

MidTerm Review

**BSIK-programme
Space for Geo-Information**

October 2007

Review Committee

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Preface

On behalf of the Review Committee I have the pleasure to present the report on the MidTerm review of the BSIK programme Space for Geo-Information (Ruimte voor Geo-Informatie). The Committee gratefully acknowledges the preparatory work by the RGI Programme Bureau. A detailed, orderly self-assessment report was set at the disposal of the Committee well in advance. The Review Committee's activities were concentrated in a three days visit from September 18-20, 2007. The programme included interviews with the RGI Programme Management, the chairs of the Scientific Advisory Committee and the User Advisory Committee and a number of project leaders from universities, research organizations, private companies and governmental organizations. A stakeholders meeting with participants from the scientific community, governmental organizations, the geo-industry and users, gave the Review Committee a good insight in the needs of the stakeholders and in the possibilities for the future embedding of the programme results. At the end of the three days the Committee presented its preliminary observations and recommendations during a meeting with the RGI-Board and the Programme Management.

As a panel we experienced a week of good fellowship. The assignment was a positive experience and we hope that our mid term conclusions and recommendations will contribute to the positive development of the programme.

Prof. Dr. Ir. Theo Bogaerts
Chairman Review Committee

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List of acronyms

ASTRON	Netherlands Foundation for Research in Astronomy
BSIK	Besluit Subsidies Investerings Kennisinfrastructuur. Funding by the Dutch government of public-private-partnerships to enhance the knowledge economy by research and innovation
COL	Consumenten en Leerlingen. Knowledge theme “Consumers and Students”
DURP	Digitale Uitwisseling Ruimtelijke Plannen. Digital exchange spatial plans
EU	European Union
GI	Geo Information
GIS	Geographic Information System
GPS	Global Positioning System
ICES/KIS	Interdepartementale Commissie Economische Structuurversterking. Interdepartmental Committee for the Economic Infrastructure. KIS: Kennis infrastructuur/knowledge infrastructure.
ICT	Information and Communication Technology
INSPIRE	Infrastructure for Spatial Information in Europe
ITC	International Institute for Geo-Information Science and Earth Observation
LOFAR	Low Frequency Array. One of the BSIK programmes
LUMOS	The Land Use MOdeling System (LUMOS) is a toolbox for land use modeling, with the Land Use Scanner and the Environment Explorer as its main components.
NGII	Nationale Geo-Informatie Infrastructuur. Knowledge theme National Geo Information Infrastructure
OOV	Openbare Orde en Veiligheid. Knowledge theme “Public Order and Safety”
PDA	Personal Digital Assistant
RAVI	Raad voor Vastgoed Informatie. Council for geo information
RC	Review Committee. The committee for the mid term review of the RGI-programme
RGI	Ruimte voor Geo Informatie. Space for Geo Information
ROI	Ruimtelijke Ordening en Inrichting. Knowledge theme “Spatial Planning and Design”
TNO	Dutch organisation aiming at strengthening the innovative power of industry and government with applied scientific knowledge
VROM	Dutch Ministry of Housing, Spatial planning and the Environment

Summary

The review is based on a self-assessment by the Programme Bureau and interviews with the RGI Programme Management, the chairs of the Scientific Advisory Committee and the User Advisory Committee and a number of project leaders from universities, research organizations, private companies and governmental organizations. A stakeholders meeting with the scientific community, governmental organizations, the geo-industry and users, gave the RC a good insight in the needs of the stakeholders and in the possibilities for the future embedding of the programme results. The synergy with other BSIK programmes was discussed by the chairs in a conference call on October 2nd. Table 1 summarises the assessment results.

Table 1: Assessment results and scores (1 unsatisfactory ... 5 excellent, see Annex A)

Results for the quality criteria	Scientific quality	Economic relevance	Societal relevance	Innovation
Public order & safety	3-4	4-5	4-5	4-5
Spatial planning & Design	4	4	3-4	3-4
Consumers & students	No priority	3	5	3
National Geo-Information Infrastructure	4-5	4-5	4-5	3-4
Overall programme	4	4	4-5	3-4
Results at programme level: score 4. The programme has made considerable progress in realising the objectives: more demand orientation, more flow of knowledge, more coherence, more innovation and more awareness.				
Progress and organisation: technical coherence - 4; synergy - 4, milestone review – not scored (see 4.3); relationship between progress and mission/objectives – 4; Implementation of recommended managerial changes from previous rounds – 5.				
Viability and future: score 4. A strong and vibrant network with a good critical mass has been built up. Care must be taken to ensure the viability of networking programmes over more years (e.g. 7-10 years).				

The RC is quite positive about the general performance of the RGI-programme. Programmes on geo-information that are comparable in size, scope and ambition have only been undertaken in Canada and Australia. The most important impact of RGI is its catalytic function: the programme enables governments, private sector parties, research institutes, etc. to cooperate. This way, developments in the field of geo-information are accelerated. A major achievement is the transition to a demand and user driven approach. Our main recommendation is to safeguard the RGI-results by: 1) embedding (especially the NGII results) into a structure of existing and possibly new institutions that can adopt and extend the present role of RGI; 2) to ensure further knowledge development in the relevant structures. This would require a continuation of the programme with several years to enable a smooth transition. The budget can be adapted to the activities that are needed during this transition period.

The most important feature of the RGI-approach is that all the relevant building blocks of the NGII have been addressed in a coherent and well balanced way: *data, standards, technology, policy and people*. In our view this has been essential for the success of the programme so far and will greatly determine the success of the future embedding. We recommend the following actions during the second period of RGI:

- Describe for each of the five building blocks what has been achieved (not at the level of the individual projects, but at the level of the building block) and what were the strong points, the weak points and the lessons learned.
- Take the present vision on the future institutional situation (VROM, Geonovum, GI-council) as a starting point and describe: 1) how the five building blocks can be embedded in this structure; 2) what elements will be delivered by the RGI programme; 3) what will be specific points of attention; 4) crucial elements of the five building blocks that will not be covered by this institutional structure and require further development; 5) the conditions for long term sustainability of the institutional situation.
- The outcomes of the activities mentioned above, should be used to develop an authorized vision and an action plan for the establishment of a National Geo-Information Infrastructure.

1. Introduction

Assignment to the Review Committee (RC)

Space for Geo-Information (Ruimte voor Geo-Informatie, RGI) is one of the 37 ICES/KIS-3 (BSIK) programmes which at the end of 2003 were selected to receive a grant from the government in the so-called BSIK scheme. This scheme has been developed with the objective to strengthen the knowledge based economy of The Netherlands with investments in the development and dissemination of knowledge in strategic fields and by stimulating a process of 'open innovation' in networks of participants from science, industry and users. In 2004 a framework document¹ for the monitoring procedure was made, providing for a mid-term review in 2007. A protocol² outlines the setup and organisation of the midterm review for all BSIK programmes in general. The general aim of the mid term review is to evaluate: 1) the scientific and other quality of the programme; 2) its substantive coherence; 3) the current relevance and predictive value of the chosen milestones; 4) the relationship between progress and the project's mission/final objectives; 5) implementation of changes recommended following earlier monitoring rounds; 6) vision and strategy for the future of the project after the grant period ends (in terms of the embedding of knowledge, organisation and finance).

These general objectives were specified in more detail in the Terms of Reference (Annex A), which are incorporated in the Plan of Action³ that was drawn up by RGI and agreed upon by SenterNovem. Additional information regarding the points of attention for the RC was derived from the Assessments by the Committee of Wise People⁴ and presented by the chairman of the RGI-Board during the welcome dinner on September 17th.

Assessment procedure and quality of information

The RGI Programme Bureau provided the RC with a self assessment⁵ and a number of other documents which were digitally available through an internet teamsite. During the review (see annex C for the programme) additional information was presented and uploaded to the teamsite. This wealth of information was discussed on September 18-19th in sessions per knowledge theme with the theme leader and representatives from a selection of projects per theme. The projects were selected with the aim to inform the RC on a balanced mix of: 1) projects and innovation pilots; 2) participants from universities and private companies and 3) distribution over the knowledge themes.

The self assessment report⁵ was well structured and provided sufficient detail. The selection of projects for the presentations per knowledge theme was adequate, except for the fact that the agro sector oriented projects were initially underrepresented. On request of the RC, this was corrected by the scientific director who gave an overview of these projects on September 20th. The sessions per knowledge theme were well organized. The short presentations were well prepared and at the right level of detail. The discussions were very helpful and provided additional information for the assessment. Especially useful in order to get the 'full' picture of the RGI programme and the National Geo-Information Infrastructure was the stakeholders meeting on September 19th with participants from the national and provincial government, companies, Geonovum, the Innovation Platform and RGI and the wrap-up session on September 20th with the RGI programme director, the scientific director and the chairmen of the Scientific Advisory Committee and the User Advisory Committee. The synergy with other BSIK programmes was discussed by the chairs in a conference call on October 2nd.

¹ Monitoring van de ICES/KIS-3-projecten. ICES/KIS-3 Working group. Den Haag, december 2004

² PROTOCOL BSIK mid-term review 2007. SenterNovem/NWO, 2004

³ Plan of action for the Mid-Term Evaluation (MTE) BSIK project 3003 Space for Geo-Information, 12-04-2006

⁴ Summary Committee of Wise People assessments 2004, 2005, 2006

⁵ MidTerm Report RGI. 2007.

2. Reliability of assessment results

An overview of the general conclusions and recommendations per knowledge theme is presented in section 3. A general remark for all knowledge themes is that the review had to be based on interim results for a selection of on-going projects. This limits the reliability of the assessment results, but is the consequence of the process chosen for this mid term review. In the interpretation of the conclusions and recommendations it is important to bear in mind the following remarks:

- **Scientific quality.** At the moment of the MidTerm Review not many scientific publications can be expected already. The 'scientific harvest' will be in the second half of the programme and in some cases even later, because the planned finish of a number of PhD-projects exceeds the closing date of the RGI-programme and because publication in peer reviewed journals often requires quite some time. This aspect has been discussed with the scientific director and the chairman of the Scientific Advisory Committee, leading to the conclusion that the judgment by the RC should mainly be based on: 1) the number of PhD's in the programme; 2) the international scientific collaboration and 3) the general impression of the scientific potential and quality of the projects presented. The RC appreciates the "science scan" that was developed by the scientific director in collaboration with the bibliometric specialists of the Wageningen University Library. The method has been applied to the Dutch publication output in the field of geo-information for the pre RGI period (2001-2004). This resulted in a baseline for comparison with the situation during and after the RGI-programme.
- **Economic relevance.** The RC appreciates the information that was presented in the ECORYS report⁶, but has also taken good notice of the methodological limitations of this type of study, which make it difficult to make solid assessments of the impact on the national economy. The report focuses on the quantitative benefits that directly result from the programme and does not give quantitative estimates of what the report describes as "*The most important impact of RGI is its catalytic function. The programme enables governments, private sector parties, research institutes, etc. to cooperate. This way, developments in the field of geo-information are accelerated. This impact is hard to quantify.*"
- **Societal relevance.** Since there are no generally accepted methods for this criterion, the RC had to base the assessment on a general impression of the presented projects and on a comparison with the situation in other countries.
- **Innovation.** This turned out to be the most difficult element for the RC to assess. Several of the projects received quite diverging scores from the individual members and also in comparison with the conclusions of the Quicksan⁷. There was no time for an extensive discussion of this complex matter. The general impression is that most differences relate to diverging perceptions of innovation. In particular the focus on scientific/technological elements vs. social processes/system elements seems to play an important role.

Despite the methodological complications the RC feels confident about the general conclusions. This is mainly based on the quality of the self assessment by RGI and the professional quality and attitude of the programme management in answering our questions. That only a selection of the total number of projects could be presented may have caused a bias, but there are no indications that the RC saw only the 'better' projects. On the contrary: when the knowledge theme Spatial Planning and Design was presented on September 18th, the agro sector projects were not included in the initial selection made by RGI. On request of the RC, an additional presentation was given on September 20th. After this presentation the RC decided to upgrade some scores for this knowledge theme. This confirms the statement made by the programme management that the quality of the projects has not been a criterion in the selection of projects to be presented to the RC. The diverging scores for innovation are a point of attention in the preparation of future reviews, but no serious problem for the conclusions of this review, because the bandwidth of the scores by the individual members of the RC was in all cases between 3 and 4-5.

⁶ Economic Impact Space for Geo-Information Programme. ECORYS Nederland BV, 2007.

⁷ Quicksan Innovativeness Portfolio RGI, Prisma & Partners, 2007.

3. Conclusions and recommendations per knowledge theme

3.1 Summary overview of themes

Table 2 gives an overview of the knowledge themes. National Geo-Information Infrastructure (NGII) is by far the most important theme (budget and number of projects). The relatively small budget for Public Order and Safety (OOV) is not an indication of its relative importance, but an outcome of the tendering procedure. Many proposals were rejected because of a lack of quality. Other proposals were of such a high relevance and quality that the Ministry decided to execute them independently from the RGI-programme. NGII has the strongest scientific profile (45% scientific spearhead projects); Consumers and Students (COL) is mainly user oriented (only 9% scientific spearhead projects). In the scientific spearhead projects, the emphasis clearly is on the spearheads 1 and 2; the more technical spearheads 3 and 4 received a lower priority. The RC considers this a well balanced reflection of the strategic needs of the Dutch society for knowledge development and innovation with respect to geo-information.

Table 2: Budget and types of projects per knowledge theme

	Public Order & Safety (OOV)	Spatial Planning & Design (ROI)	Consumers & Students (COL)	National Geo-Information Infrastr. (NGII)
Budget (M€)	3.5 M€	6 M€	7.5 M€	17 M€
Projects	3	9	1	21
Innovation plots	6	8	11	10
Total number of projects	9	17	23	31
PhDs	4	7	1	9
Scientific spearhead projects				
1. Geo-information and society	2	5		3
2. Geo-Infrastructure concepts				8
3. Geographic man-machine interaction	1	1	1	1
4. Spatio-temporal modelling aspects			1	2
Total number of scientific spearhead projects	3	6	2	14
% of total number of projects in theme	33%	35%	9%	45%

Each knowledge theme has been assessed for the key criteria: 1) scientific quality; 2) economic relevance; 3) societal relevance; 4) innovation. Annex D gives an overview of the scores and the most relevant strengths, weaknesses and recommendations per knowledge theme. The scores per knowledge theme are summarized in table 1. Scientific quality has not been scored for COL, since scientific development was not a major objective in the design of this theme.

3.2 Public order & safety (OOV)

Public order & safety is an appealing theme, because the societal advantages are so evident. The RC considers as the main achievement of this theme the fact that part of the results are already applied in practice and that geo-information has become a catalyst in the development of collaboration between the parties involved in the field of public order and safety. Geo-information has been embedded in the governmental agencies of the Ministry of Home Affairs and it attracted attention from professionals and the general public.

Scientific quality (score 3-4). The projects are more user than science driven, which is the right choice for this theme. The most prominent scientific contribution is the development towards standardization. The integration of existing technologies into new applications is of a solid scientific quality, but no contribution to scientific advancements. The development of standardised software tools for the various OOV-disciplines in this domain must be embedded in the national general standardization activities. The integration of four PhDs in this theme is highly commendable.

Economic relevance (score 4-5). The economic relevance of this theme is excellent. The projects are clearly user driven and show high cost/benefit ratios. The good evidence of synergy with users and industry demonstrates the benefits of networking.

Societal relevance (score 4-5). The theme has an excellent societal relevance and a high visibility. It has delivered two excellent show cases for key user groups that received a lot of attention in the media and demonstrate the societal relevance. The two projects that were presented made very good efforts to facilitate interaction through well designed user interfaces.

Innovation (score 4-5). The projects are user driven and sustainable. The project "Fire brigade entirely mobile" shows an excellent balance between a top down (management teams) / bottom up (incident room) approach in the formulation of requirements by the people involved. This concept is also being transferred to ambulance teams. Application by the police has proved to be more difficult because of a more rigid hierarchy and security.

Recommendations

- Ensure strong connections between the scientific approach and the end use of the technology.
- Use the showcases for outreach to other groups of users in the sector of OOV.
- The theme would benefit from more standardised software tools for the various OOV-disciplines, more networking with other RGI projects and more private partnerships.

3.3 Spatial Planning & Design (ROI)

Spatial Planning and Design has always been an important field of application for geo-information. The aim of this theme is to modernise and bring innovations into this area of activity. In the theme we have seen two totally different groups of projects. One group is the conventional field of spatial planning with a robust, high and mature scientific level. The other group consists of highly innovative agricultural projects with a large economic impact. This difference is important for the interpretation of the conclusions by the RC.

Scientific Quality (score 4). The Spatial Planning and Design field has a long scientific history in the Netherlands. Recently a lot of progress has been made in this field with DURP⁸ as a catalyst. The level of scientific progress and results in this mature field is high. The seven PhD's mainly work at methodological issues and are well connected internationally. The work that has been carried out is of high standard. For the agro oriented projects the most interesting feature is the speed with which new scientific developments are embedded into new applications and are adopted by the agricultural sector in operational management decisions at farm level.

Economic Relevance (score 4). The agricultural projects have a strong potential because of the intrinsic economic benefits and the speed of implementation in operational farming decisions. The Geofarmer project has European relevance. For the conventional spatial planning projects the economic benefits are less pronounced, but still substantial. Here the main drivers for economic benefits will be the automatic map generation and a broad acceptance of DURP in combination with the implementation of regulations and authentic registrations by the cadastre and VROM.

Societal Relevance (score 3-4). The strong demand driven approach in the agricultural group of projects has largely contributed to the societal relevance. Also the conventional group of projects is relevant from a societal point of view, but this will be delivered indirectly through (regional/local) governmental bodies. LUMOSpro has a prominent role in the National Sustainability Outlook for The Netherlands.

⁸ DURP: Digitale Uitwisseling Ruimtelijke Plannen (Digital exchange spatial plans)

Innovation (score 3-4). The agro oriented projects score very good on innovation. This is due to the close links between science and practice and to the fact that the Dutch farmers are keen on using state-of-the-art ICT. As a result of the maturity of the Spatial Planning conventional work field, the innovativeness in this particular field is moderate to low. A promising project in this category is “People in motion”, but the project is still in a very early stage.

Recommendations

- Examine the potential relevance of the project “People in motion” for the theme OOV.
- Regional and local authorities are the main future users of the results of the spatial planning projects. Make an assessment of their capabilities to implement and use the results.

3.4 Consumers and students (COL)

This theme aims at an improved use of geo-information in society by: 1) educating citizens and students in the use of geo-information and 2) by improving the knowledge flows between science, education, professional practice and society. The RC highly appreciates the successful attempts to bring geo-information under the attention of the public (Geoweek). This is a major achievement which we consider as unique, also from an international point of view.

Scientific Quality (no score given/not relevant for evaluation). The RC agrees with the point of view that this theme, regarding its nature, would only aspire to limited scientific aims and therefore can't really be measured by this key. Nevertheless the presented projects demonstrate some successful scientific results (peer reviewed articles and ongoing PhD research). Part of this scientific output is situated in communication and pedagogic sciences rather than in geo-information science.

Economic Relevance (score 3). The present involvement of private companies makes the projects moderately relevant from a point of view of direct benefits. The very high societal relevance has the potential to become a strong driving force behind the creation of new business in the future. However, big ICT-companies like Microsoft seem to be more eager to explore the potential commercial benefits from this trend, than the Dutch geo industry.

Societal Relevance (score 5). The projects have very good dissemination quality on applications of geographic information to broader public and to pupils, e.g. climate game and natural health risks in space and time. The projects support teachers in developing interesting lectures and contribute to raising awareness, e.g. “Geofort” (RGI-330).

Innovation (score 3). Distinction must be made between scientific-technical innovation and innovation in the domain of communication in society. This theme is mostly societal and communication oriented; projects bring geo-information to new or potential user groups. From this point of view it is innovative for the Netherlands and even world wide. Only a few countries made comparable efforts for raising awareness about geo-information. The technological developments were mainly made with proven techniques or required only limited new developments. The excellent social relevance and the potential economic relevance of this theme are not yet reflected in a high level of innovative activities by the Dutch geo industry.

Recommendations

- Involve more significant and striking or attractive projects in the demonstrations (e.g. in Edugis)
- Go on with publishing, even in other disciplines than geo-information, such as in the social sciences.
- Make the projects sustainable. Develop methods or techniques for measuring the effects of communication, e.g. number of schools or pupils using Edugis, impact of Geoweek.
- Search for opportunities for the Dutch Geo industry to commercially benefit from the economic and social relevance of this theme.

3.5 National Geo-Information Infrastructure (NGII)

Key features of the NGII knowledge theme are: 1) the need to make research more demand oriented; 2) the desire to facilitate innovation and 3) the importance of guaranteeing sustainable NGII development. With respect to the last feature the RGI has a catalyst role: another agency (or agencies) will have the responsibility for building and implementing the Dutch NGII. It must also be recognised that the key to the theme's success is the extent to which it will be sustainable after the end of the RGI programme.

The general concept behind building the NGII is simple: 1) broad access and availability of geodata for multiple issues and 2) focused development of detailed Spatial Data Infrastructures for specific issues. The RC highly appreciates the general structure of the theme with the five building blocks: data, standards, technology, policy and people. Especially the inclusion of the policy and people is essential for making the research more demand oriented and is rather unique also from an international point of view. Comparable programmes have only been undertaken in Canada and Australia. This demand and user orientation is a major achievement.

Scientific Quality (score 4-5). Some projects within this theme such as the 3D topography project (RGI-011) score high in terms of scientific quality and this theme also has the largest number of PhD students in the whole programme. The RC was also impressed by the extent to which the findings of social science research were incorporated into technical applications and vice versa. Most of the projects also had good links with academic research elsewhere in Europe and other parts of the world. On the debit side there was some concern that there may be an element of reinventing the wheel in some cases and some projects might have benefited by more exposure to international developments elsewhere.

Economic relevance (score 4-5). This knowledge theme scores well in terms of economic relevance. The outcomes of the Geoportals project, for example, are likely to become one of the main building blocks of the Dutch NGII and some of the other projects have the potential to generate substantial benefits to the Dutch economy. However, some concern was expressed as to the extent to which these benefits can be realised within constraints imposed by the RGI time framework and there was also a feeling that some projects were still a bit inward looking. More efforts might be made to involve captains of industry from the financial and insurance sectors. Also the involvement of the utilities sector as a heavy user of geodata, may be encouraged.

Societal relevance (score 4-5). The RGI programme as a whole has been very successful in raising awareness of the Dutch NGII. Some of the projects in this knowledge theme must also be commended for actively lobbying government officials in support of their findings, as was the case with the information access and sharing project (RGI-117). An achievement that could have important long term implications is the interest of the Ministry of the Interior in such matters. Nevertheless, even more attention may need to be given to the marketing and communications dimension of some of this work. The use of more professional expertise in these fields could in particular prove beneficial for increasing the interest of large users of geo-information and potential new users.

Innovation (score 3-4). The NGII projects score well with respect to the creation of multi sector / multi participant knowledge networks. The social sciences input from projects like "RGI-117: Towards geo-information access and sharing: Institutional obstacles" and "RGI-024: Geogov" is very important for the innovative character of the theme. However, it has to be recognised that some projects may be overambitious in their expectations, given the short time scale of the RGI programme. Another point of concern is the fact that the geo industry shows some reluctance to invest in innovation, because the strategy, (financial) interests and operational activities of governmental institutions with regard to the availability of geo-information are not always transparent. This in particular applies to the question whether governmental institutions can be relied upon as stimulating and supporting partners for the private sector, or should be seen as (potential) competitors.

Recommendations

The key to the theme's success is the extent to which it will be sustainable after the end of the RGI programme. Recommendations regarding this aspect will be presented at programme level in section 4. Specific recommendations for this theme are:

- More efforts might be made to involve sectors outside the geo-industry, like the financial and insurance sectors, or the utility sector.
- More attention may be needed for the marketing and communications dimension of some of this work and it could prove beneficial to use more professional expertise in these fields; especially toward large users and potential new users of geo-information..

4 Conclusions and recommendations at programme level

4.1 Scientific quality, economic and social relevance, innovation

Scientific quality (score 4). So far the programme is meeting its objectives. The level of the participating scientists is a guarantee for a high quality output. The cooperation between the academic chairs in several universities is intensified and even extended. The number of PhDs in preparation and the number of publications far exceed the expectations. The relatively high percentage of foreign PhD students demonstrates the good reputation of Dutch geo-information sciences in the international scientific community and contributes to the creation of future opportunities. Because a PhD takes at least four years, it is not always the best type of research for relatively short programmes. The RGI-programme could benefit from more postdocs. Although many projects have a good international networking, not all the projects mention the relation to the state-of-the-art worldwide in respect to their topic of research.

Economic relevance (score 4). The demand driven character of the programme strongly enhances its economic relevance. A positive element in the programme is the mix of big players in the public sector and small and medium size enterprises. Being a member of the consortium is profitable for small companies. It will open doors to universities and research-institutes. In this respect it will open new business opportunities. Institutional and legal obstacles for use of geo-information are identified and being tried to remove. Ongoing developments that certainly will influence the economic relevance, but lay outside the influence of the programme are: 1) the outcome of the discussion on the price setting and availability of geographic data in The Netherlands and 2) the worldwide trend that geo-information moves from its specific position towards becoming a part of ICT in general.

Societal Relevance (score 4-5). The societal relevance of the programme came up with the highest score. Raising awareness on geo-information underpins the whole programme. Major achievements of RGI are networking aspects and synergy. Government, industry and universities are brought together in a way that has not been done before. The multilevel communication and outreach are excellent. Since its foundation in 1950, more than 19,000 students from 171 countries have completed courses at ITC in Enschede, the institute for geo-information science. The strong ITC involvement in the programme contributes to continuation of this worldwide outreach.

Innovation (score 3-4). The programme has made very important contributions to process and system innovation, but only moderate contributions to technology driven innovation. The main technology driven sources of innovation in the field of geo-information are the ICT, the space-technology and the military research. No wonder that The Netherlands and in fact the whole EU is depending on products from the USA (e.g. Google-earth, GPS, Windows, ARC-info, etc). In the Netherlands a hardware-industry in the field of geo-information is almost non-existent. Therefore the technological innovation is mostly software development. The committee observed that in the programme new applications (and companies) came up. The integration of different techniques is also considered as innovation, e.g. the contact with the LOFAR-project. Although the RC highly

appreciates the many and interesting achievements in the field of social processes and systems innovation, this has not yet resulted in an overall high score. For a high score the programme results should be made sustainable by ensuring that the networks of stakeholders, the exchange of information and the interaction will continue after the programme organisation and the budget ends. To achieve this, will be more difficult than for the methods, products and services that result from technology driven innovation, which can be absorbed more easily by the geo industry.

Recommendations

- The RC strongly supports the plans to monitor the scientific output (baseline vs. effects of the programme) and recommends giving special attention to the monitoring of the international publication output and collaboration.
- Although the number of participants in the consortium is large, the RC recommends more involvement of some sectors, like the utility- companies and the financial sector.
- More explicit monitoring and marketing of the societal impacts of the programme contributes to increased awareness among policy makers and therefore to obtaining budget for future continuation of crucial activities that will not be funded by private companies.

4.2 Results at programme level

The Terms of Reference (ToR) describe the results at programme level as “the impulse of the programme on the NGII and the knowledge community. The sub criteria are the programme objectives: 1) More demand oriented; 2) More flow of knowledge; 3) More coherence; 4) More innovation; 5) More awareness”. The RC is quite positive about the general performance of the RGI-programme. Programmes on geo-information that are comparable in size, scope and ambition have only been undertaken in Canada and Australia. The most important impact of RGI is its catalytic function: the programme enables governments, private sector parties, research institutes, etc. to cooperate. This way, developments in the field of geo-information are accelerated. The effects of this catalytic function for the five objectives mentioned above can be summarized as follows:

- **More demand orientation.** A major achievement is the transition to a demand and user driven approach. The strong involvement of users in the programme and the tendering procedure strongly contributed to this aspect.
- **More flow of knowledge.** Each large project brings together participants from industry, universities and governmental organisations. The cooperation between academic chairs in several universities is intensified and even extended. The membership of the consortium is profitable for small companies; it opens doors to universities and research-institutes.
- **More coherence.** What makes the RGI-approach rather unique is the fact that all the relevant building blocks of a NGII have been addressed in a coherent and well balanced way: *data, standards, technology, policy and people*. In our view this has been essential for the success of the programme so far and will also be the main feature that has to be safeguarded and preserved when it comes to the future embedding of the programme results.
- **More innovation.** The programme has made many contributions to social processes and systems innovation, which form a potentially very valuable part of the programmes’ output, but need to be safeguarded for the period after the programme has ended. The contribution to technological innovation is moderate.
- **More awareness.** The creation of awareness about the relevance of geo-information for our daily work (e.g. professionals in the public order and safety sector) and daily life (e.g. Geoweek) is a major contribution of the programme.

Our overall conclusion is that the programme must be awarded with a mark 4.

4.3 Progress and Organisation

Technical coherence (score 4). The RC observed that the users’ point of view is largely taken into account. In each large project there is effort to bring the industry, universities and

government together. A baseline for NGII is emerging. Geoportals is considered as a strong component in the technical coherence of the programme. The contribution of the knowledge themes to the overall programme objectives is on track. The committee recommends that inter theme exchanges should be encouraged.

Synergy (score 4). The synergy with other BSIK programmes is realized through 14 bridging projects (19% of total number of projects). The majority of the bridging projects (9) aims at the linkage of RGI with 3 BSIK programmes in "8 for Space" that have an important geographical component (Climate changes spatial planning, Habiforum and Living with water). The bridging projects with LOFAR open future opportunities for technological innovation. The design and formulation of bridging projects has taken some time, but now most projects are well under way, but it still is too early to evaluate the results. Many bridging projects in the RGI programme are top ups from earlier RGI projects, which is positive for the quality of the projects. A general remark is, that the managerial complexity of the BSIK system and the focus on administrative control instead of target realisation, are counterproductive for the creation of synergy. This critical remark applies to the BSIK system as a whole and not specifically to RGI.

Milestones review (no score). The RC has mixed feelings on this item. The large number of very detailed, but sometimes not very well defined milestones gives the impression that the milestones are rather designed to satisfy the need for administrative control by SenterNovem, than to help the programme management in keeping the programme on track in the realisation of the objectives. Meeting quantitative milestones does not necessarily mean that the quality is good. Maybe some qualitative goals should be identified and monitored. The definition of some milestones must be clarified. The original programme was adapted during its implementation, but the milestones have remained unchanged, leading to some ambiguity. The committee was not able to assess the progress of the programme against the four scientific spear points. Apart from this criticism to the system of milestones it must be stated that the RC is convinced that the programme is on track and that the most important milestones will be met or even exceeded

Relationships between progress and mission/objectives (score 4). The original plan was adapted in the light of experience. The actual programme is on track and the RC expects that it will achieve the objectives. Most of the milestones are already achieved. The committee advises that the milestone be adapted to reflect the changes in the programme.

Implementation of recommended managerial changes from previous rounds (score 5). The recommended changes have been adopted.

4.4 Viability and future (score: 4)

A strong vibrant network with a good critical mass has been built up. Care must be taken to ensure the viability of networking programmes over more years (e.g. 7-10 years). The RGI-programme is a good evidence of collaboration inside The Netherlands. RGI also has a good international reputation. What makes the RGI-approach rather unique is the fact that all the relevant building blocks of a NGII have been addressed in a coherent and well balanced way: *data, standards, technology, policy and people*. In our view this has been essential for the success of the programme so far and will also be the main feature that has to be safeguarded and nurtured, when it comes to the future embedding of the programme results and the continuation of knowledge development in the relevant structures.

This future embedding is essential for the viability of the RGI programme and will need a lot of attention from the programme management in the remaining period. Two positive developments for the realisation of this aspect are: 1) The fact that the programme is on schedule and will meet and even exceed its objectives means that the programme management will have time to anticipate on the future embedding; 2) The ongoing institutional developments in the external

environment of RGI, that anticipate on the future situation. This will be elaborated further in section 5.

5 Future embedding of the programme

5.1 Introduction

When on August 17th the Chair of the RGI Board submitted the MidTerm Evaluation Report to the RC, he asked for special attention to: 1) the outlook on the National Geo-Information Infrastructure; 2) embedding the programme internationally; 3) embedding the outcomes of the programme. During the stakeholders meeting on September 19th, the RC was informed about the new organisational structures co-ordinated by the Ministry of VROM, which are being developed for establishing the NGII. Three questions were also put forward during this meeting with the stakeholders: 1) How essential is an authorized vision with status for GII; 2) what are key actions to be taken; 3) what are the essentials for a project "safeguarding RGI" (lead Geonovum) within this action plan?

The RC should not be expected to give clear-cut answers to all questions, since this would exceed the limits of our assignment and also of our expertise. The RC however feels capable and entitled to give some comments and observations that might be useful for the future embedding of the programme results. In 5.2 some general trends with relevance for the future embedding of RGI will be described. Recommendations will be formulated in 5.3.

5.2 Trends

The RG observed some general trends that are relevant for the Dutch geo-industry and should be taken into account in the future embedding of RGI:

- 1 *General ICT developments are overtaking geo-information technology development.* The geo-industry was a pioneer in using the opportunities of digital technology. As a consequence the geo-sector was developed as a domain for geo-information professionals, with only a remote relevance for professionals in other disciplines or the general public. This situation is changing quickly as a consequence of the general ICT-developments, with its massive funds for innovation based on a world wide market of businesses and consumers. This general development will have important consequences for the Dutch geo-industry. It also means that general ICT institutions (e.g. Nederlands Normalisatie Instituut) should be used to support the implementation of the achievements of RGI, as has been done with the introduction of "Terreinmodel Vastgoed" from RAVI.
- 2 *General developments in mobile telecommunication technology (blackberries, PDA, smart phones, etc.).* These offer great opportunities for geo-services, taken for granted that the strategic choice is made to use general ICT, instead of going its own way..
- 3 *Increasing availability of information stimulates innovation and threatens existing data monopolies.* Some parties in the geo-sector (both governmental agencies and private companies) have developed very strong positions based on specific data monopolies. Sometimes these monopolists are reluctant to share their information with other parties in order to develop new products and services. The fast developments in the trends 1 and 2 are stimulating innovation and are threatening the position of these data monopolists. The recent "Funda" case in The Netherlands illustrates that it will become increasingly difficult to defend 'data fortresses' against the innovative power of competitors. Also European Law will force public owners to make their information available.
- 4 *Converging coordinate-systems.* A coordinate-system is an important element in NGII. In all the countries of the EU the national systems were used for digitising cadastral maps and large-scale topographic maps. When these enormous jobs were almost finished and large databases with coordinates and attributes were built, a new coordinate-system - GPS - was introduced. Because of the many applications of GPS there are now two

- coordinate-systems in operation in the EU-countries. In some countries the differences between the systems are hundreds of meters, in The Netherlands it is only a matter of some decimetres. The general opinion in the EU is that this problem should be solved by the next generation of land surveyors and cartographers. In the future the precision of the systems will be enhanced (Galileo). Therefore the RC advises to identify in the framework of the NGII the problems that can occur and how they can be solved.
- 5 *Integration of models and GIS.* Geo-information supports all public and private location-based activities. In almost all of the related disciplines computer-models are developed. These are proposed for short-term and long-term decision support systems. Numerous models exist for planning, traffic, housing, water management, meteorology, etc. In general these models are very complex and take much computer capacity. Most of the time the results of models are presented with simple digital maps and the achievements of Geographic Information Systems (GIS) are not used. Integration of GIS and computer-models is very difficult. Nevertheless it is a challenge to spend a part of future research to the integration of GIS and computer-based decision support-systems for mutual benefit.
 - 6 *Privatisation.* An important development in the geo-sector in The Netherlands is the privatisation. Since 1970 governmental bodies (big producers and consumers of geo-information) were privatised or taken over by private companies. Examples are: the regional computer-centra of the Dutch municipalities, the utility-companies, the Dutch railways, etc. The trend of privatising is ongoing. This means that the growing private sector must be involved in the further development and management of the NGII

5.3 Recommendations

Our main recommendation is to **safeguard the RGI-results** by: 1) embedding (especially the NGII results) into a structure of existing and possibly new institutions that can adopt and extend the present role of RGI; 2) to ensure further knowledge development in the relevant structures. In our view this would require a continuation of the programme with several years to enable a smooth transition. The budget can be adapted to the activities that are needed during this transition period.

As stated in section 4.4 the most important feature of the RGI-approach is that all the relevant building blocks of the NGII have been addressed in a coherent and well balanced way: *data, standards, technology, policy and people*. In our view this has been essential for the success of the programme so far and will greatly determine the success of the future embedding. We recommend **integrating the concept of the five building blocks also in the future institutional setting**. This can be supported by the following actions during the second period of RGI:

- Describe for each of the five building blocks what has been achieved (not at the level of the individual projects, but at the level of the building block) and what were the strong points, the weak points and the lessons learned.
- Take the present vision on the future institutional situation (VROM, Geonovum, GI-council) as a starting point and describe: 1) how the five building blocks can be embedded in this structure; 2) what elements will be delivered by the RGI programme; 3) what will be specific points of attention; 4) crucial elements of the five building blocks that will not be covered by this institutional structure and require further development; 5) the conditions for long term sustainability of the institutional situation.

The outcomes of the activities mentioned above, should be used to develop an **authorized vision and an action plan** for the establishment of a National Geo-Information Infrastructure. In this vision and action plan, the following elements should be included:

- The involvement of the private sector.
- The compliance of governmental institutions with the general principles (on data availability and pricing) of the NGII. This applies in particular to the Ministry of VROM, being responsible for the coordination of the geo-information. The most important aspect is that a clear and

unambiguous policy is formulated; including targets for a stepwise implementation that might be needed to solve the budgetary problems that are related tot this change of policy.

- The international embedding of the programme. The RC supports the international strategy that has been developed by RGI. Embedding the programme internationally, especially the NGII, can best be achieved by a larger contribution in INSPIRE. By participation in drafting teams (data-specifications, network-services, standards, etc) mutual benefits can be achieved for INSPIRE and for NGII.

The embedding of NGII would greatly be enhanced by **pilots at regional and local authorities**. The RC recommends to investigate the interest of these future users of NGII for participation in pilots and to support this with tailor made training courses and distant-learning modules. Some Dutch educational institutions already pay attention to the NGII-concept.

Finally the RC recommends **further exploring the opportunities for technical innovation** by linkages with the research fields of astronomy and space-technology. In section 4.1 we stated that the USA dominates the general technical innovation in the field of geo-information. The Netherlands however has a strong scientific position in astronomy and space-technology that offers opportunities for the geo-information sector. Possible partners are: Delft University of Technology (Faculty of Aerospace Engineering), TNO Information and Communication Technology and ASTRON. An interesting development is that the next mission of the European Space Agency has a strong geo-information component.

Annex A: Terms of reference

Objective of the assessment

The overall objective of the assessment is to obtain an accurate view of the quality and progress made in the innovation programme Space for Geo-Information in the national and international arena and to formulate advice on improvement and possible continuation.

Terms of reference

The committee is tasked with assessing RGI on the following key criteria (Table 1): (scientific) quality; progress and organization; viability and future. The key criteria have been subdivided and suggestions for sub criteria added, with a view to clarifying detail (see Table 1). Note that the sub criteria are provided only by way of illustration, and the committee is at liberty to add sub criteria of their own. The report of the assessment must be restricted to the key criteria including the subdivision (i.e. key criteria 1.1, 1.2 etc.), but excluding the sub criteria.

Table 1: Key criteria and sub criteria

Focus of the assessment (key criteria)	Suggested elements to be considered (sub criteria)
1. (Scientific) Quality <i>This criterion reflects the quality of the projects and the programme</i>	
1.1 Scientific quality <i>This criterion reflects scientific quality and output as it is observed in the professional eyes of its peers and competitors.</i>	<ul style="list-style-type: none"> • Quality of research / international scientific impact • Scientific output • Knowledge / experience / training • Esteem / authority / visibility • Exact sciences / social sciences integration • ...
1.2 Economic relevance <i>This criterion reflects the programme's potential impact on the national economy. It indicates its contribution to the national economy.</i>	<ul style="list-style-type: none"> • Participation of industry • Economic awareness • Formation of industry-university and user consortia • New business developed based on RGI research •
1.3 Societal relevance <i>This criterion reflects the programme's potential impact on society. It indicates its role in the public debate and participation and its role and contribution in the development of government policy.</i>	<ul style="list-style-type: none"> • Relevance for the public • Knowledge development and transfer • Customer control / appreciation • ...
1.4 Innovation <i>This criterion reflects the programme's impact on the further development of the national spatial data infrastructure and its innovation. (NGII).</i>	<ul style="list-style-type: none"> • Awareness of NGII • International connection / (INSPIRE) • Visible and innovative pilot projects • System innovation •
1.5 Programme <i>This criterion reflects the impulse of the programme on the NGII and the knowledge community. The sub criteria are the programme objectives.</i>	<ul style="list-style-type: none"> • More demand oriented • More flow of knowledge • More coherence • More innovation • More awareness • ...
2. Progress and Organization <i>This criterion reflects abilities to operate efficiently and effectively and to develop a coherent programme in line with the overall mission and budget.</i>	
2.1 Technical Coherence <i>Coherence within the programme</i>	<ul style="list-style-type: none"> • Clarity of overall research strategy in line with the overall mission (aspects including flexibility and openness and value for money)

	<ul style="list-style-type: none"> • Contribution of the knowledge themes to the overall programme objectives • ...
2.2 Synergy <i>Relationships with other programmes/countries</i>	<ul style="list-style-type: none"> • Synergy with other Bsik projects or ICT programmes ("bridging projects") • International collaboration • ...
2.3 Milestone Review <i>The choice of the milestones and their feasibility</i>	<ul style="list-style-type: none"> • The clarity of the selected milestones and their suitability as progress criteria; • Contribution of selected milestones (deliverables) to the overall programme objectives. • the feasibility of the milestones • ...
2.4 Relationship between progress and mission/ objectives <i>The progress and feasibility of the objectives of the programme</i>	<ul style="list-style-type: none"> ▪ Progress in comparison with the original plan; • The feasibility of the objectives in the light of progress. • ...
2.5 Implementation of recommendations for managerial changes from the previous monitoring rounds	<ul style="list-style-type: none"> • Completeness of implementation of recommendations and feasibility • ...
3 Viability and future <i>This criterion reflects the vitality of the programme, future collaboration, future knowledge embedding and continuation.</i>	<ul style="list-style-type: none"> • Critical mass • Collaboration (internal / external) • Vision and strategy for the future • Embedding of knowledge development. • Development of partnerships. • View on guarantees for further funding of the research activities. • ...

Expression of assessment results

The committee is asked to evaluate the key criteria on a five-point scale as shown in Table 2. This five-point scale is derived from the Standard Evaluation Protocol for Public Research Organizations (QANU). Each assessment should preferably be accompanied by a written opinion and recommendations for improvement. The main criteria should always be reviewed in relation to the mission of the programme and the available budget. Where the evaluation committee's opinion is not unanimous, the different views of committee members should be stated explicitly.

Table 2: Assessment scale.

5-point scale (Standard Evaluation Protocol for Public Research Organizations, QANU)
5=excellent Work that is at the forefront internationally, and which most likely will have an important and substantial impact in the field. The project is considered to be an international leader.
4=very good Work that is internationally competitive and is expected to make a significant contribution. The work is at the forefront in the national field. The project is held in high esteem internationally, and is a national leader.
3=good

Work that is competitive nationally and will probably make a valuable contribution in the international field. The project is considered internationally visible and is held in high esteem nationally.

2=satisfactory

Work that is solid but unexciting, which will add to our understanding and is in principle worthy of support. It is considered to have a lower priority than work in the above categories. The project is visible nationally.

1=unsatisfactory

Work that is neither solid nor exciting, is flawed in its scientific or technical approach, or repeats earlier work, and so on. Continuation of the work is not recommended.

Annex B: Members of the Review Committee

After a careful selection procedure, the RGI Review Committee comprises the following members. Their expertise and experience cover geo-information related activities in fundamental and applied research, education, consultancy and industrial production of goods and services. Their track records and networks enable them as a team to come to a well balanced judgment of the programme with regard to the scientific, economic and societal interests that are the most relevant for this review, both from a national and an international perspective.

Prof. M.J.M. Bogaerts (chairman)

Theo Bogaerts is an em-professor of land information and was dean of the Faculty of Geodetic Engineering at the TU Delft and vice-dean of the faculty of Civil Engineering and Geosciences at the TU Delft. He has a broad interest in the role of geo-information in society and extensive international experience. Prof. Bogaerts studied geodetic engineering in Delft and graduated cum laude. The emphasis in the first part of his career (1961-1976) was on land consolidation. From 1976 on his research focused on the organizational, legal, fiscal and technical aspects of land information (nowadays known as geo-information).

Dr. H. Fijnaut

Harry Fijnaut is an ex-director of the Netherlands meteorological institute KNMI and ex-chief engineer and director of the Survey Department (now the Geo-Information and ICT Department) of the Directorate-General for Public Works and Water Management He has broad administrative experience in improving geo-information services for the public, including through his membership of the boards of Ravi and NCGI: the National Clearing House for Geo-Information. His background is in meteorology and physics.

Prof. Ph.A.M. De Maeyer

Philippe De Maeyer is at the University of Gent associate professor in the field of cartography, visualization and GIS. In 1980 he obtained a PhD in Geology and Marine Applications at the University of Bordeaux. His research in the field of geo-information is focused at geographical information management, temporal aspects from spatial data, moving objects collection and structure of data, risk calculation, 3D GIS and coastal observations. He is a member of the editorial board of the Dutch magazine Geo-Info. From 1987-1999 he worked for a private company in Antwerp as manager of the department for cartography and digital media.

Prof. I. Masser

Ian Masser is the international expert in the field of geo-information infrastructures and a prominent geo-information academic. He was president of the "Global Spatial Data Infrastructure Association" from September 2002 to February 2004. Ian graduated in Geography and Town Planning at Liverpool University. His research activities were focused to the fields of planning methods, information management and comparative planning. He retired from the position of professor of Urban Planning at International Institute for Geo-Information Science and Earth Observation (ITC), the Netherlands, in September 2002. Prior to his professorship at ITC he was Professor of Town and Regional Planning at the University of Sheffield for nearly 20 years.

Dr. K.P.B. Thomson

Keith Thomson is a member of the Board of Directors of GEOIDE (Geomatics for Informed Decisions) Network in Canada. He served as Scientific Director of GEOIDE from 1998 to 2005 and was also the CEO of GEOIDE Inc. from 2001-2005. GEOIDE is a research network that currently has 37 Canadian Universities, 132 university researchers, 243 graduate students, 120 governmental and industrial partners and participation from 20 international universities. He is an ex-director of the Geomatics Research Centre at the Université Laval in Canada. His background is in remote sensing. In October 2006 he was an external reviewer of a programme comparable with RGI in Australia (there are approximately three programmes of this kind in the world).

H.H.L.M. Waijers

Herman Waijers was General Manager of KPN and an ex-board member of the National Alliance GBKN (large-scale base map of the Netherlands). He is currently engaged from his own consultancy as interim director of KLIC (Cables and Pipelines Information Centre). This position involves him in the practice of the geo-information infrastructure, which involves information exchange and partnership between numerous parties. His background is in informatics and management science.

The committee has an external secretary: **Ir. J.M.L. Jansen** from the Environmental Sciences Group of Wageningen University and Research Centre.

Annex C: Review programme

(RC = Review Committee, see for presentations www.rgi.nl)

Date & Time	Event
September 17 18.00 – 21.00h	Welcome dinner with RC and Cor van Tilborg (chairman Board), Wim van Vierssen (vice chairman), Arnold Bregt (scientific director), Jacqueline Meerkerk (programme director): <ul style="list-style-type: none"> • Funding scientific research in The Netherlands: Wim van Vierssen • Space for Geo-Information: Geo science and Geo practice: Arnold Bregt • MidTerm review Evaluation: Objectives, Scope and ToR: Jacqueline Meerkerk
September 18 09.00 – 10.30 10.45 – 12.30 10.45 – 10.50 10.50 – 11.10 11.10 – 11.30 11.30 – 11.45 11.45 – 12.05 12.05 – 12.30 13.30 – 15.15 13.30 – 13.35 13.35 – 13.55 13.55 – 14.15 14.15 – 14.30 14.30 – 14.50 14.50 – 15.15 15.45 – 17.20 14.45 – 15.50 15.50 – 16.10 16.10 – 16.30 16.30 – 16.50 16.50 – 17.20 17.20 – 18.00	Internal discussion RC (ToR, criteria, etc.) Theme Public Order and Safety Introduction: Jacqueline Meerkerk RGI-123: The fire brigade entirely mobile: Paul Geurts RGI-128: Geo-information for risk prevention: Jeroen Neuvel RGI-147 (innovation pilot): Real-time acquisition of geo-information for rapid emergency response operations: Roland Haarbrink Discussion on theme level Recapitulation RC Lunch Theme Spatial Planning and Design Introduction: Martin Peersmann RGO-002: Generation and use of base maps for integrated querying of digital physical development plans: Jantien Stoter RGI-160 (innovation pilot): People in Motion: planning mobility on a landscape: Arend Ligtenberg RGI-254 (bridging project): Land Use Modeling System (LUMOSpro): Judith Borsboom Discussion on theme level Recapitulation RC Theme Consumers and Students Introduction: Henk Ottens RGI-022: Educational GIS-portal (EDUGIS): Joop van der Schee RGI-129: Cyclocity (innovation pilot): Panoramic Virtual reality: Bart Beers Discussion on theme level Recapitulation RC Internal discussion RC and preparation for September 19
September 19 09.00 – 15.00 09.00 – 09.20 09.20 – 09.40 09.40 – 10.00 10.00 – 10.20 10.20 – 10.40 11.00 – 11.20 11.20 – 11.40 11.40 – 12.20 13.20 – 13.40 13.40 – 14.00 14.00 – 14.30 14.30 – 15.00	Theme National Geo-Information Infrastructure Introduction: Arnold Bregt RGI-006: GeoPortals: Liberty united: Jan Kooijman RGI-027: Mutatis Mutandis: Rob beck RGI-011: 3D Topography: Peter van Oosterom Discussion on theme level RGI-117: Towards geo-information access and sharing: Institutional obstacles: Yvette Pluijmers RGI-024: Geogov: Sjaak Nouwt Recapitulation RC Lunch RGI-102: Combined: Menno Mimpen (project in theme Consumers & Students) RGI-019: Feasibility study for a Dutch National Population Register: Cees Guikers Discussion on theme level Recapitulation RC

15.30 – 17.00	Stakeholders meeting, strategy NGII with: Marjan Bevelander – Province Noord-Brabant, chair IOG-Geo; Noud Hooyman – Ministry of Housing, Spatial Planning and the Environment (VROM); Yvette Pluijmers – Bedrijvenplatform Geo-informatie (BGI); Henk Scholten – Geodan; Hessel Speelman – Innovatieplatform; Rob van de Velde – Geonovum; Jacqueline Meerkerk, Arnold Bregt
15.30 – 15.40	Introduction of all participants
15.40 – 15.50	Introduction of the role of the Ministry of Housing, Spatial Planning and the Environment and the role of Geonovum: Noud Hooyman and Rob van de Velde
15.50 – 16.15	First round of questions by RC
16.15 – 16.40	NGII: Future developments and embed routes of the National Geo Information infrastructure: Arnold Bregt and Rob van de Velde
16.40 – 17.00	Second round of questions by RC, including embedding the programme outcomes and embedding RGI internationally
17.00 – 18.00	Drinks
September 20	
09.00 – 10.00	Wrap-up session with: RC, Henk Ottens (chairman Scientific Advisory Board), Martin Peersmann (chairman User Advisory Board), Arnold Bregt and Jacqueline Meerkerk
10.00 – 16.00	Internal discussion RC and formulation of preliminary conclusions
16.00 – 17.00	Presentation of preliminary conclusions to RGI-Board, directors and chairmen Scientific Advisory Board and User Advisory Board
17.00 – 20.30	Drinks and dinner

Annex D: Summary overview of the results and scores per knowledge theme

Public Order & Safety (OOV)

Selection of projects that were presented to RC		
RGI-123: The fire brigade entirely mobile: Paul Geurts RGI-128: Geo-information for risk prevention: Jeroen Neuvel RGI-147 (innovation pilot): Real-time acquisition of geo-information for rapid emergency response operations: Roland Haarbrink		
Key criteria	Aspects considered	Score (1-5)
(Scientific) quality: This criterion reflects the quality of the projects and the programme		
1.1 Scientific quality This criterion reflects scientific quality and output as it is observed in the professional eyes of its peers and competitors	<ul style="list-style-type: none"> Quality of research / international scientific impact Scientific output Knowledge/experience/training Esteem/authority/visibility Exact sciences / social sciences integration Innovation 	3-4
Strong + / weak - Contributions to scientific progress are not a priority in this user driven theme. Where relevant, the overall scientific quality of this theme is quite good. The projects have given new impulses to the need for standardisation in this field. Attention is needed for development of open national standards for software tools used by various OOV-disciplines.		
1.2 Economic relevance This criterion reflects the programme's potential impact on the national economy. It indicates its contribution to the national economy.	<ul style="list-style-type: none"> Participation of industry Economic awareness Formation of industry-university and user consortia New business developed based on RGI-research 	4-5
Strong + / weak - + Projects are clearly user driven and show high cost/benefit ratios. + Synergy with users and industry - Standardisation of software tools for various OOV-disciplines		
1.3 Societal relevance This criterion reflects the programme's potential impact on society. It indicates its role in the public debate and participation and its role and contribution in the development of government policy.	<ul style="list-style-type: none"> Relevance for the public Knowledge development and transfer Customer control / appreciation 	4-5
Strong + / weak - + Customer appreciation by professionals + Highly relevant for public safety (less personal and societal damage from disasters) + User interfaces + Good showcases attract interest from media - Standardisation of software tools for various OOV-disciplines		
1.4 Innovation This criterion reflects the programme's impact on the further development of the national spatial data infrastructure and its innovation (NGII)	<ul style="list-style-type: none"> Visible and innovative pilot projects System innovation 	4-5
Strong + / weak - + Balance in top down/bottom up approach + User driven integration of operational procedures and technology + Possibilities for transfer to other user groups - Partnerships with industry		
Recommendations		
Ensure strong connections between scientific approach and the end use of the technology. Use showcases for outreach to other groups of users in the sector of public order and safety. Faster standardisation, more networking with other RGI projects and more private partnerships.		

Spatial Planning and Design (ROI)

Selection of projects that were presented to RC

RGI-002: Generation and use of base maps for integrated querying of digital physical development plans:
Jantien Stoter
RGI-160 (innovation pilot): People in Motion: planning mobility on a landscape: Arend Ligtenberg
RGI-254 (bridging project): Land Use Modeling System (LUMOSpro): Judith Borsboom
On request of the RC the scientific programme director presented an additional overview of the agro sector oriented projects.

Key criteria	Aspects considered	Score (1-5)
(Scientific) quality: This criterion reflects the quality of the projects and the programme		
1.1 Scientific quality This criterion reflects scientific quality and output as it is observed in the professional eyes of its peers and competitors	<ul style="list-style-type: none"> • Quality of research / international scientific impact • Scientific output • Knowledge/experience/training • Esteem/authority/visibility • Exact sciences / social sciences integration • Innovation • 	4
Strong + / weak - Conventional spatial planning: + Mature field with high scientific standards and good progress. + International collaboration. Agro oriented projects: + User driven development of new knowledge and applications.		
1.2 Economic relevance This criterion reflects the programme's potential impact on the national economy. It indicates its contribution to the national economy.	<ul style="list-style-type: none"> • Participation of industry • Economic awareness • Formation of industry-university and user consortia • New business developed based on RGI-research • 	4
Strong + / weak - Conventional spatial planning + Potential benefits are substantial. + The main drivers for economic benefits will be the automatic map generation and a broad acceptance of DURP in combination with implementation of regulations and authentic registrations by cadastre and VROM. Agro oriented projects: + High economic potential + Speed of implementation in operational decision making at farm level + Project Geo-farmer is of European relevance Conventional spatial planning: - Realisation of potential benefits strongly depends on innovative capacity public sector.		
1.3 Societal relevance This criterion reflects the programme's potential impact on society. It indicates its role in the public debate and participation and its role and contribution in the development of government policy.	<ul style="list-style-type: none"> • Relevance for the public • Knowledge development and transfer • Customer control / appreciation • 	3-4
Strong + / weak - Conventional spatial planning: + DURP: catalyst for new applications by regional authorities + LUMOSpro: prominent role in the National Sustainability Outlook for The Netherlands. Agro oriented projects + User driven approach + Efficiency of information exchange between farmers and government + Contribution to implementation of environmental friendly farming methods (precision farming) + Relevance for implementation of European rules and regulations Conventional spatial planning: - Future use and embedding of LUMOSpro needs strengthening of relation with future users. Present profile is mainly academic.		

<p>1.4 Innovation This criterion reflects the programme's impact on the further development of the national spatial data infrastructure and its innovation (NGII)</p>	<ul style="list-style-type: none"> • Visible and innovative pilot projects • System innovation • 	3-4
<p>Strong + / weak - Conventional spatial planning: + DURP gives innovative impulse to traditional spatial planning. + People in motion seems promising project, but is still in a very early stage. Agro oriented projects: + Open innovation + Excellent collaboration and information exchange between parties involved (researchers, geo-information industry and agricultural sector).</p>		
<p>Recommendations Examine the potential relevance of the project "People in motion" for the theme Public Order & Safety. The provinces are the main category of future users of the results of the spatial planning projects. Make an assessment of their capabilities to implement and use the results. Strengthen relation LUMOSpro with provincial governments</p>		

Consumers & Students (COL)

Selection of projects that were presented to RC		
RGI-022: Educational GIS-portal (EDUGIS): Joop van der Schee RGI-129: Cyclocity (innovation pilot): Panoramic Virtual Reality: Bart Beers RGI-102: Combined – weather and traffic: Menno Mimpen		
Key criteria	Aspects considered	Score (1-5)
(Scientific) quality: This criterion reflects the quality of the projects and the programme		
1.1 Scientific quality This criterion reflects scientific quality and output as it is observed in the professional eyes of its peers and competitors	<ul style="list-style-type: none"> Quality of research / international scientific impact Scientific output Knowledge/experience/training Esteem/authority/visibility Exact sciences / social sciences integration Innovation 	No Priority
Strong + / weak - + Although scientific development is not a priority in this theme, the possibilities to contribute with a PhD-project to communication and pedagogic sciences have been realised.		
1.2 Economic relevance This criterion reflects the programme's potential impact on the national economy. It indicates its contribution to the national economy.	<ul style="list-style-type: none"> Participation of industry Economic awareness Formation of industry-university and user consortia New business developed based on RGI-research 	3
Strong + / weak - + Relation to and involvement of private companies. + The involvement of and arousing the curiosity of the youth, future consumers and partners in the geo-information society will probably in the future create new business. + Potential contribution of project "Combined" (weather and traffic) to decrease of traffic congestions. - Few direct economic benefits. - Projects should increase activities to ensure continuation of funding after RGI programme ends.		
1.3 Societal relevance This criterion reflects the programme's potential impact on society. It indicates its role in the public debate and participation and its role and contribution in the development of government policy.	<ul style="list-style-type: none"> Relevance for the public Knowledge development and transfer Customer control / appreciation 	5
Strong + / weak - + Geoweek was a very successful event for the general public. + The projects have very good dissemination quality on applications of geographic information to broader public and to pupils, e.g. climate game and natural health risks in space and time. + Projects support teachers in developing interesting lectures. + Projects contribute to raising awareness, e.g. "Geofort" (RGI-330)		
1.4 Innovation This criterion reflects the programme's impact on the further development of the national spatial data infrastructure and its innovation (NGII)	<ul style="list-style-type: none"> Visible and innovative pilot projects System innovation 	3
Strong + / weak - + Projects bring geo information to new groups of (potential) users. + This type of social and system innovation is unique and has attracted international interest : "Geo year 2008" (RGI-335) is in preparation in collaboration with UNESCO; concept of "Sense of the city" (RGI-173) has been adopted by Belgian government) + Development of climate game in collaboration with Microsoft and UNESCO. - Few innovations with a direct perspective for development of new businesses in the Dutch geo industry.		
Recommendations		
Involve more significant and striking or attractive projects in the demonstrations (e.g. in Edugis) Go on with publishing, even in other disciplines than geo-information, such as in the social sciences. Make the projects sustainable. Develop methods or techniques for measuring the effects of the efforts of communication, e.g. number of schools or pupils using Edugis, impact of Geoweek. Search for opportunities for the Dutch Geo industry to commercially benefit from the economic and social relevance of this theme.		

National Geo-Information Infrastructure (NGII)

Selection of projects that were presented to RC		
RGI-006: GeoPortals: Liberty united: Jan Kooijman RGI-027: Mutatis Mutandis: Rob beck RGI-011: 3D Topography: Peter van Oosterom RGI-117: Towards geo-information access and sharing: Institutional obstacles: Yvette Pluijmers RGI-024: Geogov: Sjaak Nouwt RGI-019: Feasibility study for a Dutch National Population Register: Cees Guikers		
Key criteria	Aspects considered	Score (1-5)
(Scientific) quality: This criterion reflects the quality of the projects and the programme		
1.1 Scientific quality This criterion reflects scientific quality and output as it is observed in the professional eyes of its peers and competitors	<ul style="list-style-type: none"> Quality of research / international scientific impact Scientific output Knowledge/experience/training Esteem/authority/visibility Exact sciences / social sciences integration Innovation 	4-5
Strong + / weak - + Strong scientific profile of the theme, with a high percentage of PhD projects + Well connected internationally (INSPIRE) + Collaboration between sciences and social sciences - In some cases it was not clear whether projects sufficiently had investigated results of previous activities		
1.2 Economic relevance This criterion reflects the programme's potential impact on the national economy. It indicates its contribution to the national economy.	<ul style="list-style-type: none"> Participation of industry Economic awareness Formation of industry-university and user consortia New business developed based on RGI-research 	4-5
Strong + / weak - + Demand orientation + NORA: Netherlands Open Reference Architecture + Geoportals + Focus on access and sharing + Removal of institutional obstacles in collaboration with business community - Involvement of industry outside the geo-information sector (financial and utility sector)		
1.3 Societal relevance This criterion reflects the programme's potential impact on society. It indicates its role in the public debate and participation and its role and contribution in the development of government policy.	<ul style="list-style-type: none"> Relevance for the public Knowledge development and transfer Customer control / appreciation 	4-5
Strong + / weak - + Demand orientation + Links with BSIK "Space for Climate Programme" + Geoportals + Focus on access and sharing, combined with active lobbying in the direction of government officials. + Focus on value adding services - Involvement of professionals in marketing and communication		
1.4 Innovation This criterion reflects the programme's impact on the further development of the national spatial data infrastructure and its innovation (NGII)	<ul style="list-style-type: none"> Visible and innovative pilot projects System innovation 	3-4
Strong + / weak - + Social and systems innovation + Creation of multi sector / multi participant knowledge networks. + Social sciences input (Geogov) + Links with BSIK "LOFAR" are a potential source of future innovation - Short time scale of programme: will innovative impulses continue when programme stops? - Reluctance of geo-industry to invest in innovation, because governmental institutions are not sufficiently perceived as transparent and consistent in their role and position towards the geo-industry.		
Recommendations		
The key to the theme's success is the extent to which it will be sustainable after the end of the RGI programme. This will be addressed in the recommendations at programme level.		

Annex E: Summary overview of the results and scores at programme level

Key criteria	Aspects considered	Score (1-5)
1. (Scientific) quality This criterion reflects the quality of the projects and the programme		
1.1 Scientific quality This criterion reflects scientific quality and output as it is observed in the professional eyes of its peers and competitors	<ul style="list-style-type: none"> • Quality of research / international scientific impact • Scientific output • Knowledge/experience/training • Esteem/authority/visibility • Exact sciences / social sciences integration • 	4
<p>General Difficult mid-term to evaluate interim results. We only have seen a part of the projects and it is too early to have a good view of the results.</p> <p>Strong + / weak - + Objectives will be met + Number of PhD in preparation and number of publications + International contacts: some projects good international networking + Integration of sciences (β) and social sciences (γ) + Good management of the scientific programme - Not all projects mention the relation to the state-of-the-art world wide</p> <p>Recommendations Implement internationalisation strategy and better document the international cooperation; there is no evidence of the number of international collaborative publications Monitor baseline vs. effects at the end of the programme</p>		
1.2 Economic relevance This criterion reflects the programme's potential impact on the national economy. It indicates its contribution to the national economy.	<ul style="list-style-type: none"> • Participation of industry • Economic awareness • Formation of industry-university and user consortia • New business developed based on RGI-research • 	4
<p>General The economic relevance will be dependent on price setting and availability of data. Also the sustainability of the programme effort will determine the economic relevance. Ecorys report does not take into account the relevance of the geo infrastructure for the overall economic results and only focuses on the direct benefits of current projects. GI industry is a vital branch of Dutch economy. GI moves from a specific place to a part of the general ICT</p> <p>Strong + / weak - + Good involvement of main players in public sector + SMEs present + Many projects are demand driven + Removal of legal and other institutional obstacles for the use of GI is part of the programme - Some SMEs afraid of administrative workload or sharing technology and data - Large companies and traditional companies in GI-sector seem less involved (engineering firms, dataproviders, utility sector, financial sector, ...)</p> <p>Recommendations Encourage the contact with the utility sector and financial and insurance sector.</p>		
1.3 Societal relevance This criterion reflects the programme's potential impact on society. It indicates its role in the public debate and participation and its role and contribution in the development of government policy.	<ul style="list-style-type: none"> • Relevance for the public • Knowledge development and transfer • Customer control / appreciation • 	4-5
<p>General Raising awareness on the vital role of GI in our modern society underpins the whole programme. Involving foreign PhD's will in the long run enhance international relationships, visibility and opportunities</p>		

<p>Strong + / weak -</p> <ul style="list-style-type: none"> + Raising awareness on the vital role of GI in our modern society underpins the whole programme. + Communication, networking aspects and resulting synergy are major achievements + Brings together government, industry and science in a way that hasn't been done before + Excellent communication and outreach also to students and general public - Danger that momentum is lost at the end of programme - Programme could benefit from more postdoctoral fellows 		
<p>Recommendations</p> <p>Measure societal impacts and effects of communication Continuation of academic interdisciplinary collaboration (beta and social) Make PhD results broadly available by good communication</p>		
<p>1.4 Innovation</p> <p>This criterion reflects the programme's impact on the further development of the national spatial data infrastructure and its innovation (NGII)</p>	<ul style="list-style-type: none"> • Visible and innovative pilot projects • System innovation • 	3-4
<p>General</p> <p>The programme has considerably contributed to innovation from a societal point of view and less from a technical point of view. Technological innovation depending on innovation in military and space industry (limited activities in the Netherlands); technological innovation mostly software development</p>		
<p>Strong + / weak -</p> <ul style="list-style-type: none"> + Some new applications (and companies) came up + Integrating of different techniques with (new) user demands + Links with LOFAR contribute to innovative potential - Demand driven approach of projects limits innovation 		
<p>Recommendations</p> <p>Improve taking account of the international state-of-the-art. Technical innovation could be strengthened. The Netherlands has a strong scientific position in astronomy and space technology.</p>		
<p>1.5 Programme</p> <p>This criterion reflects the impulse of the programme on the NGII and the knowledge community. The sub-criteria are the programme objectives.</p>	<ul style="list-style-type: none"> • More demand oriented • More flow of knowledge • More coherence • More innovation • More awareness • 	4
<p>General</p> <p>The most important impact of RGI is its catalytic function: the programme enables governments, private sector parties, research institutes, etc. to cooperate. This way, developments in the field of geo-information are accelerated.</p>		
<p>Strong + / weak -</p> <ul style="list-style-type: none"> + All programme objectives are expected to be met or exceeded + Baseline for NGII is emerging - A large number of projects brings uncertainty about long term sustainability 		
<p>Recommendations</p> <p>Consolidate programme results. Long term funding is essential for viability of networking programs (funding spread over more years, e.g. 7 - 10 years)</p>		
<p>2. Progress and organisation</p> <p>This criterion reflects abilities to operate efficiently and effectively and to develop a coherent programme in line with the overall mission and budget.</p>		
<p>2.1 Technical coherence</p> <p>Coherence within the programme</p>	<ul style="list-style-type: none"> • Clarity of overall research strategy in line with the overall mission (aspects including flexibility and openness and value for money) • Contribution of the knowledge themes to the overall programme objectives • 	4
<p>General</p> <p>What makes the RGI-approach rather unique is the fact that all the relevant building blocks of a NGII have been addressed in a coherent and well balanced way: data, standards, technology, policy and people.</p>		
<p>Strong + / weak -</p> <ul style="list-style-type: none"> + Users point of view largely taken into account + Effort to bring industry, university and government together in each large project + Geoportals is a strong component in the technical coherence of the programme 		

+ Contributions of knowledge themes to overall programme is on track		
Recommendations Interaction between themes should be encouraged		
2.2 Synergy Relationships with other programmes / countries	<ul style="list-style-type: none"> • Synergy with other Bsik projects or ICT programmes (bridging projects) • International collaboration • 	4
General The synergy with other BSIK programmes is realized through 14 bridging projects. The design and formulation of bridging projects has taken some time. Now most projects are well under way, but it still is too early to evaluate the results. Many bridging projects in the RGI programme are top ups from earlier RGI projects, which is positive for the quality of the projects. A general remark is, that the managerial complexity of the BSIK system and the focus on administrative control instead of target realisation, are counterproductive for the creation of synergy. This critical remark applies to the BSIK system as a whole and not specifically to RGI.		
Strong + / weak - + Strong networking and communication + Synergy at national level is very good (LOFAR, DURP, SME, universities, research institutions) + Bridging projects are often top ups from earlier projects → high quality - International synergy can be enhanced - Managerial complexity and heavy burden of administrative control		
Recommendations Review Committee supports Plan for improvement of international cooperation		
2.3 Milestone review The choice of the milestones and their feasibility	<ul style="list-style-type: none"> • The clarity of the selected milestones and their suitability as progress criteria • Contribution of the selected milestones (deliverables) to the overall programme objectives • The feasibility of the milestones • 	3
General The Review Committee has focused on the knowledge themes and has not been able to assess the progress of the programme on the four scientific spearpoints. The original programme was adapted as a response to recommendations and experiences, but part of milestones remained unchanged.		
Strong + / weak - + Most of the milestones are achieved - Some milestones not adapted to changes in programme - Definition of some milestones ambiguous.		
Recommendations Definition of milestones could be clarified. Actual programme is on track and the committee expects that programme will achieve objectives		
2.4 Relationship between progress and mission / objectives The progress and feasibility of the objectives of the programme	<ul style="list-style-type: none"> • Progress in comparison with the original plan • The feasibility of the objectives in the light of progress • 	4
General The actual programme is on track. The reviewing committee expects that it will achieve the objectives. Most of the milestones are already achieved.		
Strong + / weak - + The original plan was adapted in the light of experience. + Most milestones are achieved - Some milestones not adapted to changes in programme		
Recommendations The committee advises that the milestone be adapted to reflect the changes in the programme.		
2.5 Implementation of recommendations for managerial changes from the previous monitoring rounds The progress and feasibility of the objectives of the programme	<ul style="list-style-type: none"> • 	5
General Strong + / weak - + Recommended changes have been adopted		

Recommendations		
3. Viability and future This criterion reflects the vitality of the programme, future collaboration, future knowledge embedding and continuation.	<ul style="list-style-type: none"> • Critical mass • Collaboration (internal / external) • Vision and strategy for the future • Embedding of knowledge development • Development of partnerships • View on guarantees for further funding of the research activities • 	4
General What makes the RGI-approach rather unique is the fact that all the relevant building blocks of a NGII have been addressed in a coherent and well balanced way: data, standards, technology, policy and people.		
Strong + / weak - + Strong vibrant network with a good critical mass has been built up. + Good evidence of collaboration inside The Netherlands + Formation of new structures for establishing NGII		
Recommendations The Review Committee supports the efforts of RGI-GeoNovum to develop an authorized vision and an action plan for the establishment of a NGII. Care must be taken to ensure the viability of networking programme (over more years, e.g. 7-10 years) Care must be taken to ensure embedding of and further knowledge development Involvement of private sector is important		