enabling Technologies Cluster ranks second in terms of private matching, which is about 15% of the NGI funding that the NGI centres in the Enabling Technologies Cluster received.

The average cash contribution of the companies that responded to our question on this matter (this applies for 23% of the companies involved in the consortia) is about 0.5 MC. The contributions varied between 20 k€ and 2 MC. Altogether the responding

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7 However CGS was able to attract some funding from research organisations.
companies provided more than 9 M€ to the NGI centres. This is about 20% of the private matching that has been reported by the NGI centres.

The companies were asked whether their financial contribution consists of resources from their existing R&D-budget or from additional resources, specifically made available for their participation in the NGI centre. The majority of the companies (86%) made their contribution from existing R&D-budget resources. Only 14% of the companies allocated additional resources to fund their contribution. The data show no differences between the different NGI clusters.

Besides the contribution ‘in cash’, the companies in the NGI consortia can also contribute ‘in kind’. As Figure 8 shows, almost 70% of the companies that responded to this question in the survey have contributed ‘in kind’ to the NGI centres. The most common contribution ‘in kind’ is the performing of certain activities for the NGI centre, which is done by 50% of the companies. Also 42% of the companies provide equipment and/or materials to the NGI centres. There are also several companies that contribute to the NGI centres in other ways (23%). In most cases this contribution includes the sharing of the companies’ expertise and knowledge with the NGI centres.

Figure 8 Percentages of companies’ contribution ‘in kind’ to the NGI centres (n=26)

![Figure 8 Percentages of companies’ contribution ‘in kind’ to the NGI centres (n=26)](image)


On average, companies contributed more than 0.6 M€ ‘in kind’. The largest contribution ‘in kind’, which was reported in our study, was made by a company involved in one of the centres in the Enabling Technologies Cluster and comprised 1.8 M€.

The survey data shows that the 13 companies that provided information on the ‘in cash’ and ‘in kind’ contributions, on average contributed more ‘in kind’ than ‘in cash’ (611 k€ ‘in kind’ and 483 k€ ‘in cash’). However, since not all companies made a contribution ‘in kind’, the total ‘in kind’ contribution is smaller than the total ‘in cash’ contribution (7.9 M€ in kind and 9.2 M€ is cash).

2.3 Income from new projects, patents and spin-offs

The above-mentioned group of funds for the NGI centres (matching from consortia partners) are inherent to the financial construction of the centre. This forms one part of the nominator for determining the internal multiplier. In addition data have been collected from the NGI centres on the number of projects and the related income (€) they have received from new research projects both from projects for industry (contract research) and public funded projects (such as national research grants, European research grants). Also data on number of patents, licenses, spin-offs and the income from licenses and spin-offs (€) were collected. The results are presented and
discussed in the next three sections. We focus here on the period 2008-2010; the data on the first NGI phase have been included in Appendix A.

2.3.1 Income from contract research

This section presents the income that the NGI clusters have generated out of new research projects with private partners during the period 2008-2010.

Figure 9 Numbers of new projects with industrial partners and income from contract research, for the period 2008-2010

<table>
<thead>
<tr>
<th>New number of projects **</th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability*</th>
<th>Safety</th>
<th>Enabling technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>20</td>
<td>9</td>
<td>33</td>
<td>NA***</td>
<td>8</td>
</tr>
<tr>
<td>2009</td>
<td>22</td>
<td>22</td>
<td>8</td>
<td>NA</td>
<td>23</td>
</tr>
<tr>
<td>2010</td>
<td>18</td>
<td>20</td>
<td>15</td>
<td>NA</td>
<td>18</td>
</tr>
</tbody>
</table>

Income from contract research ****

<table>
<thead>
<tr>
<th></th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability</th>
<th>Safety</th>
<th>Enabling technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>9,021 k€</td>
<td>10,360 k€</td>
<td>1,270 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2009</td>
<td>8,578 k€</td>
<td>10,360 k€</td>
<td>1,592 k€</td>
<td>0 k€</td>
<td>1,550 k€</td>
</tr>
<tr>
<td>2010</td>
<td>2,158 k€</td>
<td>7,697 k€</td>
<td>1,803 k€</td>
<td>0 k€</td>
<td>3,249 k€</td>
</tr>
<tr>
<td>Total</td>
<td>19,757 k€</td>
<td>28,416 k€</td>
<td>4,664 k€</td>
<td>0 k€</td>
<td>4,799 k€</td>
</tr>
</tbody>
</table>

* The income figures include fees from members of the industrial platform of one of the NGI centres in this cluster.
** Number of new projects with industrial partners. Source: NGI centres Output Tables (2011).
*** NA: not available.
**** Source: Technopolis Group analysis based on data reported by NGI centres (2011).

The Agrofood and Health Clusters are leading in terms of income from new projects with industrial partners. The Sustainability and Enabling Technology Clusters have gathered smaller, but still substantial amounts from private sources. The Safety Cluster has not (yet) obtained any funds from new private research projects.

2.3.2 Income from public grants

Figure 10 shows the numbers of new projects financed by public funding organisations (national, EC, international) and the income from these new projects for the period 2008-2010.

Figure 10 Numbers of new public funded projects and income from public grants, for period 2008-2010

<table>
<thead>
<tr>
<th>New projects *</th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability</th>
<th>Safety</th>
<th>Enabling technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>34</td>
<td>7</td>
<td>22</td>
<td>NA**</td>
<td>12</td>
</tr>
<tr>
<td>2009</td>
<td>66</td>
<td>36</td>
<td>9</td>
<td>NA</td>
<td>49</td>
</tr>
<tr>
<td>2010</td>
<td>88</td>
<td>25</td>
<td>22</td>
<td>NA</td>
<td>48</td>
</tr>
</tbody>
</table>

Income from new projects ***

<table>
<thead>
<tr>
<th></th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability</th>
<th>Safety</th>
<th>Enabling technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>18,664 k€</td>
<td>7,973 k€</td>
<td>9,602 k€</td>
<td>100 k€</td>
<td>1,745 k€</td>
</tr>
<tr>
<td>2009</td>
<td>34,816 k€</td>
<td>15,473 k€</td>
<td>7,626 k€</td>
<td>250 k€</td>
<td>8,170 k€</td>
</tr>
<tr>
<td>2010</td>
<td>62,831 k€</td>
<td>21,115 k€</td>
<td>51,614 k€</td>
<td>6,541 k€</td>
<td>16,135 k€</td>
</tr>
<tr>
<td>Total</td>
<td>116,310 k€</td>
<td>44,564 k€</td>
<td>68,842 k€</td>
<td>6,891 k€</td>
<td>26,050 k€</td>
</tr>
</tbody>
</table>

* Source: NGI Output Tables (2011).
** NA: not available.
*** Source: Technopolis Group analysis based on data reported by NGI centres (2011).
In terms of income from new public research projects, the Health Cluster is the largest exceeding a total income of 100 MC. The Sustainability Cluster’s income, close to 70 MC, is also relatively large as compared to the other clusters. As was the case with the income from new private contract research projects, the Safety Cluster is ranked last.

2.3.3 Income from patents and spin-offs

A third source of income is from patents and spin-offs. The figure below presents data on invention disclosures (feasibility of a potential patent), patents applied and granted, licenses, the income from licenses and number of and income from spin-offs for the period 2008-2010.

The Health Cluster is, with an income of almost 16 MC, far ahead of the other clusters in terms of revenues from licenses and spin-offs. The Sustainability Cluster is second with more than 1 MC in license-revenues in 2008 to 2010. The Agrofood Cluster records just over 500 k€ while the Enabling Technologies Cluster has reported zero income from licenses.

Other income sources mentioned by the NGI centres are income from winning the annual NGI Valorisation Awards in 2008 and 2010 (1.5 MC; Health Cluster) and from organising conferences and training courses (65 k€; Enabling Technologies Cluster).
3. Results: external outcomes

We investigated the effects of the companies’ participation in the NGI centres consortium and the benefits this brings to the companies in three ways. We used a qualitative tool by asking the companies to value the contribution for a large number of aspects (selected on the basis of interviews with a selected number of companies). Secondly, we made an attempt to quantify NGI’s contribution at the company level. Thirdly, we asked the companies what they would have missed most, in case there would have been no National Genomics Initiative. The results of these three parts – illustrated with findings from the interviews – are presented in the Sections 3.1, 3.2 and 3.3.

When reading these sections one should keep in mind that not all centres’ consortia include companies. Also a number of centres have not been included in this part of the study for a number of reasons: some centres consortia do not include companies and some centres companies have not been included in the survey as they had already done their own survey. Of the five centres in the Health Cluster three include companies: NCHA, CDC and VIRGO. The companies of CDC and NCHA consortia were asked to participate in our survey. VIRGO was not included as recently a similar study was performed on behalf of the centre itself. The results of this study were made available and relevant parts have been included in this report. In the Agrofood Cluster companies are participating in both centres: NNC and CBSG. However, since CBSG already investigated the impact of the centre on the participating companies, these companies were not included in the study. The results of the CBSG valorisation study have been made available and as there are large similarities to our approach, results could be used for this study. Both centres of the Sustainability Cluster (EC and KC) have been included in our study. NTC is the only centre in the Safety Cluster that includes companies in its consortium, so FGCN that also belongs to this cluster was not included. In the centres that are part of the Enabling Technology Cluster only NNIC and NMC include companies in their consortia. The other centres in this cluster (NCSB, NPC and CSG) have not been included in this part of the study.

3.1 Impact on companies in qualitative terms

We have used three impact factors (impact on the companies’ R&D activities, on their networking and cooperation activities and on their output performance), using a number of parameters for each impact indicator (see Figure 12).

Figure 12 Parameters of the three impact factors

<table>
<thead>
<tr>
<th>Impact factor</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D activities</td>
<td>... keep up with newest developments in genomics research and technologies... breakthroughs in R&amp;D-projects... the lowering of the risks of R&amp;D-projects... decrease of specific research activities... at an earlier time, determine the results of company’s research project(s) and make (des) investments decisions... at an earlier time, determine IPR possibilities (freedom to operate)... attracting new public funds for the company’s research activities (new projects with old/new partners)... use the complementary knowledge of the research groups in the consortium... use the research facilities of the research groups in the consortium... upgrade the company’s technical research facilities... a decision to find a better location for the company’s R&amp;D activities within the Netherlands... a decision to keep the company’s R&amp;D activities in the Netherlands</td>
</tr>
<tr>
<td>Impact factor</td>
<td>Parameters</td>
</tr>
<tr>
<td>---------------</td>
<td>------------</td>
</tr>
<tr>
<td>Cooperation and networking</td>
<td>... improve/consolidate cooperation with research groups in the consortium&lt;br&gt;... improve/consolidate cooperation with other companies in the consortium&lt;br&gt;... improve the networking skills of the company’s research staff&lt;br&gt;... attract qualified research staff&lt;br&gt;... at an earlier time, find new research group partners&lt;br&gt;... at an earlier time, find new commercial partners</td>
</tr>
<tr>
<td>Output performance</td>
<td>... profit from (exclusive) licenses to the centres’ patents&lt;br&gt;... shorten the time-to-market of products and/or services&lt;br&gt;... the development of new or improved products and/or services&lt;br&gt;... the development of new or improved processes&lt;br&gt;... the company’s turnover through new or improved products and/or services&lt;br&gt;... the turnover through more efficient production processes&lt;br&gt;... attract new customers, find new markets&lt;br&gt;... increase the market share&lt;br&gt;... the reputation/visibility of your company</td>
</tr>
</tbody>
</table>


The question in the survey: “To what extent has your company’s participation in the NGI centre contributed to...” was asked for each parameter. The respondents could answer on a scale from 1 to 5 (1 = no contribution and 5 = very large contribution).

In this section we present the overall cluster results for all three categories of impact: the impact on R&D activities (3.1.1), on cooperation and networking (3.1.2) and on output performance (3.1.3). Where relevant we also compared the results for the different clusters. Appendix B presents the average results for each of the NGI clusters, for each impact category and per parameter.

3.1.1 Impact on R&D activities

Figure 13 shows that the most important contribution on the R&D activities of companies is that they become aware of the newest developments in genomics research and technologies. This is especially the case for the companies participating in genomics consortia within the Enabling Technologies Cluster and to a lesser extent to the Sustainability and Agrofood Clusters. Other contributions for companies are the use of complementary knowledge of the research groups participating in the consortium and on attracting new public funds for new research activities. The Top-5 of most important contributions is complemented by the decrease of specific research activities (i.e. the NGI Centre performs certain research activities that the company otherwise had to do itself) and the use of research facilities of the research groups in the consortium.

Contributions like the company’s decision to maintain its R&D activities in the Netherlands or find a better location for its facilities and the possibility to decide on (des)investments at an earlier stage (because of the results of company’s projects) are ranked as lasts and must be considered to be of the very limited importance.

When comparing the different clusters on the impact on R&D activities, the companies in the Agrofood Cluster score relatively high while the companies in the Health and Safety Clusters score relatively low (see Plot B1 in Appendix B). However it should be kept in mind that the number of respondents in each cluster is rather limited.
Figure 13  Impact on R&D activities (n=28)

To what extent has your company’s participation in the NGI Consortium contributed to...

- ... keep up with newest developments in genomics research and technologies
- ... use the complementary knowledge of the research groups in the consortium
- ... attracting new public funds for the company’s research activities (new projects with old/new partners)
- ... decrease of specific research activities
- ... use the research facilities of the research groups in the consortium
- ... breakthroughs in R&D-projects
- ... the lowering of the risks of R&D-projects
- ... upgrade the company’s technical research facilities
- ... at an earlier time, determine IPR possibilities (freedom to operate)
- ... a decision to keep the company’s R&D activities in the Netherlands
- ... at an earlier time, determine the results of company’s research project(s) and make (de) investments decisions
- ... a decision to find a better location for the company’s R&D activities within the Netherlands


Similar high-ranking factors as mentioned above were found to be of great importance in the CBSG study, where the level of knowledge and skills and the sharing of R&D costs are valued as the two most important factors to the companies (see Figure 14).

Figure 14  Impact of participation in CBSG on company (only above average) (n=15)

<table>
<thead>
<tr>
<th>Impact on R&amp;D activities:</th>
<th>Impact on output performance:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of knowledge and skills personnel (5.40*)</td>
<td>Tested markers (4.40)</td>
</tr>
<tr>
<td>Sharing R&amp;D costs (4.87)</td>
<td>Strengthen image (4.27)</td>
</tr>
<tr>
<td>Bio-informatics knowledge and services (4.53)</td>
<td>New products launched to the market (4.00)</td>
</tr>
<tr>
<td>Improvement basic research process (4.40)</td>
<td>Competitive advantage (3.93)</td>
</tr>
<tr>
<td></td>
<td>New products developed (3.93)</td>
</tr>
<tr>
<td></td>
<td>Implemented markers (3.93)</td>
</tr>
<tr>
<td>Impact on cooperation and networking:</td>
<td>*: mean of scores between 1-7 (1 = not important, 7 = very important)</td>
</tr>
<tr>
<td>Contact with CBSG researchers (5.40)</td>
<td></td>
</tr>
<tr>
<td>Recruit new researchers or assistants (3.93)</td>
<td></td>
</tr>
<tr>
<td>Interaction with other companies (3.79)</td>
<td></td>
</tr>
</tbody>
</table>

“One should not conclude that – because NGI programme deals with pre-competitive research - companies have less interest in the results. In our consortium, companies come with research questions that are really relevant to the company. However, it took some time before the companies involved were rather open about their specific research needs, but due to the long period the NGI programme runs, there is time available for building trust amongst the partners and so ultimately the yield of the NGI-research will become much more valuable”.

3.1.2 Impact on cooperation and networking

The second impact factor deals with cooperation and networking. Figure 15 shows the results of the company’s opinions, which vary considerably between 'no contribution' and 'large contribution'. Overall the main contribution for companies is the improvement or consolidation of the cooperation with the research groups in the consortia. Also the collaboration with other companies is appreciated, as is the improvement of the networking skills of the company’s own research staff.

Figure 15 Impact on cooperation and networking (n=27)

When comparing the different clusters, the companies in the Agrofood and Enabling Technologies Clusters show the largest benefits for this impact factor. The benefit on this factor is the smallest for the companies in the Health and Safety Clusters and the Sustainability Cluster takes a center position.

“Participating in the NGI programme really made a difference for our company: without it we would have done less analyses and in the end we found have generated less turnover. There might have been alternative routes, but the NGI programme fitted perfectly with our needs. Also in the long term the NGI programme is important, it is has initialised lots of other developments in its slipstream. It is only the top of an iceberg”.

3.1.3 Impact on companies’ output performance

The last impact factor deals with the impact on the companies’ output performance. The reputation and visibility of the company is considered to be the most important contribution for the participating companies. Another relevant contribution is to the development of new products, services or processes. The other types of performance parameters listed (see Figure 16) are not considered to be very important to the companies’ participation in genomics consortia.

Figure 16 Impact on output performance (n=27)

Contrary to the other impact factors, for this impact factor the companies in the Health Cluster report relatively high benefits. Also the Agrofood Cluster shows some high scores on parameters of this impact factor (new/improved products and services, and turnover through more efficient production processes). The Safety Cluster’s companies score relatively low on the parameters of this impact factor and the other two clusters take a center position.

3.2 Impact on companies in quantitative terms

The companies have been asked to estimate the value of the contribution that the NGI centre made to the company, thereby summarising the contributions in terms of R&D, networking and cooperation and output performance in quantitative terms, i.e. in euros. Unfortunately, the response rate to this question was too low to make a proper analysis.
In the study made for the VIRGO consortium, not only the three companies in the consortium, but also the 30 industrial partners were included. Of these 33 companies, 18 cooperated in the VIRGO study and 7 of them gave an estimate of the value that VIRGO contributed to their company. The total value of the contribution to these 7 companies was 41 M€, an average of 0.58 M€ per company.

3.3 ‘What if no NGI’

The participating companies were asked to answer the question for the hypothetical situation in which there was no national genomics programme as the one run by NGI and there would have been no genomics consortia for the companies to participate in: “What would you have missed the most?”

This question was both addressed in the interviews and in the survey amongst companies participating in the genomics centres’ consortia. This section presents the results of these two investigations.

The 24 survey respondents that answered this question mention three major contributions of the NGI programme that they would have missed. Summarised in the answer of one of the respondents (Sustainability Cluster) these include: “State-of-the-art scientific information, network with world class scientists in microbial systems biology and access to good students/candidates”.

The opinions of the respondents are rather consistent; there are no differences between the clusters. We present them in more detail below:

First of all, participation in consortia gives companies a relatively easy opportunity to keep up-to-date with the most recent developments in the field of genomics: without NGI they would have missed getting easy access to fundamental scientific knowledge and to genomics technological platforms that represent a broad spectrum of genomics technologies. Also they would have missed hands-on knowledge on the use of these technologies for the companies’ specific research issues. Without NGI the companies’ level of knowledge on genomics would have been much lower. Also, NGI research shows alternatives to company approaches to specific scientific or technological issues and it provides them with know how about potential applications.

In a couple of interviews with participating companies it was mentioned that a number of research efforts are only possible in a public-private-partnership setting. Reasons for this are the fundamental character of the research, which involves too many risks for a single company and the large-scale character of some of the research. One example that illustrates this scale aspect is the access to and use of large population cohorts (either healthy people or patients) in the validation of new technological breakthroughs. A single company does not have the access to these types of cohorts in a research environment (“It is unimaginable that a single company can investigate large population cohorts on its own”). Another example is the clinical validation of new technologies that require close collaboration with research organisations (universities and university medical centres).

The second and equally important aspect companies would miss most is the network and collaborations with other companies and with research organisations (universities and university medical centres). Participation in a genomics consortium is considered to be an easy way to establish relationships with companies they had not yet been in contact with before. As one company in the Sustainability Cluster mentioned: “We would have missed new developments and market opportunities in the field of genomics based tool development for food, feed, agriculture and ecology. No options

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8 Only one of the 24 respondents (Health Cluster) would not have missed NGI that much. The respondent indicated that: "The program is a nice complement: the research outcomes confirm what we had already found".
to link up with big biotech industry for co-development of factory-of-the future concepts and bio-based sustainability evaluation”.

If ‘No NGI programme’:

- > “It would have taken us much more time to develop and integrate the new genomics-based technologies and methods in our R&D programmes. Although we are a large company, with a relatively large R&D capacity, it still is a tour-de-force to apply new technology platforms.

The access to new technologies is not only nice to have, but is absolutely a need to have. Unable to do it yourself; here public programmes play key role. Is ultimately leading to new insights for businesses. The main role of NGI is development of new platform technologies, the last 20% is for applying this in application oriented research projects”.

- > “We would have to appoint an additional investigator for the two specific fields that are of our interest in the NGI centre’s research programme’ For the whole period this would amount to 500 k Euros”.

A third, important aspect is the access to (young) skilled personnel. One of the most important outputs of participating in a genomics centre is the future availability of highly skilled personnel by means of training of PhDs but also students and post docs, which ultimately can be recruited within one of the companies. In line with this, one of the company interviewees mentioned that due to participation in a genomics consortium their employees’ knowledge and expertise remain up to date and communication between ‘research’ and ‘application’ is made possible: “People in the consortium are accustomed to questions that are relevant for companies” and “people obtain a different view that can be used in their daily activities, which assists the innovation process”. In case no other public policy initiatives (e.g. other research funding programmes) should have created the right preconditions for the training of highly skilled people in the genomics domain, the effect of a situation without NGI would have been considerable. The availability of researchers is essential for maintaining a viable knowledge infrastructure. Another element that would not have been taken place in the situation without NGI is the transfer of either young or senior scientists to industry partners.
4. Multiplier effects

In this section the quantitative data that have been presented above will be used to calculate the multiplier effects of NGI, for each cluster. This calculation will distinguish between the effects that support the research activities within the NGI centres (internal outcomes) and the effects on the companies in the consortium (external outcomes). The first is referred to as the internal multiplier (4.1), while the latter is referred to as the external multiplier (4.2).

4.1 Internal multiplier

The values of the two internal multipliers are shown in Figure 17. The multiplying effect of the investments in the various NGI clusters differs considerably. The Sustainability Cluster shows the highest value for the Internal Multiplier (including the matching funds): 7.1. This means that for each euro that is invested by NGI in the Sustainability Cluster the research groups in the cluster have generated another 7.1 euro that can be used for its research activities. The Agrofood and Health Clusters complete the Top-3; both have an Internal Multiplier value of above 6. The internal multipliers of the Safety and Enabling Technologies Clusters are significantly lower: 2.3 and 1.1 respectively. It has to be mentioned that CSG (which is included in the Enabling Technologies Cluster) does not have a matching obligation like the other centres.

Figure 17 Internal multipliers of NGI investments

<table>
<thead>
<tr>
<th>Multiplier</th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability</th>
<th>Safety</th>
<th>Enabling technologies*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal (incl. matching)</td>
<td>6.1</td>
<td>6.5</td>
<td>7.1</td>
<td>2.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Internal (excl. matching)</td>
<td>4.5</td>
<td>5.4</td>
<td>5.8</td>
<td>0.5</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Source: Technopolis Analysis (2011)

* CSG has no matching obligations.

For the Health, Agrofood and Sustainability Clusters, matching represents between 1.1 and 1.6 of the Internal Multiplier. This means that even without the matching funds these clusters have been able to attract between 4.5 and 5.8 euro for every euro of NGI funding that was received. For the Safety and Enabling Clusters for every euro of NGI funding that the research groups in these clusters have received they were able to attract 50 and 40 cents respectively (Internal Multiplier, excluding matching funds).

These figures are considerably high. However, there are no benchmarking figures from similar programmes available on the basis of which an assessment can be made of the comparative performance of the NGI centres.

4.2 External multiplier

The external multiplier indicates to what extent the investments made by NGI lead to benefits for the companies that participate in the NGI centres’ consortia. Since not all companies in the consortia responded to our survey, there are too limited data for calculating the external multiplier.
It still takes 5 to 10 years for a new product to be developed. Although this is considerably reduced compared to earlier period when it cost 10 to 20 years; it still makes it very difficult to see concrete results based on the NGI centres’ research for our company at the moment.

One could measure the companies’ turnover at the start and at the end of the programme and consider this as a proxy for the effects and impact of participating in a centre, but the attribution remains difficult to assess.

However, the interaction with knowledge institutions is even more important. Universities are cut on all sides, our company – but also the others in the consortium - considers our investment as a means to maintain and improve a good research infrastructure in the Netherlands. The research environment is important for keeping the companies in the Netherlands and for attracting companies from abroad. The most negative effect of ‘no NGI programme’ would have been that no qualified researchers would have been educated. This is for our company one of the most important assets of the NGI programme”.

4.3 Discussion

The ultimate goal of the NGI programme is to create societal and economic value from genomics. The aim of this study was to measure the multiplier effect of the NGI programme: the benefits for the research organisations and companies that participate in the NGI Centres’ consortia.

Although the external social and economic effects are the main argument for public intervention such as public research programmes, these effects are very difficult to assess. For that reason it was decided to collect not only quantitative data on the benefits of companies’ participation in NGI centres’ consortia, but also to collect qualitative information on the benefits for the companies. An important reason to collect also these qualitative data is that - due to both the multi-dimensional character of the benefits and the rather elaborated and probably also not very punctual methods for quantifying this - it is rather unlikely to expect from companies to do such quantitative calculations. And then we even haven’t addressed the attribution problems: is it the R&D- or the marketing department (or both) that has contributed to the success of a product on the market? A second reason is that by only producing a single multiplier figure (benefits divided by investments) the wide variety of benefits that participation in a centre has, would have been ignored. As the NGI research programme is mainly dealing with pre-competitive, basic research and development of technologies, the benefits are expected to be more in the realm of R&D and networking than in terms of extra turnover or more jobs. The results of the survey showed that the improvement of cooperation with research groups and with other companies in the consortia and the attraction of qualified research staff are considered of large importance by most companies.

Unfortunately, our expectations about a low response on the ‘quantitative’ question were confirmed and only a few companies provided quantitative data. To be able to calculate a quantitative external multiplier score for the full second phase (2008-2012), it is advised that this information from participating companies is directly collected by the NGI centres and included in the (annual) monitoring reports of the NGI centres.
Appendix A Data for period 2002-2007

### A.1 NGI investments in the NGI centres for the period 2002-2007

<table>
<thead>
<tr>
<th></th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability</th>
<th>Safety</th>
<th>Enabling technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
<td>350 k€</td>
</tr>
<tr>
<td>2003</td>
<td>3,506 k€</td>
<td>1,955 k€</td>
<td>2,676 k€</td>
<td>0 k€</td>
<td>2,460 k€</td>
</tr>
<tr>
<td>2004</td>
<td>10,635 k€</td>
<td>3,740 k€</td>
<td>3,990 k€</td>
<td>1,000 k€</td>
<td>7,109 k€</td>
</tr>
<tr>
<td>2005</td>
<td>10,018 k€</td>
<td>3,159 k€</td>
<td>4,852 k€</td>
<td>0 k€</td>
<td>8,137 k€</td>
</tr>
<tr>
<td>2006</td>
<td>10,155 k€</td>
<td>3,894 k€</td>
<td>6,619 k€</td>
<td>1,000 k€</td>
<td>9,818 k€</td>
</tr>
<tr>
<td>2007</td>
<td>8,085 k€</td>
<td>4,244 k€</td>
<td>5,545 k€</td>
<td>0 k€</td>
<td>10,187 k€</td>
</tr>
<tr>
<td>Total</td>
<td>42,400 k€</td>
<td>16,992 k€</td>
<td>23,681 k€</td>
<td>2,000 k€</td>
<td>38,060 k€</td>
</tr>
</tbody>
</table>

Source: Reported by NGI centres (2011).

### A.2 Matching by research organisations in the NGI centres, for the period 2002-2007

<table>
<thead>
<tr>
<th></th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability</th>
<th>Safety</th>
<th>Enabling technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2003</td>
<td>4,214 k€</td>
<td>7,969 k€</td>
<td>2,559 k€</td>
<td>0 k€</td>
<td>5,235 k€</td>
</tr>
<tr>
<td>2004</td>
<td>8,872 k€</td>
<td>7,252 k€</td>
<td>3,700 k€</td>
<td>0 k€</td>
<td>8,633 k€</td>
</tr>
<tr>
<td>2005</td>
<td>12,191 k€</td>
<td>5,428 k€</td>
<td>3,498 k€</td>
<td>0 k€</td>
<td>11,624 k€</td>
</tr>
<tr>
<td>2006</td>
<td>14,319 k€</td>
<td>4,219 k€</td>
<td>4,488 k€</td>
<td>0 k€</td>
<td>12,345 k€</td>
</tr>
<tr>
<td>2007</td>
<td>14,823 k€</td>
<td>3,250 k€</td>
<td>5,578 k€</td>
<td>0 k€</td>
<td>13,537 k€</td>
</tr>
<tr>
<td>Total</td>
<td>54,419 k€</td>
<td>28,128 k€</td>
<td>19,814 k€</td>
<td>0 k€</td>
<td>51,376 k€</td>
</tr>
</tbody>
</table>

Source: Reported by NGI centres (2011).

### A.3 Matching by companies in the NGI centres’ consortia, for the period 2002-2007

<table>
<thead>
<tr>
<th></th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability</th>
<th>Safety</th>
<th>Enabling technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2003</td>
<td>2,602 k€</td>
<td>694 k€</td>
<td>2,277 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2004</td>
<td>3,751 k€</td>
<td>1,328 k€</td>
<td>3,211 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2005</td>
<td>4,904 k€</td>
<td>1,122 k€</td>
<td>1,905 k€</td>
<td>0 k€</td>
<td>0 k€</td>
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<td>2006</td>
<td>3,850 k€</td>
<td>1,387 k€</td>
<td>3,119 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2007</td>
<td>3,981 k€</td>
<td>1,507 k€</td>
<td>997 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>Total</td>
<td>17,887 k€</td>
<td>6,038 k€</td>
<td>11,509 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
</tbody>
</table>

Source: Reported by NGI centres (2011).
## A.4 Income from contract research, for the period 2002-2007

<table>
<thead>
<tr>
<th>Year</th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability</th>
<th>Safety</th>
<th>Enabling technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2003</td>
<td>0 k€</td>
<td>6.819 k€</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2004</td>
<td>63 k€</td>
<td>6.819 k€</td>
<td>79 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2005</td>
<td>8.858 k€</td>
<td>6.819 k€</td>
<td>129 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2006</td>
<td>837 k€</td>
<td>6.819 k€</td>
<td>139 k€</td>
<td>2.800 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2007</td>
<td>31 k€</td>
<td>6.819 k€</td>
<td>1,406 k€</td>
<td>678 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>Total</td>
<td>9,789 k€</td>
<td>34,093 k€</td>
<td>1,753 k€</td>
<td>3,478 k€</td>
<td>0 k€</td>
</tr>
</tbody>
</table>

Source: Reported by NGI centres (2011).

## A.5 Income from public grants, for the period 2002-2007

<table>
<thead>
<tr>
<th>Year</th>
<th>Health</th>
<th>Agrofood</th>
<th>Sustainability</th>
<th>Safety</th>
<th>Enabling technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2003</td>
<td>182 k€</td>
<td>11,220 k€</td>
<td>526 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2004</td>
<td>6,557 k€</td>
<td>11,220 k€</td>
<td>961 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>2005</td>
<td>6,362 k€</td>
<td>11,220 k€</td>
<td>3,104 k€</td>
<td>0 k€</td>
<td>287 k€</td>
</tr>
<tr>
<td>2006</td>
<td>8,185 k€</td>
<td>11,220 k€</td>
<td>3,947 k€</td>
<td>0 k€</td>
<td>41 k€</td>
</tr>
<tr>
<td>2007</td>
<td>14,923 k€</td>
<td>11,220 k€</td>
<td>6,453 k€</td>
<td>0 k€</td>
<td>0 k€</td>
</tr>
<tr>
<td>Total</td>
<td>36,209 k€</td>
<td>56,099 k€</td>
<td>14,991 k€</td>
<td>0 k€</td>
<td>328 k€</td>
</tr>
</tbody>
</table>

Source: Reported by NGI centres (2011).
Appendix B Scatterplot of average scores of clusters, per parameter

B.1 Impact on R&D activities

... keep up with newest developments in genomics research and technologies
... use the complementary knowledge of the research groups in the consortium
... use the research facilities of the research groups in the consortium
... attracting new public funds for the company’s research activities (new projects with old/new partners)
... decrease of specific research activities
... the lowering of the risks of R&D-projects
... breakthroughs in R&D-projects
... upgrade the company’s technical research facilities
... at an earlier time, determine the results of company’s research project(s) and make (des) investments decisions
... at an earlier time, determine IPR possibilities (freedom to operate)
... a decision to keep the company’s R&D activities in the Netherlands
... a decision to find a better location for the company’s R&D activities within the Netherlands
### B.2 Impact on cooperation and networking

- ... improve/consolidate cooperation with research groups in the consortium
- ... improve/consolidate cooperation with other companies in the consortium
- ... improve the networking skills of the company’s research staff
- ... at an earlier time, find new research group partners
- ... attract qualified research staff
- ... at an earlier time, find new commercial partners

![Graph showing the impact of NGI investments on cooperation and networking](image-url)
B.3 Impact on output performance

- The reputation/visibility of your company
- The development of new or improved products and/or services
- The development of new or improved processes
- The company’s turnover through new or improved products and/or services
- Attract new customers, find new markets
- Shorten the time-to-market of products and/or services
- Increase the market share
- Profit from (exclusive) licenses to the NGI centre’s patents
- The turnover through more efficient production processes
## Appendix C Overview of interviewees

<table>
<thead>
<tr>
<th>Company</th>
<th>Name of interviewee</th>
<th>Participation in NGI centre(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioclear</td>
<td>Sytze Keuning</td>
<td>EC</td>
</tr>
<tr>
<td>De Halm</td>
<td>Rob van de Berg</td>
<td>CDC</td>
</tr>
<tr>
<td>DSM</td>
<td>Roel Bovenberg</td>
<td>KC, CDC, NBIC, NMC, NNC, NCHA</td>
</tr>
<tr>
<td>FrieslandCampina</td>
<td>Rolf Bos</td>
<td>KC, NNC</td>
</tr>
<tr>
<td>Monsanto</td>
<td>Rolf Folkertsma</td>
<td>CBSG</td>
</tr>
<tr>
<td>Pamgene</td>
<td>Tim Kievits en Rob Ruitenbeek</td>
<td>NTC</td>
</tr>
<tr>
<td>Philips</td>
<td>Hans Hofstraat</td>
<td>NBIC, NCHA</td>
</tr>
<tr>
<td>Rijk Zwaan</td>
<td>Jack de Wit</td>
<td>CBSG</td>
</tr>
<tr>
<td>Unilever Research</td>
<td>Rob Hamer</td>
<td>NCHA, NMC, NNC, NTC</td>
</tr>
</tbody>
</table>
Appendix D Questions of the web-based survey

Research and Development
1. To what extent has your company’s participation in the [name of centre] contributed to ... (1 = no contribution - 5 = very large contribution)
   - ... keep up with newest developments in genomics research and technologies
   - ... breakthroughs in R&D-projects
   - ... the lowering of the risks of R&D-projects
   - ... decrease of specific research activities
   - ... at an earlier time, determine the results of company’s research project(s) and make (des) investments decisions
   - ... at an earlier time, determine IPR possibilities (freedom to operate)
   - ... attracting new public funds for the company’s research activities (new projects with old/new partners)
   - ... use the complementary knowledge of the research groups in the consortium
   - ... use the research facilities of the research groups in the consortium
   - ... upgrade the company’s technical research facilities
   - ... a decision to find a better location for the company’s R&D activities within the Netherlands
   - ... a decision to keep the company’s R&D activities in the Netherlands

Competencies
2. To what extent has your company’s participation in the [name of centre] contributed to ... (1 = no contribution - 5 = very large contribution)
   - ... improve/consolidate cooperation with research groups in the consortium
   - ... improve/consolidate cooperation with other companies in the consortium
   - ... improve the networking skills of the company’s research staff
   - ... at an earlier time, find new research group partners
   - ... at an earlier time, find new commercial partners

Performance
3. To what extent has your company’s participation in the [name of centre] contributed to or is your participation expected to contribute within the next three years to ... (1 = no contribution - 5 = very large contribution)
   - ... profit from (exclusive) licenses to the [name of centre]’s patents
   - ... shorten the time-to-market of products and/or services
   - ... the development of new or improved products and/or services
   - ... the development of new or improved processes
   - ... the company’s turnover through new or improved products and/or services
... the turnover through more efficient production processes
... attract new customers, find new markets
... increase the market share
... the reputation/visibility of your company

**Overall contribution of the [name of centre] to company**

4. Considering the various contributions of the [name of centre] to your company for the categories mentioned above (Research & Development, Competencies, Performance) since your company joined the consortium:
   - Could you give as a rough estimate of the total contribution (cost reductions plus extra income) in €?

**Added value of the [name of centre]**

5. In case there would have been no Netherlands Genomics Initiative and thus no [name of centre] to participate in, what would your company have missed the most?

**Matching funds of the [name of centre]**

6. Companies that participate in NGI Centre’s consortia have to fund part of the costs; together with the research organisations in the consortia they match the funds provided by NGI.
   - What was your company's total contribution in cash to the [name of centre]? (in €)
   - Was this contribution paid from the existing company R&D-budget or from additional resources, specifically allocated for the [name of centre]?
     - Existing resources
     - Additional resources
     - Please explain
   - Companies may also contribute in kind. Has your company contributed in kind? And if so, what type of contribution?
     - No
     - Yes, providing equipment, materials, etc. to the [name of centre]
     - Yes, performing certain activities for the [name of centre]
     - Yes, other (please specify)

If yes, what was your company's total contribution in kind to the [name of centre]? (in €)