

November 14, 2011

Midterm Review of NGI

Report of the Review Committee

Midterm Review NGI

Report of the Review Committee

Review Committee:

Prof. dr. D.D. Breimer	Past Rector Magnificus & President of Leiden University, The Netherlands, Chairman
Dr. J. Bury	CEO, Flemish Institute of Biotechnology (VIB), Belgium
R. Camacho Fumanal	Director Genome Spain, Spain
Dr. M. Godbout	Former president of Genome Canada, Canada
Dr. T. Hooymans	Member of the board of TNO, The Netherlands
Prof. dr. M. Leptin	European Molecular Biology Organization, Germany
Prof. dr. E. Meijer	Corporate Director Research & Development, FrieslandCampina, The Netherlands
Prof. dr. ir. R. Rabbinge	Wageningen University, The Netherlands
Dr. J. Romanainen	Tekes, the Finnish Funding Agency for Technology and Innovation, Finland

Secretariat:

Dr. C. Enzing
B. Mostert
W. Vullings

Table of Contents

1. Introduction	3
1.1 Background and charge to the Review Committee	3
1.2 Review questions	4
1.3 This report	4
<hr/>	
2. Key questions of the NGI Midterm Review	5
2.1 Impressive results and impact	5
2.2 A coherent genomics infrastructure	6
2.3 Efficient focus on set goals	6
2.4 Coordinative efforts aimed at stakeholder satisfaction	6
2.5 Consolidation and embedding the centres needs increased attention	7
2.6 NGI: effective model	7
<hr/>	
3. Science, Innovation and Society	9
3.1 Research and infrastructure	9
3.2 Valorisation	10
3.3 Genomics and society	11
3.4 Talent	12
3.5 Internationalisation	13
<hr/>	
4. Recommendations	15
4.1 NGI as coordinative body and incubator	15
4.2 Research and infrastructure	15
4.3 Valorisation	16
4.4 Genomics and society	16
4.5 Talent	16
<hr/>	
Appendix A Agenda of the Review Committee meeting	19
Appendix B Sets of questions for the five themes	25

1. Introduction

1.1 Background and charge to the Review Committee

The Netherlands Genomics Initiative (NGI) was established in January 2002, with the aim to advancing the performance and application of genomics research in the Netherlands. The Dutch government provided NGI with a grant of €300 million in its first phase (2002-2007) to establish a structure to link high quality researchers and research centres, and to stimulate economic and social returns. In this phase, a strong emphasis was placed on food, multi-factorial diseases, infectious diseases, and sustainability. Besides this, technology and society were focus areas.

The first evaluation (midterm review) of NGI was carried out in 2005 and resulted in a positive assessment by the panel of international experts. One of the key recommendations of the panel for NGI was to continue its focus on strengthening critical mass, internationalisation, social and economic valorisation of research, and fostering the interaction between the social sciences and genomics research.

NGI's second phase (2008-2013) is currently under review. In this phase, NGI has put emphasis on further strengthening the knowledge base and on social research and public communication. Moreover, specific attention is paid to the valorisation of the results. In 2009 it was decided that NGI's existence would be prolonged by one year to the end of 2013. Up to this date, €280 million is invested by the government for this second phase.

This report presents the results of a review by an international committee of experts. The committee consisted of nine international experts with various backgrounds that covered both the scientific domains as the types of expertise relevant for running a national genomics or related programme. The committee was supported by a secretariat.

This review marked the last stage of the midterm review of NGI: after the review of the 16 NGI centres, the overall performance of NGI was evaluated. The Review Committee had the task to evaluate NGI as coordinating body and to formulate conclusions on the past period and recommendations for the remaining period. Since government funding for NGI will not be continued, the Review Committee was asked to specifically address the issue of anchoring the programme in the Dutch life sciences R&D infrastructure after 2013.

The review took place on October 4 and 5, 2011 in Amsterdam. During these two days representatives of the NGI centres, the NGI technology centres, the Centre for Society and Genomics (CSG), and of the Horizon programme were invited for an interview. Also, a few NGI valorisation managers, representatives of Dutch technological top institutes, members of the NGI Supervisory Board, the management of NWO, representatives of governmental departments, and from industry were interviewed. All interviewees are listed in the agenda of the meeting that is included in o.

Furthermore, a number of documents were at the disposal of the Review Committee including:

- Self-evaluation for the Midterm Review of the Netherlands Genomics Initiative. NGI management and Supervisory Board, 2011.
- Bibliometric study on Dutch NGI research centres (2001-2009/2010). Centre for Science and Technology Studies (CWTS) Leiden University, The Netherlands. 2011.
- Midterm review of all 16 NGI centres. Report of the Evaluation Committee. Technopolis BV, August, 2011.
- NGI business plan 2008-2012. NGI reaps the benefits of genomics. NGI, October, 2007.

- Effects of NGI investments, Technopolis BV, October, 2011.
- International Benchmark of NGI. Comparator organisations: EMBL, Genome Canada, Genoma España and VIB. Technopolis BV. October, 2011.

1.2 Review questions

The overall questions for the Midterm Review of NGI were:

- Can NGI be considered as an effective and efficient tool for the coordination of Dutch genomics research and its application in economy and society?
- Can this structure be recommended for the coordination of other scientific domains?

To answer these questions, seven key questions were formulated:

1. To what extent has NGI achieved the goals set in the business plan? What are the effects of the deployed and developed activities (intentional and unintentional)?
2. Have the conditions been created for a coherent genomics knowledge infrastructure – in which excellent research, enabling technologies, innovation and social embedding are approached integrally?
3. Is the method used by NGI sufficiently focused on achieving the set of goals? Are the resources used in proportion with the results?
4. Has NGI fulfilled its role as director, coordinator and liaison with policy makers and NWO to the satisfaction of the stakeholders in the field?
5. Is NGI sufficiently focused on embedding its activities?
6. What is the possible significance of the experiences with NGI as regulatory/directive body for other areas of science policy?
7. What are the recommendations for the period following 2013 for the field of genomics, with the focus on: further entrenchment and consolidation of what has been achieved/started up thanks to NGI and avoidance of (potential) loss of what now can be seen as being of value from the effects of NGI's work?

In addition, a set of sub-questions was formulated for each of the five specific themes of the Midterm Review of NGI: research and infrastructure, valorisation, genomics and society, talent and internationalisation. Annex B holds the table including these sets of questions.

1.3 This report

This report presents the main conclusions and recommendations of the Review Committee. Chapter 2 addresses the main conclusions, in terms of answer to the key questions of the evaluation. In Chapter 3, for each of the five themes, conclusions are drawn following the issues that are addressed in the questions of each theme. Chapter 4 presents the recommendations, both those addressing NGI as a coordination and directive body and those addressing the themes.

2. Key questions of the NGI Midterm Review

This chapter presents the main conclusions of the assessment by the Review Committee for the key questions. The recommendations based on these conclusions (that are asked for in Key Question 7) are included in the final chapter (4) of this report.

2.1 Impressive results and impact

To what extent has NGI achieved the goals set in the business plan? What have been the effects of the deployed and developed activities (intentional and unintentional)?

It is the unanimous opinion of the Review Committee that NGI is well underway to achieve the goals set in the business plan and that the activities in terms of their outputs so far have been highly successful.

The committee concludes that:

- NGI has performed very well in genomics research, exceeding the targets for publications, both in terms of quantity (numbers) as well as quality (high impact journals). This is shown by the results of the bibliometric analysis by CWTS, the evaluation of the NGI centres, and the international benchmark.
- NGI has achieved positive results in terms of valorisation. The organisation has strongly contributed to positive awareness towards valorisation of scientific results. The valorisation outputs are right on track. Additional revenues from new collaborations with private parties are higher than expected and growing strongly.
- The Dutch genomics community has made a remarkable awareness shift towards understanding the value of valorisation and intellectual property, while the industry has shown growing engagement by increased participating in the various programmes. The success factors for this development are the reinforced valorisation efforts of NGI in (almost) every centre, including the targeted valorisation budget.
- The NGI organisation has proved to be lean and very effective, as it has shown a great adaptive capability by identifying weaknesses in time and by re-addressing budgets when needed, as well as by identifying new needs and opportunities. The organisation carries a relatively low overhead.
- NGI has put increasing focus on outreach and dissemination of research results through public communication and education and thereby also contributed to the societal understanding and value of genomics in a broader sense.
- NGI has been successful in creating a trans-disciplinary approach to genomics and life sciences by bringing together researchers from different disciplines.
- NGI has undertaken various successful initiatives in education and talent development. The organisation nurtured a large number of PhD students, and organised several events specifically for talented researchers in the life sciences.
- NGI has facilitated international linkages and collaboration by facilitating the participation of NGI centres in several European and international programmes and networks.

Overall, the Review Committee's view is that output is higher and has more impact than originally planned and has thereby exceeded expectations.

2.2 A coherent genomics infrastructure

Have the conditions been created for a coherent genomics knowledge infrastructure – in which excellent research, enabling technologies, innovation and social embedding are approached integrally?

NGI has proved to be highly successful in creating the conditions for a coherent genomics knowledge infrastructure, in which excellent research, enabling technologies, valorisation, and social embedding are integrally approached and organised. NGI has played an important role in coordinating and integrating all these different functions of the national genomics programme. With respect to valorisation NGI has made much progress in creating greater awareness among genomics researchers about the importance of valorisations and especially of intellectual property rights.

Within this infrastructure also a culture of collaboration beyond the borders of the centres has been created. Collaboration between the NGI centres as well as with other research organisations such as with Dutch top institutes (food and nutrition, green genetics) and research consortia in specific fields (industrial biotechnology) have been intensified. Moreover, the NGI technology centres have become key actors in the Netherlands genomics network and beyond.

2.3 Efficient focus on set goals

Is the method used by NGI sufficiently focused on achieving the set goals? Are the resources used in proportion with the results?

In particular the matrix structure of NGI, in which the (enabling) technology centres and the Centre for Society and Genomics cooperate with the other centres has proved its value and has been very supportive for NGI to become a very effective organisation. The technology centres provide the most advanced platforms and services from which the other centres benefit.

NGI has developed a systematic process to explore new scientific and technological trends in life sciences and initiated new centres, monitors ongoing activities and evaluates on a regular basis the outputs and outcomes of these activities. Furthermore, NGI showed a great adaptive capability by reacting in a timely manner to identified weaknesses and by re-addressing budgets accordingly.

The Review Committee argues that NGI really made a difference in terms of starting a number of new research initiatives that are likely to develop into full research programmes, many of them in the form of public private partnerships (PPPs). This incubator concept, developed by NGI, has provided clear evidence that new research-based PPPs can be effectively developed in new areas of research by launching and developing them within an incubator for a restricted number of years after which they can and have to become more self-supporting or become part of the life sciences R&D infrastructure.

The overhead of the NGI organisation is 3%, which is low compared to other organisations worldwide, and which the committee believes is very commendable.

2.4 Coordinative efforts aimed at stakeholder satisfaction

Has NGI fulfilled its role as director, coordinator and liaison with policy makers and NWO to the satisfaction of the stakeholders in the field?

The NGI organisation has been effective and successful in directing and coordinating the research programme, supporting necessary activities aimed at optimal valorisation and communication to stakeholders in research, economy and society at large. It has effectively mediated between policymakers, research organisations, industry, and other stakeholders.

In recent years, NGI expanded its scope beyond genomics, towards the life sciences. It took the lead in elaborating and implementing a vision for the life sciences, specifically focussing on the role of PPPs in serving some of the specific industrial (top) sectors in the Netherlands.

However, the Review Committee feels that in the coming two years NGI as a coordinating body should become even more proactive in further liaising with policymakers in the relevant stakeholder organisations in order to make sure that the research programmes are securely embedded in the research infrastructure in The Netherlands.

2.5 Consolidation and embedding the centres needs increased attention

Is the NGI organisation sufficiently focused on embedding its activities?

The Review Committee recognises that while at the start of the second phase of NGI little attention was paid to exit strategies, there is currently within the NGI centres much focus on their sustainability and embedding in the future. NGI has shown considerable efforts in stimulating the centres to reflect on their future and secure embedding in the Dutch infrastructure, and their future funding. Some NGI-centres have already been rather successful in this respect. The four technology centres are in the process of establishing the *Dutch Techcentre for Life Sciences* (DTL), which is a good step to create greater strength and visibility. However, the technology centres will be most vulnerable to non-continuity if no specific measures will be taken to allow them survive when the current funding mechanisms will cease to exist.

Overall the committee has great concerns about the potential risk of losing the momentum in terms of considerable scientific and societal value that NGI and its centres have gained. The committee concludes that NGI's Supervisory Board and other policy makers (including NWO) that have been interviewed miss a sense of urgency on securing and fostering what NGI has achieved.

2.6 NGI: effective model

What is the possible significance of the experiences of the NGI organisation as a directive body for other areas of science policy?

The Review Committee sees the matrix as well as the incubator model developed by NGI as potentially very interesting, to be adopted by other fields that have similar characteristics as genomics: a combination of a strong element of excellent basic research, a key technological component and a long enough time scale that is necessary for the full development of these types of research fields. Although the committee applauds the achievements of NGI and the advantages of this model, it also should be acknowledged that such a model has its limitations. It should only be applied in those fields that are really fit for it; for those reasons such fields should be carefully selected.

3. Science, Innovation and Society

The Review Committee has reviewed five specific aspects of NGI: Research and Infrastructure, Valorisation, Genomics and Society, Talent and Internationalisation. This chapter presents the results of this assessment, in terms of the conclusions on the items addressed in the specific set questions for each aspect (see the table in Annex B). The recommendations based on these conclusions are presented in Chapter 4.

3.1 Research and infrastructure

Overall, the Review Committee feels that NGI has performed very well regarding research and infrastructure development. The committee is very positive about the impulse funding through NGI in the field of genomics. The Dutch government allowed investments in excellent science, collaboration, valorisation, and infrastructure in the genomics domain. This impulse has given the life sciences domain in the Netherlands a great boost.

3.1.1 Selection method

With respect to the selection of the new centres, independent external high-level scientific expert panels played an important role in the selection process. These panels judged all submitted plans very good to excellent. The bibliometric analysis of CWTS (August, 2011) shows that the scientific performance of the NGI centres is very high: all centres have increased their outputs in terms of number of publications since their start. With respect to their quality (impact compared to world citation average in field) they all performed well above the world average in their field of research. For only a few the impact figures decreased, all others stayed on the same high level or improved their performance. The Midterm Review of the 16 NGI centres (May, 2011) showed that the Evaluation Committee that had assessed the centres judged positively on the performance of each of the centres with varying degrees of valuation.

The Review Committee acknowledges NGI's appropriate actions by identifying weaknesses and opportunities and by re-addressing budgets when needed.

3.1.2 Technology centres

The CWTS study showed that the technology centres play a central role in the Dutch genomics network (based on co-author analysis of publications). The committee considers this as proof of their relevance for Dutch life sciences research. However the Review Committee wishes to express great concern about the future of these centres: they are of great value, not only for the other NGI centres with whom they cooperate, but also for industrial partners and the further development of the life sciences in The Netherlands at large. At this moment in time there seems to be no guarantee that these high level life sciences technology platforms will remain to exist when current funding mechanisms will stop. Within the portfolio of Dutch research programmes there is currently no suitable instrument available that would address the typical role of technology platforms.

The four technology centres – in the process of being united in the Dutch Techcentres for Life Sciences (DTL) - have made a serious attempt to create uniformity in their strategies in developing and offering high quality research support with cutting edge technologies. The committee supports this approach of establishing DTL as national technology platform, which will serve research groups in universities as well as other public research institutes and private partners. A suitable (complementary) business model for exploiting the expertise and technologies developed in these centres is needed urgently.

3.1.3 Incubator for innovative research policies

The committee appreciates the innovative character of the research conducted in the NGI centres that should be fostered towards the future. Furthermore, it is much appreciated that NGI created great awareness among the scientific community about the importance of valorisation of scientific results.

The committee believes that a coordinating body such as NGI is essential for maintaining and further advancing this excellent life sciences and technologies infrastructure that was built in the Netherlands. The fact that the centres are integrated under one 'umbrella' organisation is considered a core strength as it enables a rapid and effective adoption of new scientific and technological developments and assists in advocating the future relevance of the field.

The booster grants are a smart way to react to new trends and developments in life sciences and technologies and to start new PPPs. In 2010, NGI issued an open call for proposals for new consortia in the areas of personalised diagnostics, sustainable production of fuels, chemicals and materials, or food security in combination with either epigenetic, next-generation sequencing or synthetic biology, as relatively new technology platforms.

NGI functions as an incubator for new PPPs in life sciences, in which the participation and contribution of industry increases as the programme progresses. After some period the specific technology and research fields have gained critical quality and mass and can spinout of the NGI community and get embedded in the Dutch life sciences and technology infrastructure.

3.1.4 Embedding the centres in the Dutch Life Sciences Infrastructure

The Review Committee acknowledges that one of the largest challenges for NGI for the coming period is to embed the NGI centres in the Dutch life sciences infrastructure. The committee concludes that the centres are aware of the necessity to find a new institutional embedding and alternative funding. However, the committee fears that without increased coordinated and proactive efforts of NGI and its Supervisory Board, some centres will not be able to make the transition by the end of 2013.

3.2 Valorisation

3.2.1 Valorisation achievements

The Review Committee praises the enormous boost that NGI has given to creating awareness about valorisation in general and more in particular on the importance of intellectual property, amongst the genomics scientific community. Since the second phase started much progress has been made. The realisation of the economic targets set for each NGI centre (such as patents, spin-offs, new public and private projects) is very well on track.

The range of tools that NGI applies to stimulate valorisation has proved to be very powerful - low investment, high catalyst - and can be considered as best practice. Each centre has a local valorisation officer and a valorisation budget; some are part of the local Technology Transfer Office (TTO). Due to NGI's efforts there is a network of valorisation professionals in the life sciences in the Netherlands, which the committee highly approves. NGI invests in the education of the valorisation officers by offering courses and training. Moreover, NGI supports start-up companies through 'life sciences@work', a full range of activities including coaching, pre-seed funding and training. NGI's valorisation activities are supported by the Valorisation Advisory Board, which provides NGI and the centres with strategic advice on valorisation. There is alignment with the national valorisation infrastructure and with regional initiatives, where NGI's activities are specifically focused on the life sciences.

However, the Review Committee also learned of the variation in quality of the local TTO's of NGI centres. Some of them are acting very professionally and are supported

by the board of the local research organisation (university, research institute), while others require substantial improvement.

The Review Committee has the opinion that an initiative should be taken to sustain the central role of the NGI technology transfer team once the financial support for NGI ceases to exist. If not, the Netherlands will face a significant loss in momentum in the valorisation of life sciences research.

3.2.2 Opinions of stakeholders

The companies involved in NGI centres' consortia see a growing importance in the continuation of the PPPs: it provides access to a community of high-level scientists and companies profit especially from the new technological platforms that are being developed. In addition, the Technopolis survey showed that there is an important impact on the companies' R&D activities, on cooperation with other research organisations and even in terms of contributing to new or improved products, services and processes (mainly for high-tech firms in the health cluster) and impact on the company's reputation (important for attracting good scientists).

Industries' involvement in the NGI consortia do not directly lead to extra profits, but instead to cost reductions. It is part of risk management: by participating in the NGI consortia, companies avoid the high costs of exploring and developing new technologies. The industry stakeholders perceive NGI as a catalyst for creating such high-level scientific and technological platforms, but have concerns about what will happen after 2013.

Not only the companies, but also research organisations profited from their participation in the NGI programme: they obtained considerable extra income from new projects with industry partners (contract research), new publicly funded projects and patents and spin-offs based on the NGI research programme.

Since PPPs are a typical Dutch feature, the Review Committee wishes to express a concern towards the future. Most companies act globally and participate in high quality pre-competitive research where it is most excellent regardless of its physical location. There is a risk that after 2013 these global companies (that already have research collaborations in other parts of the world) will move their focus away from The Netherlands if the current excellent research conditions cannot be maintained.

Finally, the Review Committee believes that the current size of the NGI valorisation award (€ 1 million) is very substantial. NGI may reconsider to use parts of this resource to fund other valorisation activities in the last few years of its existence such as Zenith projects (part of Horizon programme).

3.3 Genomics and society

3.3.1 Achievements

The Review Committee was impressed with the results achieved by the Centre for Society and Genomics (CSG). It is relatively unique in its objectives; genomics initiatives in other countries do not have such centres. CSG, responsible for NGI's societal research, has met most of its targets. It has not only put societal aspects on the research agenda, but has done so in an integrated manner with science and valorisation. Research subjects are being chosen that address ethical and societal issues not only in the medical field but also in other fields. Also more generic issues are addressed, such as IPR, open sources, sharing facilities and education.

3.3.2 Collaboration

CSG has pursued a trans-disciplinary approach by bringing together researchers from different disciplines (genomics, clinical sciences, social sciences, ethics/philosophy, etc). This collaboration between researchers from different disciplines has not grown spontaneously: it took time, critical mass and engagement at the level of individual

centres. NGI has forced and facilitated this collaboration. An important success factor is that CSG researchers work closely together with genomics researchers, not only by regular meetings, but also especially by having a desk in or close to the laboratory where these genomics researchers work.

CSG has shown to be successful, not only when looking at the number of collaborations with other genomics centres and integration in such centres, but also in terms of the results of the collaboration. It is the opinion of the Review Committee that the CSG approach is a very strong concept and can function as a best practice for other research programmes and organisations, when societal relevance is to be an important part of their objectives.

3.3.3 Societal valorisation and communication

CSG's communication towards society is rather diverse. It has produced together with the other NGI centres over 1000 non-scientific publications that have appeared in Dutch newspapers and magazines and it has contributed to national radio and TV programmes, exhibitions, and presentations targeted to specific groups of the public. Dialogue meetings are organised, advisory reports are written, positions in some discussions are taken and communicated and, there are a few spin-off companies/organisations.

Practices developed by CSG have put societal issues on the agenda of scientists and of the general public. Also CSG projects have contributed to improvement of practices, such as the guidelines for medical practitioners, with potential impact on public health. The Review Committee applauds these activities because they contribute to a greater understanding among the general public of what genomics research is all about and its relevance in terms of beneficial applications. To what extent this objective has been achieved has not (yet) been measured but is considered a challenge for CSG in the coming years.

Several of the NGI centres that work with CSG appear to increasingly consider communication with society as important. When it comes to education, secondary schools show a growing interest in the mobile DNA labs. There is concern with the Review Committee as to who will take care of these travelling labs after 2013.

3.4 Talent

3.4.1 Achievements

The Horizon programme that is specially designed for young talented researchers in genomics and bioinformatics gives them the opportunity to start and develop their own line of research. Horizon projects are not linked to a specific NGI centre. The committee is impressed with the number of talented researchers, as shown by the large number of excellent applications to the programme. However, the application pressure is high; many very good proposals could not be financed. Especially the Breakthrough projects - for developing an innovative concept to the proof-of-concept phase - are highly praised: although they encompass relatively small amount of money (€ 100.000), they have resulted in many high ranked publications and several patents.

3.4.2 Embedding talent

The Horizon grant has enabled the attraction and retention of talent. It had a positive effect on the researchers' careers as - with a few exceptions -, all Horizon project leaders are still active in the Dutch life sciences. They intend to continue their line of research after completion of the Horizon project.

3.4.3 Contribution to valorisation

With its specific focus on valorisation, the Horizon programme is different from other Dutch talent programmes. The Horizon programme has promoted valorisation by linking a valorisation officer from the local (university) TTO to each of the projects.

The committee considers this of great value for the valorisation success so far. By now, valorisation results include 16 patent applications and three approved patents. Furthermore, two spin-off companies have been created from Breakthrough projects. Several projects resulted in collaboration agreements with industry to further test or develop the new concept or technology.

3.5 Internationalisation

NGI's internationalisation activities mainly focussed on supporting the international activities of some of the individual NGI centres. This includes grants for participation in European (Framework) programmes and for collaborative projects with research groups outside Europe. There is also a small budget for travel grants. By (co-) financing these international activities of NGI centres, NGI has facilitated some of them to play a leading role in their field of research in Europe and some to extend their network and market worldwide. The Review Committee endorses a further coordination role of NGI with respect to internationalisation because of its relevance to secure excellent research towards the future.

4. Recommendations

4.1 NGI as coordinative body and incubator

1. Recognising that the coordination efforts of NGI have proven to be of great added value, we encourage the Dutch government and other stakeholders to consider sustaining a coordinating body that carries on or substitutes NGI's functions when it formally will cease to exist. Possible business models range from the privatisation of the NGI organisation, to a not-for-profit corporation (foundation), helped by saving parts of the remaining resources to bridge a certain period in order to react to the future research policies in the context of the so-called top-sector approach of the Ministry of Economic Affairs, Agriculture and Innovation. There will be a need for a representative and trusted body that can advocate the interests of life sciences, technologies and innovation in the Netherlands. The possible role of NWO could be taken into account here as well.
2. There is a great risk in losing the momentum that NGI and its centres have gained, if no future funding mechanisms can be found. Therefore, the Review Committee urges NGI's Supervisory Board to show an increased ownership of this important issue, because this Board consists of representatives of key stakeholders organisations in society. They could take initiatives and - together with strategic decision makers and relevant stakeholders organisations (NWO, government, universities) - prepare the future path of NGI's coordinative role and functions. The challenge that needs to be met is to ensure sustainability of the investments made over the past 10 years.
3. In order to make NGI's success more visible, we recommend that NGI drafts and publishes a number of success stories (using both qualitative and quantitative data). These could function as show cases for presenting NGI's impact on the longer term and feed into the debate on the future embedding of NGI centres.
4. The incubator model (for PPPs) is a typical 'Dutch' model that has shown its success in the context of NGI. NWO should consider the adoption of the incubator model in other areas. These areas should be carefully selected, since not all areas may be suitable.

4.2 Research and infrastructure

5. We specifically recommend that NGI pursue the dialogue with the Dutch government and other stakeholder organisations about the need for the continuation of the technology centres. These centres truly strengthen the competitive edge of the Netherlands but are at the same time very vulnerable when current funding mechanisms will cease to exist.
6. It is recommended that the Ministries and NWO contribute to transitional funds until alternative instruments or business models have been implemented and the technology centres' future has been secured.
7. We urge DTL to develop a suitable business model with an international approach including fee-for-service concepts that will be sustainable for the period after 2013.
8. In addition, DTL should take the initiative to approach the relevant top sectors teams (agro-food, health, chemical industry) and find support for their plans by the top institutes and academia
9. In order to create continuity in the excellent research infrastructure that has been initiated by NGI, the researchers within the NGI centres could take a stronger role than so far, in coordinating life sciences research in the Netherlands and more

specifically in embedding the genomics research. This requires proactive engagement with some of the top sectors.

10. Overall the committee recommends a more coherent approach in research policy in The Netherlands. An integrated approach in which the specific funding programmes of government departments and research councils are matched based on a long-term strategy, would provide a continuity that also guarantees profiting most from the strong Dutch research base that has been created and is internationally widely recognised.

4.3 Valorisation

11. NGI has put serious efforts in building a professional valorisation organisation that has achieved considerable success. In the near future, these efforts have to be further increased in order for NGI to maximally capitalise on what has been achieved so far.
12. The quality of some TTOs should be improved. The committee recommends that NGI support further awareness of this issue among the universities, in order to educate TTOs to the desired standards. The valorisation officers of NGI should continue to share best practices. By further improving the network - with entrepreneurs and also VCs - rather than working as individual centres, optimal mutual benefit can be achieved.
13. Long-term investments in TTOs are needed. Local TTOs should get support by their university, as valorisation is now a (third) task of Dutch universities. Also there is a need for point of contact for industry, within each TTO.
14. The committee believes that the valorisation activities should be nurtured, also after 2013. It would be very unfortunate, for the future of life sciences valorisation in the Netherlands, if successful valorisation mechanisms cannot be continued. Over the next two years, NGI should explore the organisational and financial options to transfer its facilitating role in stimulating and facilitating valorisation in life sciences after 2013.
15. When presenting the outcomes and impacts of valorisation, NGI should also ask the NGI-centres to report on the number of new technologies adopted by the industry and the costs that have been saved by participating in the NGI centres. By doing so, NGI can increase the visibility of its impact.
16. The committee believes that the Dutch industry will continue investments in PPPs and other forms of collaboration. This requires the research to remain of excellent quality and the technology centres offering cutting edge new technologies.

4.4 Genomics and society

17. CSG has developed a very strong concept for trans-disciplinary research addressing societal and ethical issues related to genomics research. Its full societal impact is still to be evaluated. The committee recommends the Dutch research community to integrate this approach in other research domains with visible societal dimensions as well.
18. Societal valorisation can be further improved by addressing it in the training of all PhD students of the NGI consortium.
19. The very and important and popular travelling DNA-labs exhibits should be continued after 2013.

4.5 Talent

20. We strongly recommend the continuation of the Horizon programme in order to keep a high level of young talented researchers in the field of genomics and bioinformatics research in the Netherlands.

21. NWO should consider integration of the Horizon programme in existing schemes, such as the Innovation Research Incentives Scheme, under the conditions that valorisation is addressed already upfront and that the research is done in the research institution where the idea was generated so that it will be professionally supported by the local TTO.

Appendix A Agenda of the Review Committee meeting

Venue: Burgomaster Chamber
Sofitel Legend The Grand Hotel, Oudezijds Voorburgwal 197,
Amsterdam

Tuesday 4 October 2011

8:30 - 9:45 **NGI and the Midterm Review**

8:30 - 9:00 Welcome by Douwe Breimer, Chair of Committee MTR NGI,
Presentation of main questions for the evaluation

Introduction by Colja Laane (Director of NGI) on the Midterm
Review (MTR) of Netherlands Genomics Initiative (NGI)

9:00 – 9:30 Interviewing of Colja Laane and Wilma van Donselaar (Dpt
Director of NGI)

9:30-12:00 **Research and infrastructure: Part 1**

9:30 - 10:15 Presentation to the MTR Committee of evaluation questions
for this part: Douwe Breimer

Presentation to the MTR Committee of the most important
results of a number of studies and reports that have been
written to support the Committee's work:

- Self evaluation (for this part) by NGI: Wilma van Donselaar
- Review of NGI centres, report of the Evaluation Committee: Christien Enzing (Secretariat Committee, Technopolis)
- Bibliometric analysis of 16 NGI centres, by CWTS Leiden: Christien Enzing
- International benchmark (for this part), by Technopolis BV Amsterdam: Bastian Mostert (Secretariat Committee, Technopolis)

10:15 - 10:30 *Break*

10:30 - 11:15 Interviewing of directors of a number of NGI centres on
functioning of NGI and on embedding of the centre's activities
after 2013:

Cancer Genomics Centre (health)	Annelies Speksnijder
Netherlands Consortium for Healthy Ageing (health)	Eline Slagboom
Kluyver Centre (sustainability)	Jack Pronk
Centre for Biosystems Genomics (agro-food)	Robert Hall

11:15 - 12:00 Interviewing directors of a number of NGI technology centres on functioning of NGI and on embedding of the centre's activities after 2013:

Netherlands Proteomics Centre	Albert Heck
Netherlands Metabolomics Centre	Thomas Hankemeier
Netherlands Bioinformatics Centre	Ruben Kok
Netherlands Systems Biology Consortium	Roel van Driel

12:00 – 13:15 Lunch

13:15 – 16:15 Research and infrastructure: Part 2

13:15 - 14:15 Interviewing of public decision makers in the field of life sciences research in the Netherlands: Governmental Committee on NGI and directors of NWO, AgentschapNL and NWO

Governmental Committee (13:15-13:45)

Department of Education, Culture and Science (Unit OWB)	Jeannette de Ridder
Department of Health, Welfare and Sport	Frank Flier
Department of Economic Affairs, Agriculture and Innovation	Menno Horning

Public bodies in science and technology policy (13:45-14:15)

Netherlands Organisation for Scientific Research (NWO)	Hans de Groene
Agentschap NL	Willem Zwolve
NWO/ALW (Life Sciences)	Frans Martens

14:15 - 15:30 Interviewing of directors of technological top institutes and research organisations

Technological top institutes (14:15-14:45)

Translational Molecular Medicine	Peter Luiten
Green Genetics	Paul Hooykaas
Food & Nutrition	Jan Maat

Research organisations (14:45-15:30)

University of Utrecht	Gerrit van Meer
Leiden University Medical Centre	Eduard Klasen
Netherlands Cancer Institute (NKI)	Rene Bernards
Wageningen University, PSG	Ruud van den Bulk

15:30 – 15:45 *Break*

15:45 - 16:45 Discussion of the preliminary findings on Research and Infrastructure, and embedding, by the MTR Committee

16:45 - 18:15 **Genomics and Society**

16:45 - 17:00

- Presentation to the MTR Committee of the evaluation questions for this part: Douwe Breimer
- Presentation to the MTR Committee of the most important results of a number of studies and reports that have been written to support the Committee's work:
 - Self evaluation (for this part) by NGI: Wilma van Donselaar
 - Review of NGI centres (for this part), report of the Evaluation Committee: Christien Enzing
 - International benchmark (for this part), by Bastian Mostert

17:00 - 17:45 Interviewing of management and governing board of the NGI Centre for Society and Genomics (CSG) and of some principal investigators of other NGI centres:

Director CSG	Hub Zwart
Head Communications CSG	Frans van Dam
Governing Board of CSG (former NGI director)	Diederik Zijdeveld
PI CSG (/Kluyver Centre)	Daan Schuurbiers

PI CSG (/Centre for Medical Systems Biology)	Martina Cornell
----------------------------------------------	-----------------

17:45 - 18:15 Discussion of the preliminary findings on Genomics and Society, by the MTR Committee

19:30 Diner

Wednesday 5 October

9:00 - 10:00 Talent

9:00 - 9:15 - Presentation to the MTR Committee of the evaluation questions for this part: Douwe Breimer

- Presentation to the MTR Committee of the most important results of the self evaluation of NGI (for this part): Wilma van Donselaar

9:15 - 9:45 Interviewing of representatives of Horizon programme committee and the programme secretariat

Horizon programme committee	Jan Raaijmakers
Horizon programme secretariat	Rob Diemel

9:45 - 10:00 Discussion of the preliminary findings on Talent, by the MTR Committee

10:00 - 12:45 Valorisation

10:00 - 10:15 - Presentation to the MTR Committee of evaluation questions for this part: Douwe Breimer

- Presentation to the MTR Committee of the most important results of a number of studies and reports that have been written to support the Committee's work:

- Self evaluation (for this part) by NGI: Chretien Herben (Valorisation Manager NGI)
- Review of NGI centres, report of the Evaluation Committee, by Christien Enzing
- International benchmark (for this part), by Wieneke Vullings (Secretariat Committee, Technopolis)
- Multiplier of NGI investments, by Christien Enzing

10:15 - 11:00 Interviewing of a number of companies in the consortia of NGI centres:

MSD (Health)	Ton Rijnders
--------------	--------------

Unilever (Health, agro-food, technology)	Van Duynhoven
DSM (sustainability, technology)	Marian Driessen
RijkZwaan	<i>Jack de Wit (Cancelled)</i>

11:00 - 11:15 *Break*

11:15 - 12:00 Interviewing of valorisation managers of NGI and of local
TTO's:

Manager Valorisation of NGI	Chretien Herben
Manager Valorisation of TTO of Radboud University Nijmegen	Dorien Wellen
Manager Valorisation of TTO of University of Leiden	Laura MacDonald
Member of the Board of ASTP, Manager Valorisation of TTO NKI	Koen Verhoef

12:00 - 12:45 Discussion of the preliminary findings on Valorisation, by the
MTR Committee

12:45 - 13:45 **Lunch**

13:45 - 16:00 **Grand finale**

13:45 – 14:30 Interviewing of members of the Supervisory Board of NGI

Former Rector Magnificus Erasmus University Rotterdam	Steven Lamberts
Chief Executive Officer Galapagos	Onno van de Stolpe
Director Netherlands Institute of Ecology	Louise Vet

14:30 – 16:00 Discussion of the findings of the MTR answering the seven
main questions of the midterm review, by the Committee

16:00 - 16:15 **Closing**

Appendix B Sets of questions for the five themes

The numbering of the questions corresponds with the numbering used in the report 'Self-evaluation for the Midterm Review of the Netherlands Genomics Initiative', by NGI.

Research and infrastructure

8. Did the selection of new centres go well? Does the selection method provide sufficient scope for capitalising new trends?
9. Were the research and technology developments in the chosen centres sufficiently innovative across the whole period and do they make an internationally recognised contribution?
10. Do the position and method of the technology centres and CSG require adaptation, also in the context of integration within the Dutch life sciences research?
11. Is the embedding of various genomics centres within the Netherlands' life sciences KIS on schedule? Where are changes needed?
12. Which best practices can NGI demonstrate as an 'incubator' of PPPs? Which role should private parties play in this and at which stage?

Valorisation

13. To what extent has NGI achieved the planned valorisation activities or objectives?
14. What is the so-called hidden valorisation, i.e. the estimated (future) value for the companies involved in sales of new products or services based on the knowledge generated by the centres?
15. What are the opinions of stakeholders on NGI's (economic) valorisation (especially the companies in PPPs)?
16. Are additional activities required in the field of valorisation?
17. Is additional effort required to ensure the valorisation infrastructure leading in Europe in 2013 (which)?
18. Has there been effective alignment with the existing (local, national) valorisation infrastructure in the Netherlands? Where can this be further improved?
19. How is NGI doing in societal valorisation i.e., the application of results that do not deliver economic benefits but are of social value?

Genomics and society

20. Is CSG on track in achieving its research objectives?
21. How is the research collaboration between CSG and the other genomics centres going? Is it leading to adequate interaction between beta, alpha and gamma? Does the collaboration provide an added value?
22. How are the societal valorisation and the communication with society about genomics progressing?

Talent

23. To what extent have the set objectives been achieved?
24. Were the programmes set up and implemented efficiently?
25. How did the programmes contribute to a pleasant climate for attracting and retaining scientific talent?
26. How did the programmes contribute to integrating genomics and bio-informatic technology?

27. How is the embedding process faring: is the new talent finding its way in the Dutch life sciences infrastructure?
28. How do the programmes contribute to the NGI's valorisation objective? Have companies benefited from the new talent? How can NGI contribute here?

International expansion

29. Is each line of action sufficiently detailed? What was the added value?
30. Are other activities required in internationalisation?

technopolis |group| The Netherlands
Herengracht 141
1015 BH Amsterdam
The Netherlands
T +31 20 535 2244
F +31 20 428 9656
E info.nl@technopolis-group.com
www.technopolis-group.com