Fourth Evaluation of GEOSS Implementation

Document 8

As approved at GEO-X.
Fourth Evaluation of GEOSS Implementation

1 INTRODUCTION AND BACKGROUND

The overall approach to GEOSS Monitoring and Evaluation, approved by GEO-VI, is contained in the “GEOSS Monitoring and Evaluation framework Document”, and constitutes the basis for the performance of yearly evaluations. The first evaluation, the “mid-term assessment”, took place in 2009-2010 and the process includes a total of six evaluations, ending with the final one planned in 2014-2015.

For each of these subsequent evaluations a dedicated Evaluation Team is appointed, with the responsibility of conducting the evaluation and producing the corresponding report.

The purpose of the fourth evaluation was to assess the progress towards GEOSS implementation in the Societal Benefit Areas of Disasters, Energy and Health, having as the reference the corresponding GEOSS strategic targets for 2015.

GEO principals nominated the Evaluation Team members. The Team was co-chaired by Norway and Canada, with participation from Germany, Italy, Japan and Sweden.

The evaluation process was initiated at the Monitoring and Evaluation meeting, held in Geneva in September 2012 and the Evaluation Team provided its final report in June 2013.

2 FOURTH EVALUATION OF GEOSS IMPLEMENTATION

The Evaluation Team developed the detailed evaluation plan and, in accordance with the approved M&E Framework, the plan was reviewed and approved by the M&E Working Group.

The Evaluation Team then proceeded in implementing the Plan, starting with the collection of the information on which to base analysis and assessment, using different sources: reviews of documents and published literature; formal interviews; and three case studies, one for each of the Societal Benefit Areas under evaluation.

Before the official issue of the report, the final draft has undergone a factual review by the GEO Secretariat Experts and has been provided to the M&E Working Group that reviewed the report and wrote the formal transmittal letter to the Executive Committee.

In accordance to the agreed timeline, the Evaluation Team issued the final evaluation report in June 2013. The Team also issued a “Lessons Learned Document” that has been reviewed by the M&E Working Group and is being considered in the course of the design for the subsequent evaluations.

Appendix 1) contains the Report of the Fourth Evaluation of GEOSS Implementation, Appendix 2) the letter with which the M&E Working Group Co-Chairs transmitted the Report to the Executive Committee.

3 EXECUTIVE COMMITTEE RESPONSE TO THE REPORT OF THE FOURTH EVALUATION OF GEOSS IMPLEMENTATION

The Report of the Fourth Evaluation of GEOSS implementation was presented to the Executive Committee at its 28th meeting in July 2013 and thoroughly discussed. It was the general view of the
Executive Committee that the recommendations contained in the Report should be addressed by GEO at the highest level.

The Executive Committee has elaborated, in accordance to the procedure approved by GEO-VI, a managerial response, outlining the lines along which the recommendations should be implemented, (Appendix 3), for Plenary discussion and endorsement.

APPENDIXES

2. Report Transmittal Letter from the M&E Working Group Chair to the Executive Committee;
APPENDIX 1

REPORT OF THE THIRD EVALUATION OF GEOSS IMPLEMENTATION
GEOSS Evaluation of Disasters, Energy and Health Societal Benefit Areas

June 2013
The GEOSS Disasters, Energy and Health Evaluation was performed between September 2012, and June 2013, in order to be available for the 28th meeting of the GEO Executive Committee in July 2013, in time to be submitted, together with the Executive Committee managerial response, to the GEO X Plenary 13-17 January 2014 in Geneva, Switzerland. The evaluation was the fourth of six evaluations recommended by the Monitoring and Evaluation Working Group, after the Midterm Evaluation conducted in 2010, the evaluation of Architecture and Data Management conducted in 2011 and the evaluation of Agriculture, Biodiversity and Ecosystems SBAs in 2012. This fourth evaluation provides an understanding of the state of work progress and potential for the GEOSS Societal Benefit Areas of Disasters, Energy and Health.

As with many other parts of GEO, the Evaluation Team was comprised of volunteers from Member States and Participating Organizations. In addition to their hard work and expertise, team members were distinguished by their good humour and good will. We enjoyed the experience and in meeting and working with one another.

Given the importance of evaluation in ensuring the success of GEO and GEOSS, and the positive experience this evaluation has been, we encourage other members of the Earth science community to volunteer for subsequent evaluations.

Sincerely,
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The Fourth GEOSS Evaluation Team thanks the GEOSS Monitoring and Evaluation Working Group, especially its co-chair Craig Larlee (Canada), for their support and direction; the GEO Secretariat for hosting us during our meeting in Geneva in September 2012; the National Research Council of Italy (Consiglio Nazionale delle Ricerche, CNR) for hosting our intermediate meeting in Rome in February 2013; the Norwegian Space Center for hosting our final meeting in May 2013; Giovanni Rum and Hendrik Baeyens of the GEO Secretariat for their secretariat and technical support; the GEO Community for providing insight into GEOSS Disasters, Energy and Health SBAs; and those who accepted to be interviewed and provide us with their insight and observations.

Acronyms

AEGOS African-European Georesources Observation System
AIP Architecture Implementation Pilot
ASI Italian Space Agency
CEOS Committee on Earth Observation Satellites
CoP Community of Practice
CSDP The GEO Caribbean Satellite Disaster Pilot
CEOP Coordinated Enhanced Observing Period
DEH Disasters, Energy and Health
DLR Deutsches Zentrum für Luft- und Raumfahrt
EC European Commission
ECP Energy Community of Practice
ENDORSE Energy Downstream Services
EO Earth Observations
EPOS European Plate Observing System
ESA European Space Agency
ET Evaluation Team
EU European Union
GCI GEOSS Common Infrastructure
GEM Global Earthquake Model
GEO Group GEO Biodiversity Observation Network
GENASIS Global Environmental Assessment Information System
GEOSS Global Earth Observation System of Systems
GFMC Global Fire Monitoring Centre
GITEWS German Indonesian Tsunami Early Warning System
GOFC/GOLD Global Observation of Forest and Land Cover Dynamics
IBA MU Institute of Biostatistics and Analyses at the Faculty of Medicine and the Faculty of Science of the Masaryk University
IEA International Energy Agency
INSPIRE Infrastructure for Spatial Information in the European Union
IPCC Intergovernmental Panel on Climate Change
IPR Intellectual Property Rights
IRENA International Renewable Energy Agency
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<tr>
<td>IT</td>
<td>Information Technology</td>
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<tr>
<td>JAXA</td>
<td>Japan Aerospace Exploration Agency</td>
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<tr>
<td>JRC</td>
<td>Joint Research Centre – European Commission</td>
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<tr>
<td>MACC</td>
<td>Monitoring Atmospheric Composition &amp; Climate</td>
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<td>M&amp;E WG</td>
<td>Monitoring and Evaluation Working Group</td>
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<td>NASA</td>
<td>National Aeronautics and Space Administration</td>
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<td>NGO</td>
<td>Non-Governmental Organization</td>
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<td>NSF</td>
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<td>SAFER</td>
<td>Services and Applications for Emergency Response</td>
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<td>SAR</td>
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<td>SWERA</td>
<td>Solar and Wind Energy Resources Assessment</td>
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<td>Tsunami Alerting Device</td>
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<td>UN</td>
<td>United Nations</td>
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<td>UNAVCO</td>
<td>A non-profit university-governed consortium that facilitates geoscience research and education using geodesy</td>
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<td>UNEP</td>
<td>United Nations Environmental Programme</td>
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<tr>
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<td>United Nations Office for Disaster Risk Reduction</td>
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1. Executive Summary

1.1. Purpose

This report provides the results of the fourth evaluation of the Global Earth Observation System of Systems (GEOSS), assessing the Disasters, Energy and Health (DEH) Societal Benefit Areas (SBAs). The primary audience for this evaluation report is the GEO Plenary and Principals of GEO Members and Participating Organizations.

1.2. Overview

The evaluation of the GEOSS DEH took place over a period of nine months, from September 2012 to May 2013. The team was comprised of members from Canada, Germany, Italy, Japan, Norway and Sweden. The evaluation team met in person three times during the nine-month period and conducted bi-weekly teleconferences. The principal data gathering instruments included surveys, document and literature reviews, and a set of formal interviews.

Documents that were reviewed included GEO foundational documents, e.g., Ministerial declarations, the GEOSS 10 year Implementation Plan and the 10 year Implementation Plan Reference Document, the GEOSS Strategic Targets, the GEO 2012 – 2015 Work Plan and relevant Task Sheets, Progress Reports presented at Plenaries (particularly GEO-IX), other relevant meeting documents from Plenaries, Executive Committee and other GEO Committees, and other documents as required.

Interviews were conducted with a sample of members of GEO Committees, leads for GEO Tasks, non-lead participants in GEO Tasks, and members of user communities. Interviews were generally used for the qualitative identification of issues and themes rather than as the basis for statistical inference.

Web-based surveys were used as a means for obtaining more representative data than is possible through other methods. The following surveys were solicited:

- The Participant survey was sent to more than 440 e-mail addresses derived from the GEO Work Plans and Task Sheets;
- The User survey was sent to more than 850 user e-mail addresses provided by the GEO Secretariat, the GEO Communities of Practice (CoPs) and the members of the evaluation team;
- The surveys were distributed to attendees at the GEO IX Plenary.

Team members were asked to search the open scientific literature for technical or policy articles that were relevant to the Disasters, Energy and Health SBAs of GEOSS. The members reviewed the articles using a review guide from the prior mid-term evaluation. This guide looked for general trends of progress in the implementation of the DEH segment.

One case study for each SBA was selected to provide further insight into the elements of task effectiveness.
1.3 Summary

Disasters

One key finding of the Disasters evaluation is that tasks, components, actions and outputs as described in the Work Plan 2012-2015 and task sheets for the Disasters and related Tasks are not fully sufficient to achieve the Disasters Strategic Target and Outcomes. Landslides and disasters relevant to the transport sector should be added to Priority Actions. Improved coordination across SBAs and components will improve the likelihood of reaching the Strategic Target.

Several initiatives under Task DI-01 have progressed well and produced operative systems. However, there are areas in DI-01 that have not documented the necessary progress, particularly those related to the Hyogo framework, much due to limited resources and lack of commitment.

Our finding related to achievement of the Strategic Target is in line with the assessment in the GEO Document Assessment of Progress against the GEOSS 2015 Strategic Targets (Document 5 to GEO-IX). However, it is less positive than the assessment of progress of the relevant Disasters tasks (DI-01 and SB-04) in the mentioned document as well as in the GEO 2012 – 2015 Work Plan Implementation Report Task Assessment (Document 6 to GEO-IX), both of which mark DI-01 green.

Energy

The Energy SBA suffers from insufficient activities related to energy sources other than solar, wind and, to a lesser extent, biomass, nor is there any activity related to prediction of potential hazards to energy infrastructure. The Energy SBA is unlikely to achieve the Strategic Target and Outcomes unless action is taken to remedy this. The outcome related to prediction of potential hazards to energy infrastructure is partly covered by WE-01, particularly its component C2. However, the ET has not found evidence of an interface between the two components. Hazards other than those related to extreme weather, e.g., tsunamis and landslides, are covered by the Disasters SBA but there is no evidence of links between the two SBAs.

The GEOSS Energy SBA activities EnerGEO and ENDORSE, are showing good progress and achievements by dedicated people. It is the lack of a clear plan that includes more tasks and broader cross-SBA cooperation that jeopardizes the success of the SBA. This calls for actions to supplement the existing tasks as well as securing broader cross-SBA communication.

These findings contradict the findings in Document 5 to GEO-IX “Assessment of Progress against the GEOSS 2015 Strategic Targets”. In that document, the Energy Strategic Target is marked green in the pyramid diagram, meaning it is expected to be achieved, whereas contributing tasks are marked yellow (at risk of not being achieved without additional actions/intervention). Document 5 also marks WE-01 green, which may be true, but it does not say anything about the application of WE-01 results in the Energy SBA. However, both the Implementation Board and the ET identify the development of Earth
Observation in the fields of ocean, hydro, nuclear and fossil fuel energies as a key issue and gap.

Health

One key finding of the Health SBA evaluation is that HE-01 task components, actions and outputs as described in the Work Plan 2012-2015 and task sheets for the Health and related Tasks are not fully sufficient to achieve the Health Strategic Target and Outcomes.

On the other hand Task HE-02 is making sufficient progress toward achieving the Health Strategic Target and Outcomes through task components, actions and outputs as described in the Work Plan 2012-2015 and task sheets. These are, in some cases, beyond what is expected.

The Health SBA is on track for 2015; however lack of information on Key Activities and Key Outputs for HE-01 makes the Target vague. This has been also demonstrated by Assessment of Progress against the GEOSS 2015 Strategic Targets (Document 5 to GEO-IX).

Priority should be given to cross-SBA cooperation as there is little evidence of information exchange and collaboration between Health Task HE-02 and the following Tasks: SB-01 Oceans and Society: Blue Planet; DI-01 Informing Risk Management and Disaster Reduction; CL-01 Climate Information for Adaptation; WA-01 Integrated Water Information; WE-01 High-Impact Weather Prediction; EC-01 Global Ecosystem Monitoring; AG-01 Global Agricultural Monitoring and Early Warning; BI-01 Global Biodiversity Observation (GEO BON).

A better dissemination activity should help achievement of Strategic Target as it will foster exchange of information within and out of GEOSS.

Our finding related to achievement of the Strategic Target is in line with the assessment in the GEO Document Assessment of Progress against the GEOSS 2015 Strategic Targets (Document 5 to GEO-IX). It also supports the assessment of progress of the relevant Health tasks (HE-01, HE-01, BI-01, SB-04 and SB-05) in the mentioned document as well as in the GEO 2012 – 2015 Work Plan Implementation Report Task Assessment (Document 6 to GEO-IX), both of which mark HE-01 yellow and HE-02 green.

Other observations are that:

- The GEO Portal is not providing the needed accessibility and user friendliness that is required. The recommendations from the Second Evaluation do not seem to have been implemented;
- User engagement is low and participants generally have a more positive view of GEO and GEOSS than the users;
- Lack of cross-SBA coordination hampers the progress towards strategic targets and outcomes;
- The main value-adding elements of GEOSS are networking, global cooperation, standardization, data accessibility and information exchange; and,
- There are hardly any performance indicators in use.
1.4. **Key Findings and Recommendations**

The Key Findings of the Fourth GEOSS Evaluation are presented below in order of importance.

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<th>Key Finding</th>
<th>Recommendation</th>
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| The Disasters and Energy SBAs will not achieve their strategic targets unless new tasks/components are added. | **Recommendation 1:** Implement activities related to  
- Landslides to the Disasters SBA  
- Increasing the abilities to detect small forest fires, and fires in overcast conditions for the Disasters SBA  
- Energy sources other than wind, solar and bio for the Energy SBA  
- Prediction of potential hazards to energy infrastructure for the Energy SBA |
| Within the Health SBA a few Task Components are not described in task sheets. | **Recommendation 2:**  
- Complete task sheets for Components to clarify implementation. |
| Cross-SBA cooperation is unsatisfactory and must be improved. Tasks and Components consist of activities initiated and funded by sources external to GEO. Coordination of tasks within the SBAs is hardly visible. | **Recommendation 3:**  
The GEO Societal Benefits Implementation Board take stronger action to secure cross-task and cross-SBA interaction, cooperation, and utilization of data and information. The interaction must go in both directions.  
This could be accomplished by putting the responsibility for coordination on individual members.  
The GEO Societal Benefits Implementation Board should implement the equivalent of GEOBON under existing international frameworks or agencies. |
| Data must be made more accessible over the GEO Portal. Today it is difficult and time consuming to locate data and | **Recommendation 4:** GEOSS should develop manuals on use of the next version of the GEO Portal, |
There is not a clear understanding of the difference between the GEO Portal and the GCI. Including examples of cases. Webinars and workshops could support the introduction of the updated GEO Portal.

Users' response was too low to judge if they are sufficiently involved and their needs are taken properly care of.

Participants and Users perceive that networking and synergy will be the main value-adding elements.

**Recommendation 5:**
GEO/GEOSS should make stronger efforts to identify and involve active users in the Communities of Practice and organize more dedicated workshops in cooperation with user organizations and associations like the IEA and WHO.

Task leaders should be more specific in describing users and user engagement in the task sheets and develop performance indicators that reflect user needs and value-creation to users.

Although not a direct outcome of the evaluation of the Disasters, Energy and Health SBAs the Fourth Evaluation team would like to offer the following recommendations:

**Recommendation 6: Final Evaluation Planning**

The planning of the final evaluation should start immediately. The Evaluation Team should be recruited as soon as possible and the possibilities to financially support the Team should be identified. The Team should include members from all continents. External competence will be needed.

**Recommendation 7: Performance Indicators for Tasks**

Well in advance of the start of the final evaluation, the tasks should be presented with clear performance indicators that derive from the logic model. Task leaders should be told that part of the evaluation will be measuring the outcomes against these indicators.

**Recommendation 8: Revised Strategic Targets and Outcomes**

The post-2015 process should include revisiting the Strategic Targets and Outcomes with the aim to reduce the number of Strategic Targets and Outcomes, make them less ambiguous, more measurable, and potentially achievable.
2. Introduction

This report provides the results of the fourth evaluation of the Global Earth Observation System of Systems (GEOSS). It assesses the Disasters, Energy and Health (DEH) Societal Benefit Areas (SBAs) and it is the fourth in a regular cycle of evaluating the implementation of the GEOSS by assessing progress made towards achieving strategic targets in SBAs. The first assessment, the mid-term assessment completed in 2010, was called for by the ministerial declaration of the First Ministerial Summit of GEO in Cape Town, South Africa. It assessed the progress of all aspects of GEOSS, whereas the succeeding evaluations were concerned with Architecture and Data Management (ADM, the second evaluation completed in 2011) and the SBAs of Agriculture, Biodiversity and Ecosystems (ABE, the third evaluation completed in 2012).

2.1. Objectives of the evaluation

The overall objective of the series of GEOSS evaluations is to answer the overarching question in Appendix B to the Plan for the Fourth Evaluation of GEOSS Implementation (see Annex A to this report) “Will GEO achieve the Strategic Targets for 2015?” The Fourth Evaluation had two objectives, as laid out by the two Major Division questions in the Plan for the Fourth Evaluation of GEOSS Implementation:

1. Is implementation of DEH guided by a clear plan to 2015?
2. Is the execution of GEOSS DEH implementation on track to achieve the Strategic Targets by 2015?

The ET defines the “clear plan” as the management of resources to meet goals with well-defined performance indicators and produce an outcome within a specified time.


The fourth GEOSS evaluation used tasks as described in the Group on Earth Observations (GEO) 2012 – 2015 Work Plan and associated task sheets. The GEO 2012 – 2015 Work Plan was designed to meet the objectives described in the “demonstrated by” bullet points of the Strategic Targets document. The 26 tasks of the Work Plan 2012 – 2015 are based on the inputs of the GEO community and build directly on on-going 2009-2011 sub-tasks as well as on new proposals.

The GEO 2012-2015 Work Plan derives directly from the GEOSS Strategic Targets: it groups Tasks into three thematic parts (rather than two as before); it features a streamlined number of Tasks; and, it

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proposes an improved Work Plan management structure\(^3\). The Work Plan is structured to build a user-driven GEOSS and to engage users, especially those in developing countries.

**2.2. Scope of the evaluation**

The primary focus of the fourth evaluation was to assess progress towards delivering outputs and achieving outcomes under selected Strategic Targets. The SBAs to be assessed in the fourth evaluation are:

1) Disasters;
2) Energy; and
3) Health.

The overarching question to be answered was “Will GEO achieve the Strategic Targets for 2015?”

The evaluation was to consider all Work Plan Tasks relevant to the achievement of the selected Strategic Targets, even where these may be aligned to other Targets in the GEO Work Plan 2012 - 2015.

**2.2.1. Expected audience / users of the evaluation report**

The primary audience for the evaluation report is the GEO Plenary and Principals of GEO Members and Participating Organizations. The final report of the fourth evaluation will be made available to this audience through the normal channels of distribution of Plenary documents.

The secondary audience of the evaluation report are the various GEO members and participating organisations responsible for implementing GEOSS.

**2.2.2. Expected use of the evaluation Key Findings**

The findings and recommendations of the fourth evaluation are expected to inform decisions concerning possible changes to GEO governance, planning and reporting processes, or other aspects of the implementation of GEOSS.

**2.3. Structure of the report**

Chapter 3 summarizes the tools and approach used by the Evaluation Team; Chapters 4– 6 discuss gaps and progress and present findings of the analysis for each of the three SBAs, Chapter 7 discusses results and findings related to common issues, and Chapter 8 gives conclusions and recommendations. Chapter 9 is the reference list. Four annexes are found at the end and include a more detailed presentation of the approaches used by the evaluation team.

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3. Evaluation Approach and Methodology

The Evaluation Team used a methodology developed by the Centre of Excellence for Evaluation, a Division of the Treasury Board of Canada Secretariat within the Canadian federal government, especially the use of a logic model and evaluation framework.

The evaluation used principal sources of data and information to answer the evaluation questions; however, not all sources were used for every question. Multiple sources were used wherever possible as a control against the inherent biases of any particular source or method.

Data and information collected in support of the evaluation were maintained and made available to all members of the Evaluation Team through an electronic registry.

Information provided through interviews or surveys was secured to ensure confidentiality of informants/participants. If a sample was too small to ensure confidentiality of the respondents that sample was aggregated to a higher level.

3.1. Evaluation Framework

The Monitoring and Evaluation Working Group (M&E WG) developed a plan for the fourth evaluation of GEOSS Implementation, following the procedures as outlined in Document 13 to GEO-VI – GEOSS Monitoring and Evaluation. The plan was handed to the Evaluation team at the kick-off meeting in Geneva 25-26 September 2012. The plan contained an Evaluation Question Framework that listed the major questions to be answered during the evaluation. The overarching question asked by the evaluation of DEH was “Will GEO achieve the Strategic Targets for 2015?” The overarching question was followed by two major division questions:

1. Is implementation of DEH guided by a clear plan to 2015?
2. Is the execution of GEOSS DEH implementation on track to achieve the Strategic Targets by 2015?

Nine Evaluation Questions and 22 specific questions were derived from the overarching and major division questions. These questions formed the basis for specific survey and interview questions that were used as data sources and lines of evidence. The complete Evaluation Framework is included as Appendix A to this report.

3.2. Logic Model

One tool that allows for consistent evaluation of programs is the logic model, which describes the results expected from a program of action or an intervention. The results chains embedded in logic models are key building blocks for developing the results intended by a program (i.e., the boxes in a typical visual logic model). This is in line with the process described in Document 11 to GEO-V – GEOSS Performance Monitoring & Evaluation Framework.
In Figure 1 the “Strategic Targets”, “To be achieved through” and “Outcomes” are from the GEO Strategic Target Document (Document 12 to GEO-VI), whereas Outputs are the components of the tasks as described in the GEO Work Plan 2012 – 2015 and Activities are extracted from task descriptions in the same document.4

The Logic Models are examined in more detail in the Chapters 4, 5, and 6, where the logic models for the three SBAs are found in Figures 4.1, 5.1, and 6.1.

These Evaluation Questions were each mapped to a Logic Model as shown in Table 1.

Table 1. The overarching, major and evaluation questions used in the fourth evaluation of GEOSS

<table>
<thead>
<tr>
<th>Overarching Question</th>
<th>Major Divisions</th>
<th>Evaluation Questions</th>
<th>Map to in logic models In Chapters 4 - 6, Figures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will GEO achieve the Strategic Targets for 2015 in the Societal Benefit Areas of Disasters, Energy and Health?</td>
<td>Is implementation guided by a clear plan to 2015?</td>
<td>1. Are the Expected Outcomes and Priority Actions relevant? (Do they respond to real needs to which GEO is well-placed to contribute?)</td>
<td>Strategic Target</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Are the planned activities and outputs necessary and sufficient to achieve the Expected Outcomes?</td>
<td>To be achieved through</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Have the needs of the full range of stakeholders been addressed during planning?</td>
<td>Expected outcomes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Will it be possible to demonstrate achievement of or progress toward the Expected Outcomes?</td>
<td>Expected outcomes</td>
</tr>
<tr>
<td>Is the execution of GEOSS implementation on track to achieve the Strategic Targets</td>
<td>6. Are the Work Plan Tasks and Components proceeding as planned?</td>
<td>Expected outcomes</td>
<td></td>
</tr>
</tbody>
</table>

4 Please note that the Evaluation Framework uses the term “Priority Actions” for the statements in the Strategic Targets document that follow the phrase “This will be achieved through” whereas in the GEO Work Plan 2012 – 2015 “Priority Actions” is used to describe important activities to be carried out as part of the task component.
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Are Expected Outcomes being realized, relative to the stage of implementation?</td>
<td>Expected outcomes</td>
</tr>
<tr>
<td>8. Have any unintended outcomes (positive or negative) been observed?</td>
<td>Activities</td>
</tr>
<tr>
<td>9. Are there any lessons learned during implementation to date that might be transferable to other Strategic Target areas?</td>
<td>Activities</td>
</tr>
</tbody>
</table>

Figure 3.1. A sample of the Logic Model used in this evaluation, illustrating where the various levels are found. The SBA specific Logic Models are shown in Figures 4.1, 5.1 and 6.1.

### 3.3. Review of GEO documents

GEO Documents are defined GEO foundational documents: Ministerial declarations; the GEOSS 10 year Implementation Plan and the 10 year Implementation Plan Reference Document; Work Plans, Work Plan Progress Reports and relevant Task Sheets; meeting documents from Plenaries, Executive Committee and other GEO Committees found at ftp://ftp.earthobservations.org and documents marked as deliverables from one of the relevant GEOSS tasks.
GEO documents were reviewed to answer the major division questions of the evaluation “Is implementation guided by a clear plan to 2015?” and “Is the execution of GEOSS implementation on track to achieve the Strategic Targets by 2015?”

To this end the Evaluation Team (ET) used the GEO 2012 – 2015 Work Plan and the Task and Component Sheets. In addition to the main tasks DI-01, EN-01, HE-01 and HE-02 and their components, the ET also looked at tasks that are mentioned under the heading “To be implemented in connection with” for each of the SBAs. The tasks listed under this heading were included as described in Chapters 4, 5, and 6. It should be noted that tasks under “Infrastructure” and “Institutions and Development” are inherently crosscutting and were not considered in the analysis.

To evaluate progress of the tasks against the GEO 2012 – 2015 Work Plan the review included the Work Plan Progress Report to GEO-VIII (Document 5), the GEO 2012 – 2015 Work Plan Progress Report (Document 12 to 25th GEO Executive Committee meeting 12 – 13 July 2012), the Assessment of Progress against the GEOSS 2015 Strategic Targets (Document 5 to GEO-IX), and the GEO 2012 – 2015 Work Plan Implementation Report Task Assessment (Document 6 to GEO-IX), in addition to what could be found in the task sheets and the presentations at GEO-IX. In particular, the ET notes the efforts made by the GEO Implementation Boards to respond to the need for an assessment of GEOSS Implementation progress against the 2015 Strategic Targets (Document 5 to GEO-IX). This assessment was found useful by the ET. It is divided into summary assessments at the level of the Target featuring: a pyramid diagram; analysis of implementation status and issues and gaps; and key actions/intervention requested from Plenary. The report also included a detailed assessment at the level of the Outcome (“Demonstrated by” bullets in the Strategic Targets document) featuring a colour code, an analysis of implementation status and issues and gaps, and key actions/intervention requested from Plenary. Also Document 12 to the 25th ExCom had short and useful messages whereas Document 6 to GEO-IX, while having valuable information, is more of a detailed list of activities rather than a progress report.

3.4. Literature Review

The purpose of the literature review was to evaluate to what extent:

- The needs and results of GEOSS DEH are presented to a wider audience; and,
- The non-GEO community has knowledge of GEOSS and gives feedback.

The evaluation focused on peer reviewed literature and included six questions as listed in Annex B.

Literature related to DEH from the mid-term evaluation 2010 bibliographic list was revisited and supplemented by publications found by a simple internet search up to and including 2012. The final list of publications that were reviewed appears in the reference list in Chapter 9. The reviewed literature is a sample of what has been published. It is non-exhaustive and only indicative.

Table 2 below summarizes results of the review with respect to the questions that relate to gaps and progress and were used in the analysis. Less than a handful of papers indicated unintended positive or negative outcomes.
3.5. Surveys

Survey questionnaires are found in Annex C. Invitations to participate in the surveys were sent to more than 440 persons listed in the task sheets as task leads and participants and to approximately 850 users. The majority of users were classified as Health (469) and General (239), whereas direct users within Disasters (12) and Energy (32) were difficult to identify. The many invitations to Health and General users are due to the use of participant lists from relevant conferences. The surveys were announced at the Plenary in November 2012 and at one conference on geology and EO. The responses used in the final analysis of the separate SBAs were distributed as shown below in Table 3.

Table 2 Number of reviewed publications that indicate gaps or progress. Note that gaps apply not only to GEOSS but may include the SBA in general if relevant to the specific GEOSS SBA, whereas progress relates strictly to GEOSS tasks.

<table>
<thead>
<tr>
<th>SBA</th>
<th>Total number of reviewed papers</th>
<th>Number where authors are GEOSS participants or Secretariat*</th>
<th>Number of papers in peer reviewed journals**</th>
<th>Number that indicates gaps</th>
<th>Number that indicates progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disasters</td>
<td>11</td>
<td>1</td>
<td>10</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Energy</td>
<td>18</td>
<td>14</td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Health</td>
<td>18</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>General</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>18</td>
<td>21</td>
<td>17</td>
<td>18</td>
</tr>
</tbody>
</table>

*Includes participants in EU projects that go into GEOSS.

**Written manuscripts for conference papers are, if nothing else is indicated, assumed to be peer reviewed.

Table 3. Number of persons that responded to the surveys, sorted by SBA.

<table>
<thead>
<tr>
<th>Region</th>
<th>Responses used in the analysis</th>
<th>Total responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Disasters</td>
<td>Energy</td>
</tr>
<tr>
<td>Participants</td>
<td>26</td>
<td>9</td>
</tr>
<tr>
<td>Users</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

5 Totals do not balance. Some respondents did not indicate an SBA, and some respondents indicated involvement in more than one SBA.
Figures 3.1 and 3.2 show that the majority of the respondents performed their GEOSS activities in Europe, followed by Asia.

![Figure 3.1 geographic distribution of participant survey response](image1)

**Figure 3.1 geographic distribution of participant survey response**

![Figure 3.2 geographic distribution of user survey response](image2)

**Figure 3.2 geographic distribution of user survey response**

The survey questions were either “yes/no/don’t know” type or used a score that ranged from 0 to 10, with 0 being the negative end and 10 the positive end of the scale. Scores around 5 are called “neutral” in the presentations and discussions of the results. The raw survey data were analyzed separately for each of the User and Participant surveys. For the numerical responses we calculated a Min, Max and Average. Both participants (49) and user (21) responses were split by SBA. They were also consolidated into a "Combined Participant and User Survey Detailed Response Analysis".

The view of the ET is that there is not enough data in the "user" files to be statistically significant. More than 850 surveys were sent out and 21 persons responded. Of these 21 only 3 identified as being in the Health SBA. In our opinion this is too small a number to be statistically significant.

The “participants” data set is a bit better - 49 respondents out of 450 surveys, with the split between

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6 Totals do not balance. Some respondents did not indicate an area of GEOSS activity.

7 Totals do not balance. Some respondents did not indicate a geographic area.
SBAs of 26, 9 and 16 in each of Disasters, Energy and Health. In general, the response is too low to find differences between the SBAs and between participants and users within the SBAs. However, the overall averages for all 70 respondents may provide some useful data.

3.6. **Key Informant Interviews**

An interview protocol was developed based on the logic model and evaluation framework. Interviews were conducted with a sample of members of GEO Communities of Practice (CoPs), leads for GEO Tasks, non-lead participants in GEO Tasks, and members of user communities. The interviews were used for the qualitative identification of issues and themes rather than as the basis for statistical inference. The interview questionnaire is included as Annex D to this report. All interviewees received the questionnaire in advance of the interview being conducted.

3.6.1. **Interviewee Selection Criteria**

The list of interview candidates was assembled from names of task leads (taken from the latest GEO task sheets), lists provided by the relevant communities of practice and knowledge and contacts of team members. The list was designed to reflect geographic diversity, balance between experts in the three SBAs, and a balance of task leads and users/stakeholders within each of these communities.

The final list was compiled through discussion within the team and with input from the M&E WG and the GEO Secretariat. Where there were a large number of interviewees in a potential region priority was given to those most active in the tasks or the relevant GEO CoPs. The ET tried to avoid interviewing several persons from the same organization.

3.6.2. **Interviewees by region and task**

The representation of interviewees by region and SBA was as shown in Table 4.

We note from Table 4 that the geographic spread is limited and interviewees are heavily biased towards Europe. Furthermore, it is uncertain why so many potential interviewees did not respond. Whether it is due to limited knowledge or lack of interest are reasons for concern.

3.7. **Case studies**

Three case studies were conducted, one for each of the evaluated SBAs. The cases are described in more detail in Sections 4.3, 5.3 and 6.3.
Table 4. Number of persons interviewed sorted by region and SBA.

<table>
<thead>
<tr>
<th>Region</th>
<th>Disasters</th>
<th>Energy</th>
<th>Health</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asia</td>
<td>4*</td>
<td>3*</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Australia/New Zealand</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Europe</td>
<td>12*</td>
<td>5</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>North America</td>
<td>2</td>
<td>3</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>South &amp; Central America</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>18</strong></td>
<td><strong>10</strong></td>
<td><strong>4</strong></td>
<td><strong>32</strong></td>
</tr>
</tbody>
</table>

*Indicates that some interviewees may have indicated that they are active in more than one region. The “secondary” region is not counted in the sum.
4. Disasters – evaluation results and key findings

This chapter presents the results and findings of the evaluation of the Disasters SBA.

4.1. Relevant Tasks

The task directly related to the Disasters SBA is DI-01. In addition, the Work Plan 2012 – 2015 lists the following tasks under the heading “to be implemented in connection with”:

SB-01 Oceans and Society: Blue Planet
SB-04 Global Urban Observation and Information
HE-01 Tools and Information for Health Decision Making
CL-01 Climate Information for Adaptation
WA-01 Integrated Water Information
WE-01 High-Impact Weather Prediction
AG-01 Global Agricultural Monitoring and Early Warning

Of these, only SB-04 lists the disasters target as a related strategic target. The others may provide important input to Disasters. Here we have only considered the activities of SB-04 and HE-01.

4.2. Logic Model – Disasters

Figure 4.1 shows a logic model for the Disasters SBA. This logic model shows, in pictorial format, the activities undertaken by the Disasters SBA, the outputs from the activities, and the expected outcomes and priority actions necessary to produce the strategic target. How the evaluation questions and derived survey and interview questions map to the logic model were shown in Table 1, Section 3.1.

Note that the “Outputs” in Figure 4.1 are the components of the 2012 version of the GEO 2012 – 2015 Work Plan (Revision 2, 17 December 2012). In this version some components were removed relative to the version presented at GEO-VIII (16-17 November 2012) and the official review version Revision 1.1 of 18 July 2012. The first Component C3 – Tsunami Early Warning and Hazard Assessment was included as a priority action in C2, and component C4 – Global Wildland Fire Information System was removed entirely. The document “Assessment of Progress against the GEOSS 2015 Strategic Targets, Document 5 to GEO-IX” has the following comment to the changes: “The structure of the current Disaster Task does not favor the development of a multi-hazard approach. There is a proposal to restructure the Task in that sense based on three cross-cutting Components. The proposal has been incorporated in the GEO-IX Work Plan update”.

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4.3. **Content and activities in the Disasters SBA**

The Disasters task DI-01, Informing Risk management and Disaster Reduction, has three components, shown under Outputs in Figure 4.1. The document GEO 2012-2015 Work Plan Implementation Report Task Assessment, Document 6 to GEO-IX, gives a comprehensive description of the activities. Here we give a brief summary:

- The GEO Supersites initiative gives rapid access to seismic information and is described in more detail in Section 4.4 below.
- The Global Earthquake Model (GEM) is working towards the establishment of a global network of researchers for assessing seismic damage.
- Tsunami warning is accomplished in the German Indonesian Tsunami Early Warning Systems (GITEWS) and supported by the pilot project “Capacity Building in Local Communities”.

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**Figure 4.1 Logic Model for Disasters SBA.** How the different levels map onto the Evaluation questions are shown in Table 3.1.
- The GEO wildfire team has activities related to global early warning system for wildland fires and the South African regional fire danger forecasting.
- The GEO Caribbean Satellite Disaster Pilot (CSDP) is working on utilization of Earth Observation data for disaster management and has had successful experiences with hurricanes.
- There is extensive support to operational systems.

4.4. Case Study – Disasters

The GEO Supersites activity was selected for case study. The Supersites provide access to space-borne and in-situ geophysical data of selected sites prone to earthquake, volcano or other hazards, with emphasis on data from Synthetic Aperture Radars (SAR), GPS crustal deformation measurements, and earthquakes. The data is provided by ESA, NASA, JAXA, DLR, ASI, UNAVCO, EPOS and the National Science Foundation (NSF) of the United States ensuring easy access to Earth science data which will promote their use and advance scientific research and close critical gaps on geological hazards assessment, ultimately leading to reduced loss of life, injuries, and damages to property and the environment from natural hazards. The objective is to stimulate an international and intergovernmental effort to monitor and study selected reference sites by establishing open access to relevant datasets according to GEO principles to foster the collaboration between all partners and end-users.

The Geohazard Supersites were selected for scientific reasons but also to maximize the visibility of the project. It is clear that, for example, a better understanding of the seismic hazard of Vancouver and Tokyo requires not only the study of these particular sites but also of subduction zones around the world.

The present supersites are:
- Earthquake Supersites: Los Angeles, Vancouver/Seattle, Tokyo-Mt. Fuji, Marmara Sea (Istanbul)
- Volcano Supersites: Hawaii, Mount Etna, Vesuvius/Campi Flegrei, Icelandic Volcanoes, Marmara Sea (Istanbul)
- Event Supersites: 2010 Haiti, 2011 Tohoku-oki, Japan, 2010 Chile, and 2009 Wenchuan, China, earthquakes

There are 3 typologies of Supersites: 1) Permanent Supersites 2) Natural Laboratories 3) Event Supersites (which are established in the aftermath of major geological disasters.)

4.5. Results

4.5.1. Is the Implementation of GEOSS Disasters SBA guided by a clear plan to 2015?

In this section the main focus is on “to what extent defined actions, outputs and deliverables from the relevant tasks are sufficient to achieve the Strategic Target and Outcomes of the Disasters SBA?” This question was answered by comparing the activities and outputs described in the Work Plan 2012 – 2015 to the outcomes in the Strategic Target Document.
The Disasters SBA is in constant development. As pointed out above, the Disasters Work Plan 2012 – 2015 was restructured between the version presented at GEO-VIII and Revision 2, and components were reduced from four to two. The latter version was approved by Plenary in Brazil, Nov., 2012. The Component on wildland fires was moved to C1 and reduced from four Priority Actions to part of an action that says “Review global and regional disaster risk management systems, such as the Wildland Fire Early Warning system”. The Tsunami component that had been moved to C2 earlier more or less kept its content. The ET notes that the task sheets of Components DI-01 C1 and DI-01 C3 were last updated 25 and 12 March 2013, respectively, at a time when the ET had completed data gathering and was well into data analysis and report writing. Our findings regarding GEO Documents must be seen in this context.

Formally the ET finds the general themes of the outcomes are covered by the Priority Actions in the Work Plan 2012 – 2015, with a slight reservation for the outcome “Support to the successful implementation of the *Hyogo Framework for Action 2005-2015*”, of which there is no specific mention in neither the WP nor the task sheets. However, the Strategic Target for Disasters reads “Enable the global coordination of observing and information systems to support all phases of the risk management cycle associated with hazards (mitigation and preparedness, early warning, response, and recovery)” but there does not appear to be anyone with the overall responsibility for this coordination and its implementation.

**Surveys**

The response to the Disasters surveys was 26 participants and 7 users. Of these, 22 participants indicated average to very good knowledge and familiarity of the GEOSS Disaster SBA (PQ5), and four indicated poor to none. Of the users the numbers were six with average to very good knowledge and one with poor to none (UQ5). The survey results must be seen in this light.

The most relevant question in the surveys was “How well do you think the Work Plan Tasks and Components are reflective of the actions required to achieve the Strategic Target?”

Overall, the Disasters respondents have a neutral view on this (5.8). The survey results indicate that participants have a more positive view on this than the users, giving scores of, respectively, 6.8 and 4.7, i.e., the participants thought the tasks and components are fairly reflective whereas the users are slightly on the non-neutral side. However, the significance of this result is doubtful. The participants are also slightly above neutral (6.1) regarding the fit when they rate the objectives of their task to the expected outcomes and how the connection between components and outcomes is explained or apparent (6.0). Forty-four percent (44%) find that all components and priority tasks are necessary to achieve the target.

**Interviews**

The majority of the eighteen interviewees in Disasters SBA classified themselves as providers of information/data or as a user. Some interviewees classified themselves in more than one category. No task leads were interviewed for this SBA. The majority identified themselves as belonging to science and research, education and outreach.

The knowledge of and familiarity with GEOSS of a plurality (6) was neutral, with three respondents...
indicating a very good knowledge and familiarity and four a poor-very poor knowledge and/or familiarity. The background for the targets and outcomes was well known, the majority (8) of those who answered this question answered good or very good, while four had poor-very poor knowledge.

When asked “Do you believe that the present Components, Actions or Outputs are sufficient to reach the Target and Outcomes of the task you are involved in?” the interviewees were split 50/50 between “Yes” and “No”. When asked what additional components, activities or outputs should be added or in which specific topics GEOSS should be more engaged the answers were that more emphasis should be given to dissemination of information, coordination of already existing projects and that national disaster management authorities should be involved in the cycle of disaster management. Use of satellite data in detection of landslides and in support to transport sector in management of geohazards should be added as Priority Actions. There is also a need to increase the ability to detect forest fires through cloud cover. More focus on polar satellites is needed because geostationary satellites do not give sufficient support for northern areas. Air quality and aerosol pollution is a typical cross SBA interest, both for Health and Disaster. Those should be defined in both.

According to one interviewee this revised disaster work plan will ensure that “success” occurs, but only because deliverables were much reduced. The ET believes that the recent changes (March 2013) may improve the possibilities of achieving the Strategic Targets and the Outcomes.

One interview did not quite see the point of GEOSS. There are suppliers like the International Charter on Space and Major Disasters and GMES/Copernicus that supply the information needed, where satellite data has been merged with other data to give a full picture that interprets the situation. It was also said that they cooperate with national organizations in charge of rescue. The ET observes that GMES EMS is not mentioned in the Implementation Report under Disasters.

Case study
The GEO Supersites are good examples of work that meets target and outcomes by contributing to

- International coordination in use of earth observations,
- Improved use of observations,
- Effective access to observations, and
- Improved national response to natural and made-made disasters.

All supersites have the data and information available in a timely manner and users may search the data according to need.

However, it is not straightforward to find similar information for other hazards. This appears as a gap in the work towards achieving the overall Disasters targets and outcomes.

Literature review
Few of the reviewed papers mention GEO or GEOSS specifically and identified gaps are of a general nature. One example is Sweta and Bijker (2013), who mention the lack of common established standards for producing disaster products, the lack of coordination between a large number of suppliers and the
lack of an established framework for monitoring and authenticating the level of quality and reliability of the products delivered to the targeted users. Bally (2012) offers insight into the needs of the geohazards community with emphasis on EO but does specifically mention gaps in the GEOSS Disasters SBA.

It should be pointed out that searching for GEO/GEOSS and disasters may not turn up all relevant literature. An example is GITEWS, mentioned in the Work Plan under DI-01 C2. GITEWS is mentioned in GEO 2012 – 2015 Work Plan Implementation Report Task Assessment (Document 6 to GEO-IX) as a completed project and a system now in operation. After completion, GITEWS was presented in a special issue of Natural Hazards and Earth System Sciences. Neither the preface (Rudloff et al., 2009) nor the postface (Münch et al., 2011) papers mention GEO or GEOSS.

4.5.2. Is the execution of GEOSS Disasters SBA implementation on track to achieve the Strategic target by 2015?

In this section we evaluate the progress of the Disasters SBA task against outputs and deliverables as described in the Work Plan 2012 – 2015, Revision 2 (December 2012) and the task sheets. Except for mentioning that some initiatives have resulted in operative systems the GEO 2012 – 2015 Work Plan Implementation Report Task Assessment (Document 6 to GEO-IX) does not really describe progress. For most other activities we find formulations such as “The GEO wildfire team, led by EC (JRC), GOF/GOLD and the Global Fire Monitoring Center (GFMC, an activity of UNISDR) is building the Global Early Warning System for Wildland Fires”, which are quite unsatisfactory for an evaluation (through no fault of the authors, there simply is not any requirement/system for milestone reporting).

The document GEO 2012 – 2015 Work Plan Implementation Report Task Assessment (Document 6 to GEO-IX) has as a priority action under DI-01 C2 that the task shall support tsunami early warning and hazards assessment, building on existing systems such as the German Indonesian Tsunami Early Warning System (GITEWS) and the European Tsunami Alerting Device (ETAD). The progress report does not describe how this support is progressing; it only mentions that GITEWS is operative. In general the progress report has descriptions of what is going on or planned, in several nationally or regionally funded projects, such as the Global Earthquake Model (GEM), GITEWS and the South African Risk and Vulnerability Atlas (SARVA), not how the all the initiatives are being coordinated to the benefit of GEOSS progress.

13 of 21 Disasters respondents in the participants survey indicated that there are areas where adequate progress has not been achieved, 4 said they do not know. When asked which outcomes this applied to they answered as shown in Figure 4.2. Note that not all respondents answered this question and that several ticked off more than one outcome. A majority holds the opinion that the outcome related to more effective access to observations is unlikely to be achieved. Note the insufficient progress related to the Hyogo framework.

The Disasters participants have a slightly above neutral (5.8 score) view on how they rate the overall progress towards completion of the relevant task/component. Only two of 21 indicated that there are particular areas where progress has exceeded expectations.
When asked to what extent the expected outcomes of the task/component they are involved with have been realized to date, the average of all respondents was slightly less than neutral, (5.4) with the participants more positive than the users (5.7 vs. 4.3, but the responses are few).

Several interviewees point out noticeable and valuable accomplishments. The main ones are:
- Access to relevant data/information via different earth observation programs/portals/Supersites;
- International networking;
- Monitoring disasters and geohazards; and,
- Well-promoted activities and good projects/analysis.

![Bar chart showing outcomes for improved use of observations, more effective access to observations, increased communication and coordination, improved national response, and support to Hyogo Framework for Action.](chart.png)

Figure 4.2. Disasters participants’ view on outcomes where insufficient progress has been made

The Case Study, GEO Supersites, is frequently mentioned as an important achievement within the Disasters SBA, in agreement with Document 6 to GEO-IX (GEO 2012 – 2015 Work Plan Implementation Report Task Assessment) and Document 5 to GEO VIII (GEO 2009-2011 Work Plan Progress Report). The International Charter on Space and Major Disasters has also been mentioned, where actions to improve access to data have been undertaken and activations in response to major disasters have taken place. In the 7th GEO European Projects’ Workshop 15-16 April 2013 a session on the Disasters SBA was included with actual projects and global initiatives. The Workshop showcased the same point emphasized in Document 5 above: the need for GEO activity in the full cycle of disaster management. GEO accelerates the spatial intercommunication. The challenges are the 5V: the volume, variety, velocity, veracity and visualibility of EO data.

When asked if there are particular areas where adequate progress has not been achieved, 2/3 of the interviewees answered yes. Shortcomings are:
- No great development in the area of forest fire detection. The resolution is poor and not possible to detect through clouds.
- More dispersal models are needed to provide decision support to forest fires.
- Submitting papers and demonstrating experiments.
- Lack of communication with right stakeholders. Some more top-down approaches might be needed.
The reason for lack of progress is usually insufficient resources and commitment by the performers as well as long decision times.

One outspoken interviewee stated that Disasters SBA outcomes will not be met in their totality by 2015. Although some issues will see progress, the major impediments are:
  o Volunteers who say they will something but don’t do [it];
  o Lack of commitment;
  o Small group of people doing all of the work;
  o It took too long before people started to work on what they said they would work on; and,
  o Much better planning required.

4.6. Summary and key findings, Disasters SBA

One key finding of the Disasters evaluation is that tasks, components, actions and outputs as described in the Work Plan 2012-2015 and task sheets for the Disasters and related Tasks are not fully sufficient to achieve the Disasters Strategic Target and Outcomes. Landslides and disasters relevant to the transport sector should be added to Priority Actions. Improved coordination across SBAs and components will improve the likelihood of reaching the Strategic Target.

Several initiatives under Task DI-01 have progressed well and produced operative systems. However, there are areas in DI-01 that have not documented the necessary progress, particularly those related to the Hyogo framework, much due to limited resources and lack of commitment.

Our finding related to achievement of the Strategic Target is in line with the assessment in the GEO Document Assessment of Progress against the GEOSS 2015 Strategic Targets (Document 5 to GEO-IX). However, it is less positive than the assessment of progress of the relevant Disasters tasks (DI-01 and SB-04) in the mentioned document as well as in the GEO 2012 – 2015 Work Plan Implementation Report Task Assessment (Document 6 to GEO-IX), both of which mark DI-01 green.
5. **Energy – evaluation results and key findings**

This chapter presents the findings of the evaluation of the Energy SBA.

### 5.1. Relevant Tasks

The tasks directly related to the Energy SBA are EN-01 and SB-05. In addition, the Work Plan 2012 – 2015 lists the following tasks under the heading “to be implemented in connection with” for these two tasks:

- SB-02 Global Land Cover
- SB-03 Global Forest Observation
- SB-04 Impact Monitoring of Human Activities
- CL-01 Climate Information for Adaptation
- CL-02 Global Carbon Observation and Analysis
- HE-01 Tools and Information for Health Decision Making
- HE-02 Tracking Pollutants
- WA-01 Integrated Water Information
- WE-01 High-impact Weather Prediction
- AG-01 Global Agricultural Monitoring and Early Warning

Of these, only WE-01 lists the energy target as a related strategic target. The others may provide important input to Energy. Here we have only considered the activities of WE-01.

SB-05 is considered an Energy task, as some of the sub-tasks from the Work Plan 2009-2011 were transferred here in the Work Plan 2012-2015.

### 5.2. Logic Model – Energy

Figure 5.1 shows a Logic Model for the Energy SBA. This Logic Model shows, in pictorial format, the activities undertaken by the Energy SBA, the outputs from the activities, and the expected outcomes and actions (“to be achieved through”) necessary to produce the strategic target. How the evaluation questions and derived survey and interview questions map to the logic model were shown in Table 1, Section 3.1.

Note that in Figure 5.1 the output “Impact assessment of human activities” is a remnant of the GEO 2009 – 2011 Work Plan Task EN-07-01 and is now found as part of SB-05 C1 (Tools and information for impact assessment and energy policy planning) in the GEO 2012 – 2015 Work Plan related to the Energy SBA.
5.3. Content and activities in the Energy SBA

The Energy SBA is dominated by energy-related EU-funded projects. These are:

EN-01 C1: ENDORSE (http://www.endorse-fp7.eu/) (ENergy DOwnstReam Services) which aims at a user-driven development of downstream services in renewable energies by exploiting the GMES/Copernicus Core Services (Monitoring Atmospheric Composition & Climate, MACC; Services and Applications for Emergency Response, SAFER; and Geoland 2) together with other Earth Observations (EO) and in-situ data and modelling. It addresses regional services promoting the energy use from sun, wind, and biomass, electricity grid management and building engineering through day-lighting in buildings.

System), which aims at setting-up the preparatory phase for the building of an information system containing and making accessible data and knowledge on African geological resources including mineral resources, raw material, groundwater and energy (georesources). Developing capacity building activities in the domain of Earth observation in developing countries is a priority.

SB-05 C1: EnerGEO (http://www.energeo-project.eu/mainmenu/home.html), which aims to develop a global observation strategy for monitoring and predicting the impact of the exploitation of energy resources on the environment and to demonstrate this strategy for a variety of energy resources. In the Work Plan 2012 – 2015 EnerGEO is mentioned under SB-05 C1 only but according to Hendriks et al. (2012) it also contributes to EN-01 C1.

5.4. Case Study - Energy SBA

The Energy SBA is covered by two components – EN-01 C1 and SB-05 C1. Input to these components comes from several projects under the EU 7th Framework Programme. Thus there is both funding and commitment behind the work. The case was selected partly for this reason and partly because there is much more information to find on the web-pages of the EU projects than on the GEO website. Another reason is that the Energy SBA through one of the EU projects (EnerGEO) has contributed to several of the Architecture Implementation Pilots (AIP), which makes additional information available through the AIP websites and special reports.

5.5. Results

5.5.1. Is the Implementation of GEOSS Energy SBA guided by a clear plan to 2015?

In this section the main focus is on “to what extent defined actions, outputs and deliverables from the relevant tasks are sufficient to achieve the Strategic Target and Outcomes of the Energy SBA?” This question was answered by comparing the activities and outputs described in the Work Plan 2012 – 2015 to the outcome related to prediction of potential hazards to energy infrastructure and is partly covered by WE-01, particularly its component C2. However, the ET has not found evidence of an interface between the two components. Hazards, other than those related to extreme weather, such as tsunamis and landslides are covered by the Disasters SBA but there is no evidence of links between the two SBAs.

GEO Documents
The review focussed on comparing the Energy SBA Strategic Target to the description in the Work Plan 2012-2015 and the Task Sheets for EN-01 C1 and SB-05 C1. Whereas results from all the projects or available resources mentioned in the Work Plan 2012 – 2015 may be applied to a wide range of energy sectors, there is nothing in the Work Plan or Task Sheets that point to support of energy operations and energy policy planning and implementation except for energy sources such as solar, wind, biomass and, in one Priority Action, geothermal energy (and even this is limited to the East African Rift System). One component of SB-05, C3 – Operational Carbon Capture and Sequestration (CCS) Monitoring System, which was a feasibility study, addressed impacts of use of fossil energy. It was completed in June 2012. However, this component is not sufficient to close the apparent gap related to other energy sources.
The document *GEO 2012 – 2015 Work Plan Progress Report, Document 12 to the 25th Executive Committee 12 – 13 July 2012*, states that stronger interaction between EN-01 and WA-01 is needed in the area of hydropower, but WA-01 does not mention hydropower in the Work Plan 2012 – 2015. So it is not clear from existing GEO documents how hydropower is covered in the Energy SBA.

There is no activity related to the outcome “Improved prediction of potential hazards to energy infrastructure”. This outcome is covered by WE-01, particularly its component C2. However, the ET has not found evidence of an interface between the two components. Moreover, the documents *Assessment of Progress against the GEOSS 2015 Strategic Targets (Document 5 to GEO-IX)* and *GEO 2012 – 2015 Work Plan Implementation Report Task Assessment (Document 6 to GEO-IX)* state that a project called COST WIRE is making good progress and implicitly states that the outcome related to prediction of potential hazards to energy infrastructure is likely to be achieved. However the ET has not found any evidence that the Work Plan has changed to accommodate an interface with the COST WIRE activity.

The Energy Community of Practice (ECP) produced a GEO Energy Strategic plan as Document 21 at GEO-IV (28-29 November 2007) as well as two reports issued by GEO Task US-09-01a on “Critical Earth Observation Priorities” (GEO 2010 and 2012). These reports focus on wind, solar, and biomass with little mentioning of other energy sources.


**Surveys**

The response to the Energy surveys was 9 participants and 4 users. Of these, six participants indicated average to very good knowledge and familiarity of the GEOSS Disaster SBA (PQ5), and two indicated poor to none. One did not answer. Of the users the numbers were one with average to very good knowledge and three with poor to none (UQ5). The survey results must be seen in this light.

The most relevant question in the surveys was “How well do you think the Work Plan Tasks and Components are reflective of the actions required to achieve the Strategic Target?”

Overall, the Energy respondents have a neutral view on this (6.1). The survey results indicate that participants have a more positive view on this than the users, giving scores of, respectively, 8.0 and 4.3, i.e., the participants thought the tasks and components are well reflective whereas the users find them slightly below neutral but there were few responses (nine participants and four users) so the significance is doubtful. The participants are also positive (8.0) regarding the fit when they rate the objectives of their task to the expected outcomes and how the connection between components and outcomes is explained or apparent (7.2). Six responding Energy participants find that all components and priority tasks are necessary to achieve the target, but only seven answered this question.

**Interviews**

The majority of the ten interviewees in Energy SBA classified themselves as Task contributor/participant or provider of information/data; some in more than one category. The majority
identified themselves as belonging in science and research. Of the four users three were from industry (two in wind and one in oil and gas) and one placed himself in all five categories.

The knowledge of and familiarity with GEOSS seemed to be good but a few said poor or neutral. The background for the targets and outcomes was not well known, the majority answered neutral on this one, only two claimed good – very good knowledge.

When asked “Do you believe that the present Components, Actions or Outputs are sufficient to reach the Target and Outcomes of the task you are involved in?” the majority (2/3) answered “yes” but with the general provisos that there are needs to have stronger focus on making the GCI and the Portal work, on coordination and on dissemination.

When asked what additional components, activities or outputs should be added or in which specific topics GEOSS should be more engaged, energy sources other than wind and solar was a frequent answer.

In addition, one interviewee pointed strongly to needed improvements in the Portal, search engines and interoperability and another interviewee to impacts other than emissions to air. None of the interviewees were able to point to particular tasks that are essential for achieving targets and outcomes, nor were any tasks or components identified as not essential.

Case study
As the Energy case study is made up of several EU FP7 projects, the reporting to EU reflects progress and not gaps. EnerGEO has made good progress and developed six pilots: one on wind, three on solar, one on biomass and one on fossil fuels (Hendriks et al., 2012). However, the one on fossil fuels focuses on air quality modelling, i.e., the dispersion and potential impacts of non-greenhouse gases (Hendriks et al., 2012), thus strengthening the impression that energy sources than wind, solar, and biomass are being paid limited attention. ENDORSE has tested products, specified services, and made advances in modelling related to sun, wind, and biomass. (http://www.endorse-fp7.eu/sites/www.endorse-fp7.eu/files/docs/2012_262892_ENDORSE_Publishable_Summary.pdf)

Literature review
Seven of 18 reviewed papers indicated gaps in the Energy SBA. Three of the 18 reviewed papers are user requirements found at the Energy CoP website. They were produced outside GEO tasks (Huld et al., 2007; Ranchin et al., 2007; Quiniou et al., 2008). Only Quiniou et al. (2008) focus on energy sources other than wind and solar (the need for meteorological and oceanographic data in support of offshore oil and gas operations). Two gap analysis reports were produced by CEOS and focus on renewables. One important publication (Hendriks et al., 2012) deals mainly with energy sources other than solar, wind or biomass but also describes impacts of air emissions from fossil fuels on air quality.

Summing up
The findings are in line with the findings in Document 5 to GEO-IX “Assessment of Progress against the GEOSS 2015 Strategic Targets” that identifies the development of Earth Observation based applications and services in the fields of ocean, hydro, nuclear and fossil fuel energies as a key issue and gap. However, unlike the Implementation Board, that marks the Energy Strategic Target green
(Expected to be achieved. Some actions/interventions may be required), we find it should be yellow (at risk of not being achieved without additional actions/intervention).

5.5.2. Is the execution of GEOSS Energy SBA on track to achieve the strategic target by 2015?

In this section we evaluate the progress of the Energy SBA tasks against outputs and deliverables as described in the Work Plan 2012 – 2015, Revision 2 (December 2012) and the task sheets.

Only seven of the Energy respondents to the participant survey answered the question whether there are areas where adequate progress has not been achieved. Four said yes, one said no and two did not know. When asked which outcomes this applied to they answered as shown in Figure 5.2. The outcome related to potential hazards to energy infrastructure seems most unlikely to be achieved, in line with the evidence found by ET from the GEO document review.

![Figure 5.2. Energy participants’ view on outcomes where insufficient progress has been made](image)

The Energy participants have a neutral to positive (6.3 score) view on how they rate the overall progress towards completion of the relevant task/component. None of the seven participants indicated that there are particular areas where progress has exceeded expectations.

When asked to what extent the expected outcomes of the task/component they are involved with have been realized to date, the overall average answer was about neutral (5.8), with the participants more positive than the users (6.8 vs. 3.5), but again, the responses are few, with nine participants and four users.

Several interviewees point out noticeable and valuable accomplishments. The main ones are:
- Creation of a catalogue with more than one hundred levels for energy use;
- Establishment of an Energy SBA architecture (similar to GCI) and the EnerGEO Portal and access to databases on web;
- Global solar atlas in cooperation with International Renewable Energy Agency (IRENA);
- Demonstration through participation in the Architecture Implementation Pilots (AIP), in particular
AIP-5, which presented high resolution data for industry;
- Coupling energy models with impact models; and,
- A feasibility study on operational system for monitoring CO\textsubscript{2} storage sites using satellite data.

These conclusions are supported in the literature by Hendriks et al. (2012), in which one can also see that EnerGEO has contributed to the GEO Health Strategic Target through the air quality modelling tools. Six other papers mention achievements and/or progress, mainly related to the development of tools but were not detailed enough to answer the question posed in the heading of this section.

The Case Study, which was accessed through the web sites referred to in Section 5.3 also confirms and underscores the good progress and achievements within the Energy SBA, in agreement with the assessment in Document 6 to GEO-IX (GEO 2012 – 2015 Work Plan Implementation Report Task Assessment).

Accomplishments of a more non-technical nature are:

- Connecting people, e.g., collaboration with organizations like UNEP, NASA and USGS on Solar and wind that led to a useful web-site. (Solar and Wind Energy Resources Assessment, SWERA)
- In the early days (2007 – 2008) GEO functioned as an arena for discussions between national and international agencies.

One informant also mentioned the diversification of countries’ energy matrix by increasing the share of clean energy, such as solar, wind and biomass, as an important accomplishment.

Aside from the need for more activity on a broader range of energy sources the interviewees identified the following as topics where the GEOSS Energy SBA should be more engaged:

1. Cross-SBA cooperation;
2. Dissemination; and,
3. Improvements in the Portal, search engines and interoperability.

One task lead added that although there has been success in development of individual models for impact assessment, there is still much work to do to integrate the models. This will not be achieved until after 2015. The challenges with the GEO Portal seem to be common to all GEOSS SBAs and are discussed in Section 7.1.

### 5.6. Summary and key findings, Energy SBA

The Energy SBA suffers from insufficient activities related to energy sources other than solar, wind, and, to a lesser extent, biomass, nor is there any activity related to prediction of potential hazards to energy infrastructure. The Energy SBA is unlikely to achieve the Strategic Target and Outcomes unless action is taken to remedy this. The outcome related to prediction of potential hazards to energy infrastructure is partly covered by WE-01, particularly its component C2. However, the ET has not found evidence of an interface between the two components. Hazards other than those related to extreme weather, e.g., tsunamis and landslides, are covered by the Disasters SBA but there is no evidence of
links between the two SBAs.

The GEOSS Energy SBA activities EnerGEO and ENDORSE, are showing good progress and achievements by dedicated people. It is the lack of a clear plan that includes more tasks and broader cross-SBA cooperation that jeopardizes the success of the SBA. This calls for actions to supplement the existing tasks as well as securing broader cross-SBA communication.

These findings contradict the findings in Document 5 to GEO-IX “Assessment of Progress against the GEOSS 2015 Strategic Targets”. In that document, the Energy Strategic Target is marked green in the pyramid diagram, meaning it is expected to be achieved, whereas contributing tasks are marked yellow (at risk of not being achieved without additional actions/intervention). Document 5 also marks WE-01 green, which may be true, but it does not say anything about the application of WE-01 results in the Energy SBA. However, both the Implementation Board and the ET identify the development of Earth Observation in the fields of ocean, hydro, nuclear and fossil fuel energies as a key issue and gap.
6. Health – evaluation results and key findings

This chapter presents the findings of the evaluation of the Health SBA.

6.1. Relevant Tasks

The tasks directly related to the Health SBA are HE-01 and HE-02, which are the major contributors, and BI-01, SB-04 (Urban), and SB-05 (Impact) which are contributing by computing Year of Life Loss from coal activities.

Task HE-01 Tools and Information for Health Decision Making

This Task aims to improve access to environmental information and tools to support the global community of human health and environment experts. It is developing tools and information systems, advancing the integration of Earth observations and forecasts into health decision-making processes, engaging with health users and decision-makers to identify needs, and carrying out capacity building for the promotion and sustainable use of Earth information by the health user-community.

The following four Components have established priority actions for the accomplishment of objectives:

<table>
<thead>
<tr>
<th>Component</th>
<th>Priority action</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1 Air-borne Diseases, Air Quality and Aeroallergens</td>
<td>Support the integration of research activities for Meningitis; Expand the availability, use, and application of Earth and influenza monitoring data; Monitoring of the atmospheric cycles of aerosols.</td>
</tr>
<tr>
<td>C2 Water-borne Diseases, Water Quality and Risk</td>
<td>Implement a global initiative for cholera early warning; Identify and map factors affecting the distribution of leptospirosis; Improve knowledge to reduce freshwater and marine disease risk; Assess coastal and inland aquatic system health and human health.</td>
</tr>
<tr>
<td>C3 Vector-borne Diseases</td>
<td>Build user-driven tools for vector-borne disease monitoring; Foster the use of satellite and in-situ data for monitoring spread of vector-borne and zoonotic diseases; Develop distribution maps of vector-borne diseases.</td>
</tr>
<tr>
<td>C4 A Holistic Approach to Health: Transmission Dynamics, Urban Health Forecasting, Linkages and New Technologies</td>
<td>Implement the health-meteorology forecasting service Healthy City–Intelligent City; Characterize the dynamics and mechanisms underlying the relationship between social stressors, changes in biodiversity, and disease transmission to humans; Establish linkages between disasters and areas prone to vector and waterborne diseases.</td>
</tr>
</tbody>
</table>
Task HE-02 Tracking Pollutants
This Task is aimed at increasing the availability of Earth observation information needed to track pollutants and anticipate changes to the environment, harmonizing standard operating procedures for monitoring pollutants and their compounds in air, atmospheric deposition, water, soil, sediments, vegetation, and biota, understanding temporal and spatial patterns of pollutant transport and deposition to and evasion from terrestrial and aquatic ecosystems, supporting the validation of regional and global atmospheric pollutant models for use in evaluations of different policy options, and evaluating the effectiveness of international efforts to reduce releases of pollutants.

The following Components have established priority actions for the accomplishment of objectives:

<table>
<thead>
<tr>
<th>Component</th>
<th>Priority action</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1 Global Mercury Observation System</td>
<td>Develop standard operating procedures for monitoring mercury and its compounds;</td>
</tr>
<tr>
<td></td>
<td>Conduct observations to provide spatially-distributed information on mercury</td>
</tr>
<tr>
<td></td>
<td>concentrations in ambient air, precipitation, biotic and abiotic systems as well</td>
</tr>
<tr>
<td></td>
<td>as tropospheric profiles; Validate regional and global scale atmosphericmercury</td>
</tr>
<tr>
<td></td>
<td>models; Develop an interoperable system to share information and tools.</td>
</tr>
<tr>
<td>C2 Global Monitoring of Persistent Organic Pollutants, Emerging</td>
<td>Develop and implement a global monitoring plan for tracking changing levels of</td>
</tr>
<tr>
<td>Organics Contaminants and Global Change Indicators</td>
<td>Persistent Organic Pollutants (POPs) in the natural environment and human beings;</td>
</tr>
<tr>
<td></td>
<td>Evaluate the effectiveness of international efforts to reduce POP releases;</td>
</tr>
<tr>
<td></td>
<td>Interlink relevant existing systems for monitoring air, water, ice caps and human</td>
</tr>
<tr>
<td></td>
<td>health.</td>
</tr>
</tbody>
</table>

In addition, the Work Plan 2012 – 2015 lists the following tasks under the heading “to be implemented in connection with”:

SB-01 Oceans and Society: Blue Planet
DI-01 Informing Risk Management and Disaster Reduction
CL-01 Climate Information for Adaptation
WA-01 Integrated Water Information
WE-01 High-Impact Weather Prediction
EC-01 Global Ecosystem Monitoring
AG-01 Global Agricultural Monitoring and Early Warning
BI-01 Global Biodiversity Observation (GEO BON)

None of these lists the health target as a related strategic target. Here we have considered the activities of SB-04 and SB-05 as relevant.

6.2. Logic Model – Health

Figure 6.1 shows a Logic Model for the Health SBA. This Logic Model shows, in pictorial format, the activities undertaken by the Health SBA, the outputs from the activities, and the expected outcomes and
priority actions necessary to produce the strategic target. How the evaluation questions and derived survey and interview questions map to the logic model were shown in Table 1, Section 3.1.

6.3. Case study


The priority actions listed under this component are:
- Develop and implement a global monitoring plan for tracking changing levels of POPs in the natural environment and human beings;
- Evaluate the effectiveness of international efforts to reduce POP releases; and,
- Interlink relevant existing systems for monitoring air, water, ice caps and human health.

As a test case under HE-02 C2 we used GENASIS (Global Environmental Assessment Information System: http://www.genasis.cz/index-en.php?pg=about-genasis), which provides comprehensive information on contamination of the environment by chemicals, namely persistent organic pollutants (POPs). It was created with the cooperation of RECETOX, the IBA MU, the institutes of the Masaryk University, Brno, Czech Republic. Design and administration of the portal are supported by CETOCOEN project.

GENASIS combines expertise, validated data from partner institutions, and input from regular environmental monitoring programmes and provides data repository, analytical tools, and data management. A GENASIS user thereby receives all available up-to-date information on spatial and temporal trends in POPs concentrations in various environmental matrices (air, water, soil, biota and human tissues) that can be sorted, viewed and further analysed by using three GENASIS on-line tools: information portal, publishing platform, and on-line data visualization.
6.4. Results

6.4.1. Is the Implementation of GEOSS Health SBA guided by a clear plan to 2015?

In this section we evaluate “to what extent defined actions, outputs and deliverables from the relevant tasks are sufficient to achieve the Strategic Target and Outcomes of the Health SBA?” This question was answered by comparing the activities and outputs described in the Work Plan 2012 – 2015.

GEO Documents
Comparing the Health SBA Strategic Target to the description in the Work Plan 2012-2015 and the Task Sheet for HE-01 and HE-02 there is an uncertainty whether the outcome “Applying outcomes from other Societal Benefit Areas to improve health and wellbeing” will be met by the Health SBA, as the Health...
tasks do not directly address the outcome (HE-01) or the tasks are not well defined (HE-02). However, the components SB-04 C1 and SB-05 C1 will meet this outcome if implemented as planned.

The Health SBA is supported by two CoPs – the Air Quality CoP and the Health and Environment CoP. Both have their own web-pages; however, we have not been able to identify any documents that address the question posed in the heading of this section, only progress reports.

**Surveys**
The response to the Health surveys was 16 participants and 3 users. Of these, 12 participants indicated average to very good knowledge and familiarity of the GEOSS Health SBA (PQ7), two indicated medium knowledge and two indicated poor to none. All user respondents indicated good to very good knowledge and familiarity of the Health SBA (UQ7).

The most relevant question in the surveys was “How well do you think the Work Plan Tasks and Components are reflective of the actions required to achieve the Strategic Target?” (PQ19 and SQ14).

Overall, the Health participants and users expressed the same positive view on this, giving scores of, respectively, 7.5 and 7.3, i.e., the both groups thought the tasks and components are well reflective of the Strategic Target, but there were few user responses (three). The participants are also positive (7.6) regarding the fit when they rate the objectives of their task (PQ16) to the expected outcomes and how the connection between components and outcomes is explained or apparent (7.1) (PQ11). Ten responding Health participants find that all components and priority tasks are necessary to achieve the target, three said no and three did not know.

**Interviews**
There were only four interviewees from the Health SBA. Some classified themselves as belonging to more than one category, so the involvements were: one task lead, one task participant, three providers of data/information and one user. Except for the user, who was from Education and outreach, all were from science/research.

All four interviewees believed that the present tasks, components, actions and output are sufficient to reach the Health target and outcomes and that none of the tasks are not essential.

**Case study**
The selected case study shows good data availability, and associated tools to assess POPs in the environment. It includes data from 20 monitoring Networks/Projects. Yearly reports show clearly and in a user-friendly manner changes in concentration of monitored chemicals in various environmental matrices. The data repository, visualization system, and report generator are very advanced. A point lacking is metadata, which can improve integration into GEOSS and the associated broker system.

**Literature review**
None of 18 reviewed papers indicated activity gaps in the Health SBA, only gaps or shortcomings related to implementation of on-going tasks.
6.4.2. Is the execution of GEOSS Health SBA implementation on track to achieve the Strategic Targets by 2015?

In this section we evaluate the progress of the Health SBA tasks against their own outputs and deliverables.

The self-evaluation reported in the *GEO 2012 – 2015 Work Plan Implementation Report Task Assessment (Document 6 to GEO-IX)* showed a risk of not being achieved without additional actions/intervention for the Task C1 and expected to be achieved with some actions/intervention for Task C2.

The following activities currently contribute to accomplishment of the objectives, whereas associated actions/interventions would foster the outcome:

<table>
<thead>
<tr>
<th>Task</th>
<th>Highlights on activities</th>
<th>Actions/Intervention Needed</th>
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</thead>
</table>
| C1   | • Tests performed on a meningitis predictive model to meet C2 information needs for reactive and preventive vaccination. Protocol prepared for testing in Benin, Togo, Nigeria, and Chad.  
• Influenza data jointly analyzed by USA and numerous countries in Europe and Africa.  
• International online comparison of sand and dust forecasts underway.  
• Feasibility of using remotely-sensed data as a proxy for in-situ air pollution under study.  
• Hot-spots of high cholera risk located.  
• Mobile phone application developed for cholera patient tracking.  
• New initiative launched to improve prediction of, and intervention on Leptospirosis. | Management  
• Ensure active participation from Leads and Contributors and provision of information.  
Additional Resources and/or Contributions  
• Expand national/international participation in GEO health activities.  
• Encourage WHO to become a Participating Organization in GEO. |
| C2   | • Ground-based observing system for mercury established.  
• Oceanographic campaigns performed over Mediterranean Sea and Atlantic Ocean.  
• Spatial Data Infrastructure (SDI) for mercury designed and structured.  
• Networking activities ongoing to develop capacity and improve instrumentation and system design.  
• Persistent Organic Pollutants (POP) concentration data in ambient air, human blood and milk evaluated; major drawbacks identified.  
• Baseline data gathered for 10 new POPs listed in Stockholm Convention. | Additional Resources and/or Contributions  
• Expand national/international participation in pollutant monitoring activities.  
Technical  
• Increase advocacy for in-situ Quality Assurance/Quality Control procedures.  
• Develop more advanced sensors for Mercury and POPs to make observing systems less human dependent. |

The Tasks’ Component Sheets for this SBA show large incomplete sections for HE-01 whereas those for HE-02 are mostly filled (Figure 6.2). From the point of view of the ET, this affected the ability to effectively evaluate the SBA.
Fourteen Health participant respondents answered the question “are there particular areas where adequate progress has NOT been achieved”. Four said “yes”, six said “no” and four did not know. When asked which outcomes this applied to they answered as shown in Figure 6.3. Note that all respondents did not answer this question and some gave more than one answer. Fifty percent (50%) hold the opinion that the two first outcomes do not show sufficient progress and 75% have the same opinion for the “Applying outcomes from other SBAs to health and wellbeing”. The latter points to lack of cross-SBA cooperation and communication.

Some respondents to the participant survey indicate that the outcomes “Access to improved environmental information” and “Increased use of environmental information” have exceeded expectations.

The Health participants have a positive (6.9 score) view on how they rate the progress towards completion of the relevant task/component. Only two of 13 answers indicated that there are particular areas where progress has exceeded expectations.

When asked to what extent the expected outcomes of the task/component they are involved with have been realized to date, the overall answer was positive (7.7). It is not possible to tell if there is a difference between participants and users due to the low user response (3).

The interviewees point the following accomplishments:
- Information, data and knowledge exchange;
- The establishment of a global mercury observation network was a really important accomplishment;
- Cross-disciplinary interaction;
- Actions towards policy making; and,
- Engaging communities.

They also identified the following as topics where the GEOSS Health SBA should be more engaged:
- Improved communication with health researchers;
- Capacity building;
- Methodology for risk assessment, on local scale with a general scheme; and,
- Collaboration between health agencies, including the UN.
# Data Entry Status Report: Numbers given by Paragraph for each Task Component Sheet

Report generated on: 05 Mar 2013

<table>
<thead>
<tr>
<th></th>
<th>HE O1</th>
<th>HE O1</th>
<th>HE O1</th>
<th>HE O2</th>
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<td><strong>Introduction</strong></td>
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<td>Gap Analysis</td>
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<td>SOCIETAL BENEFITS</td>
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<td>Key Outputs</td>
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<td>Key Activities</td>
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<td>Resources Available for Implementation</td>
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<td>Issues and Gaps</td>
<td>63</td>
<td>22</td>
<td>80</td>
<td>72</td>
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<tr>
<td>Supporting Documents and Links</td>
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</table>

**Report Legend:**
- **148**: Number of words in that paragraph
- **17**: Number of outputs / activities given
- **1;25**: No data entered for this paragraph
- **1;25**: Number of PoCs ; Number of Participants

*Figure 6.2. Report on data entry for Health Tasks.*
The Case Study, which was accessed through the web sites referred to in Section 6.3 showed a user-friendly interface but the database is not yet registered in the GEO Portal, neither does it show metadata availability. While the registration requires some effort, metadata compilation can be difficult. Particular attention needs to be given to emerging POPs listed in the Stockholm Convention and to ensure monitoring coverage all over the world.

The reviewed literature did not contain sufficient discussions on progress to draw conclusions.

6.5. Summary and key findings, Health SBA

One key finding of the Health SBA evaluation is that HE-01 task components, actions and outputs as described in the Work Plan 2012-2015 and task sheets for the Health and related Tasks are not fully sufficient to achieve the Health Strategic Target and Outcomes.

On the other hand Task HE-02 is making sufficient progress toward achieving the Health Strategic Target and Outcomes through task components, actions and outputs as described in the Work Plan 2012-2015 and task sheets. These are, in some cases, beyond what is expected.

The Health SBA is on track for 2015; however lack of information on Key Activities and Key Outputs for HE-01 makes the Target vague. This has been also demonstrated by Assessment of Progress against the GEOSS 2015 Strategic Targets (Document 5 to GEO-IX).

Priority should be given to cross-SBA cooperation as there is little evidence of information exchange and collaboration between Health Task HE-02 and the following Tasks: SB-01 Oceans and Society: Blue Planet; DI-01 Informing Risk Management and Disaster Reduction; CL-01 Climate Information for Adaptation; WA-01 Integrated Water Information; WE-01 High-Impact Weather Prediction; EC-01 Global Ecosystem Monitoring; AG-01 Global Agricultural Monitoring and Early Warning; BI-01 Global Biodiversity Observation (GEO BON).
A better dissemination activity should help achievement of Strategic Target as it will foster exchange of information within and out of GEOSS.

Our finding related to achievement of the Strategic Target is in line with the assessment in the GEO Document *Assessment of Progress against the GEOSS 2015 Strategic Targets (Document 5 to GEO-IX)*. However, it is in line with the assessment of progress of the relevant Health tasks (HE-01, HE-01, BI-01, SB-04 and SB-05) in the mentioned document as well as in the *GEO 2012 – 2015 Work Plan Implementation Report Task Assessment (Document 6 to GEO-IX)*, both of which mark HE-01 yellow and HE-02 green.
7. Common issues

7.1. Accessibility of data, user friendliness of Portal

The 4th ET would remind readers that at present there are two infrastructures that provide convenient access to the full range of GEOSS data and information:

- The GEOSS Portal (http://www.geoportal.org/web/guest/geo_home); and
- The Geo Common Infrastructure (GCI) and its GEO Discovery and Access Broker (DAB) (http://184.73.174.89/gi-cat-StP/).

While the former is operated by the European Space Agency and the Food and Agriculture Organization of the United Nations and provides a web-based interface for searching and accessing data, information, imagery, services, and applications, the latter is operated by a dedicated catalogue browser, namely GI-cat.

When distributing the survey a possible misconception about the function of the two infrastructures among the respondents was not considered and, therefore is not reflected in the report. In addition, analysis of other documents from GEO highlights that the current Portal implementation does not give access to all the functionalities supported by the GCI.

Eight users and 22 participants had tried to extract data from the GEO Portal, out of 20 and 41, respectively, that answered the question. The experience was overall judged as slightly below neutral (4.3), with the participants giving a neutral score (5.0) and the users a moderately poor score (3.6). Due to limited answers it is difficult to say if there are different experiences between the SBAs. Only six participants indicated communication with the infrastructure community. Five participants indicated that their organization had provided data to the GEO Portal.

The interview questionnaire did not ask directly about data accessibility and user friendliness but some interviewees pointed out that these are areas where sufficient progress has not been made. Some interviewees point out that the GCI and the Portal are lagging behind with respect to the needed progress; indeed, one goes as far as to say that the Portal needs total revamping and must employ the most up-to-date technology. He misses good search engines (“Google is the competitor” was the expression used), the innovation and the cutting edge technology. These views were corroborated when ET tried to access Energy data and information. The process is too often unacceptably long and it may be difficult for a non-expert to retrieve information.

The registration process for Components and Services over-commits users, who often bypass compilation of metadata fields. Several resources are incomplete or have fields filled at a minimal stage. This process shows that this is actually a GEO communication problem as the GEO DAB is able to connect existing catalogues/inventories without any registration (GCI Research Engineering Report v1.1).
One Energy interviewee pointed out that GEO needs to establish partnerships, deals and common platforms with data providers across nations, improve on metadata content, improve on making data interchangeable and intercomparable and improve on access, which is of utmost importance. Another Energy interviewee stated that the GEO Portal and the GEOSS Common Infrastructure (GCI) are not at the level of user friendliness, they are not really functional, there are discrepancies between original and Portal data, and a dedicated catalogue is missing. “This is not rocket science. The Ministerial should push ESA to accelerate the process. Poor performance discredits GEOSS and gives bad publicity.” This respondent’s point-of-view highlights the misunderstanding of GEO Portal and GCI objectives. While the former should be user-friendliness the latter is more technical and serves for machine-to-machine dialogues.

**Finding:**
The GEO Portal is not providing the needed accessibility and user friendliness that is required. The recommendations from the Second Evaluation do not seem to have been implemented.

### 7.2. Outreach to users and science and technology communities

The main source of evidence is interviews and web-based surveys. The low interview response may in itself be an indication of insufficient outreach. The low response rate to the surveys—particularly in the sector of GEO/GEOSS-users—may also be an indication of insufficient outreach.

It is not possible to deduce any trend or change in response rate of the surveys in comparison to the former evaluations. The different evaluations analyzed different SBAs and (in part) Transverse Areas / Infrastructure / Institutions and Development. Transverse areas have a much larger target group than the SBAs and the SBAs have different target groups. Further, difference in the evaluation approach adds to the difficulty of extracting trends, e.g., the evaluation of Agriculture, Biodiversity and Ecosystems (3rd evaluation) did not include web-based surveys.

When asked how they think GEOSS priority actions are well aligned with the priorities of the GEO/GEOSS-users, the users gave a slightly positive answer, with an average score 5.8, where 0 is not aligned at all and 10 is extremely well aligned. The participants were more positive, with an average score of 6.9. When asked how they would rate GEO’s role in advancing the relevant priority actions and outcomes the users were neutral (average score 5.0) whereas the participants found them clear (average score 6.5).

Only 2 of 20 users had participated in the planning or implementation of more than three tasks. All who

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8 During the GEO European Projects’ Workshop in Barcelona 15 – 16 April 2013 it was informed that a new version of the Portal will be launched this year, in three steps. None of the interviewees seemed to be aware of this. The Portal will get better search functionalities with discovery-search and map-boxes. The home page will provide information in three main areas; data, news and community and the Portal will be more user-friendly and social. Data providers will get possibilities to register data directly into the Portal. The aim is more raw-data and less metadata and images.

9 Response rate were 11% for the Participant Survey and 2.5% for the User Survey.
indicated involvement to some extent said the experience was positive. The participants were asked to what extent they engage user communities, and responses ranged from “neutral” to “extensive”.

The three Energy users we interviewed had all heard about GEOSS but none was familiar with the work plan or achievements. The Energy CoP is supposed to, amongst other tasks, function as a link between the tasks and the users. Interviewed users as well as several participants suggest that more targeted communication can be achieved by designated workshops and GEOSS presence at gatherings of professional societies and industry associations as well as through use of Supersites, Wiki technology and social media. Both Energy and Health interviewees suggest stronger efforts to engage international agencies like the IEA and health organizations in the UN (WHO). Work in the field is suggested from the Health SBA. Better coordination and communication between GEO and national organizations and publication in scientific journals are other means to improve outreach to users and science and technology communities.

Four of the Energy related papers that were reviewed were written by people from the energy industry (ASME, 2007; Quiniou et al, 2008, Ahlstrom et al., 2011; Madjarov, 2012). None of them mention GEOSS, which is perhaps a strong indication of lack of industry involvement in GEO and GEOSS or of low relevance of the “brand” GEO /GEOSS. The document Assessment of Progress against the GEOSS 2015 Strategic Targets(Document 5 to GEO-IX) points to user involvement in Energy as a key issue and a gap, and one Energy paper reviewed refers to the need for stronger user focus.

One health interviewee pointed out that for this SBA interaction with medical and environmental science communities is more important than interaction with technology communities.

Finding:
- User engagement in GEOSS is low.
- Participants have a more positive view than users on the alignment of GEOSS priorities with users’ priorities.
- Participants have a more positive view than users on GEO’s role in advancing their respective priority actions and outcomes.

7.3. Value-adding and Capacity Building

The main source of evidence is surveys and interviews. Thirty-seven percent (37%) of the users and 26% of the participant responders hold the opinion that the three most important accomplishments in “their” SBA would have occurred in the absence of GEO, whereas the proportion that says they would not are 21% and 46%, respectively; this indicates a higher regard of GEO’s importance amongst participants than users. The general impression from surveys as well as interviews is that GEO has had an influence both regarding the time aspect and the extent of the accomplishments but also that some achievements would not have been made without GEOSS, like the Disasters Supersites.

The surveys reveal networking, increased use of EO and synergy as the most important value-adding elements and 60% say the value-added contributions are achieved. Interviews in all three SBAs also
point to standardization and interoperability, data accessibility and information exchange, creating awareness of EO and their value, political attention, and public funding being seen as the most important value-adding contributions of GEOSS. The Disasters interviewees add to this list the benefit of GEOSS as a connector of different systems (e.g., volcanic explosion + Early warning system), that GEO can achieve a broad global cooperation over many different regions and organizations, and the increased capability to prevent incidents, monitor disasters, and implement risk management. There seems to be unanimous agreement amongst the Energy interviews that this value-adding is being achieved whereas two of eleven Disasters interviewees were negative on this point and the Health responses split in equal.

Of the 21 users and 49 participants 12 and 19, respectively, say GEOSS’ contribution to their capacity to produce or make use of data and information is not very good or non-existing compared to only one user and eight participants who say it is very good to excellent. This measure of capacity building may not paint an accurate picture due to the imbalance in geographic spread of respondents, with a clear over-representation from Europe and Japan.

Finding:
The main value-adding elements of GEOSS appear to be networking, global cooperation, standardization, data accessibility and information exchange.

7.4. Interdisciplinary or cross-cutting cooperation, an holistic view

Under each task the Work Plan 2012 – 2015 lists several other tasks under the heading “to implemented in connection with”. In the Energy interviews the link to other SBAs was mentioned several times, in particular to Weather, Agriculture, Biodiversity and Ecosystems. Thus one would expect a co-operation across SBAs and that task leads would strive for an holistic view. One finding from the Energy interviews is that this is not the case; rather, several interviewees mentioned the interdisciplinary cooperation as an area where more effort is needed. This is also pointed out in under Energy in Assessment of Progress against the GEOSS 2015 Strategic Targets (Document 5 to GEO-IX).

With respect to interaction with infrastructure communities, 58% of the participants say they have had communication/interface and 55% say they have delivered data or information to the GEO Portal. Interviewees in Disasters interaction claim extensive interface with infrastructure communities and mention Supersites, Rescue services and projects like INSPIRE and Copernicus. In Energy, the only link that was found was one task participant who also worked with the Infrastructure tasks (Architecture, Data Management, GCI, Portal). None of the Health interviewees answered the question about interface/communication with infrastructure communities.

The lack of cross-SBA cooperation is identified as a key issue and gap for Disasters and Energy SBAs in the document Assessment of Progress against the GEOSS 2015 Strategic Targets (Document 5 to GEO-IX).

Finding:
Cross-SBA cooperation is unsatisfactory and must be improved.
7.5. **Gap analysis and performance indicators**

70% of the respondents to the participant survey said there is a process to identify, document, and address gaps. This is more positive than in the previous evaluations. It is unknown to what extent this improvement is a result of the documents *Development of a GEOSS Gap Analysis 06 Strategy. Document 13, 21st Executive Committee (March 22-23, 2011); Progress Report on GEOSS Gap Analysis Strategy; and Document 13, 22nd Executive Committee Meeting (July 12-13, 2011).*

Thirty-eight percent (38%) of the respondents to the participant survey said that performance indicators or other systematic tools for assessing progress towards targets and outcomes exist and 33% said they do not, the remaining respondents were not aware of any progress indicators. A slight majority (50 - 60%) find that indicators are or will be useful.

Only one Energy interviewee seemed to be aware of existing indicators of success or target achievement. The person had found these useful. The response to whether indicators would be useful was very limited but measurable indicators like number of users, downloads and economic benefits were mentioned. Improved weather forecasts were mentioned as a possible indicator for the Energy SBA. The quality of forecasts is regularly monitored by national weather services. For Disasters only four of 17 interviewees seem to be aware of performance indicators and three find them useful. In addition, the number of submitted papers to scientific journals and measures of benefit to users were mentioned as possible indicators. From health interviewees there was no real response.

The ET has not been able to find any official GEO document that describes implementation of performance indicators for SBAs. The document *GEOSS Implementation Performance Indicators, Document 11, 22nd Executive Committees Meeting (July 12-13, 2011)* addresses only transverse areas. An informal note, “Analysis of the Potential Measurability of GEOSS Outcomes as Identified in the Strategic Targets Document”, that evaluated the suitability of performance indicators was circulated to task leads by the M&E WG in December 2010 but ET has not found evidence of how it has been taken further.

<table>
<thead>
<tr>
<th>Finding:</th>
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<tbody>
<tr>
<td>Performance indicators exist only to a very limited degree. It is unclear how the existing indicators were developed. A slight majority finds that performance indicators would be useful.</td>
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</table>

7.6. **Particular lessons learned and other issues**

There are several general challenges to the implementation of GEOSS. Some are repeated in all evaluations to date. The Health paper by Vik et al. (2012) may speak for all: “The air quality community is generally aware of the GEOSS initiative, but has so far provided little contribution to this system of systems. Reasons for this include: lack of incentives for establishing a contribution, lack of sustainable funding, lack of suitable repositories and lack of harmonized technical solutions.”

Other lessons learned from the evaluations are:
Interviews:
- Important to have support in coordination from the GEO Secretariat;
- Important to receive recognition and positive feedback when it is deserved, particularly from the Plenary;
- National policies may be a factor outside the control of GEO that may impact the possibilities to achieve the targets;
- Organizational data policies, including sharing principles and license agreements, are needed;
- Sharing of good practices with user involvement is important;
- GEOSS should strengthen capacity building in developing countries;
- Hardly any reports on unintended negative effects, those that appear relate to additional work; and,
- The most often cited unintended positive effects are networking and visibility.

Participant survey:
- Need to formalize interactions and build on people who won't drop out half way even in the non-committal environment GEO provides;
- Involving people from different countries and technologies is a benefit to GEOSS;
- GEOSS should make better use of existing infrastructures such as Google or other search engines;
- Need a clear idea about how the GEOSS Data Portal will interact with all other existing portals;
- The value of data sharing is recognized but the policy is not ready yet;
- The principal lesson learned is the communication among the actors. It is important to learn what has to be done via efficient mechanisms;
- Stakeholders need awareness and capacities building;
- Foster data policy discussion with networked user group;
- There is a latent misunderstanding between scopes and functions of the GEO Portal and the GEOSS Common Infrastructure.

User survey:
- Users need to be more involved;
- People don't like to share all the information they manage... information is power?;
- RS data in 2009 for flood area prediction;
- Dissemination of information (Data Access and Self-Monitoring).

The participant survey asked if, to the best of the respondent’s knowledge, changes were made to planned activities and/or output that are NOT reflected in the work plan. 20% answered “Yes” to this question and 37% “Don’t know”. Changes that are made without being reflected in the Work Plan make evaluation difficult.
8. Key Findings and Recommendations

This Chapter gives the conclusions of the Fourth Evaluation Team and its recommendations. The distinction between Findings and Conclusions is as follows:

- Key Findings are summaries of the results and evidence from interviews, case studies and other evaluation material as presented in the main body of Chapters 4 - 7. Findings may contain explanatory text and brief evidence for a finding related to the third level headlines of Chapter 4.
- Recommendations are strong suggestions which might improve implementation in the Societal Benefit Areas of Disasters, Energy and Health.

The Key Findings of the Fourth GEOSS Evaluation are presented below in order of importance.

<table>
<thead>
<tr>
<th>Key Finding</th>
<th>Recommendation</th>
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| The Disasters and Energy SBAs will not achieve their strategic targets unless new tasks/components are added. | Recommendation 1: Implement activities related to  
  - Landslides to the Disasters SBA  
  - Increasing the abilities to detect small forest fires, and fires in overcast conditions for the Disasters SBA  
  - Energy sources other than wind, solar and bio for the Energy SBA  
  - Prediction of potential hazards to energy infrastructure for the Energy SBA |
| Within the Health SBA a few Task Components are not described in task sheets. | Recommendation 2: Complete task sheets for Components to clarify implementation. |
| Cross-SBA cooperation is unsatisfactory and must be improved. Tasks and Components consist of activities initiated and funded by sources external to GEO. Coordination of tasks within the SBAs is hardly visible. | Recommendation 3: The GEO Societal Benefits Implementation Board take stronger action to secure cross-task and cross-SBA interaction, cooperation, and utilization of data and information. The interaction must go in both directions.  
  This could be accomplished by putting the responsibility for coordination on |
| Data must be made more accessible over the GEO Portal. Today it is difficult and time consuming to locate data and information. There is not a clear understanding of the difference between the GEO Portal and the GCI. | **Recommendation 4:**  
GEOSS should develop manuals on use of the next version of the GEO Portal, including examples of cases. Webinars and workshops could support the introduction of the updated GEO Portal. |
| --- | --- |
| Users' response was too low to judge if they are sufficiently involved and their needs are taken properly care of. Participants and users perceive that networking and synergy will be the main value-adding elements. | **Recommendation 5:**  
GEO/GEOSS should make stronger efforts to identify and involve active users in the Communities of Practice and organize more dedicated workshops in cooperation with user organizations and associations like the IEA and WHO.  
Task leaders should be more specific in describing users and user engagement in the task sheets and develop performance indicators that reflect user needs and value-creation to users. |

Although not a direct outcome of the evaluation of the Disasters, Energy and Health SBAs the Fourth Evaluation team would like to offer the following recommendations:

**Recommendation 6: Final Evaluation Planning**

The planning of the final evaluation should start immediately. The Evaluation Team should be recruited as soon as possible and the possibilities to financially support the Team should be identified. The Team should include members from all continents. External competence will be needed.
Recommendation 7: Performance Indicators for Tasks

Well in advance of the start of the final evaluation, the tasks should be presented with clear performance indicators that derive from the logic model. Task leaders should be told that part of the evaluation will be measuring the outcomes against these indicators.

Recommendation 8: Revised Strategic Targets and Outcomes

The post-2015 process should include revisiting the Strategic Targets and Outcomes with the aim to reduce the number of Strategic Targets and Outcomes, make them less ambiguous, more measurable, and potentially achievable.
9. References

9.1. GEO Documents


21st Executive Committee


from ftp://earthobservations.org/GEO-VIII/


GEO Secretariat (November 2012) Assessment of Progress against the GEOSS 2015 Strategic Targets (Document 5 to GEO-IX). Retrievable from ftp://earthobservations.org/GEO-IX/


GEO Societal Benefits Implementation Board Action Plan for 2012 (Version 1) (Undated)

9.2. General literature


Pongsiri M.J. (2011) Advancing Tele-Epidemiology and Tele-Health: Strategic Collaborations Workshop on Space Technology for Public Health Actions in the Context of Climate Change Adaptation, June 19-21, 2011, Montreal, Canada


Tiede, D., Hoffmann, C., Willhauck, G. (2012) Fully integrated workflow for combining object-based image analysis and LiDAR point cloud metrics for feature extraction and classification improvement. ILMF International LiDAR Mapping Forum 2012, Denver, USA


Washburn, E. (2009) Earth observations, independent empirical data, adaptive learning, and
environmental evaluations … …could this be a systematic approach to acquiring the observational evidence? Environmental Evaluators Networking Forum, The Value of Environmental Evaluation, Washington, D.C. June 8-9, 2009


Annex A Plan for the Fourth Evaluation of GEOSS implementation

Draft version 3 – 12 September 2012

1. Introduction

This Evaluation Plan is intended to describe the purpose, design, implementation and reporting of the fourth evaluation of GEOSS implementation.

The Evaluation Plan is a product of the Monitoring and Evaluation Working Group (M&EWG) of the Group on Earth Observations. The M&EWG was established by a decision of the GEO-V Plenary in November 2008.

The primary purpose of the Evaluation Plan is to serve as guidance from the M&EWG to the Evaluation Team which will conduct the actual evaluation.

2. Purpose of the evaluation

The fourth evaluation continues implementation of a comprehensive strategy for the “monitoring of performance against defined requirements and intended benefits” as stated in the GEOSS 10-Year Implementation Plan and in the 10-Year Implementation Plan Reference Document and as further defined in the GEOSS Monitoring and Evaluation Framework Document. The fourth evaluation will continue the regular cycle of evaluating the implementation of GEOSS by assessing progress made towards achieving strategic targets in SBAs and Transverse Areas.

a. Expected audience / users of the evaluation report

The primary audience for the evaluation report is the GEO Plenary and the ministers of GEO member countries. The final report of the fourth evaluation will be made available to this audience through the normal channels of distribution of Plenary documents.

The secondary audience of the evaluation report is the various GEO bodies responsible for implementing GEOSS.

b. Expected use of the evaluation findings

The findings and recommendations of the evaluation are expected to be used to inform decisions concerning possible changes to GEO governance, planning and reporting processes, or other aspects of the implementation of GEOSS.

3. Description of the activity to be evaluated

The purpose of GEOSS is to achieve comprehensive, coordinated and sustained observations of the Earth system, in order to improve monitoring of the state of the Earth, increase understanding of Earth processes, and enhance prediction of the behaviour of the Earth system. GEO works to implement the vision of the international community for GEOSS by playing a role of a facilitator and advocate for advanced cooperation between communities of providers and users across the nine SBAs and the related five transverse areas of architecture, data management, capacity building, science and technology, and user engagement.

GEO is a group of willing member states and participating organizations that have agreed to promote an integrated approach to earth observations, sharing of data and building capacity of individuals, institutions and systems on a
voluntary and non-legally binding basis. These agreements are expressed in the First Summit Declaration, the Second Summit Communiqué, the Third Summit Resolution, and the Cape Town Declaration.

Membership of GEO is open to any country or international organization that supports the vision for GEOSS and agrees to support the key principles of GEOSS, including data sharing principles. GEO assesses no membership fees and operates on a modest budget from the voluntary contributions by the GEO members. Although GEO activities are initiated, funded and carried out by member states and/or participating organizations, GEO bridges complementary and related activities and provides a unified framework for their implementation. By building bridges among projects and programs that benefit from such interconnectivity, GEO seeks to ensure that these initiatives reach mission partners and users on a wider scale.

4. Scope of the evaluation

As described in the GEOSS Monitoring and Evaluation Framework Document, the primary focus of the fourth evaluation will be to assess progress towards delivering outputs and achieving outcomes under selected Strategic Targets. The specific Targets to be assessed in the fourth evaluation are:

1) Disasters;
2) Energy; and
3) Health.

The evaluation must consider all Work Plan Tasks and/or Components relevant to the achievement of the selected Strategic Targets, even where these may be aligned to other Targets in the GEO Work Plan.

The evaluation should pay particular attention to capacity building and the needs of users within the Societal Benefit Areas. The evaluation should also examine data collection, data sharing and dissemination within and across the SBAs, as well as evidence of integration of remote sensing and in situ data. Effort should be made to assess the value-added that GEO brings in each of the SBAs.

See Appendix A of this Plan for the relevant text from the GEOSS Strategic Targets document pertaining to the areas being evaluated.

5. Evaluation question framework

See Appendix B. This is a generic framework provided as a guide to the Evaluation Team to assist in planning. Details concerning the specific questions to be asked during interviews and in surveys, as well as the specific methods used in document analysis, will need to be developed by Evaluation Team. A final version of the framework, along with the proposed data collection instruments (e.g. survey questions, interview questions) should be submitted to the M&E WG for approval prior to commencement of data collection.

6. Data collection and analysis

The following will be the principal sources of data and information that will be used to answer the evaluation questions. Not all sources will be used for every question; however, multiple sources will be used wherever possible as a control against the inherent biases of any particular source or method (triangulation).

Data and information collected in support of the evaluation will be maintained and made available to all members of the Evaluation Team and the M&E WG through an electronic registry.

Information provided through interviews or surveys will be secured to ensure confidentiality of informants/participants.
a. Review of GEO documents

Documents to be reviewed will include all GEO foundational documents, e.g. Ministerial declarations, the GEOSS 10 year Implementation Plan and the 10 year Implementation Plan Reference Document, all Work Plans and Task Sheets, various versions of the GEOSS Roadmap, Progress Reports, meeting reports from Plenaries, Executive Committee and other GEO Committees, and other documents as required.

b. Evaluations, audits and reviews conducted by GEO Members or Participating Organizations

A call should be issued to all GEO Component Leads requesting any evaluations, audits or reviews relevant to the assessment of Task implementation of which they are aware.

c. Key informant interviews

Interviews should be conducted with a sample of relevant: GEO Secretariat staff, members of GEO Committees/Implementation Boards, Leads for GEO Tasks Components, non-lead participants in GEO Tasks/Components, members of communities of practice, and user communities. Sample sizes, sampling methods and interview protocols will be developed as part of the evaluation work plan. Interviews will generally be used for the qualitative identification of issues and themes rather than as the basis for statistical inference.

d. Sample surveys of selected communities

Surveys should be considered as a means for obtaining more representative data than is possible through other means. Given time and resource limitations, surveys will likely only be feasible for a few selected areas where preliminary analysis based on other methods suggests such an approach would be worthwhile. Electronic surveys should be used unless this approach is likely to significantly bias results.

e. Performance measurement data

Component Leads should be requested to provide any performance measurement data they have that may be relevant to the assessment of Task implementation or to the assessment of progress toward the realization of the outcomes associated with the Areas being evaluated.

f. Case studies

The use of one or more case studies may be considered as a means to address questions of attribution of outcomes to GEOSS activities, to identify best practices or to explore other aspects of the evaluation in greater depth than would be possible using other means.

7. Evaluation work plan

a. Roles and responsibilities

The M&E WG is responsible for:

- Developing the overall strategy for GEOSS evaluation, as articulated in the Monitoring and Evaluation Framework Document.
- Preparing the Evaluation Plan, as guidance to the Evaluation Team.
- Providing oversight of the execution of the evaluation process.
- Implementing a strategy for the recruitment of the Evaluation Team.
- Transmitting the final evaluation report to the GEO Executive Committee. In doing so, the M&E WG may, at its discretion, append to the report its own analysis or remarks concerning the evaluation process, findings or recommendations.
The Evaluation Team is responsible for:

- Reviewing the Evaluation Plan and discussing any potential implementation issues with the M&E WG.
- Submitting a final Evaluation Plan -- including an amended Evaluation Question Framework, proposed data collection instruments, proposed list of interviewees and proposed survey populations – to the M&E WG for approval.
- Conducting the evaluation as set out in the Evaluation Plan (if applicable, as amended).
- Informing the M&E WG on a regular basis (at least once per month) of the progress in the implementation of the evaluation.
- Promptly and proactively raising issues affecting implementation of the evaluation with the M&E WG.
- Circulating the draft evaluation report (or portions of it) to individuals within the GEO community who have relevant subject-matter expertise for review of factual accuracy.
- Preparing a final evaluation report and transmitting it to the M&E WG. The Evaluation Team is solely responsible for the Findings, Conclusions and Recommendations contained in the evaluation report.

The GEO Secretariat is responsible for:

- Providing office space and support to the Chair of the Evaluation Team, if requested by the nominating Member.
- Providing reasonable access to documentation and files in the possession of the Secretariat, as required for the evaluation.
- Providing reasonable access to Secretariat staff to participate in interviews and other data collection processes where their personal knowledge is relevant to answering evaluation questions.
- Ensuring the availability of an internet-based tool to enable the secure sharing of documents and data supporting the evaluation process among members of the Evaluation Team.
- Providing support to the Evaluation Team in identifying and contacting GEO stakeholders (e.g. Component Leads, end users).
- Providing logistical support to the Chair of the Evaluation Team for meetings and teleconferences of the Evaluation Team.

b. Timeline

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
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<tbody>
<tr>
<td>Initial meeting of the Evaluation Team with the M&amp;E WG</td>
<td>September 2012</td>
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<tr>
<td>Completion of Draft Final Evaluation Report (for factual review)</td>
<td>end April 2013</td>
</tr>
<tr>
<td>Transmittal of the Final Evaluation Report to the M&amp;E WG</td>
<td>end May 2013</td>
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</table>

c. Resources

Except for those services identified in 7a above, which will be provided by the GEO Secretariat, all resources (human, financial, etc.) associated with the evaluation will be covered as part of the voluntary contributions by GEO Members and Participating Organizations to the evaluation process.

8. Structure of the final report

The following are required elements of the final evaluation report. Other sections may be added at the discretion of the Evaluation Team.

a. Executive summary

   i. Overview of the evaluation
   ii. Summary of findings
   iii. Summary of recommendations
b. Introduction
   i. Purpose and objectives
   ii. Scope and description of activities evaluated
   iii. Evaluation approach and methodology

c. Findings
   Structure based on Evaluation Question Framework

d. Conclusions and recommendations

e. Appendices
   i. Details of documents consulted, persons interviewed, interview protocols, surveys, etc.
   ii. Case study reports (if relevant)
   iii. other appendices as required
Appendix A – Excerpt from the Strategic Targets document

2.4 Disasters

Before 2015, GEO aims to:

9. Enable the global coordination of observing and information systems to support all phases of the risk management cycle associated with hazards (mitigation and preparedness, early warning, response, and recovery).

This will be achieved through:

- more timely dissemination of information from globally-coordinated systems for monitoring, predicting, risk assessment, early warning, mitigating, and responding to hazards at local, national, regional, and global levels;
- development of multi-hazard and/or end-to-end approaches, as appropriate to meet the needs for disaster risk reduction, preparedness and response in relevant hazard environments;
- supporting the implementation of the priorities for action identified in the Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters (HFA).

This will be demonstrated by:

- Improved use of observations and related information to inform policies, decisions and actions associated with disaster preparedness and mitigation.
- More effective access to observations and related information to facilitate warning, response and recovery to disasters.
- Increased communication and coordination between national, regional and global communities in support of disaster risk reduction, including clarification of roles and responsibilities and improved resources management.
- Improved national response to natural and man-made disasters through delivery of space-based data, resulting from strengthened International Charter on "Space and Major Disasters."

2.6 Energy

Before 2015, GEO aims to:

11. Close critical gaps in energy-related Earth observations and increase their use in all energy sectors in support of energy operations, as well as energy policy planning and implementation, to enable affordable energy with minimized environmental impact while moving towards a low-carbon footprint.

This will be achieved through:

- engaging and working with governments, national and international energy agencies, the energy industry, research communities and other stakeholders in order to:
  - map user needs and requirements for specific energy data sets (e.g. geophysical, geological, biological, weather, climatological, pollutant and greenhouse gases as well as socio-economic data);
  - develop best practices for the integration of information as well as support capacity building.
- initiating environmental impact studies to identify what data are needed to collect and share by developers to ensure impacts on the environment be as low as reasonably possible for all energy sources (biomass, fossils, geothermal, hydropower, nuclear, ocean, solar and wind);
- initiating application and demonstration projects where earth observations are used for all sources of energy, thus enabling:
  - improved energy management, including balance between energy demand and supply as well as development of alternative energy scenarios;
  - safe, efficient and affordable development and operation of existing and new energy resources, with emphasis on minimizing environmental and societal impact while moving towards a low-carbon footprint;
  - advancement of the application of data, systems and tools.
This will be demonstrated by:

- Significant increase in use of Earth observations by all sectors for improved:
  - Environmental, economic and societal impact assessments of energy exploration, extraction, conversion, transportation and consumption.
  - Prediction of potential hazards to the energy infrastructure.
  - Prediction of the production of intermittent sources of energy.
  - Mapping of renewable energy potential.

2.7 Health

Before 2015, GEO aims to:

- **12. Substantially expand the availability, use, and application of environmental information for public health decision-making in areas of health that include allergens, toxins, infectious diseases, food-borne diseases, and chronic diseases, particularly with regard to the impact of climate and ecosystem changes.**

This will be achieved through:

- working with the World Health Organization (WHO) and the global community of human health and environment experts in order to develop and implement health-and-environment projects which will:
  - advance the application of observation, monitoring and forecasting systems to health decision-making processes;
  - foster the use of established and emerging observation systems in operational health-related applications for air and water quality, infectious diseases, and vector-borne diseases, and develop associated products such as forecasts and alerts compliant with the Common Alerting Protocol (CAP);
  - include efforts to examine terrestrial, freshwater, and marine (ocean) ecosystems and their services, to establish causality between changes in flora, fauna and other factors affecting the emergence and transmission of disease;
  - document links between water and communicable diseases, as part of the life cycle of vectors or as a medium infecting populations;
  - facilitate the integration of Earth science databases and emerging information products with public health data, socioeconomic data, and epidemiological information needed in decision support systems for health care planning and delivery.

- development of a global network of scientists, researchers, practitioners and other operational end users which will:
  - provide free access to an expanded inventory of available Earth observation data, metadata and products applicable to public health;
  - provide input relating to the technical specification of new major environmental observation capabilities, including in-situ and remotely sensed observations that will allow historical data analysis and early detection of changes that influence health;
  - facilitate Earth observation training and capacity building for future scientists, researchers, public health policy makers and practitioners, and end users, including contributions of best practices in this domain to the GCI best practices registry.

This will be demonstrated by:

- Access to improved environmental information and tools to support the global community of human health and environment experts.
- Increased use of environmental information and tools to support decision making in epidemics and/or disease management and planning for well-being. The effectiveness of these tools is demonstrated in at least 3 specific areas on different continents.
- **Increased Applying outcomes from other Societal Benefit Areas to improve health and wellbeing.**
Appendix B -- Evaluation Question Framework

“Priority Actions” are the statements in the Strategic Targets document that follow the phrase “This will be achieved through”.

“Expected Outcomes” are the statements in the Strategic Targets document that follow the phrase “This will be demonstrated by”.

“Tasks”, “Components”, “Outputs”, and “Activities” are based on the GEO Work Plans in their various iterations.

<table>
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<tr>
<th>Overarching Question</th>
<th>Major Divisions</th>
<th>Evaluation Questions</th>
<th>Specific Questions</th>
<th>Lines of Evidence</th>
<th>Criteria</th>
<th>Data Sources</th>
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</table>
| Will GEO achieve the Strategic Targets for 2015? | Is implementation guided by a clear plan to 2015? | Are the Expected Outcomes and Priority Actions relevant? (Do they respond to real needs to which GEO is well-placed to contribute?) | Is there a clear rationale for the selection of the Expected Outcomes and Priority Actions? | Document review | Documented rationale for the selection of Expected Outcomes. | Strategic Targets document  
GEOSS 10 year implementation plan reference document  
GEO Work Plans (including Task / Component sheets)  
Other documents as identified during the evaluation |
| | | | | Interviews | Common understanding among key informants of the rationale for outcome selection. | Interview question 5:  
“How well do you understand why GEO chose to focus on the Expected Outcomes and Priority Actions for the task you are involved with, on a scale from 1 to 5, where 1 is very poor and 5 is very good?” Please elaborate. |
| | | | | Survey of participants and end users | Comparison of perceived understanding between task participants and end users on the rationale for outcome selection. | Survey question P10:  
“Do you know why GEO chose to focus on the Expected Outcomes and Priority Actions for the task you are involved with?” and survey questions U10 and P11:  
“How would you characterize the rationale for the selection of the Expected Outcomes and Priority Actions, using the scale below?” |
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<th>Overarching Question</th>
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<th>Data Sources</th>
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<tr>
<td>Are GEO’s Priority Actions for DEH aligned with information user priorities?</td>
<td>Interviews</td>
<td>Comparison of data provider and/or Task participant perspectives with user perspectives</td>
<td>Interview question 6: “To what extent do you find that GEO’s Priority Actions for your task are aligned with your priorities for improved earth observation information, using scale from 1 to 5, where 1 is very poor and 5 is very good? Where your priorities are not fully aligned with GEO priorities, what changes would you want to see?”</td>
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<td>Survey of participants and end users</td>
<td>Comparison of data provider and/or Task participant perspectives with user perspectives</td>
<td>Survey question P12: “How well do you think that GEO’s Priority Actions for DEH are aligned with your priorities in this area, using the scale below?” and Survey questions U11 and P13: “How well do you think that GEO’s Priority Actions for DEH are with priorities of users in this area generally, using the scale below?”</td>
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<td>Is there a clearly defined role for GEO in</td>
<td>Document review</td>
<td>Documentation referring to needs or Strategic Targets document</td>
<td>Strategic Targets document</td>
<td>GEOSS 10 year implementation plan reference</td>
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<td>Overarching Question</td>
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<td>achieving the Expected Outcomes?</td>
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<td>requirements that GEOSS is best positioned to meet.</td>
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<td>GEO Work Plans (including Task / Component sheets)</td>
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<td>Other documents as identified during the evaluation</td>
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| Interviews | Comparison of data provider and/or Task participant perspectives with user perspectives | | Interview question 8: “Do you believe that the present Components, Actions or Outputs are sufficient to reach the Target and Outcomes of the task you are involved in?  
a. Yes  
b. No  
If NO, what additional Components, Activities or Outputs should be added to the GEO Work Plan?” | | | |
<p>| Survey of participants and end users | Comparison of data provider and/or Task participant perspectives with user perspectives | | Survey questions U12 and P14: “How will you rate GEO’s role in advancing the Priority Actions and Expected Outcomes of task(s) relevant to you, using the scale below?” | | | |
| Are the planned activities and outputs necessary and sufficient to achieve the Expected Outcomes? | Are all Tasks and Components necessary to the achievement of the Expected Outcomes? | Document review | Documented rationale for the selection of Tasks and Components. | GEOSS 10 year implementation plan reference document | |
| | | | GEO Work Plans (including Task / Component sheets) and progress reports | | |
| | | | Other documents as identified during the evaluation | | |
| Interviews | Additional evidence of the rationale for Task selection. | | Interview questions 10: “Which of the Work Plan Components do you believe are essential for achieving the Strategic | | |</p>
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<td>Target and Expected Outcomes for your task/component?</td>
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<td>Interview question 11: “Are there any Components that you believe are not essential? If Yes, do these add value to GEOSS? If so, please explain”</td>
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<td>Target-Task matching Identification of non-relevant Tasks.</td>
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<td>Work Plan and Task/Component sheets</td>
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<td>Are all activities and outputs within Tasks and Components necessary to the achievement of the Expected Outcomes?</td>
<td>Document review</td>
<td>Documented rationale for the selection of activities and outputs.</td>
<td>GEOSS 10 year implementation plan reference document GEO Work Plans (including Task / Component sheets) and progress reports Other documents as identified during the evaluation</td>
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<td>Interviews</td>
<td>Additional evidence of the rationale for Task selection.</td>
<td>Interview questions 10: “Which of the Work Plan Components do you believe are essential for achieving the Strategic Target and Expected Outcomes for your task/component?</td>
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<td>Interview question 11: “Are there any Components that you believe are not essential? If Yes, do these add value to GEOSS? If so, please explain”</td>
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<td>Where Tasks, Components, activities or outputs have been identified as not necessary to the</td>
<td>Interviews</td>
<td>Evidence of added value of the identified items.</td>
<td>Interview question 11: “Are there any Components that you believe are not essential? If Yes, do these add value to GEOSS? If so, please explain”</td>
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<td>achievement of the Expected Outcomes, do they add value to GEOSS?</td>
<td>Document review</td>
<td>Documentation of known gaps in Tasks required for achieving Expected Outcomes.</td>
<td>GEOSS 10 year implementation plan reference document, GEO Work Plans (including Task / Component sheets) and progress reports, Other documents as identified during the evaluation</td>
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<td>Are the existing Tasks and Components sufficient to achieve the Expected Outcomes? If not, what are the gaps?</td>
<td>Interviews</td>
<td>Identification of possible gaps.</td>
<td>Interview question 8: “Do you believe that the present Components, Actions or Outputs are sufficient to reach the Target and Outcomes of the task you are involved in? a. Yes b. No If NO, what additional Components, Activities or Outputs should be added to the GEO Work Plan?”</td>
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<td>Surveys of participants and end users</td>
<td>Identification of possible gaps</td>
<td>Survey questions U13 and P18: “Are there other factors, outside of GEO’s control, which may affect whether or not the Expected Outcomes will be achieved? Please tick all that apply.”</td>
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<td>Overarching Question</td>
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<td>Is the plan revised in light of new information on gaps and status of implementation?</td>
<td>Is there a process in place to identify and fill gaps?</td>
<td>Document review</td>
<td>Evidence and documentation of gap analyses in the context of work planning.</td>
<td>GEO Work Plans (including Task / Component sheets) and progress reports</td>
<td>Survey of participants</td>
<td>Additional evidence of gap analyses or consideration of possible gaps in Tasks.</td>
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<tr>
<td>Have the needs of the full range of stakeholders been addressed during planning?</td>
<td>Has the plan adequately addressed capacity building needs?</td>
<td>Document review</td>
<td>Evidence that capacity building needs were identified as part of planning and that activities were developed to respond to the identified needs.</td>
<td>GEO Work Plans (including Task / Component sheets) and progress reports</td>
<td>Survey of participant and end users</td>
<td>Perceived adequacy of capacity building activities. Evidence that capacity building needs were identified as part of planning and that activities were developed to respond to the identified needs.</td>
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<tr>
<td>Overarching Question</td>
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<td>Have expected end users been adequately engaged in the development of the plan?</td>
<td>Document review</td>
<td>Evidence that key user communities and their requirements were identified and contacted during planning.</td>
<td>GEO Work Plans and progress reports Other documents as identified during the evaluation</td>
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<tr>
<td>Interviews</td>
<td>Additional evidence of user engagement activities. Perceived adequacy of user engagement activities.</td>
<td>Interview question 12: “Based on your experience, how might GEO better engage users in the task/component you are involved?”</td>
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<tr>
<td>Survey of end users</td>
<td>Perceived adequacy of user engagement activities</td>
<td>Survey question U17: “How many GEOSS tasks or activities have you participated in the planning or implementation of? a) None; b) One; c) Two; d) Three to five; e) More than five” Survey question U18: “If you did participate in GEO-related activity: How was this experience? A) Did not participate; b) Positive; c) Negative; d) Uncertain”</td>
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<tr>
<td>Have science and technology communities been adequately engaged in the development of the plan?</td>
<td>Document review</td>
<td>Evidence that relevant science and technology communities were identified and contacted during planning.</td>
<td>GEO Work Plans (including Task / Component sheets) and progress reports Other documents as identified during the evaluation</td>
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</table>
| Interviews | Additional evidence of engagement of science | Interview question 13: “Based on your experience, how might GEO
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<th>Overarching Question</th>
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<tr>
<td>Will it be possible to demonstrate achievement of or progress toward the Expected Outcomes?</td>
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<td>and technology communities. Perceived adequacy of science and technology engagement activities</td>
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<td>better engage science and technology communities in the task/component you are involved? “</td>
</tr>
<tr>
<td>Survey of participants</td>
<td>Additional evidence of engagement of science and technology communities</td>
<td>Survey question P24: “Within the Tasks you are involved, to what extent do you engage relevant science and technology communities, using the scale below?”</td>
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<td>Is there a clear and common understanding of what evidence is required to demonstrate achievement of the Expected Outcomes?</td>
<td>Document review</td>
<td>Articulation of the Expected Outcomes such that the evidence of achievement is readily apparent. or Identification of specific criteria or indicators of achievement of the Expected Outcomes.</td>
<td>Strategic Targets document GEOSS 10 year implementation plan reference document GEO Work Plans (including Task / Component sheets) Other documents as identified during the evaluation</td>
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<tr>
<td>Interviews</td>
<td>Evidence of discussion among user and lead participants of how achievement of the Expected Outcomes will be demonstrated / measured.</td>
<td>Interview question 14: “For the Tasks that you are involved in, what evidence would best demonstrate, in your view, the successful achievement of the Strategic Target and the Expected Outcomes? “ Interview question 15: “Would you say that this view is broadly shared by Task participants or are there differences in opinion? Please explain why.”</td>
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<tr>
<td>Are processes in place to obtain the data required to demonstrate achievement of the Expected Outcomes?</td>
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<td>Document review</td>
<td>Identification of data requirements and data sources.</td>
<td>Documents as identified through the key informant interviews</td>
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<tr>
<td>Interviews</td>
<td>Evidence of consideration by Task participants of data requirements to support demonstration / measurement of Expected Outcomes.</td>
<td>Interview question 16: “If indicators or other methods have been developed, in your view, have these tools been useful? A) Yes; b) No. If indicators or other methods have not been developed in your view, would indicators or other assessment tools be useful? A)Yes; b) No. Please explain why.”</td>
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<td>Survey of participants</td>
<td>Evidence of consideration by Task participants of data requirements to support demonstration / measurement of Expected Outcomes.</td>
<td>Survey questions P25: “For the Tasks that you are involved in, and to the best of your knowledge, have performance indicators or other systematic tools for assessing progress toward the Strategic Target and/or Expected Outcomes been developed?” Survey question P26: “If indicators or other methods have been developed ,in your view, have these tools been useful? A) Yes; b) No, c) Don’t know”” Survey question 27: “If indicators or other methods have not been developed, in your view, would indicators or other assessment tools be useful? A) Yes; b) No; c) Don’t know.”</td>
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<td>Is the execution of GEOSS implementation on track to achieve the Strategic Targets by 2015?</td>
<td>Are the Work Plan Tasks and Components proceeding as planned?</td>
<td>Do the activities described in Progress Reports match those expected in the Work Plans?</td>
<td>Document review</td>
<td>Comparison of planned and reported progress</td>
<td>GEO Work Plans (including Task / Component sheets) and Progress Reports</td>
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<td>Survey of participants</td>
<td>Additional evidence confirming or disconfirming reports.</td>
<td>Interview question P28: “For the Tasks that you are involved in, and to the best of your knowledge, were changes made to planned Activities and/or Outputs that are not reflected in the latest Work Plan? A) Yes; b) no; c) Don’t know.”</td>
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<td>Document review</td>
<td>Task ratings by the Secretariat experts are positive (green) or show improvement over time. Ratings are supported by text discussion in progress reports.</td>
<td>GEO Work Plans (including Task / Component sheets) and progress reports</td>
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<td>Interviews</td>
<td>Additional evidence confirming or disconfirming reports.</td>
<td>Interview question 17: “For the Tasks that you are involved in, and to the best of your knowledge, are there particular areas where adequate progress has not been achieved? A) yes; b) No. Please explain why.” Interview question 18: “For the Tasks that you are involved in, and to the best of your knowledge, are there particular areas where progress has exceeded...”</td>
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<td>Are Expected Outcomes being realized, relative to the stage of implementation?</td>
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<td>To what extent have the Expected Outcomes been realized to date?</td>
<td>Document review</td>
<td>Evidence of outcomes realized</td>
<td>GEO Work Plans (including Task / Component sheets) and progress reports</td>
<td>Other documents as identified during the interviews</td>
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<td>What challenges have arisen during implementation and how have these been addressed?</td>
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<td>Document review</td>
<td>Reported challenges and responses</td>
<td>Interview question 19: “What challenges have arisen during implementation of the Tasks/Components you are involved in and how have these been addressed?”</td>
<td>GEO Work Plans (including Task / Component sheets) and progress reports</td>
<td>Other documents as identified during the interviews</td>
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<td>Surveys of participants</td>
<td>Additional evidence confirming or disconfirming reports.</td>
<td>Interview question P29: “How do you rate overall progress towards completion of the Activities and Outputs for the task(s) that you are involved in at this point in its development and implementation, using the scale below”</td>
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<td>Has GEO added value to outcomes beyond what would have happened in its absence?</td>
<td>Survey of end users</td>
<td>Comparison of perceived progress in achieving outcomes between Task participants and end users.</td>
<td>Survey questions U19 and P32: “In your view, to what extent have the Expected Outcomes for Tasks/components relevant to you been realized to date, using the scale below?”</td>
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<td>Document review</td>
<td>Evidence of GEO value-added</td>
<td>GEO Work Plans (including Task / Component sheets) and Progress Reports Other documents as identified during the interviews</td>
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<td>Interviews</td>
<td>Evidence of GEO value-added</td>
<td>Interview questions 21: [In reference to the identified key accomplishments] “In your view, would these have occurred in the absence of GEO? Would they have occurred as quickly or to the same extent?” Interview question 22: [Independent of accomplishments]: “What would in your opinion be the most important value-adding contribution of GEOSS?” Interview question 23: “Is this value-adding contribution being achieved? A) Yes; b) No. Please explain why”</td>
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<td>To what extent are data and information becoming available on the GEO Portal?</td>
<td>Interviews</td>
<td>Identification of data availability and sufficiency</td>
<td>Interview question 24: “What has been your interface/communication with infrastructure communities?”</td>
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<td>Survey of end user</td>
<td>Comparison of data provider/task participant and end user on data availability and accessibility</td>
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<td>Survey question P37: “Has there been interface/communication with infrastructure communities?”</td>
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<td>Survey question P38: “Have your organization provided data/information to the GEO Portal. If yes, what kind of data/information?”</td>
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<td>Survey questions U24 and P39: “Have you ever tried to find or extract data/information from the GEO Portal?”</td>
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<td>Survey questions U25 and P40 (if yes to the above) “What is your experience with finding and extracting relevant data from the GEO Portal?”</td>
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<td>Survey questions U26 and P41: “What kind of data/information were you looking for?”</td>
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Have any unintended outcomes (positive or negative) been observed?

|                      | Have there been any significant unintended positive outcomes of the reviewed Tasks? | Interviews | Identification of unintended positive outcomes realized, with reference to sources of evidence. | Interview question 25: “Have there been any unintended positive effects of GEO’s involvement in your task or SBA to date? Please explain why” |
|                      | Survey of end users and participants | Identification of unintended positive outcomes realized, with reference to sources of evidence. | Survey questions U27 and P42: “Have there been any unintended positive effects of GEO’s involvement in your task or SBA to date? If yes, what were they?” |

Have there been any

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<td>Interview question 27:</td>
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<td>Are there any lessons learned during implementation to date that might be transferable to other Strategic Target areas?</td>
<td>Are there any methods, processes, tools, etc. that were found to be particularly important to realizing progress?</td>
<td>Interviews Surveys of end users and participants</td>
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Annex B – Literature review questionnaire

GEOSS Evaluation Team Literature Review Form

Article I.D.                                                                 Team Member:

Title:

First Author:

Literature Review Questions: Please note information in the article that can help answer the following review questions.

Q1: Does the literature show evidence of links between the described activities and the goals of GEOSS Disasters, Energy or Health

Q2: Does the literature identify any gaps in GEOSS Disasters, Energy or Health? If yes, what gaps are identified?

Q3: Does the literature indicate attempts to fill identified gaps in GEOSS Disasters, Energy or Health? If yes, how?

Q4: Does the paper identify or describe topics or activities that GEOSS Disasters, Energy or Health should do but is not? If yes, what are the topics/activities?

Q5: Does the literature show progress or outcomes from GEOSS Disasters, Energy or Health activities? If yes, please describe the progress reported.

Q6: Does the literature identify any unintended positive or negative outcomes or impacts of GEOSS Disasters, Energy or Health implementation? If yes, what are these outcomes?
Welcome,

The Global Earth Observation System of Systems (GEOSS) is a coordinating and integrating network of Earth observing and information systems, contributed on a voluntary basis by Members and Participating Organizations of the Intergovernmental Group on Earth Observations (GEO). The vision for GEOSS is to realize a future wherein decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth observations and information (GEO-VI, Document 12).

GEOSS is in the process of evaluating its progress towards the targets and objectives. An evaluation of the overall progress at the mid-point of the 10-year implementation plan was conducted during the first half of 2010. It is being followed by evaluations of the GEOSS Building Blocks, also called Transverse Areas, and Societal Benefit Areas (SBA).

This survey is being conducted by the GEOSS Evaluation Team to collect feedback on the implementation of the GEOSS Disasters, Energy and Health building blocks.

The Evaluation Team is requesting your participation in this survey to obtain your perspective on certain aspects of the implementation and progress of these two important building blocks. By responding to this survey, your experience and/or expertise can contribute to our understanding and knowledge of GEOSS implementation.

The survey contains 49 questions and will take about 15 minutes to complete.

Thank you,

The GEOSS Disasters, Energy & Health Evaluation Team

1. With which Societal Benefit Area (SBA) are you involved? Please tick all that apply.

☐ Disaster

☐ Energy

☐ Health

☐ Other, please specify... ________________________

2. What is, or has been, your involvement with GEO and/or GEOSS?
Contributor means active participation in a task/component. Provider means submitting data and/or information.

- Task Lead
- Task Contributor / Participant
- Provider of data/information

3. In which region do you conduct most of your activities within DEH?
- Africa
- Asia
- Australia/Oceania
- Europe
- North America
- South America

4. Please describe your involvement with the relevant GEOSS task/component (contributions, roles, responsibilities, etc.) Please tick all that apply.
- I do not conduct any activities in a GEOSS Strategic Area
- Science / Research
- Research Administration
- Public Administration
- Policy
- Information Technologies
- Education and Outreach
- Decision Support
- Other, please specify... ______________________

5. How would you rate your knowledge of and familiarity with GEOSS in the SBA of Disasters?
Please answer on a scale of 0 to 10, where 0 is “No knowledge” and 10 is “Expert knowledge”
6. How would you rate your knowledge of and familiarity with GEOSS in the SBA of Energy?
Please answer on a scale of 0 to 10, where 0 is “No knowledge” and 10 is “Expert knowledge”

7. How would you rate your knowledge of and familiarity with GEOSS in the SBA of Health?
Please answer on a scale of 0 to 10, where 0 is “No knowledge” and 10 is “Expert knowledge”

8. How many of the GEOSS strategic targets for the Disaster, Energy or Health SBAs do you believe will be achieved by 2015?
Please answer on a scale of 0 to 10, where 0 is “None” and 10 is “All”

9. Do you know the expected Outcomes and Priority Actions for the task you are involved in?
   - Yes
   - No

10. Do you know why GEO chose to focus on the expected Outcomes and Priority Actions for the task you are involved with?
    - Yes
    - No

11. How would you characterize the rationale for the selection of the expected Outcomes and Priority Actions?
    Please answer on a scale of 0 to 10, where 0 is “Not clear” and 10 is “Extremely clear”

12. How well do you think that GEO's Priority Actions for DEH are aligned with your priorities in this area?
    Please answer on a scale of 0 to 10, where 0 is “Not aligned” and 10 is “Extremely well aligned”

13. How well do you think that GEO's Priority Actions for DEH are aligned with priorities of users in this area?
    Please answer on a scale of 0 to 10, where 0 is “Not aligned” and 10 is “Extremely well aligned”

14. How will you rate GEO's role in advancing the Priority Actions and Expected Outcomes of task(s) relevant to you?
    Please answer on a scale of 0 to 10, where 0 is “Not clear” and 10 is “Extremely clear”
15. Do you believe that all Components and Priority Actions are necessary to achieve the targets and outcomes of the task you are involved in?

- Yes
- No
- Don't know

16. How do the objectives of your task address or fit with the Expected Outcomes?

Please answer on a scale of 0 to 10, where 0 is “No fit at all” and 10 is “Extremely good fit”

17. How well do you think the connection between the Components and the Expected Outcomes is either explained or readily apparent?

Please answer on a scale of 0 to 10, where 0 is “Not explained at all” and 10 is “Extremely well explained”

18. Are there factors, outside of GEO's control, which may affect whether or not the Expected Outcomes will be achieved? Please tick all that apply.

- National policies
- Proprietary issues
- Financial issues
- Personnel resources
- Time commitment
- Support from home organization
- Support from home government
- Travel funds
- Technological reasons
- Other, please specify... ______________________

19. How well do you think the Work Plan Tasks and Components are reflective of the actions required to achieve the Strategic Target?

Please answer on a scale of 0 to 10, where 0 is “Not reflective” and 10 is “Extremely reflective”
20. For the tasks you are involved in, is there a process to identify, document and address gaps?

- Yes
- No
- Don't know

21. How will you rate GEOSS’ contribution to improving your capacity to produce or make use of data and information produced?

Please answer on a scale of 0 to 10, where 0 is “No contribution” and 10 is “Excellent contribution”

22. Within the Tasks you are involved with, to what extent do you engage user communities?

Please answer on a scale of 0 to 10, where 0 is “None” and 10 is “Extensively”

23. What mechanisms do you have within the Tasks you are involved with to engage users? Please tick all that apply.

- Through national user groups
- Ask user to define needs
- Keep them on a mailing list
- Invite to workshops
- Other, please specify... ______________________

24. Within the Tasks you are involved with, to what extent do you engage relevant science and technology communities?

Please answer on a scale of 0 to 10, where 0 is “None” and 10 is “Extensively”

25. For the Tasks you are involved with, and to the best of your knowledge, do performance indicators or other systematic tools for assessing progress toward the Strategic Target and/or Expected Outcomes exist?

- Yes
- No
- Don't know

26. If indicators or other methods exist, in your view, are these tools useful?
27. If indicators or other methods do NOT exist, in your view, would indicators or other assessment tools be useful?

- Yes
- No
- Don't know

28. For the Tasks that you are involved with, and to the best of your knowledge, were changes made to planned Activities and/or Outputs that are NOT reflected in the latest Work Plan?

- Yes
- No
- Don't know

29. How do you rate overall progress towards completion of the Activities and Outputs for the task(s) you are involved with at this point in its (their) development and implementation?

Please answer on a scale of 0 to 10, where 0 is “Very poor” and 10 is “Very good”

30. For the Tasks that you are involved with, and to the best of your knowledge, are there particular areas where adequate progress has NOT been achieved?

- Yes
- No
- Don't know

If you answered YES to question 30, please indicate which Outcome where adequate progress has not been achieved. Please tick all that apply. Disasters:

- Improved use of observation
- More effective access to observations
- Increased communication and coordination
Improved national response
Support to the Hyogo Framework for Action

Energy:
- Environmental, economic and societal impact assessments
- Prediction of potential hazards to the energy infrastructure
- Prediction of the production of intermittent sources of energy
- Mapping of renewable energy potential issues

Health:
- Access to improved environmental information
- Increased use of environmental information
- Increased use of applying Outcomes from other SBAs to improve health and well-being.

31. For the Tasks that you are involved with, and to the best of your knowledge, are there particular areas where adequate progress has EXCEEDED expectations?

- Yes
- No
- Don't know

If you answered YES to question 31, please indicate which Outcome where adequate progress has EXCEEDED expectations. Please tick all that apply. Disasters:

- Improved use of observation
- More effective access to observations
- Increased communication and coordination
- Improved national response
- Support to the Hyogo Framework for Action

Energy:
- Environmental, economic and societal impact assessments
☐ Prediction of potential hazards to the energy infrastructure
☐ Prediction of the production of intermittent sources of energy
☐ Mapping of renewable energy potential issues

Health:
☐ Access to improved environmental information
☐ Increased use of environmental information
☐ Increased use of applying Outcomes from other SBAs to improve health and well-being.

32. In your view, to what extent have the Expected Outcomes for Tasks/Components you are involved with been realized to-date?

Please answer on a scale of 0 to 10, where 0 is “Not at all realized” and 10 is “Extremely well realized”

33. In your view would the three most important accomplishments of GEOSS implementation in your SBA have occurred in the absence of GEO?

☐ Yes
☐ No
☐ Don’t know

34. If Yes to question 33, if GEOSS had not been created, would the accomplishments have occurred as quickly, or to the same extent?

☐ Yes
☐ No
☐ Don’t know

35. Independent of accomplishments, in your opinion what would be the most important value-added contribution of GEOSS? Please tick all that apply.

☐ Networking
☐ Increased use of EO
☐ Increased capacity
☐ Increased capacity to service users

☐ Synergy

☐ Other, please specify... ______________________

36. Is this value-added contribution being achieved?
   ○ Yes
   ○ No
   ○ Don't know

37. Has there been interface/communication with infrastructure communities?
   ○ Yes
   ○ No
   ○ Don't know

38. Has your organization provided data/information to the GEO Portal?
   ○ Yes
   ○ No
   ○ Don't know

If Yes, what kind of data/information?

☐ In-situ datasets

☐ Remote sensing datasets

☐ Airborne datasets

☐ Data archives and repositories

☐ Real-time and near-real-time data from sensors/sensor networks

☐ Environmental models

☐ Processing/transformation services

☐ Information products (maps, etc.)
39. Have you ever tried to find or extract data/information from the GEOSS Portal?

If you answered "NO", please skip to Question 42.

☐ Yes
☐ No

40. What is your experience with finding and extracting relevant data/information from the GEO Portal?

Please answer on a scale of 0 to 10, where 0 is “Very poor” and 10 is “Very good”

41. What kind of data/information were you looking for? Please tick all that apply.

☐ In-situ datasets
☐ Remote sensing datasets
☐ Airborne datasets
☐ Data archives and repositories
☐ Real-time and near-real-time data from sensors/sensor networks
☐ Environmental models
☐ Processing/transformation services
☐ Information products (maps, etc.)
☐ Other, please specify... ______________________

42. Have there been any unintended positive effects of GEO's involvement in your task/component to-date?

☐ Yes
☐ No
☐ Don't know

If there were unintended positive effects, what were they?

________________________
43. Have there been any unintended negative effects of GEO's involvement in your task/component to-date?

- Yes
- No
- Don't know

If there were unintended negative effects, what were they?

________________________

44. Were there any particular lessons learned during implementation of the task you are involved with, either good practices that might be expanded or things that others should avoid, that you could share with us?

- Yes ______________________
- No ______________________
- Don't know

PART 2

This section contains some questions about you. This information will not be shared with anyone and will be used solely for purposes of this evaluation.

If you would like to skip this section and finish the survey please scroll to the bottom of this page and press "Next".

45. What is your university degree?

- I do not have a university degree
- Bachelors
- Masters
- PhD
- Other, please specify: ______________________

46. How old are you?
47. Are you:

- Female
- Male

48. Who is your employer?

- Private sector
- Private sector - education
- Private sector - research
- Public sector - government
- Public sector - education
- Public sector - research
- Unemployed
- Retired
- Other, please specify: ________________

49. How long have you worked in the GEOSS environment?

- Less than 5 years
- Less than 10 years
- Less than 15 years
- Less than 20 years
Less than 25 years
More than 25 years
I don’t work in this area
C.2 – GEOSS Societal Benefit Areas: Disasters, Energy & Health User Survey

Welcome,

The Global Earth Observation System of Systems (GEOSS) is a coordinating and integrating network of Earth observing and information systems, contributed on a voluntary basis by Members and Participating Organizations of the intergovernmental Group on Earth Observations (GEO). The vision for GEOSS is to realize a future wherein decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth observations and information (GEO-VI, Document 12).

GEOSS is in the process of evaluating its progress towards the targets and objectives. An evaluation of the overall progress at the mid-point of the 10-year implementation plan was conducted during the first half of 2010. It is being followed by evaluations of the GEOSS Building Blocks, also called Transverse Areas, and Societal Benefit Areas (SBA).

This survey is being conducted by the GEOSS Evaluation Team to collect feedback on the implementation of the GEOSS Disasters, Energy and Health building blocks.

The Evaluation Team is requesting your participation in this survey to obtain your perspective on certain aspects of the implementation and progress of these two important building blocks. By responding to this survey, your experience and/or expertise can contribute to our understanding and knowledge of GEOSS implementation.

The survey contains 35 questions and will take about 12 minutes to complete.

Thank you,

The GEOSS Disasters, Energy & Health Evaluation Team

1. With which Societal Benefit Area (SBA) are you involved? Please tick all that apply.

☐ Disaster
☐ Energy
☐ Health

2. Users are persons and organizations actively use GEOSS data and information and/or acquire information from value-added services that use GEOSS data and information. How would you describe your role in GEO and/or GEOSS?

Participants are registered as contributors to one or more GEOSS tasks/components. Data providers upload data or information onto the GEOSS Portal.
User

Participant

Provider of data/information

Other, please specify... ______________________

3. In which region do you conduct most of your activities within DEH?
   - Africa
   - Asia
   - Australia/Oceania
   - Europe
   - North America
   - South America

4. Please describe your involvement with the relevant GEOSS task/component (contributions, roles, responsibilities, etc.) Please tick all that apply.
   - I do not conduct any activities in a GEOSS Strategic Area
   - Science / Research
   - Research Administration
   - Public Administration
   - Policy
   - Information Technologies
   - Education and Outreach
   - Decision Support
   - Other, please specify... ______________________

5. How would you rate your knowledge of and familiarity with the activities and planned outcomes of GEOSS in the SBA of Disasters?
   Please answer on a scale of 0 to 10, where 0 is “No knowledge” and 10 is “Expert knowledge”
6. How would you rate your knowledge of and familiarity with the activities and planned outcomes of GEOSS in the SBA of Energy?

Please answer on a scale of 0 to 10, where 0 is “No knowledge” and 10 is “Expert knowledge”

7. How would you rate your knowledge of and familiarity with the activities and planned outcomes of GEOSS in the SBA of Health?

Please answer on a scale of 0 to 10, where 0 is “No knowledge” and 10 is “Expert knowledge”

8. How many of the GEOSS strategic targets for the Disaster, Energy or Health SBAs do you believe will be achieved by 2015?

Please answer on a scale of 0 to 10, where 0 is “None” and 10 is “All”

9. Do you know the expected Outcomes and Priority Actions for the task you are involved in?

   ○ Yes
   ○ No

10. How would you characterize the rationale for the selection of the Expected Outcomes and Priority Actions?

Please answer on a scale of 0 to 10, where 0 is “Not clear” and 10 is “Extremely clear”

11. How well do you think that GEO’s Priority Actions for DEH are aligned with priorities of users in this area?

Please answer on a scale of 0 to 10, where 0 is “Not aligned” and 10 is “Extremely well aligned”

12. How will you rate GEO’s role in advancing the Priority Actions and Expected Outcomes of task(s) relevant to you?

Please answer on a scale of 0 to 10, where 0 is “Not clear” and 10 is “Extremely clear”

13. Are there factors, outside of GEO’s control, which may affect whether or not the Expected Outcomes will be achieved? Please tick all that apply.

   □ National policies
   □ Proprietary issues
   □ Financial issues
   □ Personnel resources
14. How well do you think the Work Plan Tasks and Components are reflective of the actions required to achieve the Strategic Target?

Please answer on a scale of 0 to 10, where 0 is “Not reflective” and 10 is “Extremely reflective”

15. How will you rate GEOSS’ contribution to improving your capacity to produce or make use of data and information produced through the relevant Task/Component?

Please answer on a scale of 0 to 10, where 0 is “No contribution” and 10 is “Excellent contribution”

16. Are you aware of any opportunities GEO has provided for improving/building capacity?

- Yes
- No
- Uncertain

17. How many GEOSS Tasks or Activities have you participated in the planning or implementation of?

- None
- One
- Two
- Three to Five
- More than Five

18. If you did participate in a GEO-related activity, how was this experience?
19. In your view, to what extent have the Expected Outcomes for Tasks/Components relevant to you been realized to-date?

Please answer on a scale of 0 to 10, where 0 is “Not at all realized” and 10 is “Extremely well realized”

20. In your view would the three most important accomplishments of GEOSS implementation in your SBA have occurred in the absence of GEO?

- Yes
- No
- Don't know

21. If Yes to question 20, if GEOSS had not been created, would the accomplishments have occurred as quickly, or to the same extent?

- Yes
- No
- Don't know

22. Independent of accomplishments, in your opinion what would be the most important value-added contribution of GEOSS? Please tick all that apply.

- Networking
- Increased use of EO
- Increased capacity
- Increased capacity to service users
- Synergy
- Other, please specify... ______________________
23. Is this value-added contribution being achieved?
   - Yes
   - No
   - Don't know

24. Have you ever tried to find or extract data/information from the GEO Portal?
   If you answered "NO", please skip to Question 27.
   - Yes
   - No

25. What is your experience with finding and extracting relevant data/information from the GEO Portal?
   Please answer on a scale of 0 to 10, where 0 is “Very poor” and 10 is “Very good”

26. What kind of data/information were you looking for? Please tick all that apply.
   - In-situ datasets
   - Remote sensing datasets
   - Airborne datasets
   - Data archives and repositories
   - Real-time and near-real-time data from sensors/sensor networks
   - Environmental models
   - Processing/transformation services
   - Information products (maps, etc.)
   - Other, please specify... ______________________

27. Have there been any unintended positive effects of GEO's involvement in your task/component to-date?
   - Yes
   - No
28. Have there been any unintended negative effects of GEO's involvement in your task/component to-date?

- Yes
- No
- Don't know

If there were unintended negative effects, what were they?

29. Were there any particular lessons learned during implementation of the task you are involved with, either good practices that might be expanded or things that others should avoid, that you could share with us?

- Yes ______________________
- No ______________________
- Don't know

PART 2

This section contains some questions about you. This information will not be shared with anyone and will be used solely for purposes of this evaluation.

If you would you like to skip this section and finish the survey please scroll to the bottom of this page and press "Next".

30. What is your university degree?

- I do not have a university degree
- Bachelors
- Masters
○ PhD
○ Other, please specify: ______________________

31. How old are you?
○ Less than 30
○ Less than 40
○ Less than 50
○ Less than 60
○ Less than 70
○ Over 70

32. Are you:
○ Female
○ Male

33. Who is your employer?
○ Private sector
○ Private sector - education
○ Private sector - research
○ Public sector - government
○ Public sector - education
○ Public sector - research
○ Unemployed
○ Retired
○ Other, please specify: ______________________

34. How long have you worked in the GEOSS environment?
○ Less than 5 years
○ Less than 10 years
○ Less than 15 years
○ Less than 20 years
○ Less than 25 years
○ More than 25 years
○ I don't work in this area
Annex D – Interview questionnaire

GEOSS FOURTH EVALUATION INTERVIEW GUIDE V4

An Evaluation Team has been tasked with conducting the fourth GEOSS evaluation. The evaluation will include web-based surveys and interviews. Invitation to participate in this interview goes to all task coordinators and selected participants and users within GEOSS Societal Benefit Areas (SBAs) Disasters, Energy and Health (DEH).

The interview supplements the surveys and its purpose is to obtain more detailed views on planning, implementation, and progress that have been made thus far regarding GEOSS DEH than could be achieved in the survey. Please excuse the Evaluation Team for asking some of the same questions as in the survey. It is necessary for a complete picture.

Please be reminded that you are not asked to answer any questions that you cannot or choose not to address. Just skip the question and move on to the next one on the list. However, it is important that you answer the first three questions.

Any information you provide will remain anonymous and none of your responses will be associated with you in our evaluation report.

Our analysis of evaluation interviews for Disasters (D), Energy (E) and Health (H) will examine trends and patterns of opinion. Once we complete all our data collection, our evaluation report will be presented to the GEO Monitoring and Evaluation Working Group and later to the Executive Committee.

If you are a task lead you may be contacted for a more in-depth interview.

Targets and Outcomes are included in an appendix for your reference.

1. With which Societal Benefit Area (SBA) are you involved? Please tick all that apply.
   a. Disaster
   b. Energy
   c. Health
   d. Other, please specify task and component: ________

2. What is or have been your involvement with GEO and/or GEOSS?
   Please tick all that apply.
   (Contributor means active participation in a task/component, provider means just submitting data and/or information.)
   a. Task Lead
   b. Task Contributor/Participant
c. Provider of data/information  
d. User  
e. Beneficiary  

*Users are persons and organizations actively using GEOSS data and information.*  

*Beneficiaries are persons and organization that do not necessarily use the GEOSS data themselves but acquire information from value-added service using GEOSS data and information.*

3. In which region do you conduct your part of GEOSS activities within DEH?  
a. Africa  
b. Asia  
c. Australia/Oceania  
d. Europe  
e. North America  
f. South America

4. Please describe your involvement with the relevant GEOSS task/component (Contributions, roles, responsibilities etc.). *Please tick all that apply.*

a. I do not conduct any activities in a GEOSS Strategic Area  
b. Science / Research  
c. Research Administration  
d. Public Administration  
e. Policy  
f. Information Technologies  
g. Education and Outreach  
h. Decision Support  
i. Other, please specify:

5. How would you rate your knowledge of and familiarity with GEOSS on a scale from 1 to 5, where 1 is very poor and 5 is very good?

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How well do you understand why GEO chose to focus on the Expected Outcomes and Priority Actions for the task you are involved with, on a scale from 1 to 5, where 1 is very poor and 5 is very good?

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Please elaborate

6. If task participant: To what extent do you find that GEO’s Priority Actions for your task are aligned with your priorities for improved earth observation information, using scale from 1 to 5, where 1 is very poor and 5 is very good?

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Where your priorities are not fully aligned with GEO priorities, what changes would you want to see?

7. If user: To what extent do you think that GEO’s Priority Actions for SBA that you are involved in are aligned with priorities of information users in this area generally, using scale from 1 to 5, where 1 is very poor and 5 is very good?

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Where user priorities are not fully aligned with GEO priorities, what changes would you want to see?

8. Do you believe that the present Components, Actions or Outputs are sufficient to reach the Target and Outcomes of the task you are involved in?

a. Yes
b. No

If NO, what additional Components, Activities or Outputs should be added to the GEO Work Plan?

9. Are there any specific topics within your SBA in which you would suggest that GEO should be engaged either more or less than at present?

10. Which of the Work Plan Components do you believe are essential for achieving the Strategic Target and Expected Outcomes for your task/component?

11. Are there any Components or Priority Actions that you believe are not essential?

a. Yes
b. No

If YES, do these add value to GEOSS? If so, please explain why.

12. Based on your experience, how might GEO better engage users in the task/component you are involved?

13. Based on your experience, how might GEO better engage science and technology communities in the task/component you are involved?

14. For the Tasks that you are involved in, what evidence or kind of performance indicator would best demonstrate, in your view, the successful achievement of the Strategic Target and the Expected Outcomes? Please explain why.

15. Would you say that this view is broadly shared by Task participants or are there differences in opinion? Please explain why.

16. If indicators or other methods have been developed, in your view, have these tools been useful?
   a. Yes
   b. No

If indicators or other methods have not been developed, in your view, would indicators or other assessment tools have been useful?
   a. Yes
   b. No

Please explain why.

17. For the Tasks that you are involved in, and to the best of your knowledge, are there particular areas where adequate progress has not been achieved?
   a. Yes
   b. No

Please explain why.

18. For the Tasks that you are involved in, and to the best of your knowledge, are there particular areas where progress has exceeded expectations?
   a. Yes
   b. No

Please explain why.

19. What challenges have arisen during implementation of Tasks/Components you are involved in and how have these been addressed?

20. Based on your experience, what are the three most important accomplishments of GEOSS implementation in Tasks/Components you are involved to date?

21. In your view, would these accomplishments have occurred in the absence of GEO? If yes, would they have occurred as quickly or to the same extent? Please explain why.
22. What would in your opinion be the most important value-adding contribution of GEOSS?
23. And is this value-adding contribution being achieved?
   a. Yes
   b. No

Please explain why

24. What has been your interface/communication with infrastructure communities?

25. Have there been any unintended positive effects of GEO’s involvement in your task or SBA to date?
   a. Yes
   b. No
   Please explain why

26. Have there been any unintended negative effects of GEO’s involvement your task or SBA to date?
   a. Yes
   b. No
   Please explain why

27. Were there any particular lessons learned during implementation of DEH, either good practices that might be expanded or things that others should avoid, that you could share with us?
   a. Yes
   b. No
   Please explain why.
APPENDIX 2

REPORT TRANSMITTAL LETTER FROM THE M&E WORKING GROUP CHAIR TO
THE EXECUTIVE COMMITTEE
Dear Members of the Executive Committee:

The Monitoring and Evaluation Working Group (M&E WG) is pleased to provide you with the final report of the 4th Evaluation of GEOSS Implementation, specifically, on progress towards the Strategic Targets for Disasters, Energy and Health. The report also addresses aspects of user Engagement, Capacity Building and Science and Technology as they pertain to these Strategic Targets. This is the second of three evaluations focusing on progress toward the Societal Benefit Area Targets.

As with previous evaluations, the M&E WG reviewed the process by which the Evaluation Team independently conducted the evaluation and we believe that the approach taken by the Evaluation Team is consistent with the requirements of the Monitoring and Evaluation Framework Document and the Evaluation Plan.

The completion of the 4th Evaluation offers an opportunity to reflect on the findings of the four evaluations collectively, especially given the broader context of thinking about the post-2015 period. The observations below thus focus on matters, which, while appearing as findings of the 4th evaluation are also common to previous evaluations as well.

1. It is difficult to identify clear standards against which to evaluate progress.
   - The wording of the Strategic Targets is very broad which means that each evaluation and progress assessment must define for themselves what it would mean to achieve the Strategic Target. This introduces considerable variability and uncertainty in the meaning of the assessments.
   - The Outcomes associated with the Strategic Targets (the “to be demonstrated by...” bullets) are better, but their quality is uneven, many are not true outcomes, and many are also not very specific.
   - The Component Sheets are an essential source of information to support management and evaluation, but some are incomplete and the quality of the information is uneven. Information on activities, outputs and milestones is often insufficient to permit assessment of whether actual performance is in keeping with expectations.
   - Evaluations have tended to interpret the expected performance generously; that is to accept the views of the Task leaders unless there is clear evidence of inconsistency or gaps. This standard, however, may not fully represent the expectations of external stakeholders and so the extent of progress may be overstated.
   - Looking to post-2015, it would be desirable, in our view, that the Strategic Targets (or their replacements) include more specific and measurable expectations of expected achievements. Doing so would not only serve to provide Members and users with clearer information on the level of new functionality which would be provided, but would also serve as a basis for building a common understanding among task participants of the objectives to which they are contributing.

2. Gaps between the actions necessary to achieve the Strategic Targets and the activities actually implemented are not managed as effectively as they should be.
   - As a voluntary initiative involving many organizations, the evaluation expectations for the level of control over the commitment of resources are less stringent than would be expected for a single organization with a legal mandate and budgetary allocation.
   - Two kinds of gaps are visible across evaluations: (a) gaps between the actions that are required and the activities and resources identified by Members and Participating Organizations in the Work Plan, and (b) gaps between the activities and resources
identified in the Work Plan and those which are actually realized in the form and to the extent originally envisaged.

- In the GEO context, it must be accepted that Member and P.O. priorities and available resources may be subject to change from time to time and that this may impact the Work Plan. Nevertheless, it is essential even in this context that GEO understand what resources will be made available for the achievement of its objectives. This is necessary to allow for alignment of performance expectations to resources as well as to identify resource gaps that might be addressed during mobilization efforts.

- GEO should look for ways to address the status of resource commitments and gaps more explicitly in its planning so that these gaps are better understood within the GEO community and thereby become more likely to be addressed. This need not take the form of a comprehensive gap analysis; a less intensive, but more frequent assessment by Component Leads, Task Coordinators and Implementation Boards is likely preferable for this purpose. While there is evidence that this is starting to occur, it is not yet systematic nor is it applied consistently across Tasks.

3. The user perspective still does not emerge clearly in GEO plans or evaluations.

- The identification of users is often incomplete or not specific. Broad user definitions make it difficult to develop concrete user engagement strategies.

- Evaluation teams have found it difficult to identify users for interviews; most names put forward as potential interviewees are GEO Task participants. This suggests that many Tasks do not have strong processes of user engagement in place.

- Response rates to surveys of users, based on lists of users generated from GEO sources, remain low. Users that do respond often have little knowledge of GEO and their perception of GEO services is mixed, though tending to be less positive than that of GEO insiders.

- Added to this is a strong regional geographic bias (toward Europe and North America) in the evaluation data collection. The combined effect is that much of the information on which we can assess progress is based on the perspectives of European and North American task participants, rather than broadly-based.

- We suggest that, as a first step, GEO consider developing a taxonomy of users that may be applied across Tasks and included in the Component Sheets to facilitate identification of users. This will support further analysis of users and strategy development within the User Engagement Task.

We recommend that the Executive Committee, with support from the GEO Secretariat, prepare a Management Response to the Report of the 4th Evaluation. Such a response should indicate whether the Executive Committee agrees, partially agrees, or disagrees with each of the Key Findings and Recommendations, along with any corrective actions being undertaken.

As directed by the GEO-VIII Plenary, the next evaluation will address progress toward the Strategic Targets for Weather, Water and Climate. The call for nominations to the 5th Evaluation Team was issued on 21 June 2013 and work is expected to commence in October 2013. The results will be provided to Executive Committee at its July 2014 meeting.

Based on the recommendation of the 4th Evaluation Team, we also wish to propose that the Final Evaluation of the 2005-2015 GEOSS Implementation Plan commence in May 2014. This will provide additional time to complete the evaluation but will not overlap with the 5th evaluation so that it will be possible for some Evaluation Team members to participate in both the 5th and the
Final Evaluations. Accordingly, it will be necessary to issue the call for nominations to the Final Evaluation Team early in 2014.

Finally, we wish to highlight that a key factor for a successful evaluation remains GEO’s ability to recruit an adequately resourced Evaluation Team. Experience has shown that the ideal composition of the Evaluation Team includes two professional evaluators and two subject matter experts for each of the Societal Benefit Areas being evaluated. While much of the data collection and team coordination can and is performed via teleconference, email and other technologies, face-to-face meetings remain essential to completing the report. Organizations nominating Evaluation Team members should expect to support travel to three meetings during the evaluation period. Additional support should also be available to permit participation of Evaluation Team members from less developed countries, which has been weak in the evaluations to date.

Sincerely,

Craig F. Larlee  
Co-Chair (Canada)

John Adamec  
Co-Chair (United States)
APPENDIX 3

EXECUTIVE COMMITTEE RESPONSE TO THE REPORT OF THE THIRD EVALUATION OF GEOSS IMPLEMENTATION
EXECUTIVE COMMITTEE RESPONSE TO THE 4TH GEOSS EVALUATION REPORT

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| The Disasters and Energy SBAs will not achieve their strategic targets unless new tasks/components are added. | **Recommendation 1:** Implement activities related to  
- Landslides to the Disasters SBA  
- Increasing the abilities to detect small forest fires, also in overcast conditions for the Disasters SBA  
- Energy sources other than wind, solar and bio for the Energy SBA  
- Prediction of potential hazards to energy infrastructure for the Energy SBA | The Executive Committee recommends that the Secretariat makes a quick assessment, together with relevant CoPs and task team on the suitability of implementing the recommendation two years before the end of the 2005-2015 period, in time to report to GEO-X  
The Executive Committee also recommends that this should be taken in full account when defining the GEO 2025 Implementation Plan |
| Within the Health SBA a few Task Components are not described in task sheets. | **Recommendation 2:** Complete task sheets for Components to clarify implementation. | The Executive Committee fully concurs with the recommendation and directs the Secretariat to work with Task Components lead to fill in the task sheets. |
| Cross-SBA cooperation is unsatisfactory and must be improved. Tasks and Components consist of activities initiated and funded by sources external to GEO. Coordination of tasks within the SBAs is hardly visible. | **Recommendation 3:**  
a. The GEO Societal Benefits Implementation Board take stronger action to secure cross-task and cross-SBA interaction, cooperation, and utilization of data and information. This could be accomplished by putting the responsibility for coordination on individual members.  
b. The GEO Societal Benefits Implementation Board should implement the equivalent of GEOBON under existing international frameworks or agencies. | a. The Executive Committee fully concurs with the recommendation and recalls that it is full in line with the Implementation Boards terms of reference and that this is particularly critical for the Societal Benefits Implementation Board. The Board should be asked to identify means and ways to ensure this essential function and to report at the first Executive Committee after the GEO-X Plenary.  
b. The Executive Committee thinks that this recommendation should be for Members and PO’s contributing to a certain initiative and asks them to take this into account for existing and new initiatives/tasks. The GEO Societal Benefits Implementation Board is asked to provide advice on best-suited existing framework for coordination of similar |
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<td>Data must be made more accessible over the GEO Portal. Today it is difficult and time consuming to locate data and information. There is not a clear understanding of the difference between the GEO Portal and the GCI.</td>
<td><strong>Recommendation 4:</strong> GEOSS should develop manuals on use of the next version of the GEO Portal, including examples of cases. Webinars and workshops could support the introduction of the updated GEO Portal.</td>
<td>The Executive Committee fully concurs with the recommendation and recognizes the need of further efforts to improve the functionalities of the GEOSS Common Infrastructure (GCI), to provide a clear identity to the GEO Portal with respect to the GEO website and to provide a much better and user friendly information on GCI use. The Executive Committee thinks that this recommendation is taken into account by the on-going GCI revision (pending its results) and that the specific recommendation on manuals, ..etc should be forwarded to the GCI team for their consideration.</td>
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<td>Users response was too low to judge if they are sufficiently involved and their needs are taken properly care of. Participants and Users perceive that networking and synergy will be the main value-adding elements.</td>
<td><strong>Recommendation 5:</strong> GEO/GEOSS should make stronger efforts to identify and involve active users in the Communities of Practice and organize more dedicated workshops in cooperation with user organizations and associations like the IEA and WHO. Task leaders should be more specific in describing users and user engagement in the task sheets and develop performance indicators that reflect user needs and value-creation to users.</td>
<td>The Executive Committee notes that this critical issue is well addressed in the approach for the GEO post 2015, calling for strengthening and broadening the GEO (user) community. For the completion of the current phase, the Executive Committee recommends that the Secretariat to work with Task Components leadership to ensure user involvement and to describe it clearly and that the Institutions Implementation and the Societal Benefits Implementation Boards work together to identify and organize dedicated events to foster user engagement.</td>
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<td>Although not a direct outcome of the evaluation of the Disasters, Energy and Health SBAs, these Recommendations are offered by the Evaluation Team.</td>
<td><strong>Recommendation 6: Final Evaluation Planning</strong>&lt;br&gt;The planning of the final evaluation should start immediately. The Evaluation Team should be recruited as soon as possible and the possibilities to financially support the Team should be identified. The Team should include members from all continents. External competence will</td>
<td>The Executive Committee takes note of the recommendation and proposes that the M&amp;E Working Group provides its assessment in time to activate an early start, if deemed necessary.</td>
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<td>Key Finding</td>
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<td>be needed.</td>
<td><strong>Recommendation 7: Performance Indicators for Tasks</strong>&lt;br&gt;Well in advance of the start of the final evaluation, the tasks should be presented with clear performance indicators that derive from the logic model. Task leaders should be told that part of the evaluation will be measuring the outcomes against these indicators.</td>
<td>In response to a recommendation from the first evaluation, the Executive Committee “… would not recommend that GEO align itself to a specific model and would rather not make reference to any, including the logic model.” Since then the information contained in the task sheets has been greatly improved to contain outputs connected to timelines. Rather than go for indicators for the conclusion of the 2005-2015 period, the Executive Committee recommends to use the current approach to assess task progress. Nevertheless the Executive Committee proposes that the M&amp;E Working Group identifies a few key indicators (up to five) to be used for the final evaluation and to be tracked throughout the evolution of GEOSS. For post 2015, the Executive Committee recommends to take the recommendation fully into account.</td>
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<td><strong>Recommendation 8: Revised Strategic Targets and Outcomes</strong>&lt;br&gt;The post-2015 process should include revisiting the Strategic Targets and Outcomes with the aim to reduce the number of Strategic Targets and Outcomes, make them less ambiguous, more measurable, and potentially achievable.</td>
<td>The Executive Committee fully concurs with the recommendation and will make sure that it will be taken into account when shaping GEO 2025, in particular for targets to be more focused and measurable.</td>
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