



GROUP ON
EARTH OBSERVATIONS

GEO-VII

3-4 November 2010

Mid-Term Evaluation of GEOSS Implementation

Document 6(Rév1)

As accepted at GEO-VII.

Mid-Term Evaluation of GEOSS Implementation

The Plenary is requested to take note of the Report of the Mid-term Evaluation of GEOSS Implementation (Enclosure 1) and endorse the managerial response to the Report prepared by the Executive Committee (Enclosure 3).

The two documents are also being distributed to the Ministers attending the GEO Summit in Beijing, in response to the request made in the Cape Town Declaration

1 INTRODUCTION AND BACKGROUND

At GEO-VI, the Plenary approved the approach to GEOSS monitoring and evaluation that was presented by the Monitoring and Evaluation Working Group (M&E WG), by endorsing the relevant documents developed by the M&E WG.

The overall approach to GEOSS Monitoring and Evaluation is contained in the “GEOSS Monitoring and Evaluation framework Document”, and constitutes the reference for the definition of the objectives and plans for the subsequent evaluations starting with the “mid-term assessment” in 2010 and continuing until the final assessment in 2015. For each of these subsequent evaluations a dedicated Evaluation Team will be appointed, with the responsibility of conducting the evaluation and producing the corresponding report.

The objectives, guidelines and the associated planning to perform the first evaluation are contained in the “GEOSS Summary Plan for the First Evaluation”, to take place in 2010 and to support the above mentioned “mid-term assessment”, requested in the Ministerial Declaration of the Cape Town Earth Observation Summit.

The Evaluation Team members were suggested at GEO-VI Plenary and confirmed shortly after by the relevant GEO principals.

2 MID-TERM EVALUATION OF GEOSS IMPLEMENTATION

The Evaluation Team developed the detailed evaluation plan for the midterm assessment in 2010 and, in accordance with the approved M&E Framework, the plan was reviewed and approved by the M&E Working Group in mid February 2010.

The Plan consists of a main document and four annexes addressing respectively the question framework, the interview guide, the survey description and the survey form.

The Evaluation Team then proceeded in implementing the Plan and, in accordance to the agreed timeline, issued the final evaluation report on June 23rd. 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 second 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, in its meeting from 7 to 9 June, reviewed the report and wrote the formal transmittal letter to the Executive Committee.

Enclosure 1) contains the Report of the Mid-term Evaluation of GEOSS Implementation, Enclosure 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 MID-TERM EVALUATION OF GEOSS IMPLEMENTATION

The Report of the Midterm evaluation of GEOSS implementation was presented to the Executive Committee at its 19th meeting in July and thoroughly discussed. It is 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, (Enclosure 3).

ENCLOSURES

1. Report of the Mid-term Evaluation of GEOSS Implementation;
2. Report Transmittal Letter from the M&E Working Group co-chairs to the Executive Committee;
3. Executive Committee response to the Report of the Mid-term Evaluation of GEOSS Implementation.

ENCLOSURE 1

REPORT OF THE MID-TERM EVALUATION OF GEOS IMPLEMENTATION

(pdf document attached)

ENCLOSURE 2

REPORT TRANSMITTAL LETTER FROM THE M&E WORKING GROUP CO-CHAIRS TO THE EXECUTIVE COMMITTEE

Dear Members of the Executive Committee:

The Monitoring and Evaluation Working Group is pleased to forward to you the Midterm Evaluation of GEOSS Implementation.

At Bucharest in November 2008, the GEO-V Plenary agreed to conduct the midterm evaluation¹ of GEOSS implementation and to establish the Monitoring and Evaluation (M&E) Working Group. The Plenary tasked the Executive Committee with defining the Terms of Reference for the M&E Working Group and supervising its activity. In March 2009, the M&E Working Group, composed of personnel nominated by GEO Members and Participating Organizations, held its first meeting. In June 2009, the Executive Committee approved the Terms of Reference for the Working Group. The Working Group's M&E Framework Document and Summary Plan for the First Evaluation were approved by the Executive Committee in September 2009 and subsequently accepted by the GEO-VI Plenary in Washington, D.C. in November 2009. In January 2010, the Evaluation Team, composed of personnel nominated by Members and Participating Organizations, was constituted and began the evaluation. The Working Group approved the GEOSS Midterm Evaluation Detailed Plan, and from that point onward, the Evaluation Team conducted the evaluation independently.

The M&E Working Group wishes to call the Executive Committee's attention to several aspects of the attached Report:

The Working Group reviewed the process by which the Evaluation Team conducted its evaluation and prepared its report. The Working Group has concluded that the Team carefully followed the Summary Plan for the First Evaluation, as accepted by the Plenary, and the GEOSS Midterm Evaluation Detailed Plan, as approved by the Working Group. The Working Group believes that the approach taken by the Evaluation Team is consistent with what the Executive Committee expected from the midterm evaluation.

The report is broad in scope, and was prepared in a short period of time, so it does not address individual Work Plan Tasks or Strategic Targets in depth. Detailed review of the Work Plan Tasks and Strategic Targets is scheduled for future evaluations. The Working Group and GEO Secretariat are developing changes to the progress reporting to allow better monitoring of the Work Plan Tasks and assess the status of Strategic Targets.

The Working Group takes great pleasure in noting the overall finding of the Evaluation Team that "GEOSS represents an important new Earth observation community and network and has raised the visibility of the importance and need for integrated global Earth observations", and that "GEOSS implementation sufficiently reflects high-level Ministerial priorities including those contained in the Cape Town Declaration."

The Evaluation Team also found that several aspects of GEOSS implementation could be improved. Findings of problem areas and recommendations for management action should be taken in a spirit of collaborative effort toward a set of common goals. The Working Group believes that a vibrant and

¹ The terms "First Evaluation" and "Midterm Evaluation" refer to the same process.

successful GEOSS depends upon an ongoing process of identifying problems and taking management actions.

The Working Group recommends that the Executive Committee, with support from the GEO Secretariat, prepare a Response to the Report. 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 management actions being undertaken.

The M&E Framework Document approved by the Executive Committee and the GEO-VI Plenary calls for the next four evaluations (2011-2014) to focus on specific Strategic Targets, with a final evaluation in 2015 to address GEOSS as a whole. The Working Group continues to believe that this is a good approach to the evaluation process.

However, in recent weeks, members of the Planning Task Force for the Beijing Summit have suggested that Ministers should make an assessment of the future of GEOSS in 2013. The M&E Working Group recommends that we continue with our schedule of activities and those evaluations completed by 2013 will be input to the Ministers' assessment.

Regards,



Craig F. Larlee, Co-chair (Canada)



Charles S. Baker, Co-chair (USA)

ENCLOSURE 3

EXECUTIVE COMMITTEE RESPONSE TO THE GEOSS MID-TERM EVALUATION REPORT

BACKGROUND

The GEOSS Ten Year Implementation plan recognizes as one of its functional components the monitoring of performance against defined requirements and intended benefits. It also calls on the Group on Earth Observations (GEO) to develop performance indicators for GEOSS. The Ministerial resolution of the Third Earth Observation Summit in Brussels, Belgium and the Ministerial declaration of the Fourth Earth Observation Summit in Cape Town, South Africa, pronounced the ministers' commitment to conducting a midterm (by 2010) assessment of the progress of the GEOSS implementation and to provide further guidance on its implementation.

The commitment of GEO to conduct a midterm assessment of GEOSS Implementation was formalized by the GEO V Plenary held in 2008 in Bucharest, Romania. At this meeting, the main body of GEO principals representing GEO Member States and Participating Organizations, decided to establish a GEOSS Monitoring and Evaluation Working Group (M&E WG) and task this group with putting in place a framework for monitoring and evaluating the implementation of GEOSS. At GEO-VI in Washington, the United States of America, Plenary approved the approach to GEOSS monitoring and evaluation that was presented by the Monitoring and Evaluation Working Group (M&E WG), by endorsing the relevant documents developed by the M&E WG and agreeing that the WG proceed with the appointment of evaluators.

The Evaluation Team was appointed in early 2010 and immediately started work by developing a detailed evaluation plan for the midterm assessment and, in accordance with the approved M&E Framework, the plan was reviewed and approved by the M&E Working Group in mid February 2010. The team finalised its evaluation work in June 2010 and presented its findings and recommendations to the 19th meeting of the Executive Committee.

In accordance with the procedure approved by GEO-VI, the Executive Committee is required to prepare a managerial response to the Report that will be submitted, together with the Report itself, to the Ministers attending the GEO Summit in Beijing. This document therefore provides the Executive Committee managerial response to the recommendations and results from discussions that took place at the 19th executive committee meeting in July 2010.

Key Findings of Mid-term Evaluation

1. GEOSS represents an important new Earth observation community and network. GEOSS has raised visibility of the importance and need for integrated global Earth observations.
2. Current GEOSS implementation sufficiently reflects high-level ministerial priorities including those contained in the Cape Town Declaration.
3. Stakeholders are generally positive about the foundation that has been established and optimistic that appropriate outcomes are being realized.

4. GEOSS implementation has brought together various organizations and governments to collaborate and support integrated global Earth observations.
5. GEOSS implementation has created a path to enable full and open data sharing and lowered discussion barriers.
6. GEOSS implementation has resulted in positive outcomes for the Earth observation community, such as Data Sharing Principles.
7. GEO has not adequately communicated evidence of progress to show value-added results unique to the implementation of GEOSS and to unequivocally prove a positive return on investment.
8. Survey respondents had an overall “neutral” feeling towards the status of GEOSS development and implementation at this point.
9. Stakeholders perceive that architecture developed by GEO does not yet meet their needs for data, information, and tools.
10. Stakeholders are concerned about the sustainability of GEOSS with regard to:
 - (a) the voluntary nature of GEOSS implementation which has been beneficial up to this point for engaging partners; and
 - (b) the lack of sufficient resources, both financial and human to sustain efforts into the future.
11. Stakeholders indicated widely varying expectations for GEO and GEOSS, particularly as a source of new funding or a competing operational entity.
12. Some stakeholders view current GEO practices as co-opting achievements of contributors and giving them limited or no acknowledgement or credit.
13. GEO has not conducted a comprehensive gap analysis of either their implementation approach (structural) or observation needs (observational).
14. The GEOSS implementation approach does not explicitly describe an end-to-end process of how the application of resources supports the overall vision and goals of GEOSS, how or why benefits are expected, or when benefits will be achieved. Without this, it may be difficult for stakeholders to make well-informed decisions about supporting GEOSS.

Recommendations from Mid Term Evaluation and Executive Committee Managerial Response are contained in the following tables

RECOMMENDATIONS	EVALUATORS COMMENTS	EXECUTIVE COMMITTEE RESPONSE
Recommendation 1: GEO should develop a long-term Strategy to ensure the sustainability of GEOSS beyond 2015.	One of the key priorities for GEOSS in the Cape Town Declaration was to ensure the sustainability of Earth observing capabilities. In order to be effective in this role, GEOSS itself must be sustained. The framework for GEOSS must enable the continued development and long-term operation of the Earth observation system of systems. As such, thought to GEOSS beyond 2015 should occur now. Consideration may be given to constraining the future scope of GEO Work Plan and focusing on the achievement of substantive outcomes.	The Executive Committee is of the view that Recommendations 1, 2, & 7 address related issues. Improving an understanding of the needs of user communities and focusing GEOSS on addressing identified gaps enables the development of a long term sustainability strategy and resource commitments. The issue of sustainability was raised through the Cape Town Ministerial Declaration in which it is stated that: <i>“We commit to explore ways and means for the sustained operations of the shared architectural GEOSS components and related information infrastructure”</i> This charge to GEO should now be broadened to look beyond a 2015 GEO. The Executive Committee suggests that it should, with the guidance of the Summit, develop a discussion paper on options for a long-term strategy to ensure the sustainability of GEOSS beyond 2015. This discussion paper will be presented to GEO-VIII, with the objective of a report and recommendations to Ministers in 2013.
Recommendation 2: GEO must investigate alternative models for sustained resource commitments from Members and Participating Organizations which are necessary for current and future operations.	The evaluation found that both the voluntary nature of GEOSS and the inadequate and discontinuous funding are key factors that may ultimately limit the sustainability of GEOSS. In addition, it was found that a major problem with the sustainability of GEOSS appears to be the lack of sufficient resources, both financial and human. While much of the current progress to date can be attributed to the voluntary and non-binding nature of the GEOSS initiative, the evaluation found that leadership and commitment are needed to deliver GEOSS fully (including support to the Secretariat). As such, it may be time for GEO to investigate alternative models for sustained resource commitments to ensure a framework capable of providing effective incentives for translating “voluntary acceptance” into a priority “commitment to action.”	Note the Executive Committee response for recommendation 1. The Executive Committee acknowledges that the current model has at times put the GEO Trust Fund budget under strain and has, as a result, investigated various options including introducing a minimum participation or fee of association, as well as a GDP related subscription fee. While there is still room for further investigation, it was noted that the voluntary nature of GEO has been one of its primary selling points. For example, the severe impacts of Earth Observation related disasters are mostly experienced by poor regions and whilst GEO continues to work towards facilitating and enhancing the membership of such countries within GEO, this process could be jeopardised if a “membership fee” were introduced for all GEO Members, including those from the poorer regions.

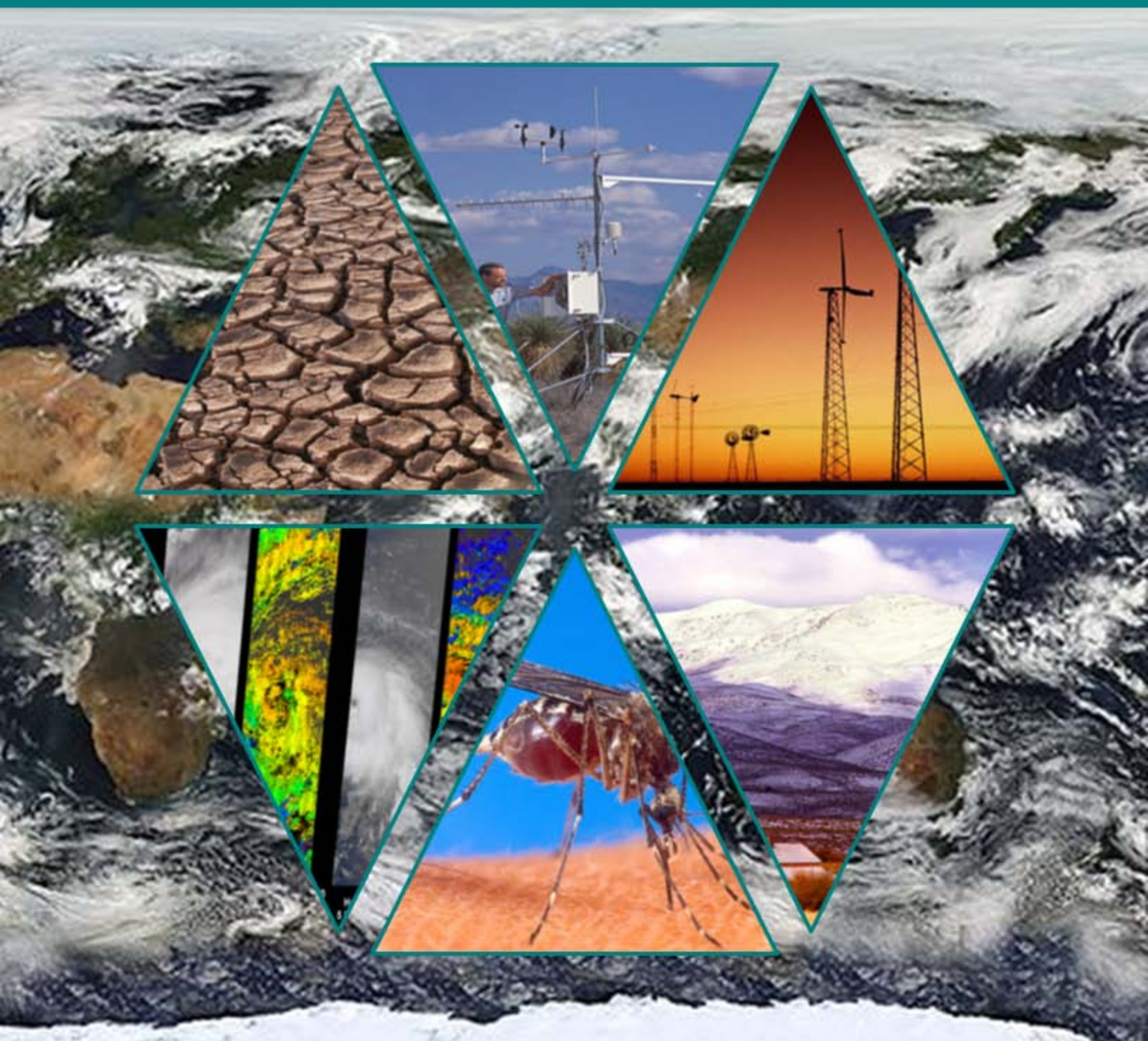
RECOMMENDATIONS	EVALUATORS COMMENTS	EXECUTIVE COMMITTEE RESPONSE
Recommendation 3: GEOSS implementation in the short-term should be guided by an explicit approach linking activities and outputs of the GEO Work Plan to measurable, achievable objectives and strategic targets. This can be accomplished through adopting a logic model and performance measurement strategy.	While it was found that the GEOSS Work Plan overarching tasks correspond to Strategic Target outcomes, without a recognized logic model, the current approach to building GEOSS is not transparent in how activities connect to Strategic Targets and the vision of GEOSS. Without a clearly defined and linked approach, it is difficult for participants at all levels to see how activities are contributing to progress of GEOSS implementation.	The strategic target document is already in place and provides the means to clearly link Work Plan tasks with strategic targets and outcomes. ... The strategic targets were developed after the current 2009-2011 work plan was adopted. As the 2012 – 2015 Work Plan evolves, linkages between work plan tasks and strategic targets will be made evident. Notwithstanding the voluntary nature of contributions to GEO, an effort must be made to align contributions to strategic targets, in particular identifying those that are required as a priority. The Executive Committee also notes that the M&E Working Group has made use of the strategic targets as benchmark in its assessment. The Executive Committee however, would not recommend that GEO align itself to a specific model and would rather not make reference to any, including the logic model.
Recommendation 4: GEO should clarify its role as a supporting and enabling platform by facilitating and providing value through coordination among existing Earth observation systems and developing an information networks system.	The Evaluation Team discovered confusion about the role that GEO and GEOSS play in the Earth observations community. Comments from key informants, survey respondents, and even certain published literature reflect unfulfilled expectations rather than new unexpected developments arising because of GEOSS. The Evaluation Team believes that GEO would benefit from positioning itself as a supporting and enabling platform. GEO should work to facilitate the exchange of best practices and successful concepts between sectors of the Earth observation community in the anticipation that new partnerships will develop, rather than become a producer or broker of information.	The Executive Committee is of the view that the role of GEO has been clearly communicated through the 10-Year Implementation Plan, adopted by Governments and Participating Organisations, and various Ministerial declarations. Advances in international data sharing and initiatives such as GEOBON demonstrates how GEO continues to add value in coordinating existing EO systems. Nonetheless, it is also true that improving communication is always beneficial to GEO and still needs to be done to raise awareness of what GEO is and how it engages other organisations. To address latter concern, the Executive Committee will work with the Secretariat to continue to improve the communication strategy of GEO emphasising that GEOSS will be a supporting and enabling platform for data and information.
Recommendation 5: GEO must improve its efforts in communication and outreach through: a) clarifying their purpose to the stakeholder community; b) enhancing clarity and traceability of GEO processes; c) providing evidence of value-added results through GEOSS, and; d) d) engaging a wider audience beyond those directly involved in GEOSS implementation.	Greater effort is needed to reach a common understanding about GEOSS. Survey respondents expressed that one facet of GEOSS implementation that can use much improvement is the marketing and awareness of GEOSS. They would like to see improved communication and information sharing with the wider policy and end-user communities, especially about the purpose and added value of GEOSS, and also to define what GEOSS' unique contribution is to the Earth observation community. Finally, better advertisement of successful tasks (i.e. data sharing, GEONETCast), with identifiable impacts, might stimulate activity in other areas and aid in gaining further buy-in from Members and Participating Organizations.	The Executive Committee concurs with the recommendation.

RECOMMENDATIONS	EVALUATORS COMMENTS	EXECUTIVE COMMITTEE RESPONSE
Recommendation 6: GEO should act to improve its understanding, engagement, and responsiveness to the user community by: e) a) undertaking a detailed characterization of its current users in order to strengthen and expand the user base; and, f) b) increasing opportunities for dialogue with the user community to provide helpful feedback on a timely basis.	The evaluation found that there needs to be more effort to incorporate the user component, as key informants felt that there were inconsistencies between what the users need and what the architecture provides. The inclusion of users in GEOSS development is an extremely important factor for fostering stakeholder buy-in and long-term success.	Executive Committee fully concurs with the recommendation and believes that effective user engagement is key to ensuring long term sustainability. This particular issue is addressed through the strategic target 5 “<i>Ensure critical user information needs for decision making are recognized and met through Earth observations.</i>” The user-interface committee (UIC) of GEO is taking the lead in driving user community engagement initiatives and the Executive Committee will, in executing its oversight responsibility, ensure that the UIC delivers effectively on this mandate.
Recommendation 7: GEO should conduct comprehensive observational and structural gap analyses as anticipated in the 10-Year Implementation Plan and Strategic Targets document.	The identification of gaps in the implementation framework will enable the GEO community to effectively and strategically organize its activities to ensure that the set targets are achieved. There is a clear indication from respondents that a process to identify gaps in GEOSS implementation is not documented or widely known. The Evaluation Team believes there are clear benefits to be gained from a common approach to gap analysis of GEOSS.	Note the Executive Committee’s response for recommendation 1. Executive Committee acknowledges the importance of gap analyses and coordinated addressing of targets. It does however caution that a comprehensive gap analyses is resource intensive and requires sufficient planning. During its 19th meeting, the Executive Committee therefore established Action 19.11 “<i>The STC, the M&E WG, the Secretariat, and other interested members of the GEO Community to draft an initial outline of a process that can eventually lead to a coherent overall mechanism being put in place for required GEO/GEOSS gap analyses</i>”.
Recommendation 8: GEO should establish clear and consistent mechanisms for properly attributing contributions to eliminate the appearance of co-opting activities.	The evaluation found that there is a perception by key informants and survey respondents that GEO is co-opting achievements of contributors and giving limited or no acknowledgement or credit to Members and Participating Organizations. At this point in implementation, acknowledgement might be one of contributors’ only immediate returns for integrating their systems into GEOSS.	The Executive Committee notes the importance of acknowledging the source of contributions to GEO and the GEOSS, including data providers IPR / copyright attributions. The Executive Committee will work with the Secretariat to provide visible public recognition to the organisations and entities making significant contributions to the advancement of GEOSS.

Enclosure

GEOSS Mid-Term Evaluation Report

Midterm Evaluation of GEOSS Implementation

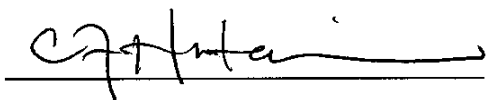




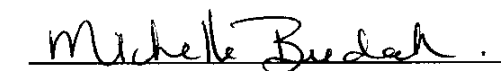
The GEOSS Midterm Evaluation was performed under a very aggressive schedule in order to be available for the meeting of the GEO Executive Committee prior to the Beijing 2010 Ministerial Summit. The Evaluation Team and the GEO Secretariat responded with grace and dedication to meet these demands, and the report that follows is testimony to their efforts.

The evaluation takes place midway in GEOSS implementation and is a necessary reference point that will (a) allow “mid-course” adjustments to be made, and (b) provide a reference point for future evaluations that will help ensure that this critical effort stays on-target. I feel this report will meet both those needs.

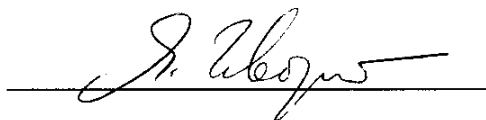
Sincerely,



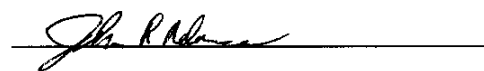
Charles Hutchinson (ISPRS)



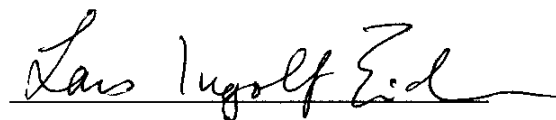
Michelle Budak (Canada)



Yana Gevorgyan (USA)



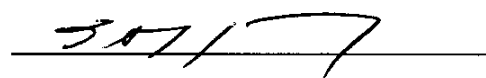
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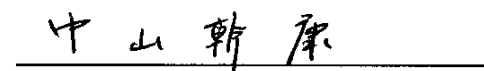
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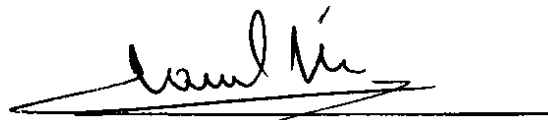
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Acknowledgements

The Evaluation Team thanks the GEOSS Monitoring and Evaluation Working Group, especially its co-chairs Craig Larlee (Canada) and Charles Baker (USA), for their support and direction; GEO Secretariat for hosting us during our meetings in Geneva; Giovanni Rum and Hendrik Baeyens of the GEO Secretariat for providing us administrative and technical support; GEO Secretariat Staff and Committees for their expertise

and assistance with collecting stakeholder feedback; GEO Community for providing insight into the complexity of this undertaking; our sponsoring agencies and organizations for allowing us to participate in and complete the evaluation; and the National Oceanic and Atmospheric Administration for hosting our final meeting in the United States.

Acronyms

CEOS:

Committee on Earth Observation Satellites

CoP:

Community of Practice

EU:

European Union

FP7:

Framework Program 7

GCI:

GEOSS Common Infrastructure

GCOS:

Global Climate Observing System

GEO:

Group on Earth Observations

GEO BON:

Group on Earth Observations Biodiversity Observation Network

GEOSS:

Global Earth Observation System of Systems

ICSU:

International Council for Science

IOC:

International Oceanographic Commission

M&E WG:

Monitoring and Evaluation Working Group

SBA:

Societal Benefit Area

UIC:

User Interface Committee

UNEP:

United Nations Environment Program

WMO:

World Meteorological Organization





Executive Summary

Introduction

The ministerial declaration of the First Ministerial Summit of The Group on Earth Observations (GEO) in Cape Town, South Africa called for a midterm evaluation of the implementation progress of the Global Earth Observation System of Systems (GEOSS). To complete the task, an Evaluation Team (hereafter called the Team) comprised of members from around the globe was assembled in January 2010. The Team has drawn data from a variety of key sources including GEO documents, opinions from the Earth observation community through interviews and surveys, and case studies of a selection of individual tasks from the GEO Work Plan.

The findings and recommendations of the midterm evaluation may be used to inform decision making, planning and reporting processes, or other aspects of the implementation of GEOSS. In addition, the evaluation may serve to increase awareness of the GEOSS initiative.

Methodology

During this midterm evaluation, the Team drew data from various key data sources. The analysis used data from GEO documents, the Earth observation community, and from interviews, surveys, and case studies conducted by the Team.

The Team reviewed and compared various internal and external documents during the midterm evaluation. Documents consulted were the key GEO documents, including the Strategic Targets document, 10-Year Implementation Plan, GEO Work Plans and Task Sheets, GEO Work Plan Progress Reports, and GEO meeting reports; external (non-GEO) documents; external literature, including professional publications, journals, presentations, and statements that make

references to GEOSS and GEO, and opinions of the Earth observation community.

Data analysis methods included key informant interviews, web-accessible survey, case study analysis of select GEO Tasks, Work Plan Progress report analysis, overarching task to Strategic Target comparison, and review of literature.

In this report we refer to “key informants,” “survey respondents,” and “stakeholders.” It should be recognized that a) key informants refers to the individuals with active participation in GEO and thorough knowledge about its mission objectives and organizational processes who participated in personal interviews; b) survey respondents refers to various categories of individuals on the provider-user spectrum who provided input via web-accessible survey; and c) stakeholders refers to any combination of key informants, survey respondents and authors of the documents consulted during the evaluation.

Key Findings

1. GEOSS represents an important new Earth observation community and network. GEOSS has raised visibility of the importance and need for integrated global Earth observations.
2. Current GEOSS implementation sufficiently reflects high-level ministerial priorities including those contained in the Cape Town Declaration.
3. Stakeholders are generally positive about the foundation that has been established and optimistic that appropriate outcomes are being realized.
4. GEOSS implementation has brought together various organizations and governments to collaborate and support integrated global Earth observations.



5. GEOSS implementation has created a path to enable full and open data sharing and lowered discussion barriers.
6. GEOSS implementation has resulted in positive outcomes for the Earth observation community, such as Data Sharing Principles.
7. GEO has not adequately communicated evidence of progress to show value-added results unique to the implementation of GEOSS and to unequivocally prove a positive return on investment.
8. Survey respondents had an overall “neutral” feeling towards the status of GEOSS development and implementation at this point.
9. Stakeholders perceive that architecture developed by GEO does not yet meet their needs for data, information, and tools.
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Recommendations

RECOMMENDATIONS		
RECOMMENDATIONS	COMMENTS	SUPPORTING FINDINGS
Recommendation 1: GEO should develop a long-term strategy to ensure the sustainability of GEOSS beyond 2015.	One of the key priorities for GEOSS in the Cape Town Declaration was to ensure the sustainability of Earth observing capabilities. In order to be effective in this role, GEOSS itself must be sustained. The framework for GEOSS must enable the continued development and long-term operation of the Earth observation system of systems. As such, thought to GEOSS beyond 2015 should occur now. Consideration may be given to constraining the future scope of GEO Work Plan and focusing on the achievement of substantive outcomes.	▪ Key Finding #1, 2, 10 ▪ 3.4 Sustainability ▪ 4.5 Challenges Facing GEOSS Implementation ▪ 5.2 Need for Marketing



RECOMMENDATIONS	COMMENTS	SUPPORTING FINDINGS
Recommendation 2: GEO must investigate alternative models for sustained resource commitments from Members and Participating Organizations which are necessary for current and future operations.	The evaluation found that both the voluntary nature of GEOSS and the inadequate and discontinuous funding are key factors that may ultimately limit the sustainability of GEOSS. In addition, it was found that a major problem with the sustainability of GEOSS appears to be the lack of sufficient resources, both financial and human. While much of the current progress to date can be attributed to the voluntary and non-binding nature of the GEOSS initiative, the evaluation found that leadership and commitment are needed to deliver GEOSS fully (including support to the Secretariat). As such, it may be time for GEO to investigate alternative models for sustained resource commitments to ensure a framework capable of providing effective incentives for translating “voluntary acceptance” into a priority “commitment to action.”	▪ Key Finding #10 ▪ 3.4 Sustainability ▪ 4.5 Challenges Facing GEOSS Implementation
Recommendation 3: GEOSS implementation in the short-term should be guided by an explicit approach linking activities and outputs of the GEO Work Plan to measurable, achievable objectives and strategic targets. This can be accomplished through adopting a logic model and performance measurement strategy.	While it was found that the GEOSS Work Plan overarching tasks correspond to Strategic Target outcomes, without a recognized logic model, the current approach to building GEOSS is not transparent in how activities connect to Strategic Targets and the vision of GEOSS. Without a clearly defined and linked approach, it is difficult for participants at all levels to see how activities are contributing to progress of GEOSS implementation.	▪ Key Finding #14 ▪ 3.0 GEOSS Implementation Approach ▪ 3.2 Clearly Defined Implementation Approach



RECOMMENDATIONS	COMMENTS	SUPPORTING FINDINGS
Recommendation 4: GEO should clarify its role as a supporting and enabling platform by facilitating and providing value through coordination among existing Earth observation systems and developing an information networks system.	The Evaluation Team discovered confusion about the role that GEO and GEOSS play in the Earth observations community. Comments from key informants, survey respondents, and even certain published literature reflect unfulfilled expectations rather than new unexpected developments arising because of GEOSS. The Evaluation Team believes that GEO would benefit from positioning itself as a supporting and enabling platform. GEO should work to facilitate the exchange of best practices and successful concepts between sectors of the Earth observation community in the anticipation that new partnerships will develop, rather than become a producer or broker of information.	▪ Key Finding #7, 11, 12 ▪ 4.3 Task Activity Progress ▪ 5.1 Misconceptions about GEO/GEOSS ▪ 5.2 Need for Marketing
Recommendation 5: GEO must improve its efforts in communication and outreach through: a) clarifying their purpose to the stakeholder community; b) enhancing clarity and traceability of GEO processes; c) providing evidence of value-added results through GEOSS, and; d) engaging a wider audience beyond those directly involved in GEOSS implementation.	Greater effort is needed to reach a common understanding about GEOSS. Survey respondents expressed that one facet of GEOSS implementation that can use much improvement is the marketing and awareness of GEOSS. They would like to see improved communication and information sharing with the wider policy and end-user communities, especially about the purpose and added value of GEOSS, and also to define what GEOSS' unique contribution is to the Earth observation community. Finally, better advertisement of successful tasks (i.e. data sharing, GEONET-Cast), with identifiable impacts, might stimulate activity in other areas and aid in gaining further buy-in from Members and Participating Organizations.	▪ Key finding #7, 11 ▪ 5.2 Need for Marketing GEOSS



RECOMMENDATIONS	COMMENTS	SUPPORTING FINDINGS
Recommendation 6: GEO should act to improve its understanding, engagement, and responsiveness to the user community by: a) undertaking a detailed characterization of its current users in order to strengthen and expand the user base; and, b) increasing opportunities for dialogue with the user community to provide helpful feedback on a timely basis.	The evaluation found that there needs to be more effort to incorporate the user component, as key informants felt that there were inconsistencies between what the users need and what the architecture provides. The inclusion of users in GEOSS development is an extremely important factor for fostering stakeholder buy-in and long-term success.	▪ Key Finding #7, 8, 9 ▪ 3.4 Sustainability
Recommendation 7: GEO should conduct comprehensive observational and structural gap analyses as anticipated in the 10-Year Implementation Plan and Strategic Targets document.	Identification of gaps will enable the GEO community to effectively and strategically organize its activities to ensure that the set targets are achieved. The identification of gaps in the implementation framework will enable the GEO community to effectively and strategically organize its activities to ensure that the set targets are achieved. There is a clear indication from respondents that a process to identify gaps in GEOSS implementation is not documented or widely known. The Evaluation Team believes there are clear benefits to be gained from a common approach to gap analysis of GEOSS.	▪ Key Finding #9, 13 ▪ 3.3 Gap Identification
Recommendation 8: GEO should establish clear and consistent mechanisms for properly attributing contributions to eliminate the appearance of co-opting activities.	The evaluation found that there is a perception by key informants and survey respondents that GEO is co-opting achievements of contributors and giving limited or no acknowledgement or credit to Members and Participating Organizations. At this point in implementation, acknowledgement might be one of contributors' only immediate returns for integrating their systems into GEOSS.	▪ Key Finding #12 ▪ 5.1 Misconceptions about GEO/GEOSS





1. Evaluation Details

1.1 Introduction

The Group on Earth Observations (GEO) committed to conduct a midterm evaluation¹ of the implementation progress of the Global Earth Observation System of Systems (GEOSS) in order to provide guidance on its further implementation. Such an assessment was called for by the ministerial declaration of the First Ministerial Summit of GEO in Cape Town, South Africa. GEO's commitment was then formalized in 2008 by the GEO-V Plenary by establishing a GEOSS Monitoring and Evaluation Working Group (M&E WG). The M&E WG is tasked with coordination of monitoring and evaluation of GEOSS implementation. Subsequently, the M&E WG developed a Monitoring and Evaluation Framework and a Summary Evaluation Plan, and recruited an Evaluation Team (hereafter called the Team) to carry out the midterm (2010) evaluation process.

Recognizing the requirement to complete a midterm evaluation in time for the Second Ministerial Summit of GEO in November 2010, the midterm evaluation will be the first of several in a phased evaluation approach. The purpose of this midterm evaluation is to provide an objective assessment of the progress in the implementation of GEOSS and in the achievement of the expected benefits for the global community. The primary target audience for

the evaluation is the GEO Plenary and the Ministers of the GEO Members. The secondary audience is the GEO bodies responsible for implementing GEOSS and potential new partners for GEO. This evaluation should inform decisions by both of these audiences regarding the future direction of GEOSS implementation and may serve to broaden support for the GEO initiative.



Figure 1: 2007 Cape Town Ministerial Summit.
Source: GEO Secretariat

The midterm evaluation plan was developed by the Team on the basis of the Summary Evaluation Plan and in consultation with the M&E WG during the joint meeting of the M&E WG and the Team on January 20-22, 2010. The Team members are the sole authors of the evaluation report, which includes findings and recommendations to be explored by GEO stakeholders. In addition to the evaluation report, the Team has provided the M&E WG with recommendations to improve the evaluation process for future teams.

1.2 Objectives

The midterm evaluation has been designed to answer critical questions about progress in the implementation of GEOSS. The findings and recommendations of the midterm evaluation may be used to inform decisions concerning

¹ Midterm evaluation refers to an evaluation that occurs approximately mid-way through the program, in this case the GEOSS 10-year implementation (2005-2015), and examines program implementation and progress towards achieving the intended outcomes.



GEO governance, planning, and reporting processes, or other aspects of the implementation of GEOSS. The following objectives have been defined for the midterm evaluation of GEOSS implementation:

- Determine if the priorities stated in the Cape Town Declaration are reflected in the GEO Work Plan;
- Assess the alignment and relevance of the GEO Work Plan activities to the outcomes of the GEO Strategic Targets and the expected benefits of GEOSS;
- Review the progress of GEO Work Plan Tasks;
- Determine if there is appropriate progress towards stated Strategic Target outcomes;
- Examine the extent to which GEOSS information system providers are able to reach the intended users; and
- Identify whether there have been any unintended outcomes or impacts of GEOSS implementation to date.

1.3 Scope

The midterm evaluation includes years 2005-2009 of GEOSS implementation. Listed below are the midterm evaluation parameters and what does not fall within the evaluation scope.

1.3.1 Strategic Targets

GEOSS objectives were streamlined in 2009 and are currently defined in *Strategic Targets: GEOSS Implementation by 2015* (hereafter referred to as the “Strategic Targets document”). The Strategic Targets document served as a key reference for the evaluation, especially with respect to clarifying the in-

tended priorities and outcomes of GEOSS by 2015.

1.3.2 GEO Work Plans

The implementation of GEOSS has been coordinated through a series of GEO Work Plans. Each Work Plan provides a framework for achieving the intended strategic objectives of GEOSS. GEO Work Plans typically cover a multi-year time period, are considered living documents, are revised by the GEO Plenary on a yearly basis, and are structured around GEO Tasks with defined planned outputs. GEO Work Plan Tasks, when implemented, contribute to achieving GEOSS Strategic Targets. Task progress is annually evaluated by the GEO Secretariat in Work Plan Progress Reports. The Team used GEO Work Plans, Work Plan Progress Reports, and the Strategic Targets document to determine the extent to which GEOSS implementation is progressing to meet the 2015 expectations of the GEO community.

1.3.3 Cape Town Declaration

The midterm evaluation evaluated aspects of GEOSS implementation within the context of the priorities stated in the *Cape Town Declaration*. Attention was given to identifying whether any priority areas have not been reflected in the GEO Work Plan or Strategic Targets document.

1.3.4 Evaluation Question Framework

A detailed question framework document (Annex 1) was developed by the Team to provide a systematic approach to the evaluation. The Evaluation Question Framework has been built off the question matrix found in the M&E WG Summary Evaluation Plan. All ques-



tions in the M&E WG's matrix have been absorbed into the Team's Question Framework.

1.3.5 Limitations of Scope

The midterm evaluation, due to time constraints and available resources, does not include the following:

- Detailed analysis of all activities and projects of the GEO Work Plan; and
- Evaluation of communication channels or established practices of analysis used by the GEO Secretariat and various GEO bodies.

It is important to note the distinct difference between GEO and GEOSS. 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 Team has been tasked to evaluate GEOSS implementation and *not* GEO as an organization or its structure, including the performance of the GEO Secretariat.

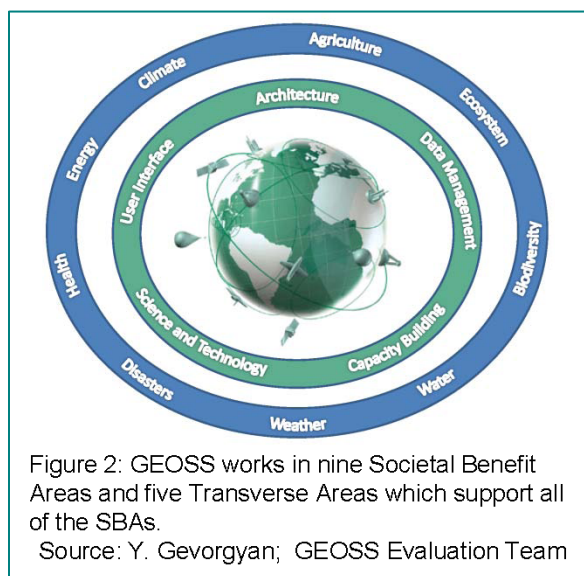
1.4 Report Structure

The midterm evaluation report is presented in three main sections: GEOSS Implementation Approach, GEOSS Implementation Progress, and GEO and Relations with the Earth Observation Community: Room for Improvement. Included at the end of the report are the major findings that emerged during the evaluation. Recommendations for the GEOSS Stakeholders are also found at the end of the report.

2. Overview of GEOSS

2.1 Background

The Group on Earth Observations (GEO) was launched in response to calls for action by the 2002 World Summit on Sustainable Development and by the Group of Eight leading industrialized countries. These high-level meetings recognized that international collaboration is essential for exploiting the growing potential of Earth observations. In turn, international collaboration in Earth observations can support decision making in an increasingly complex and environmentally stressed world.



GEO is a voluntary partnership of governments and international organizations. It provides a framework within which these partners can develop new projects and coordinate their strategies and investments. As of May 2010, GEO Members include 80 Governments and the European Commission. In addition, 58 intergovernmental, international, and regional organizations with a mandate in Earth observation or related issues have



been recognized as Participating Organizations.

GEO is coordinating efforts to build GEOSS – a system of systems. The construction of GEOSS is based on a Ten-Year Implementation Plan for the period 2005 to 2015. The Plan defines a vision statement for GEOSS, its purpose and scope, expected benefits, its approach towards User Involvement, Functional Components, Capacity Building and Outreach. The Ten-Year implementation plan led to the development of the five Transverse Areas which form the building blocks of GEOSS (architecture, data management, capacity building, science and technology, and user engagement) as well as nine Societal Benefit Areas (SBAs, in agriculture, biodiversity, climate, disasters, ecosystems, energy, health, water, and weather). The GEOSS Ten-Year Implementation Plan also recognizes the monitoring of performance against defined requirements and intended benefits as one of its functional components.

The Strategic Targets document streamlines the intended objectives of GEOSS, and the GEO Work Plans that span three overlapping multi-year periods, coordinate the implementation of GEOSS implementation. It is the vision of GEOSS to “realize a future wherein decisions and actions for the benefit of humankind are informed by coordinated, comprehensive, and sustained Earth observations and information.”²

² GEOSS 10-Year Implementation Plan



3. GEOSS Implementation Approach

In order to identify the successes and challenges of GEOSS implementation, a clearly defined vision and plan must be present. A clearly defined plan allows for comparisons of progress, outputs, and outcomes against intended benefits and expectations. The GEOSS implementation approach must enable fulfillment of Ministerial level priorities, contain Work Plan tasks that align with GEOSS Strategic Target outcomes, allow for the identification and closing of gaps, and ensure stability of the whole GEOSS framework. A well-crafted approach to GEOSS implementation is necessary to maintain the momentum of the initiative, engage potential contributors and users of systems and data, and realize the full potential of GEOSS to deliver societal benefits.

The findings from this evaluation indicate that the current GEOSS implementation approach sufficiently reflects high-level Ministerial priorities. Also, the GEOSS Work Plan overarching tasks correspond to Strategic Target outcomes. However, without an explicit approach (such as a logic model), linking activities and outputs of the GEO Work Plan to outcome impacts within SBAs, the current approach to building GEOSS is not transparent in how activities connect to Strategic Targets and the vision of GEOSS. Also, while GEOSS is an evolving initiative, there must be a mechanism to identify gaps in both the framework itself and the global capacity for Earth observations. Ultimately, to fully develop and achieve sustainability, GEOSS has to overcome many of the challenges still facing its implementation

today. However, with efforts to ensure participant commitment, funding, and engagement – clearly significant challenges – GEO can successfully implement, operate and sustain an integrated global Earth observation system of systems.

3.1 Ministerial Priorities

Ministerial priorities and confirmations were clearly stated at the First Ministerial Summit of GEO in Cape Town, South Africa in 2007. Some of the Ministers' priorities include: sustained operation; informed decision making; cooperation and dialogue of Members; and improvement, expansion, and interoperability of and open access to data and products. The Ministers' high level confirmations were intended for the overall implementation of GEOSS and should be reflected in the GEOSS implementation approach. It is important for such an approach to adequately address the Ministers' priorities in order to keep high level commitment and momentum to reach 2015 goals. The evidence indicates that the overall GEOSS implementation approach sufficiently addresses the Ministerial priorities and confirmations from the Cape Town Declaration.

In 2009, the GEOSS Strategic Targets were developed to streamline GEOSS overall objectives. They encompass the *GEOSS 10-Year Implementation Plan* and *Reference Document*, thus constituting the reference for the evaluation. Textual analysis of the Cape Town Declaration and the 14 Strategic Targets shows that there is coverage of the Ministers' priorities. Not all Strategic Targets align with every priority or confirmation but overall coverage of the priorities



is achieved throughout the 9 SBAs and 5 Transverse Areas.

The 14 Strategic Targets are further defined by outcomes (“This will be demonstrated by:” in the Strategic Targets document). The GEOSS implementation approach should support Ministerial level priorities via continuous progress towards the Strategic Target outcomes. When asked to what extent Strategic Target outcomes are aligned with the Ministers’ priorities and confirmations from the Cape Town Declaration, the majority of the Team’s key informants felt that alignment has been “moderately” to “a great deal” achieved. Additionally, approximately 61% of key informants felt that no key points in the Cape Town priorities are absent from the Strategic Target outcomes. Some key informants clarified that while the Cape Town Declaration is more “philosophical,” Strategic Target outcomes are more operational. Therefore, a perfect match is not necessary.

The majority of key informants (67%) expressed that the Strategic Target outcomes, if achieved, are sufficient to meet the commitments of the Cape Town Declaration by 2015. However, many respondents also stated that the Strategic Targets are ambitious in light of the voluntary basis of GEOSS. To meet the priorities of the Cape Town Declaration would require commitment and resources from governments, organizations, and the GEO community.

3.2 Clearly Defined Implementation Approach

Implementation of GEOSS should be guided by an approach for producing outputs and achieving outcomes in a

timely manner, leading to the ultimate vision for GEOSS as a coordinated, comprehensive, and sustained Earth observation system of systems. To provide a clearly understood path for progress, GEOSS activities should link to the overall goals of GEOSS in a logical, transparent, and documented way.

Currently, GEOSS implementation is facilitated through a series of Work Plans. The Work Plans are comprised of contributed activities and organized by overarching tasks with sub-tasks. To be relevant to the goals of GEOSS and contribute to its implementation, Work Plan overarching tasks should align with GEOSS Strategic Targets. The Team found that the GEOSS Work Plan was largely aligned with GEOSS Strategic Targets.

A large majority, 80%, of key informants felt that Work Plan overarching tasks are at least “moderately” sufficient to produce all of the Strategic Target outcomes. The Team also analyzed the text of the two documents and determined that all 42 of the overarching tasks address at least 1 Strategic Target outcome. However, 2 of the overarching tasks were found to only indirectly address outcomes³. And 1 overarching task, “Architecture: Radio Frequency Protection”, does not address any specific Strategic Target outcome but was clearly traced to the 10-Year Implementation Plan Reference Document and the Cape Town Declaration. Of all 60 Strategic Target outcomes, 52 were directly addressed by one or more over-

³ Tasks identified as indirectly addressing outcomes: Ecosystems: “Ecosystem Vulnerability to Global Change;” and Water: “Capacity Building for Water Resource Management.”

arching tasks, 6 were only indirectly addressed, and 2 were identified as not being addressed⁴ by any overarching task.

Some of the key informants feel that the GEOSS vision will be fully realized through the Work Plan. The majority of informants feel that there is potential that the outcomes of overarching tasks and sub-tasks, along with the consultative process under GEO, will support the vision of GEOSS. Key informants feel that GEOSS is “headed in the right direction” and there has been progress, even if incremental in some areas. Some were concerned that it might be too early to recognize if the overarching tasks and sub-task activities will contribute to the overall vision of GEOSS. However, some key informants felt that, in theory, if all tasks are implemented as planned, the vision of GEOSS should be realized.

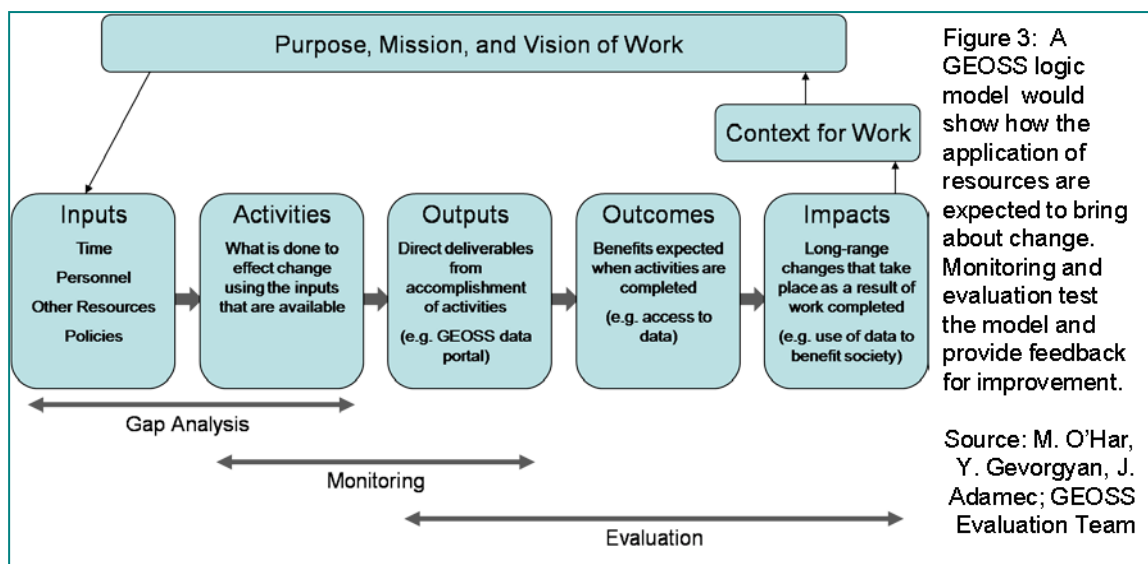
Many other key informants are less optimistic. They note that the lack of mapping of GEO activities makes it difficult to ensure that the GEO activities directly support the vision of GEOSS. Some key informants believe a disconnect exists between the vision of GEOSS and the activities being undertaken. This may be the result of the voluntary “patchwork” nature of GEOSS accepting a variety of contributed tasks. Several respondents feel that overlapping over-



arching tasks and sub-tasks create redundancy in some areas.

A majority of key informants (62%) also expressed that they are not aware of a documented process or formal logic model to show links between overarching task and sub-task activities and GEOSS outcomes and they indicated that it may not exist. A GEOSS logic model would link tasks and activities with both short- and long-term outcomes and the overall GEOSS vision and goals (Figure 3). A documented process or logic model can highlight how desired outcomes will be achieved through the systematic approach of tasks and activities. A logic model can be applied at any level of GEOSS organization. The Biodiversity SBA of GEOSS, for example, has done a good job of documenting the process which it plans to follow for GEO BON. GEO BON has been organized in a way for participants to focus on short- and long-term outcomes as pieces of an integrated whole, link activities to desired outcomes, and clearly understand the GEO BON effort. Such a model goes beyond mere “categorization” of their efforts to describe how GEO BON becomes intended to work and reveal what adaptations or additions may be needed once GEO BON is operational. The Team was not able to locate a documented process or logic model to explain the connection of task and sub-task activities to Strategic Target outcomes and the GEOSS Vision. Many key informants believe that the Work Plan, with overarching tasks and sub-tasks, is a document that can be used for creating such linkages. However, the Team determined that causative links are not inherently understood when reviewing the Work Plan.

⁴ Outcomes identified as not being addressed by any overarching task: Agriculture: “Development of quantitative measurements of global and regional desertification;” and, Ecosystems: “Increased knowledge of environmental flow requirements of river base flow and peak flow, as well as human requirements for irrigation and power plant cooling water and domestic usage.”



Other key informants identified the Work Plan structure as useful mainly for reporting.

The Team asserts that, without a clearly defined and linked approach, it is difficult for participants at all levels to see how activities are contributing to progress of GEOSS implementation. Additionally, without a clear logic model, GEOSS may duplicate efforts or overlook important aspects of Earth observation that are missing. Gap identification is discussed further in the next section of this report. A current effort by Japan to create a tool that shows links between sub-tasks, overarching tasks, and Strategic Targets seems promising. Such a tool could help achieve transparency in the implementation approach for the Earth observation community.

The Team deems that the current overall approach to GEOSS implementation only allows an observer to view the ambitions, effort, and resources intended to be spent on GEOSS tasks and activities. The approach does not explicitly describe the end-to-end process of how the application of resources supports

the overall vision and goals of the GEOSS initiative, how or why benefits are expected, or when benefits will be achieved. The Team believes these factors are the keys to a good logic model and, without them, it might be difficult for stakeholders to make well-informed decisions about supporting GEOSS.

3.3 Gap Identification

In the case of GEOSS, it is useful to distinguish between two categories of gaps – structural gaps in the GEOSS implementation framework and gaps in global Earth observation systems and data. To fulfill the vision of GEOSS, identification of gaps within both categories must occur. On one hand, identification of gaps in the implementation framework will enable the GEO community to effectively and strategically organize its activities to ensure that the set targets are achieved. On the other hand, identification of gaps in Earth observation requirements and capabilities will enable the GEO community to set objectives and design and fund activities that would help address these gaps.



The Team's analysis focused on GEOSS implementation, and therefore the first type of gap. However, the Team believes that analysis of gaps in Earth observation capacity will help GEOSS to maintain global capabilities and provide the impetus to develop products and services adequate to meet the evolving requirements of the Earth observation community. The literature provides many specific reports on Earth observation capacity and coverage gaps. However, there is a role for GEOSS in coordinating analysis of the needs and capabilities of Members, Participating Organizations, and user communities. A Participating Organization, the Committee on Earth Observation Satellites (CEOS) has success in this area through the development of virtual constellations. Learning from the CEOS experience, Earth observation gap identification and filling could be expanded to a wider array of systems and applications.

To enable structural gap identification, the GEOSS implementation approach should be transparent in how sub-tasks, overarching tasks, and Strategic Targets contribute to achieving the vision of GEOSS. A benefit that Members should gain from GEOSS is meaningful interactions among diverse participants so that synergies can emerge and gaps can be recognized and filled in the SBA and Transverse Areas. For instance, the User Interface Committee (UIC) recently compiled an analysis of GEO Task Sheets for "current and potential user-engagement activities." All task sheets contain a section for reporting on "User Engagement" components; however, the UIC found only a minority of task sheets contained meaningful reporting

on user engagement activities. Based on this analysis, they have developed recommendations to improve their own interaction and outreach to task teams to better support effective user engagement. Similar analyses of the infiltration of all Transverse Areas into tasks or of the development of interactions between "Key Related Tasks" in the SBAs would support integration of activities, sharing of best practices, and efficient use of resources. However, without a systematic and documented gap analysis process, such benefits may not be widespread.

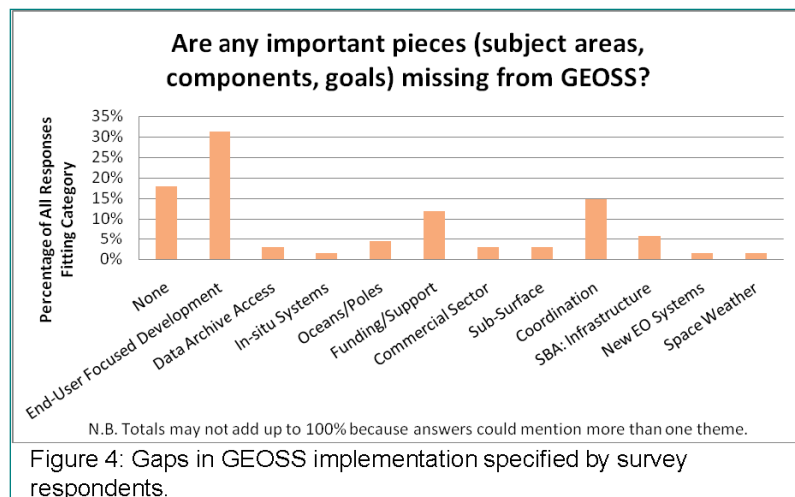
There is a clear indication from key informants that a process to identify gaps in GEOSS implementation is not documented or widely known. The majority of key informants (63%) feel there is no documented process to identify gaps. The lack of evidence in literature also suggests that there has been no systematic gap analysis done for GEOSS implementation, but some constituent groups have reported gaps for their particular areas of concern. A few key informants feel that gap analyses are implicit in several documents and activities, such as the current Work Plan structure with accompanying progress reports, the tool being created by Japan, the coordinating efforts of the GEO Secretariat experts, individual initiatives on perceived needs, or the interaction of the User Interface Committee with users. Without an established systematic gap analysis procedure, key informants' opinions on how gaps should be or are being identified and addressed vary from being the responsibility of the Secretariat, to the Communities of Practice, to GEO Members within their various focus areas.



Many key informants were unable to identify examples of gaps within the GEOSS implementation framework, but some broader attitudes about why gaps

would like to see entered in the GEOSS framework. However, a larger portion of respondents said that GEOSS was sufficiently comprehensive. Instead, there

are existing areas that stakeholders would like to see prioritized within the current framework of GEOSS. Three main items revealed by survey respondents were 1) an increased focus on the end-user of GEOSS information, 2) more coordination between Members and Participating Organizations at the SBA and task level, and 3) the need for the development of a sustainable funding and resource



may exist were expressed. A frequent feeling among key informants was that the Strategic Targets are broad and, for the outcomes to be achieved, a more concrete plan is required. A lack of focus can lead to increasing gaps between Strategic Targets and activities. Some key informants stated that the Work Plan is short-term, should be considered a living document, and will evolve and change over time. Therefore, the existence of gaps in the Work Plan does not necessarily correspond to gaps in GEOSS. Some actions that are needed to meet the 2015 Strategic Targets have not yet been developed or completed so what is needed is not a “perfect match” with zero gaps but rather a higher degree of alignment.

A handful of survey respondents identified specific focus areas⁵ that they

model to support the GEOSS initiative (Figure 4). The items revealed by the survey respondents and additional attitudes expressed by key informants are discussed in the next section of the report, Sustainability.

GEOSS, as a system of systems, focuses on observing, analyzing, and anticipating changes in the Earth system over time. As such, the Team believes that GEOSS will continually change and evolve as the needs for and capabilities of Earth observation systems change. GEOSS is a huge undertaking that can never really be “completed.” Instead, it will gradually grow within its visionary framework of goals and tasks. New Earth observation systems will be added periodically and others may disappear or be replaced as needs change. The Strategic Targets document indicates that a gap analysis will be performed in connection with the alignment of the updated Work Plan with the Strategic Tar-

⁵ Examples of gaps identified include: stand-alone SBAs for oceans and Polar Regions, infrastructure (the human-built environment), space weather, the Earth’s sub-surface, and new focus areas related to archived/historical data, *in-situ* systems, commercial

sector engagement, and developing new operational systems.



gets but, to the knowledge of the Team, this has not taken place. The Team believes there are clear benefits to be gained from a common approach to gap analysis of GEOSS. Sporadic and uncoordinated gap analysis activities will not generate a clear and comprehensive picture of the needs and priorities for GEOSS development.

3.4 Sustainability

One of the key priorities for GEOSS in the Cape Town Declaration was to ensure the sustainability of Earth observing capabilities. In order to be effective in this role, GEOSS itself must be sustained. The framework for GEOSS must enable the continued development and long-term operation of the Earth observation system of systems. Key informants and survey respondents point to the voluntary nature of GEOSS as a key factor that may ultimately limit sustainability. In addition, key informants and survey respondents pointed out other challenges that potentially imperil the future of GEOSS including inconsistent participant commitment, inadequate and discontinuous funding, and limited user engagement. If the GEOSS implementation approach is not sustainable, the overall initiative will be unsuccessful.

The Team did not find that the voluntary framework for GEOSS has thus far limited sustainability. In the case study of the Data Sharing Principles task, participants attribute much of the current progress to the voluntary nature of GEOSS. The reason is that the voluntary and non-binding nature of the GEOSS initiative allows participants to agree and reach consensus on specific recommendations even if their sponsoring government or organization could

not comply under existing laws and policies. However, several key informants pointed to the voluntary nature as a hindrance because it does not give much incentive to participants to act on commitments. A few key informants stated that more political support and leadership is needed to build a sustained operation and to fully deliver GEOSS. Key informants also expressed that, while tasks have been developed with the GEOSS vision in mind, the voluntary nature of tasks may mean that a task is mostly relevant to the contributing Member and brings little to the success of GEOSS. Also, a structure based on volunteer “best-efforts” may mean that some tasks lack enough resources for progress. Without political leadership and commitment, productivity within the GEOSS framework may get put on hold.

In the same case study of the Data Sharing Principles task, the voluntary nature of GEOSS, while beneficial in one way, was also identified as hindering access to resources. In many instances, there are few or no mechanisms for Members and Participating Organizations to support the coordination components of their individual activities⁶. Personnel-hours and funding to produce reports, attend meetings and interface with other GEOSS contributors must be pared from already tight budgets and their use for an extraneous “voluntary” initiative may be discouraged. The need then is not so much for a “binding” mechanism as for a framework capable of providing effective incentives

⁶ According to the ST-09-02 Task Sheet, projects funded under the European FP7 are a notable exception and require budgets to include set-asides for participation and coordination with the relevant GEOSS tasks.

for translating “voluntary acceptance” into a priority “commitment to action.”

Key informants also expressed that a major problem with the sustainability of GEOSS appears to be the lack of sufficient resources, both financial and human. One key informant stated that many of the activities within GEOSS that have been successful are those that have dedicated funding. The success of GEOSS is very dependent on each task. When tasks are well supported, they will contribute to GEOSS. But, where there is a lack of financial resources it is likely the task will not go far and, instead, contribute to negative perceptions of GEOSS. Key informants clearly feel that GEOSS could be more successful with an appropriate sustainable funding mechanism.

Some key informants stated that there needs to be more effort to incorporate the user component. They felt that there were inconsistencies between what the users need and what the architecture provides. The case studies also revealed that engagement of users in defining a task’s purpose and plan would be beneficial. A broad-based, engaged, and dedicated community of users supports the viability of tasks. This is done by providing a pool of volunteers to participate in activities, encouraging communication and adoption of products, and increasing resiliency of task teams through reduced dependency on only a few engaged individuals.

Inclusion of users in GEOSS development is an extremely important factor for fostering stakeholder buy-in and long-term success. However, survey respondents did not positively express that



GEOSS is responding to their needs for data, information, or tools. Overall, survey respondents feel that GEOSS is less than “moderately” responsive to their needs. Additionally, survey respondents expressed a feeling that their needs are less than “moderately” represented in GEOSS development and governance. Ultimately, a lack of buy-in from the intended beneficiaries of GEOSS will limit the generation of societal benefits. Also, disaffection among the individuals who do the “work” of GEOSS could undermine the GEOSS initiative as a whole.



4. GEOSS Implementation Progress

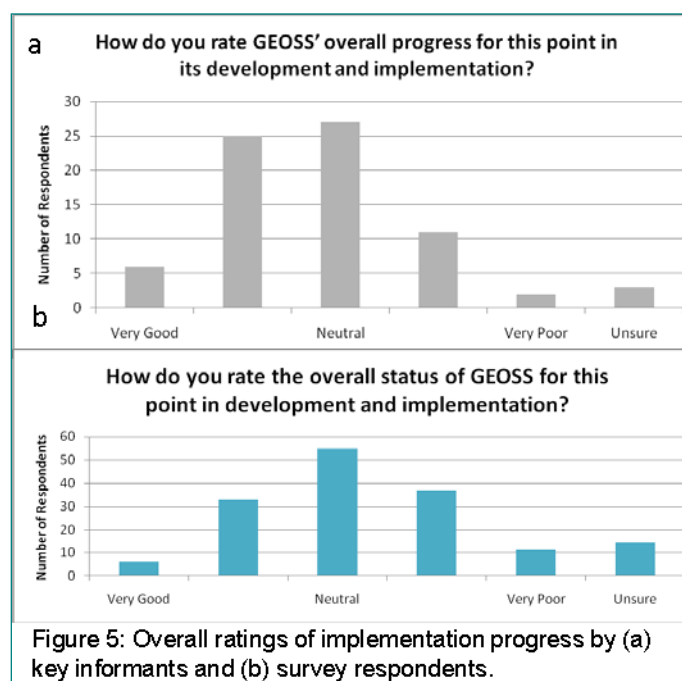
GEOSS implementation has positively progressed since the start of the 10-year implementation period in 2005. The GEO community is generally positive about the foundation that has been established and optimistic that appropriate outcomes are being realized. The GEO Secretariat views current progress to be “very good” to “excellent.” However, challenges still exist. GEOSS is a developing system of systems that will continue to evolve beyond the initial 10-year implementation period ending in 2015. While there is much value in articulating the progress made thus far, it is important to focus on what lies ahead.

4.1 Evaluation Respondents Opinion

As mentioned previously, key informants generally believe GEOSS implementation is “headed in the right direction”.

The majority of key informants (Figure 5a) rate overall progress of GEOSS for this point in its development and implementation as good or “very good” (42%). The second highest response was a “neutral” feeling towards progress (32%). One key informant explained that GEOSS implementation has so far produced isolated pockets of success because many of the activities within GEOSS that have been successful are those that are funded. Additionally, such success is mainly confined to countries and organizations that can afford the activity.

Survey respondents had an overall “neutral” feeling towards the status of GEOSS development and implementation at this point (Figure 5b). When asked to rate GEOSS implementation progress towards intended Strategic Targets, the majority of survey respondents expressed that they feel “neutral” or “unsure”. However, ratings of good progress outnumbered poor progress ratings three to one. When survey respondents were asked which component of GEOSS they find most useful, the most common response (25% of respondents) was “access to data.” However, as seen below, it is questionable whether such a response reflects actual or anticipated benefits. When asked what needs the most improvement in GEOSS, more than a third of survey respondents mentioned the GEOSS Common Infrastructure (GCI, 36%) and, even more specifically, the GEO Portal (12%).



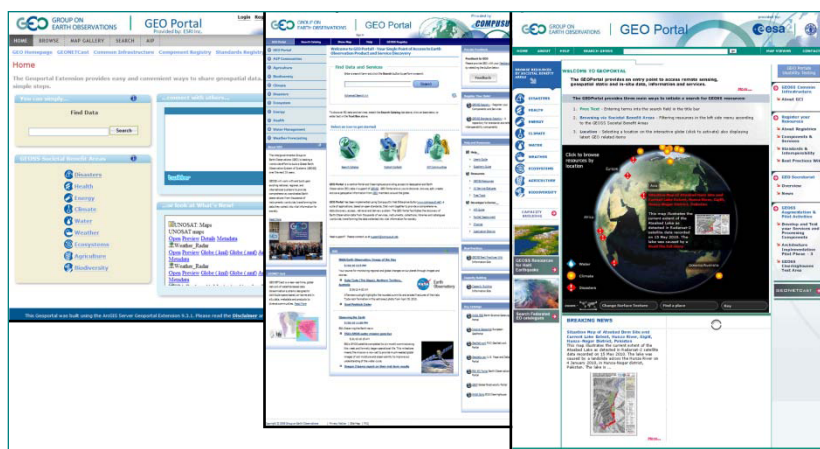


Figure 6: There are currently 3 pilot portals for accessing the GEOSS architecture. Many respondents identified the GEO Portal as an area in need of improvement.

Source: Online GEO Portal pilot pages by ESRI, Compusult, and ESA

As a measure of whether appropriate results are being realized from GEOSS implementation, a large majority of survey respondents answered that they are not readily accessing or contributing data, information, or tools through GEOSS components (Figure 7). The average response fell between “sometimes” and “never.” Many survey respondents expressed that they “never” make use of GEOSS interoperability standards. Also, survey respondents indicated only infrequent contributions to fundamental

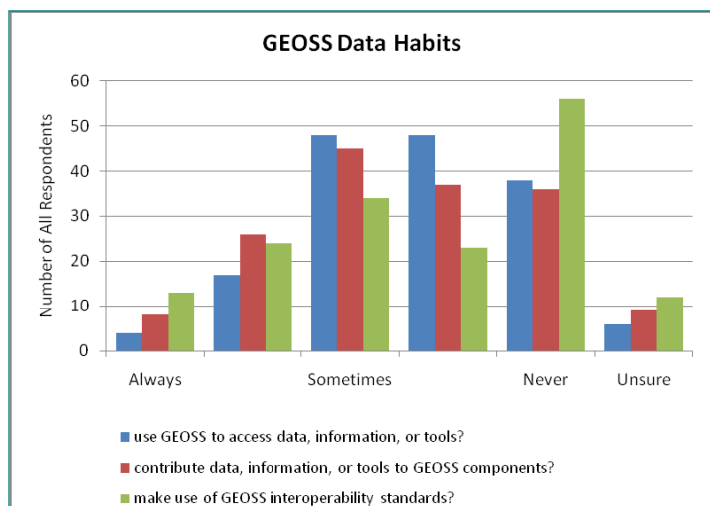


Figure 7: Survey respondents' patterns of use of GEOSS components and standards for Earth observations.

scientific research, predictive model development, management or policy decisions, or education and outreach from their use of GEOSS. However, some respondents perceive that their interaction with GEOSS has contributed to informed decision making and their capacity to generate and use data, information, and tools (Figure 8). While average ratings were slightly negative, any perception that GEOSS data is

being used and is affecting decisions for some users represents an optimistic view from the survey population. This is seen as optimistic because it was thought by stakeholders to possibly be too early for discernible effects from GEOSS implementation. Survey respondents also positively rated the cooperation of Members and Participating Organizations in the implementation of GEOSS.

For GEOSS to develop successfully, the GEO community needs to better communicate evidence of progress in GEOSS implementation. Generally speaking, the key informants and survey respondents had “neutral” or better feelings about progress made thus far but strong specific examples were lacking. As one survey respondent put it, GEOSS has yet to “show its value by generating some killer applications.” Stakeholders feel optimistic about progress and they would like to see their investment in GEOSS pay off in visible success. The Team believes additional effort to recognize

actual valuable GEOSS outcomes could fuel optimism and motivate further ac-

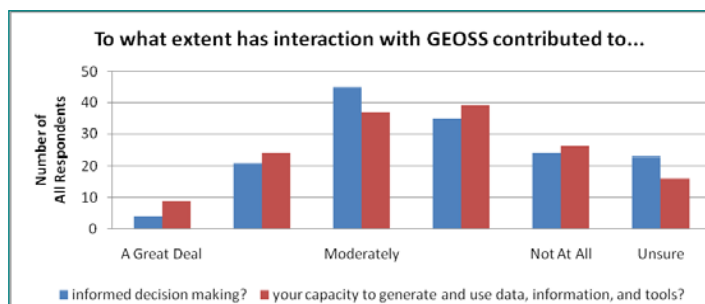


Figure 8: Survey respondents perception of specific impacts from GEOSS. Because GEOSS is still relatively new and impacts are generally “long term” effects, it was expected that many more respondents would have selected “Not at All.”

complishments. The Earth observation community is a ready audience waiting to be impressed.

4.2 Secretariat Rating of Progress

The GEO Secretariat experts regularly rate the performance of tasks and present task status in the Work Plan Progress Report. The Work Plan Progress Report is submitted annually at the GEO Plenary sessions. For this evaluation, the Team analyzed reports from the Fourth, Fifth, and Sixth Plenary Sessions of GEO (GEO IV, GEO V, and GEO VI). The Secretariat gives tasks a rating of green, yellow, or red. Green represents tasks the Secretariat has judged progress to be “very good” to “excellent.” Yellow represents tasks that are progressing but more effort is required. Red represents tasks that the Secretariat has judged progress as insufficient or that the task is inactive.

The Secretariat has rated overall progress of the GEOSS Work Plan to be “very good” to “excellent” with a slight increase from 2007-2009. It is important to note that two tasks were marked as

“complete” in the GEO VI Work Plan. Also, at least three additional tasks were completed in 2006 according to the GEO IV Work Plan Progress Report. However, it was difficult to track individual tasks across years because the relevant information was inconsistently presented across varying documents from year to year. Also, when the Work Plan was restructured to include overarching tasks with sub-task activities, many tasks were merged, consolidated, or closed. Thus, the total number of completed tasks since the beginning of GEOSS implementation was difficult to verify.

As evidence of successful progress of GEOSS implementation, the majority of all tasks were rated green in the GEO IV, V, and VI progress reports (Figure 9). Tasks rated green also increased in percentage of all tasks from 2007-2009.

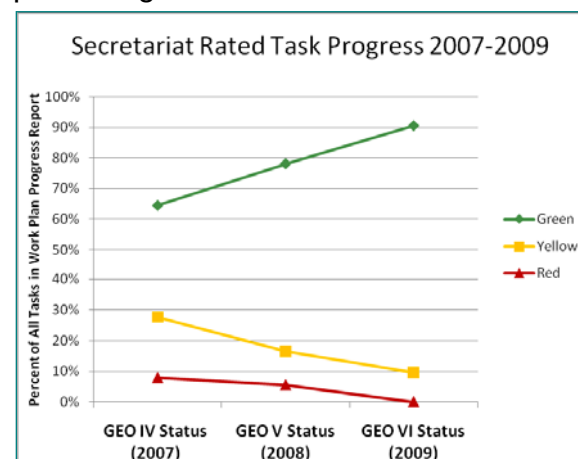


Figure 9: The prevalence of each task rating category as a percentage of all tasks in the Work Plan at time of rating. The total number and composition of tasks in the work plans varied from year to year.

In addition, the percentage of tasks graded yellow or red dropped during the same time. The drop in yellow and reds

would be expected for adequate GEOSS implementation progress.

When evaluating GEOSS progress by SBA or Transverse Area, the results are not as straightforward. Many SBA or Transverse Areas continuously improved progress from 2007-2009. But, some areas saw declines in progress at points during the same time frame. Notably, the User Engagement Transverse Area increased progress the most. The Water SBA, while still rated green, saw the only decrease in progress from 2008 to 2009 (see Annex 5 for graph).

4.3 Task Activity Progress

For substantial advancement in the implementation of GEOSS, tasks and activities from the Work Plan must be making progress. The success of GEOSS implementation is dependent on each and every task. Key informants were asked to what extent they feel activities in the sub-task level are contributing to the completion of overarching tasks. The majority of key informants (53%) feel that the activities in the sub-task level are contributing “a great deal” or just slightly less. A large portion of key informants (28%) feel that sub-task activities are “moderately” contributing to completion of overarching tasks. As a measure of progress, key informants are quite optimistic about the contribution of activities at the sub-task level. It was argued by one key informant that in areas where there are resources, personnel, and initiative, successes will be found, and that, at the same time, a success anywhere within GEOSS implementation, even if piecemeal, should be seen as success.



The Team selected a small sample of individual tasks for analysis in order to provide some evaluation coverage of all areas within GEOSS. One task was selected within each SBA or Transverse Area for the case study analysis. Through the case studies, it was found that task progress generally meets or exceeds expectations of the task supporters and contributors. However, it is not always clear how the reported progress contributes to GEOSS as a whole. Task leads and the Secretariat need to have a common understanding of what constitutes success for a particular task. Within some tasks, contributors noted that progress is not actually measurable. One task contributor specifically stated tasks should not be evaluated like a funded project with rigid milestones, targets, and requirements. The voluntary nature of GEOSS does not make tasks suited for comparison against centrally defined outcomes. However, the most successful tasks tend to engage in some form of internal goal-setting and outcome planning. Such self-made targets appear to be strong motivators for achievement. When there is a clear purpose and plan to achieve success for a task, progress is more likely.

The Team determined that all tasks reviewed have relevance to other GEOSS tasks. Still, there is significant room for improved facilitation and coordination among tasks by the Secretariat. The most successful tasks regularly use multiple forms of communication. Though, in many tasks there is room for improved communication within task teams and with the rest of the GEOSS community. The Team believes that without proper coordination and com-



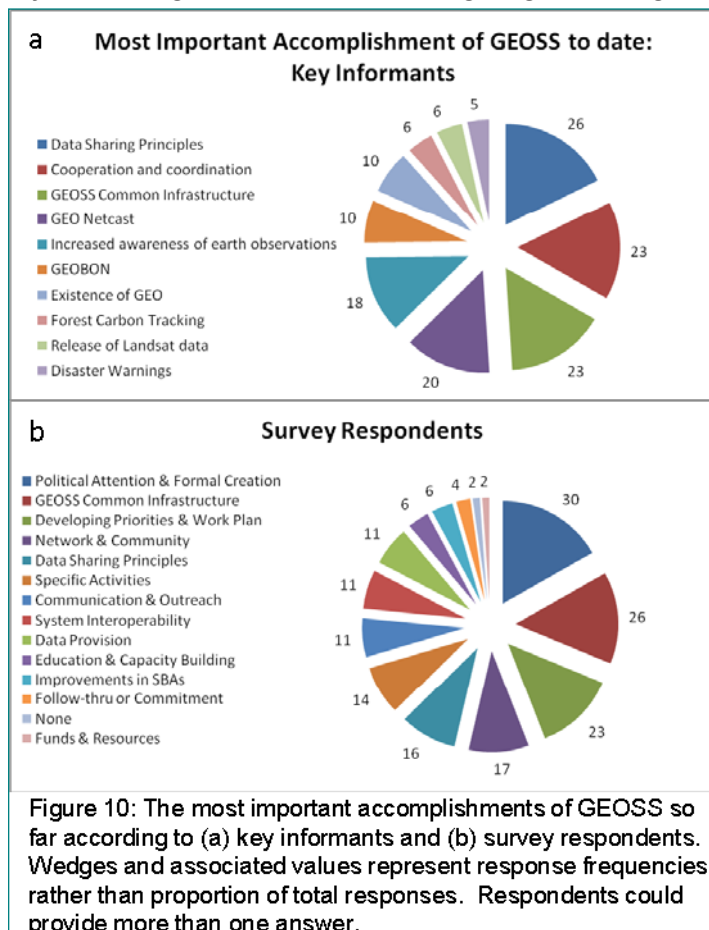
munication, successful tasks may grow distant from the core of GEOSS. A key informant raised the concern that individually successful communities, not seeing any benefit from GEO, might eventually break off into a series of disconnected themes, or regionally-specific observation networks, and leave GEOSS as a weak and fragmented system. However, the Team believes that such an outcome is entirely avoidable. A large portion of the activity reviewed in the 12 case studies is directly attributable to GEOSS rather than strictly pre-existing efforts. And, it was expressed that GEOSS was seen as a uniquely appropriate coordination vehicle with GEO providing the necessary intergovernmental framework for the establishment of some tasks.

4.4 Accomplishments and Challenges Overcome

GEOSS implementation progress is illustrated by the accomplishments made over the first five years of implementation. Progress is also demonstrated by the major challenges that have been overcome throughout the course of GEOSS development. When asked to identify the most important accomplishments achieved and challenges overcome by GEOSS to date, a great deal of similarity was seen between key informants' and survey respondents' opinions (Figure 10).

Garnering international political attention and formally establishing GEO were the most widely recognized accomplishments by 43% of survey respondents. Approximately 22% of key informants also responded that main-

taining political support has been a challenge overcome and 19% specifically mentioned the establishment of the GEO Secretariat as a major challenge overcome. Approximately 13% of key informants acknowledged that the nature of GEO, as a new international engagement model based on volunteer contributions, is a unique challenge. Survey respondents and key informants mentioned that high-level political recognition has facilitated the acquisition of resources to implement GEOSS activities in multiple areas. And, 36% of survey respondents feel that, while sustaining resources is an ongoing challenge, it



has been successfully faced for the first five years of GEOSS implementation.



According to 35% of key informants, the most important accomplishment has been the GEOSS Data Sharing Principles. The same accomplishment was identified by 23% of survey respondents. The international collaboration on building GEOSS was instrumental in the successful creation of Data Sharing Principles because it helped open lines of multi-lateral communication and advanced discussion and agreement on a historically contentious issue within the international community. Approximately 29% of key informants and 19% of survey respondents also recognized the Data Sharing Principles as one of the most important challenges overcome in GEOSS implementation. The challenge was creating a discussion forum and developing guidelines, agreeable to all parties, in light of divergence between national laws and policies. GEOSS implementation has created a path to enable full and open data sharing and conquered discussion barriers making Data Sharing Principles a major accomplishment.

The progress in building a “system of systems” via the GCI and developing a means for user access through the GEO Portal ranked highly in the accomplishments lists of both survey respondents (37%) and key informants (31%). While not yet fully operational, the GCI represents a major effort of GEOSS. The establishments of the component and standards registries along with piloting the portal interfaces are recognized as unique to the existence of GEOSS. Survey respondents (21%) also believe the challenges in reaching the current state of the infrastructure, including designing the system architecture, achieving component interoperability, and po-

pulating the registries, represent significant successes of GEOSS but will continue to present challenges. Survey respondents revealed an underlying perception of success in the establishment and maintenance of the GEOSS framework.

Achieving cooperation and coordination of various organizations and governments was noted as an important accomplishment of GEOSS to date by key informants (31%). Similarly, 33% of survey respondents felt that the coordinated development of priorities for Earth observing and the GEOSS Work Plans were a significant achievement. GEO has been successful in bringing together groups that had not worked together before and were, to some extent, previously disparate and competitive communities. Approximately 59% of key informants mentioned that fostering the broad membership of countries and organizations, and their effective engagement, is the greatest challenge that GEOSS has overcome to date. Survey respondents’ sentiments regarding the establishment of GEOSS echoed this opinion. The GEOSS initiative was able to get countries and organizations to participate and collaborate, subscribe to a common vision, and recognize common needs and the potential for joint progress. GEOSS implementation has facilitated the exchanges among networks and multi-disciplinary groups. By bringing various organizations and governments together to collaborate, plan, and support integrated global Earth observations, an important new Earth observation community and network have been created for GEOSS implementation.



The broad impact of the GEOSS initiative on awareness about Earth observations was also noted as an important accomplishment. Approximately 24% of key informants mentioned that GEOSS has raised the visibility of the importance and need for integrated global Earth observations. Beyond the major themes of GEOSS accomplishments and challenges overcome already discussed, many key informants and survey respondents also referred to specific GEOSS components as important accomplishments in implementing GEOSS to date. These include GEONETCast, GEO BON, and Forest Carbon Tracking.

4.5 Challenges Facing GEOSS Implementation

It is important to determine the progress of GEOSS implementation by what has been achieved at this point. However, future progress will be determined by how successfully challenges are addressed in the future. Sustainability, including both funding and commitment, is seemingly the biggest challenge facing GEOSS implementation. Over half of all survey respondents and key informants felt that sustainability, through increased funding and commitment, is among the most important challenges facing GEOSS. As previously mentioned, sustainability is the key to successful implementation and progress of GEOSS.

Key informants acknowledged that certain aspects of GEOSS can be completed under the current voluntary model. However, many felt that building on the momentum that has accrued thus far requires concrete resources to support GEOSS projects and the continued operation of the Secretariat. Some key informants felt that there is a need to be

forward-looking and consider now how GEOSS will be sustained for the decades beyond 2015. An important aspect of this will be defining the role and contribution of GEOSS in the international realm. In part, examination of GEO's organization and consideration of a governance or institutional change may be needed. Key informants have begun to question the viability of GEOSS based on voluntary contributions. The GEO structure may not lend itself to strong decision-making power and may have little leverage without a legal mandate and formal budget. Some key informants feel it may be time for GEO to think strategically about its evolution as an organization under the United Nations.

Full implementation of the Data Sharing Principles document is seen as a major challenge facing GEOSS by approximately 20% of both key informants and survey respondents. Continued support and advocacy for full and open data sharing are essential to realizing the benefits of integrated Earth observations. Data Sharing Principles have been acknowledged as an important accomplishment thus far but there is a definite need to transition from discussion to application.

Lastly, refining the GEOSS Work Plan and engaging users through outreach are important challenges that still face GEOSS implementation. As mentioned previously, the current Work Plan may not be completely transparent and gaps may not be easily identifiable. More than 20% of survey respondents identified the refinement of the Work Plan as a challenge to come. There is a feeling among key informants and survey res-



pondents that GEOSS needs a clearly defined plan that is strategic in nature. However, care must be taken not to create additional bureaucratic and administrative burden on Members and Participating Organizations. The Team believes that if the time and effort requirement to participate in GEOSS outweighs the actual benefits of participation, Members and Participating Organizations will lose interest, and commitment will waver. Education, outreach, and capacity building that capitalize on the unique characteristics, accomplishments, and benefits of GEOSS will be a vital challenge.

The Team asserts that if the benefits and accomplishments of GEOSS are exhibited, issues related to sustainability of resources and commitment may be mediated. The need for marketing GEOSS is discussed more in-depth in the next section.



5. GEO and Relations with the Earth Observation Community: Room for Improvement

The role that GEO plays within the Earth observation community is unclear. There are misunderstandings about whether assistance can or will be provided for task implementation and what the unique value-added aspects of GEOSS are or will be in the future. The Earth observation community feels that additional stakeholder engagement is needed to stimulate sustained contributions of data, resources, and commitment. By refocusing on GEOSS' unique contributions to Earth observations, misunderstandings will be cleared, and GEOSS can reach its full potential.

5.1 Misconceptions about GEO/GEOSS

The Team discovered confusion about the roles that GEO and GEOSS play in the Earth observation community. Comments from key informants, survey respondents, and even certain published literature reflect unfulfilled expectations rather than new unexpected developments arising because of GEOSS. The first point of confusion is regarding funding. A few key informants noted that there may have been unrealistic expectations that the creation of GEO would generate a new funding body. When new resources to support projects were not forthcoming, the result was disappointment, "turmoil and tension," and, in some instances, loss of enthusiasm. Rather than providing a mechanism for funding, the GEOSS system relies on the commitment, initiative, and

resources of Members and Participating Organizations.

In a published interview, GEO Secretariat Director José Achache indicated that the scientific community has been less involved than was hoped in the development of GEOSS.⁷ He identified such an outcome with the expectation that GEOSS would be a new funding mechanism. Interestingly, multiple survey responses and case study results show that participation in GEOSS has actually helped to secure or increase funding for individual activities through other sources (e.g. the EU FP7). However, additional effort is required to participate in GEOSS, including travel for meetings, expenses related to networking, and resources devoted to reporting. Many task participants have expressed that support for these aspects of GEOSS is lacking.

The Team believes that clarification from GEO about its role as a coordination framework without the ability to fund activities directly needs to be more widely advertised. Effort by GEO to showcase facilitation and coordination of Earth observation activities would alleviate negative sentiments. One such opportunity for GEO was identified in the evaluation case studies. There is a perception that Member and Participating Organization collaboration is very much restricted because, even in GEOSS-related activities, laws and policies often exclude the international exchange of funds. It was suggested that GEO could promote closer collaboration and the

⁷ CODATA Secretariat. (May 2009). The importance of data sharing within the Global Earth Observation System of Systems. Committee on Data for Science and Technology (CODATA) Newsletter.



global dimension of projects by facilitating joint funding calls from Members and Participating Organizations.

Related to the confusion about the role of GEO, many key informants noted that, among stakeholder groups and organizations, GEO is often viewed as a “competitor.” Some argued that GEO has been attempting to “reinvent the wheel” rather than build upon and engage activities already in progress. Key informants noted that the perception about GEO as a competitor likely arises from a feeling that credit is being taken for work that would have been accomplished even without the construction of GEOSS. It seems to some that GEO is trying to replace, rather than incorporate, established Earth observation coordination systems that are now contributing to GEOSS. The Team believes that such a perception can limit the degree to which older organizations will embrace GEOSS. One key informant mentioned a simmering concern that observation agencies and organizations in developing countries may lose funding to collect primary observations and build local capacity because governments expect GEOSS to replace those services for free. Another key informant noted that while GEO works to increase access to remotely sensed data, they are perceived as removing the incentives for nations to develop sufficient coverage of local and regional *in situ* observing systems. Such expressed concerns are testament to the confusion about GEOSS’ role in Earth observations.

There is also a perception by key informants and survey respondents that GEO is co-opting achievements of con-

tributors and giving limited or no acknowledgement or credit to Members and Participating Organizations. In specific instances, there may be “resentment” of the GEO branding of activities and products. At this point in implementation, formal acknowledgement might be one of contributors’ only immediate returns for integrating their systems into GEOSS. For example, many key informants noted the perceived tension between GEO and the World Meteorological Organization (WMO). Literature reviewed specifically indicated a conflict with the Global Climate Observing System (GCOS), a program co-sponsored by WMO, IOC, UNEP, and ICSU. In working to gain recognition for the importance and value of GEOSS, GEO has created an image of an organization intending to assimilate existing systems under its own banner. Rather than defining itself in terms of system development and operations – the responsibility of Members – GEO’s added value is in the coordination of resources. The Team believes that GEO would benefit from positioning their organization as a supporting and enabling platform. GEO is the facilitator and provides value through coordination among existing Earth observation systems and developing an information networks system.

As clearly defined in the 10-Year Implementation Plan, “GEOSS will build on and add value to existing Earth-observation systems by coordinating their efforts, addressing critical gaps, supporting their interoperability, sharing information, reaching a common understanding of user requirements, and improving delivery of information to users.” The role of GEOSS is to integrate existing and planned systems operated by

Members and Participating Organizations, to provide services, make cross-organizational and cross-disciplinary collaboration possible, and enhance the public benefit of Earth observation. The Team suggests that GEO, through effective facilitation and better coordination of Members and Participating Organizations, can strengthen partnerships with independent operators.

5.2 Need for Marketing GEOSS

A large majority of survey respondents feel that they have a good to great understanding of the purpose of GEOSS. However, as previously discussed, there are divergent opinions about what GEOSS is supposed to be and needs to deliver. Greater effort is needed to establish a common understanding about GEOSS in order to address the outlying opinions of stakeholders. Survey respondents expressed that one facet of GEOSS implementation that can use much improvement is the marketing and awareness of GEOSS. They would like to see improved communication and information sharing with the wider policy and end-user communities. Additionally, approximately 15% of key informants stated that there is a need to identify the “value-added” by GEOSS and define what GEOSS’ unique contribution is to the Earth observation community. Key informants want GEO to be clear about its role and the niche that GEOSS fills in the international landscape. Specifically, key informants want GEO to focus more on impacts rather than increasing the number of activities under the GEOSS umbrella. Also, key informants want projects or actions that are unique to GEOSS to be identified and highlighted, because there is a feeling that

many projects might have occurred even without the creation of GEOSS.



Figure 11: The “First 100 Steps” report from the Cape Town Ministerial was the only major attempt to market results of GEOSS that the Team found. Respondents and key informants both identified a need for better communication of the value-added results of GEOSS.

Some key informants also noted that better advertisement of successful tasks, with identifiable impacts, might stimulate activity in other areas and aid in gaining further buy-in from Members and Participating Organizations. The concept of advertising in order to gain more support was also found in peer-reviewed literature. In an article about land-cover observations integrated into GEOSS, the author expressed that “It is hoped that, by emphasizing the progress made so far, more countries will be encouraged to get engaged and support this process.”⁸ The Team be-

⁸ Herold M., Woodcock C.E., Loveland T.R., Townshend J., Brady M., Steenmans C., Schullius C.C.

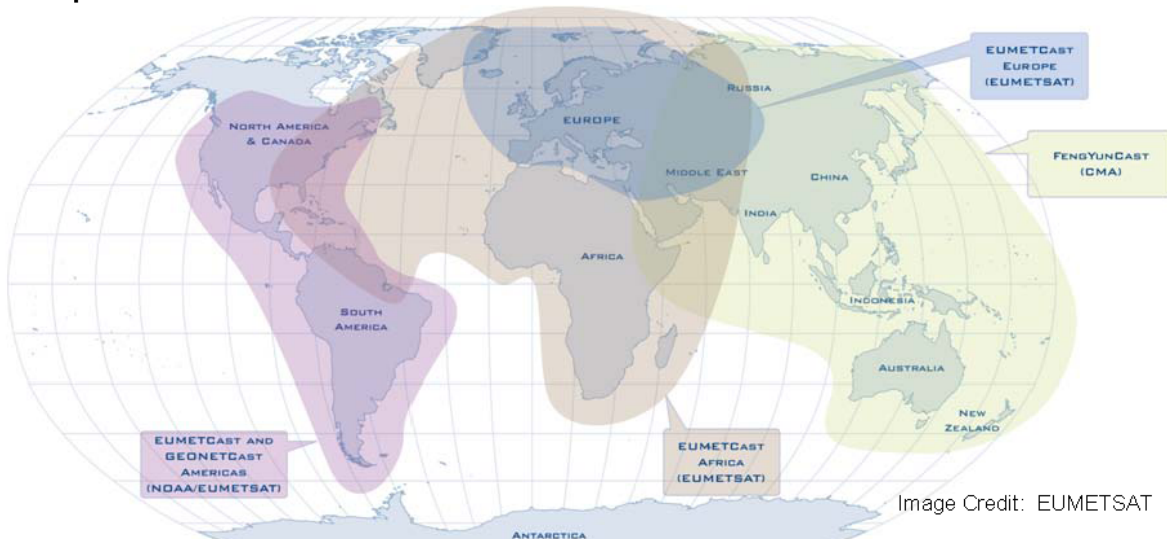


believes that by providing, and being known for, adding valuable coordination and integration services, GEOSS will organically increase the Earth observation community's support.

GEOSS links countries, international organizations, and individuals, contributing

articulated by multiple sources, there is no comparable global framework for international sharing of Earth observations and related data. Many of the activities examined in the case studies suggested that the specific task would not exist at all or to the same degree without GEOSS. Activities within GEOSS bring

Example: GEONETCast



While many sources cite GEONETCast as a major achievement, it is seen by others as an example of missteps both in how GEOSS is positioned relative to contributors and in how the role and function of GEO are communicated.

GEONETCast originated in programs developed in Europe (EUMETCast) and China (FengYunCast). The core operational concept—low-cost distribution of meteorological data through satellite broadcasts—and the bulk of the operational capacity for GEONETCast come from these programs. Collaboration through GEO encouraged others (NOAA and data providers) to contribute toward expanded coverage. By coming together in GEOSS, independent regional programs effected near-global coverage. Through GEOSS, the programs' scopes have also grown. Originally, the programs distributed meteorological data but, as GEONETCast came together, providers volunteered additional environmental products. The GEOSS task provided the platform for coordination and facilitated parallel growth of regional services leading to expanded coverage and content of environmental data broadcasts.

However, labeling GEONETCast simply as “an achievement of GEOSS” is misleading because GEO does not directly support operations; such a label fuels perceptions that GEO is trying to co-opt the contributions of Members and Participating Organizations and fails to adequately showcase the vital role GEO did play in enhancing global access to data. A message focused on the outcome of “greater access to environmental data products” which they contributed to by “facilitating the expansion and further development of a successful regional concept” would clarify both the added value and role of GEO relative to contributors.

to the collection, management, sharing, and analysis of Earth observations. As

together many different contributors who, by collectively engaging in GEOSS implementation, can leverage one another's activities to effectively achieve their independent and common goals, delivering intended impacts. Many key

(2008). Land-Cover Observations as Part of a Global Earth Observation System of Systems (GEOSS): Progress, Activities, and Prospects. *IEEE Systems Journal*. 2 (3), pp. 414-423.



informants, survey respondents, and case study responses noted that with GEOSS came the interaction and collaboration of many groups – groups made up of nations, sectors, organizations, and individuals that may not have otherwise had an opportunity for partnerships and networking. The unique structure of GEOSS may have provided just the right framework to bring Members and Participating Organizations together and allow a high level of engagement without the need to form a binding agreement. The GEOSS framework, while intended to globally integrate observing systems, also integrates people, Members and Participating Organizations.

Key informants noted that GEOSS has stimulated new ways of working together, including the idea that there can be a sharing of data and resources with free and open access. As one peer-reviewed article stated: “From our research group’s perspective, the rationale for linking... to the GEOSS Common Infrastructure is largely self-interest. As new... GEOSS components and standards-based services will be registered by other systems,... [we] will be able to access and utilize those ‘for free’ and benefit from the ‘network effect’ made possible by the GEOSS service-sharing infrastructure.”⁹ The Team believes that GEOSS can expand on the unique concept of globally sharing data and resources and networking and integrating people and systems through better communication and marketing.

⁹ Husar R.B., Hoijarvi K., Falke S.R., Robinson E.M., Percivall G.S. (2008). DataFed: An architecture for federating atmospheric data for GEOSS. *IEEE Systems Journal*. 2 (3), pp. 366-373.



6. Key Findings

1. GEOSS represents an important new Earth observation community and network. GEOSS has raised visibility of the importance and need for integrated global Earth observations.
2. Current GEOSS implementation sufficiently reflects high-level ministerial priorities including those contained in the Cape Town Declaration.
3. Stakeholders are generally positive about the foundation that has been established and optimistic that appropriate outcomes are being realized.
4. GEOSS implementation has brought together various organizations and governments to collaborate and support integrated global Earth observations.
5. GEOSS implementation has created a path to enable full and open data sharing and lowered discussion barriers.
6. GEOSS implementation has resulted in positive outcomes for the Earth observation community, such as Data Sharing Principles.
7. GEO has not adequately communicated evidence of progress to show value-added results unique to the implementation of GEOSS and to unequivocally prove a positive return on investment.
8. Survey respondents had an overall “neutral” feeling towards the status of GEOSS development and implementation at this point.
9. Stakeholders perceive that architecture developed by GEO does not yet meet their needs for data, information, and tools.
10. Stakeholders are concerned about the sustainability of GEOSS with regard to (a) the voluntary nature of GEOSS implementation which has been beneficial up to this point for engaging partners; and, (b) the lack of sufficient resources, both financial and human to sustain efforts into the future.
11. Stakeholders indicated widely varying expectations for GEO and GEOSS, particularly as a source of new funding or a competing operational entity.
12. Some stakeholders view current GEO practices as co-opting achievements of contributors and giving them limited or no acknowledgement or credit.
13. GEO has not conducted a comprehensive gap analysis of either their implementation approach (structural) or observation needs (observational).
14. The GEOSS implementation approach does not explicitly describe an end-to-end process of how the application of resources supports the overall vision and goals of GEOSS, how or why benefits are expected, or when benefits will be achieved. Without this, it may be difficult for stakeholders to make well-informed decisions about supporting GEOSS.



7. Recommendations

RECOMMENDATIONS		
RECOMMENDATIONS	COMMENTS	SUPPORTING FINDINGS
Recommendation 1: GEO should develop a long-term strategy to ensure the sustainability of GEOSS beyond 2015.	One of the key priorities for GEOSS in the Cape Town Declaration was to ensure the sustainability of Earth observing capabilities. In order to be effective in this role, GEOSS itself must be sustained. The framework for GEOSS must enable the continued development and long-term operation of the Earth observation system of systems. As such, thought to GEOSS beyond 2015 should occur now. Consideration may be given to constraining the future scope of GEO Work Plan and focusing on the achievement of substantive outcomes.	▪ Key Finding #1, 2, 10 ▪ 3.4 Sustainability ▪ 4.5 Challenges Facing GEOSS Implementation ▪ 5.2 Need for Marketing
Recommendation 2: GEO must investigate alternative models for sustained resource commitments from Members and Participating Organizations which are necessary for current and future operations.	The evaluation found that both the voluntary nature of GEOSS and the inadequate and discontinuous funding are key factors that may ultimately limit the sustainability of GEOSS. In addition, it was found that a major problem with the sustainability of GEOSS appears to be the lack of sufficient resources, both financial and human. While much of the current progress to date can be attributed to the voluntary and non-binding nature of the GEOSS initiative, the evaluation found that leadership and commitment are needed to deliver GEOSS fully (including support to the Secretariat). As such, it may be time for GEO to investigate alternative models for sustained resource commitments to ensure a framework capable of providing effective incentives for translating “voluntary acceptance” into a priority “commitment to action.”	▪ Key Finding #10 ▪ 3.4 Sustainability ▪ 4.5 Challenges Facing GEOSS Implementation



RECOMMENDATIONS	COMMENTS	SUPPORTING FINDINGS
Recommendation 3: GEOSS implementation in the short-term should be guided by an explicit approach linking activities and outputs of the GEO Work Plan to measurable, achievable objectives and strategic targets. This can be accomplished through adopting a logic model and performance measurement strategy.	While it was found that the GEOSS Work Plan overarching tasks correspond to Strategic Target outcomes, without a recognized logic model, the current approach to building GEOSS is not transparent in how activities connect to Strategic Targets and the vision of GEOSS. Without a clearly defined and linked approach, it is difficult for participants at all levels to see how activities are contributing to progress of GEOSS implementation.	▪ Key Finding #14 ▪ 3.0 GEOSS Implementation Approach ▪ 3.2 Clearly Defined Implementation Approach
Recommendation 4: GEO should clarify its role as a supporting and enabling platform by facilitating and providing value through coordination among existing Earth observation systems and developing an information networks system.	The Evaluation Team discovered confusion about the role that GEO and GEOSS play in the Earth observations community. Comments from key informants, survey respondents, and even certain published literature reflect unfulfilled expectations rather than new unexpected developments arising because of GEOSS. The Evaluation Team believes that GEO would benefit from positioning itself as a supporting and enabling platform. GEO should work to facilitate the exchange of best practices and successful concepts between sectors of the Earth observation community in the anticipation that new partnerships will develop, rather than become a producer or broker of information.	▪ Key Finding #7, 11, 12 ▪ 4.3 Task Activity Progress ▪ 5.1 Misconceptions about GEO/GEOSS ▪ 5.2 Need for Marketing



RECOMMENDATIONS	COMMENTS	SUPPORTING FINDINGS
Recommendation 5: GEO must improve its efforts in communication and outreach through: a) Clarifying their purpose to the stakeholder community; b) Enhancing clarity and traceability of GEO processes; c) Providing evidence of value-added results through GEOSS, and; d) Engaging a wider audience beyond those directly involved in GEOSS implementation.	Greater effort is needed to reach a common understanding about GEOSS. Survey respondents expressed that one facet of GEOSS implementation that can use much improvement is the marketing and awareness of GEOSS. They would like to see improved communication and information sharing with the wider policy and end-user communities, especially about the purpose and added value of GEOSS, and also to define what GEOSS' unique contribution is to the Earth observation community. Finally, better advertisement of successful tasks (i.e. data sharing, GEONET-Cast), with identifiable impacts, might stimulate activity in other areas and aid in gaining further buy-in from Members and Participating Organizations.	▪ Key finding #7, 11 ▪ 5.2 Need for Marketing GEOSS
Recommendation 6: GEO should act to improve its understanding, engagement, and responsiveness to the user community by: a) undertaking a detailed characterization of its current users in order to strengthen and expand the user base; and, b) increasing opportunities for dialogue with the user community to provide helpful feedback on a timely basis.	The evaluation found that there needs to be more effort to incorporate the user component, as key informants felt that there were inconsistencies between what the users need and what the architecture provides. The inclusion of users in GEOSS development is an extremely important factor for fostering stakeholder buy-in and long-term success.	▪ Key Finding #7, 8, 9 ▪ 3.4 Sustainability



RECOMMENDATIONS	COMMENTS	SUPPORTING FINDINGS
Recommendation 7: GEO should conduct comprehensive observational and structural gap analyses as anticipated in the 10-Year Implementation Plan and Strategic Targets document.	Identification of gaps will enable the GEO community to effectively and strategically organize its activities to ensure that the set targets are achieved. The identification of gaps in the implementation framework will enable the GEO community to effectively and strategically organize its activities to ensure that the set targets are achieved. There is a clear indication from respondents that a process to identify gaps in GEOSS implementation is not documented or widely known. The Evaluation Team believes there are clear benefits to be gained from a common approach to gap analysis of GEOSS.	▪ Key Finding #9, 13 ▪ 3.3 Gap Identification
Recommendation 8: GEO should establish clear and consistent mechanisms for properly attributing contributions to eliminate the appearance of co-opting activities.	The evaluation found that there is a perception by key informants and survey respondents that GEO is co-opting achievements of contributors and giving limited or no acknowledgement or credit to Members and Participating Organizations. At this point in implementation, acknowledgement might be one of contributors' only immediate returns for integrating their systems into GEOSS.	▪ Key Finding #12 ▪ 5.1 Misconceptions about GEO/GEOSS



Annex 1

Evaluation Question Framework

Overarching Question	Major Divisions	Evaluation Questions	Specific Questions and lines of evidence		Indicator	Source
Is GEOSS Implementation progressing to meet 2015 expectations? (To what extent are expected outcomes of GEOSS being realized?)	Is GEOSS implementation guided by a clear plan to 2015?	Does the plan reflect the Cape Town priorities? (To what extent do the Strategic Targets (and the associated outcomes) adequately reflect the priorities and commitments in the Cape Town Declaration?)	Are target outcomes (Strategic Target Document) tied to goals (Cape Town priorities)?	1. Do both documents show a clear connection in descriptive language? 2. Are any goals overlooked by target outcomes or any target outcomes not represented in goals? 3. Do any key points appear in only one of the documents?	Text Comparison (including other documents as necessary /available)	Strategic Target Document and Cape Town Priorities
				Are the answers to the above questions confirmed or adequately accounted for by relevant GEOSS participants?	Explanation of relationship between targets and priorities	Interviews with Secretariat members and Target Task Team members
		Does the plan follow a logical progression to the task level?	Is there a logic model or statement of expected outcomes for GEOSS in a form that depicts the progression from GEOSS Tasks through expected outcomes at various levels and to the ultimate intended impacts of GEOSS?	Is there evidence in GEOSS documents of a model?	Specific presentation of a model in text or figure	GEOSS Document Review
				Is the answer to the above question confirmed or adequately accounted for by relevant GEOSS participants?	Description or Explanation of a model by GEOSS participants	Interviews with Secretariat members and Target Task Team (and Executive?)
			Are overarching tasks (work plan) tied to target outcomes (Strategic Target Document)? (To what extent are the Work Plan Tasks reflective of the actions required to achieve the Strategic Targets?)	1. Do both documents show a clear connection in descriptive language? 2. Are any target outcomes overlooked by overarching tasks or any overarching tasks not represented in target outcomes? 3. Do any key points appear in only one of the documents?	Text Comparison	Strategic Target Document and Work Plan
				Are the answers to the above questions confirmed or adequately accounted for by relevant GEOSS participants?	Explanation of relationship between tasks and targets	Interviews with Secretariat members and Target Task Team members
				Is the answer to the above question confirmed or adequately accounted for by other lines of evidence?	Additional evidence of relationship between tasks	Literature Review (Survey?)
		Are there important gaps in the plan?	Are there any major areas that the stakeholder community feels are missing from the GEOSS plan?	Is there evidence in internal or external documents provided to the evaluation team of gaps currently identified by stakeholders?	Specific critiques of GEOSS scope and plans	Document Review



Overarching Question	Major Divisions	Evaluation Questions	Specific Questions and lines of evidence		Indicator	Source
				Do the stakeholders themselves currently identify any gaps?	Specific critiques of GEOSS scope and plans	Survey
			Is there a process in place to identify and fill gaps?	Is there evidence in GEOSS documents for such an activity?	Description of plans for gap analysis	Document Review
				Is the answer to the above question confirmed or adequately accounted for by relevant GEOSS participants?	Description and documentation of plans for gap analysis	Interviews with Secretariat members
	Has the execution of GEOSS implementation been adequate to meet 2015 expectations?	Are activities contributing to the completion of overarching tasks? (To what extent are the Tasks being implemented as intended?)	Does the information in work plan progress reports show progress toward completion of work plan tasks?	Do the work plan progress reports indicate adequate progress for the majority of tasks?	Colors of Progress Reports (also change over time?)	Work Plan Progress Reports
				Do the activities described in the progress report match those expected in the work plan?	Comparison of planned and reported progress	Subset of Tasks in Work Plan and Work Plan Progress
				What other evidence or information is provided to	Additional evidence or	Interviews with Secretariat
		Are appropriate outcomes being realized?	What outcomes have been fulfilled to date?		Response to	Interviews with Secretariat and surveys of users
			Where is progress being made on anticipated outcomes?		Specific Claims	
			What are the challenges to progress?			
	Have there been any unintended outcomes and impacts of GEOSS implementation to date?	Have there been any unintended positive outcomes or impacts of GEOSS to date?	What do GEOSS participants identify as unintended positives?		Response to Question	Participant Interviews
			What do GEOSS stakeholders identify as unintended positives?		Response to Question	User Survey
			What do internal documents identify as unintended positives?		Specific Claims	Document Review
			What do external documents identify as unintended positives?		Specific Claims	Literature Review
		Have there been any unintended negative outcomes or impacts of GEOSS to date?	What do GEOSS participants identify as unintended negatives?		Response to Question	Participant Interviews
			What do GEOSS stakeholders identify as unintended negatives?		Response to Question	User Survey
			What do internal documents identify as unintended negatives?		Specific Claims	Document Review
			What do external documents identify as unintended negatives?		Specific Claims	Literature Review



Annex 2

Evaluation Methodology

During the midterm evaluation, the Team drew data from various key data sources. The analysis used data from GEO documents, the Earth observation community, and from interviews, surveys, and case studies conducted by the Team.

Key Data Sources

The Team reviewed and compared various internal and external documents during the midterm evaluation. The following is a limited list of data examined. To view a full listing of articles included in the literature review, see Annex 3.

- GEO documents including the Strategic Targets document, Ten-Year Implementation Plan, Work Plans and Task Sheets, GEO Work Plan Progress Reports, and meeting reports from the GEO Plenary sessions, Executive Committee and other GEO Committee meetings;
- External (non-GEO) documents including external audits, reviews, and comprehensive program evaluations relevant to the assessment of Task implementation;
- External literature, including professional publications, journals, presentations, and statements that make references to GEOSS and GEO; and
- Earth observation community opinions collected via methods described below.

Data Collection and Analysis Methods

The evaluation approach addressed the evaluation questions through several

lines of textual evidence. In addition, guided by the Evaluation Question Framework, data was collected directly from stakeholder communities for analysis. In depth document analysis and additional data collection methods including analysis approach are described below.

Web-Accessible Survey

A Web-accessible survey was created in order to gather feedback from a wide range of respondents about the implementation progress of GEOSS as this was seen as the most efficient mechanism to reach a large pool of respondents. The intention was to distribute the survey through a combination of promotional activities including electronic messaging and in-person solicitation of participants at meetings and conferences. However, time and budget constraints limited opportunities to effectively bring the survey directly to respondents. Instead, the Team invited access to the survey through presentations to GEO committees and emails to targeted audiences as well as through online outlets and social networking sites. Attempts were made to promote the survey through scientific and Earth observation media outlets with minimal success; again, time was a limiting factor.

In total, 202 surveys were fully completed. In addition, responses from 126 partially completed surveys contributed to the available data. GEOSS target populations do not have a known estimated size. Therefore, it was impossible to determine whether the survey



sample size was suitable for quantitative statistical analysis.

Demographic questions were included in the survey to allow for possible response comparisons among sub-sets of the Earth observation community. The initial set of demographic questions filtered respondents into four major categories:

- GEOSS Participants – all Secretariat staff, committee members, plenary representatives, and other individuals who have been involved in the design and implementation of GEOSS;
- GEOSS Users or Contributors – anyone associated with the SBA or Transverse Areas that has interacted with GEO/GEOSS, but is not a participant;
- No Role – any person associated with the SBA or Transverse Areas, but not connected to GEOSS; and
- Non-Users – all other respondents who have no affiliation with GEOSS subject matter but found their way to the survey. These respondents were directed to the closing comment box and did not figure into further analysis.

The survey demographics showed approximately 50% of respondents identified themselves as GEOSS Participants, 25% as No Role, and 25% as GEOSS Users or Contributors. A modular set of questions, from basic to in-depth, was developed to engage all of the respondent types. Questions were stacked with the most basic questions given first then more specialized questions were added for respondents in the “User” and “Participant” populations. The survey

used by the Team can be found in Annex 4.

Data analysis using Microsoft Excel was conducted once the survey was closed. For open-ended questions, responses were grouped into recurring concepts and themes. The Team attempted to generate a single set of themes when two or more survey questions were directly related. Trends and patterns of opinion were extracted to support findings in the report where appropriate. The survey employed a variety of question types including numerical ranking, pre-determined response selection, and free responses. The analyses of these various question types allowed some trends to be reported numerically but restricted others to qualitative results.

Key Informant Interviews

To gain detailed insight into how the Earth observation community views the implementation progress of GEOSS, the Team conducted key informant interviews. Interviews were held in-person or over the phone with various members of the GEO Community including GEO Secretariat experts, members of GEO’s decision making bodies, GEO Committees and Task Teams, and members of the user community, including Communities of Practice. Each Team member worked within their respective professional networks to identify interviewee candidates. To ensure balanced representation of opinions, the Team made every effort to identify interviewee candidates from as many GEO member countries and with as broad range of perspectives and opinions as possible. However, it was difficult to achieve complete global coverage with limited resources and time.



The interview candidate list was extensive after initial consolidation of interviewee nominations from the Team members. The list was then filtered by prioritizing a select group with the most knowledge about GEOSS while taking into account geographic representation. Individuals who were not on the priority interview list were sent the GEOSS evaluation survey via email for an opportunity to capture their opinions about GEOSS implementation. In total, 75 interviews were conducted in-person or over the phone by the Team.

Potential interviewees received a notification email from the GEO Secretariat and an email interview invitation followed from a Team member. A copy of the interview guide including questions and links to key GEO documents for easy reference was included in the email interview invitation. Interviewees were informed of the purpose of the interview and how their responses would be used in the evaluation. The Interview Guide used by the Team can be found in Annex 4. Although personally identifiable information was collected, all data recorded during the interview was held in complete confidence. No names were associated with individual interview responses and paper documents containing identifiable information were destroyed following finalization of the report.

The Team grouped open-ended responses into recurring concepts and themes. Responses were quantified to examine trends and patterns of opinion. Microsoft Excel was used for calculations and display. The interview form employed a variety of question types

including numerical ranking, pre-determined response selection, and free responses. The analyses of these various question types allowed some trends to be reported numerically but restricted others to qualitative results.

Task Case Studies

The Team decided to select a small group of individual tasks for analysis in order to develop a better understanding of activities within Strategic Target areas. Because of a desire to cover all areas of GEOSS, while recognizing that comprehensive analysis of activities is better suited to subsequent, narrow-focus evaluations, the Team limited the analysis to one sub-task within each of the 14 SBA and Transverse Areas. The individual sub-tasks selected became the “task case studies.” Sub-tasks were selected for case study analysis based on a variety of inputs: alignment with Strategic Targets, Secretariat progress reports, and relevance to the Cape Town priorities and confirmations. Selections were subjective and chosen to obtain a broad view of the tasks contributing to GEOSS, highlight key implementation activities, and develop insights about both catalysts of and challenges to success. The following sub-tasks were selected for case study analysis¹:

- Architecture: AR-09-04a
GEONTeamCast
- Data Management: DA-06-01
GEOSS Data Sharing Principles

¹ Tasks selected in the categories of Data Management, Science and Technology, Health, Energy, and Weather did not have associated sub-tasks but were functionally equivalent to sub-tasks selected in other categories.



- Capacity Building: CB-09-05a Open Source Software
- Science and Technology: ST-09-02 Promoting Awareness and Benefits of GEO in the Science and Technology Community
- User Engagement: US-09-01a Identifying Synergies between Societal Benefit Areas
- Disasters: DI-09-03a Tsunami Early Warning System of Systems
- Health: HE-09-01 Information Systems for Health
- Energy: EN-07-01 Management of Energy Sources
- Climate: CL-09-03a Integrated Global Carbon Observation (IGCO)
- Water: WA-08-01e Water Cycle Data Integration
- Weather: WE-06-03 TIGGE and the Development of a Global Interactive Forecast System for Weather
- Ecosystems: EC-09-01b Ecosystem Functions and Services
- Agriculture: AG-07-03a Global Agricultural Monitoring System
- Biodiversity: BI-07-01a Biodiversity Observation Network

The Team developed a general guide to gather task case study data that included: soliciting feedback from task leads, task contributors, and relevant Secretariat experts; reviewing task sheets and Work Plan Progress Reports; and reviewing other task reports and documentation including task-specific web sites. Responsibility for completing the case studies was assigned to individual team members based on experience, interest, and availability. Individual methods varied,

but yielded responses for 12 of the 14 selected sub-tasks².

Individual team members were responsible for extracting main points from each of the data sources and then creating a short description about task progress. One team member then created a document containing general findings and highlights (included in Annex 5). Examples from the task case studies have been incorporated in the midterm report where appropriate.

Overarching Task to Strategic Target Comparison

The Team wanted to determine the extent to which Work Plan tasks are reflective of the actions required to achieve the Strategic Target outcomes. A matrix was established for each of the GEOSS SBA and Transverse Areas with overarching tasks along the horizontal axis and Strategic Target outcomes along the vertical. Team members were then asked to mark the cells for which the overarching task reflected the outcome. The number of team members assigned to each SBA or Transverse Area varied as shown in the following table.

² The two areas that did not return any responses were disasters and water.



SBA/Transverse Area	AR	DA	CB	ST	US	AG	BI	CL	DI	EC	EN	HE	WA	WE
# of Team members assigned	3	3	2	3	4	3	3	3	2	4	3	3	2	2

AR=Architecture; DA=Data Management; CB= Capacity Building; ST= Science and Technology; US=User Engagement; AG=Agriculture; BI=Biodiversity; CL=Climate; DI=Disasters; EC=Ecosystems; EN=Energy; HE=Health; WA=Water; WE=Weather

Team members looked for textual evidence as an indication to whether the overarching tasks directly or indirectly addressed the Strategic Target outcomes. A certain degree of subjectivity was inevitable and there were varied ratings of certain task and outcome pairings amongst the reviewers. In order to synthesize the data, the following characterization between task and outcome was used:

- Green = Task directly addresses outcome = Majority of reviewers found the task to address the outcome;
- Yellow = Task indirectly addresses outcome = Half or less of reviewers found the task to address the outcome;
- Red = Outcome not addressed by task = None of the reviewers found match between task and outcome.

Greens, yellows, and reds were tallied and analysis results have been included in the midterm report where applicable.

Work Plan Progress Report Analysis

In order to determine progress of GEOSS implementation, the Team reviewed progress reports from the Fourth, Fifth, and Sixth Plenary Sessions of GEO (GEO IV, GEO V, and GEO VI). The Work Plan Progress Reports correspond to the years 2007, 2008, and 2009. In the GEO IV Work

Plan Progress Report there were 76 tasks and in the GEO V Progress Report there were 73. Tasks were then condensed into 42 overarching tasks in the GEO VI Work Plan Progress Report. The Team discovered that it was difficult to trace the history of specific tasks because the total number of tasks changed from one year to the next. Also, when the Work Plan was restructured between GEO V and GEO VI, many tasks were removed, consolidated, merged, or completed.

In order to complete analysis, progress report “grades” were compiled for all tasks in the GEO IV, V, and VI Progress reports. In the reports, the GEO Secretariat experts rated tasks green, yellow, or red. Green represented that the Secretariat judged task progress to be very good to excellent. Yellow represented that tasks were progressing but more effort was required. Red represented that the Secretariat judged task progress as insufficient or that the task was inactive.

Greens, yellows, and reds were then tallied overall for each annual report and broken down by SBA/Transverse Area. Numeric “weights” were then assigned to each color to quantify progress. The weights assigned were: Green = 5, Yellow = 3, Red = 1. Analysis results were added to the evaluation report as evi-



dence of GEOSS implementation progress.

Literature Review Analysis

Bibliographic search tools were used to generate a list of GEOSS-related literature. The list was then filtered by titles, abstracts, and keywords for relevance to the Evaluation Question Framework to create a list of priority items for analysis. Team members coordinated collection of literature items through open access and institutional resources. A literature review question guide was created for team members to use as they read the literature. Team members were assigned several items apiece to review and were asked to complete a question guide for each source. For a full list of literature reviewed during the midterm evaluation, see Annex 3.

All completed question guide forms were reviewed in the writing of the report. Where appropriate, examples from the literature were cited as evidence to support the Team's evaluation of GEOSS implementation progress.



Annex 3

Documents Consulted

GEO Documents

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Images

Front and Back Cover

MODIS map of Earth, July 11, 2005. Credit: NASA Earth Observatory; Wikimedia Commons.

Front Cover Triangles (clockwise from top left)

Dry earth in the Sonora desert, Mexico. Credit: Tomas Castelazo; Wikimedia Commons.

Wind turbines generate power at the US Department of Agriculture-Agricultural Research Service, Conservation and Production Research Laboratory in Bushland, Texas. Credit: Scott Bauer; USDA-ARS.

Technician Dara Parker and John Anderson, manager of the Long-Term Ecological Research (LTER) Network site, reset weather recording equipment used in Jornada Range. Credit: Peggy Greb; US Department of Agriculture-Agricultural Research Service.

Site of the 90-square-mile Reynolds Creek Experimental Watershed in the Owyhee Mountains about 50 miles southwest of Boise, Idaho. Credit: Scott Bauer; US Department of Agriculture-Agricultural Research Service.

Aedes (Ochlerotatus) sp. mosquito on human skin. Credit: US Department of Agriculture-Agricultural Research Service.

Cloud Height Maps for Hurricanes Frances and Ivan Description. Credit: NASA Jet Propulsion Laboratory (NASA-JPL).



Back Cover Triangles (clockwise from top left)

Severe Drought, Majuro, Marshall Islands. Credit: Angel Santiago; US Federal Emergency Management Agency.

Birds along the Chesapeake Bay. Credit: Scott Bauer; US Department of Agriculture-Agricultural Research Service.

Catfish ready for harvest. Credit: Peggy Greb; US Department of Agriculture-Agricultural Research Service.

Aerial view of apple and pear orchards near Yakima, Washington. Credit: Brian Prechtel; US Department of Agriculture-Agricultural Research Service.

Sahara dust over Caribbean. Credit: NOAA/NESDIS Operational Significant Event Imagery.

Arctic ice flows. Credit: Peter West; US National Science Foundation.



Annex 4

Data Collection Tools



Survey Questionnaire

Global Earth Observation System of Systems Evaluation Survey

Acknowledgment and Consent

Voluntary Participation

Your participation in the midterm evaluation survey is entirely voluntary. It is your choice to participate or not. Once you start the survey, if you feel uncomfortable or you change your mind for any reason, you may leave the survey unfinished.

Confidentiality

The Evaluation Team will maintain the confidentiality of any information about you and information that you share. We will not be sharing information with anyone outside of the Evaluation Team and any information collected from this survey will be kept completely private.

Duration

The length of the survey will vary depending on your responses to certain questions. We estimate the average respondent will require approximately 20 minutes, but may last longer depending on your previous involvement with GEO/GEOSS and the depth of your responses. And, if any further clarification is needed, the Evaluation Team may follow-up via email at a later date.

The Midterm Evaluation Report

Any findings from the midterm evaluation survey will be presented collectively in our midterm evaluation report. Our report will be presented at the 2010 Ministerial Summit in Beijing, China.

Disclaimer

The claims and views expressed or implied in this survey and any opinions, findings, conclusions, or recommendations derived from the survey are those of the GEOSS Evaluation Team members and do not necessarily reflect the views of GEO member governments, participating organizations, or their representatives in the GEO process.

Contact

If you have any questions or concerns once the survey is complete, please contact Evaluation Team member John Adamec by email at john.adamec@noaa.gov.

By completing the survey, I acknowledge that I have read, understood and agreed to the above terms of the survey.



First, we would like to learn some information about you.

1. Are you familiar with either or both GEO or GEOSS?

- ☐ Yes
☐ No

2. The list below represents the 14 Strategic Target Areas in GEOSS. Even if you are unfamiliar with GEO and GEOSS, which of the following categories describe fields in which you are personally involved?

Involvement could include, but is not limited to, such things as research, management, policy making, education, etc.

- | | | | |
|---------------------------------------|----------------------------------|--|---|
| ☐ Agriculture | ☐ Energy | ☐ Earth Observation Architecture | ☐ Earth Observation Science and Technology |
| ☐ Biodiversity | ☐ Health | ☐ Earth Observation Data Management | ☐ Earth Observation User Engagement |
| ☐ Climate | ☐ Water | ☐ Earth Observation Capacity Building | ☐ None of the Above [Skip to Part IV] |
| ☐ Disasters | ☐ Weather | | |
| ☐ Ecosystems | | | |

3. In which country do you conduct the largest part of your activities related to the GEOSS Strategic Area(s) you identified in Question 3? If your activities take place in international oceanic or Polar Regions, please select the country of your supporting institution.

- | | | | | | | |
|--|---|---|--|---|--|---|
| ☐ Afghanistan | ☐ Cameroon | ☐ Equatorial Guinea | ☐ Japan | ☐ Monaco | ☐ Russian Federation | ☐ Tajikistan |
| ☐ Albania | ☐ Canada | ☐ Eritrea | ☐ Jordan | ☐ Mongolia | ☐ Rwanda | ☐ Thailand |
| ☐ Algeria | ☐ Cape Verde | ☐ Estonia | ☐ Kazakhstan | ☐ Montenegro | ☐ Saint Kitts and Nevis | ☐ The former Yugoslav Republic of Macedonia |
| ☐ Andorra | ☐ Central African Republic | ☐ Ethiopia | ☐ Kenya | ☐ Morocco | ☐ Saint Lucia | ☐ Timor Leste |
| ☐ Angola | ☐ Chad | ☐ Fiji | ☐ Kiribati | ☐ Mozambique | ☐ Saint Vincent and the Grenadines | ☐ Togo |
| ☐ Antigua and Barbuda | ☐ Chile | ☐ Finland | ☐ Kuwait | ☐ Myanmar | ☐ Samoa | ☐ Tonga |
| ☐ Argentina | ☐ China | ☐ France | ☐ Kyrgyzstan | ☐ Namibia | ☐ San Marino | ☐ Trinidad and Tobago |
| ☐ Armenia | ☐ Colombia | ☐ Gabon | ☐ Lao People's Democratic Republic | ☐ Nauru | ☐ Sao Tome and Principe | ☐ Tunisia |
| ☐ Australia | ☐ Comoros | ☐ Gambia | ☐ Latvia | ☐ Nepal | ☐ Saudi Arabia | ☐ Turkey |
| ☐ Austria | ☐ Congo (Republic of the) | ☐ Georgia | ☐ Lebanon | ☐ Netherlands | ☐ Senegal | ☐ Turkmenistan |
| ☐ Azerbaijan | ☐ Costa Rica | ☐ Germany | ☐ Lesotho | ☐ New Zealand | ☐ Serbia | ☐ Tuvalu |
| ☐ Bahamas | ☐ Côte d'Ivoire | ☐ Ghana | ☐ Liberia | ☐ Nicaragua | ☐ Seychelles | ☐ Uganda |
| ☐ Bahrain | ☐ Croatia | ☐ Greece | ☐ Libya | ☐ Niger | ☐ Sierra Leone | ☐ Ukraine |
| ☐ Bangladesh | ☐ Cuba | ☐ Grenada | ☐ Liechtenstein | ☐ Nigeria | ☐ Singapore | ☐ United Arab Emirates |
| ☐ Barbados | ☐ Cyprus | ☐ Guatemala | ☐ Lithuania | ☐ Norway | ☐ Slovakia | ☐ United Kingdom |
| ☐ Belarus | ☐ Czech Republic | ☐ Guinea | ☐ Luxembourg | ☐ Oman | ☐ Slovenia | ☐ United Republic of Tanzania |
| ☐ Belgium | ☐ Democratic Republic of the Congo | ☐ Guinea-Bissau | ☐ Madagascar | ☐ Pakistan | ☐ Solomon Islands | ☐ United States |
| ☐ Belize | ☐ Democratic People's Republic of Korea | ☐ Guyana | ☐ Malawi | ☐ Palau | ☐ Somalia | ☐ Uruguay |
| ☐ Benin | ☐ Democratic Republic of the Congo | ☐ Haiti | ☐ Malaysia | ☐ Panama | ☐ South Africa | ☐ Uzbekistan |
| ☐ Bhutan | ☐ Denmark | ☐ Honduras | ☐ Maldives | ☐ Papua New Guinea | ☐ Spain | ☐ Vanuatu |
| ☐ Bolivia | ☐ Djibouti | ☐ Hungary | ☐ Mali | ☐ Paraguay | ☐ Sri Lanka | ☐ Venezuela |
| ☐ Bosnia and Herzegovina | ☐ Dominica | ☐ Iceland | ☐ Malta | ☐ Peru | ☐ Sudan | ☐ Viet Nam |
| ☐ Botswana | ☐ Dominican Republic | ☐ India | ☐ Marshall Islands | ☐ Philippines | ☐ Swaziland | ☐ Yemen |
| ☐ Brazil | ☐ Ecuador | ☐ Indonesia | ☐ Mauritania | ☐ Poland | ☐ Switzerland | ☐ Zambia |
| ☐ Brunei Darussalam | ☐ Egypt | ☐ Iran | ☐ Mauritius | ☐ Portugal | ☐ Sweden | ☐ Zimbabwe |
| ☐ Bulgaria | ☐ El Salvador | ☐ Iraq | ☐ Mexico | ☐ Qatar | ☐ Syria | |
| ☐ Burkina Faso | | ☐ Ireland | ☐ Micronesia (Federated States of) | ☐ Republic of Korea | | |
| ☐ Burundi | | ☐ Israel | | ☐ Republic of Moldova | | |
| ☐ Cambodia | | ☐ Italy | | ☐ Romania | | |
| | | ☐ Jamaica | | | | |



4. Which of these terms best describes your primary activity in the GEOSS Strategic Area(s) you identified in Question 2?

- ☐ Science/Research ☐ Public Administration ☐ Information Technologies ☐ Decision Support
☐ Research Administration ☐ Policy ☐ Education and Outreach

5. Which of these terms best describes the body through which you are involved in the GEOSS Strategic Areas identified in Question 2?

- ☐ State or Local Government ☐ National Government ☐ Academic Institution
☐ Private Entity ☐ Intergovernmental Body
☐ Non-Governmental Organization ☐ Individual

6. How are your current activities in the GEOSS Strategic Target Area(s) you identified in Question 2 funded?

- ☐ Entirely Public Funds ☐ Mostly Public Funds ☐ Even Mix of Sources
☐ Entirely Private Funds ☐ Mostly Private Funds ☐ Unfunded

7. What, if any, is your primary relationship to GEO/GEOSS?

- ☐ GEO/GEOSS Participant (Plenary Representative, Task Participant, Secretariat Staff, etc.) [Complete Parts I, II, III and IV]
☐ GEOSS User [Complete Parts I, II and IV]
☐ No Role [Complete Part I and IV]

Part I

The following questions are about your relationship to data, information, and tools.

Considering any and all of your activities in the GEOSS Strategic Areas previously indicated...

8. How often do you...

	Always	Sometimes	Never	Unsure
make personally generated data, information, and tools publicly available?	☐	☐	☐	☐
use data, information, and tools that you have not personally generated?	☐	☐	☐	☐

9. If you make personally generated data, information, and tools publicly available, what outlets do you most often use?

OR

If you do not make personally generated data, information, and tools publicly available, why not?



10. If you use data, information, and tools that you have not personally generated, what sources do you most often use?

OR

If you do not use data, information, and tools that you have not personally generated, why not?

The following questions are about your relationship to the Earth Observation community.

11. Are you a member of any professional societies or organizations related to the Earth observation community? (If a member of more than 5 relevant organizations, please list the top five by level of involvement.)

1 _____

2 _____

3 _____

4 _____

5 _____

12. Have you participated in capacity building activities related to Earth Observations?

Capacity building in this context refers to increasing the ability of individuals, groups, or institutions, especially those in developing nations, to access, generate, and utilize Earth observations.

☐ Yes

☐ No

If so, please describe the activity:

13. How active do you consider yourself in service to the Earth Observation Community?

A Great Deal	2	Moderately	4	Not at All	Unsure
☐	☐	☐	☐	☐	☐

14. Please describe briefly your main service to the Earth observation community, if any.

End of Part I.



Part II

The following questions are about your interactions with GEOSS.

15. How often do you...?

	Always	2	Sometimes	4	Never	Unsure
use GEOSS to access data, information, or tools?	☐	☐	☐	☐	☐	☐
contribute data, information, or tools to GEOSS components?	☐	☐	☐	☐	☐	☐
make use of GEOSS interoperability standards?	☐	☐	☐	☐	☐	☐

16. Have you contributed to the development of the GEOSS Common Infrastructure or Data Sharing Principles?

- ☐ Data Sharing Principles
- ☐ GEOSS Common Infrastructure
- ☐ None of the Above

17. Do you currently or have you previously participated in a GEO Community of Practice?

- | | | |
|---|-------------------------------------|---|
| ☐ Air Quality and Health | ☐ Cryosphere | ☐ Global Agricultural Monitoring |
| ☐ Atmospheric Chemistry | ☐ Energy | ☐ Water Cycle |
| ☐ Biodiversity | ☐ Forests | ☐ None of the Above |
| ☐ Carbon Cycle | ☐ Geohazards | |
| ☐ Coastal Zone | | |

The following questions are about the outcomes of interacting with GEOSS.

18. How often does your use of GEOSS contribute to...?

	Always	2	Sometimes	4	Never	Unsure
fundamental scientific research	☐	☐	☐	☐	☐	☐
predictive model development	☐	☐	☐	☐	☐	☐
management decisions	☐	☐	☐	☐	☐	☐
policy decisions	☐	☐	☐	☐	☐	☐
education and outreach	☐	☐	☐	☐	☐	☐

19. If possible, please provide an example of GEOSS' contribution to your response in Question 18.



20. To what extent has your interaction with GEOSS contributed to...

	A Great Deal	2	Moderately	4	Not at All	Unsure
informed decision making?	☐	☐	☐	☐	☐	☐
your capacity to generate and use data, information, and tools?	☐	☐	☐	☐	☐	☐

21. What unexpected outcomes have come from your interaction with GEOSS, if any?

Unexpected positive outcomes

Unexpected negative outcomes

The following questions are about your perception of GEOSS as it exists today.

22. How do you rate the...

	Very Good	2	Neutral	4	Very Poor	Unsure
accessibility of GEOSS data, information, and tools?	☐	☐	☐	☐	☐	☐
interoperability of GEOSS data, information, and tools?	☐	☐	☐	☐	☐	☐
timeliness of GEOSS data, information, and tools?	☐	☐	☐	☐	☐	☐
availability of GEOSS data, information, and tools?	☐	☐	☐	☐	☐	☐
overall status of GEOSS for this point in development and implementation?	☐	☐	☐	☐	☐	☐

23. What components of GEOSS do you find...?

are the most useful?

Could use the most improvement?



24. What changes would you make to improve the usefulness of GEOSS?

25. Are any important pieces (subject areas, components, goals) missing from GEOSS?

26. To what extent do you feel...

	A Great Deal	2	Moderately	4	Not at All	Unsure
you understand the purpose of GEOSS?	☐	☐	☐	☐	☐	☐
GEOSS is responding to your needs for data, information, or tools?	☐	☐	☐	☐	☐	☐
your needs are represented in GEOSS development and governance?	☐	☐	☐	☐	☐	☐

End of Part II



Part III

The following questions are about your participation in GEOSS.

27. What is your current affiliation (member government, participating organization, or observer) for participation in GEOSS?

- | | | | | |
|--|--|---|--|--|
| ☐ Other | ☐ Luxembourg | ☐ APN: Asia-Pacific Network for Global Change Research | ☐ FDSN: Federation of Digital Broad-Band Seismograph Networks | ☐ ISDE: International Society for Digital Earth |
| ☐ GEO Secretariat | ☐ Madagascar | ☐ CATHALAC: Water Center for the Humid Tropics of Latin America and the Caribbean | ☐ GBIF: Global Biodiversity Information Facility | ☐ ISDR: International Strategy for Disaster Reduction |
| ☐ Algeria | ☐ Malaysia | ☐ CEOS: Committee on Earth Observation Satellites | ☐ GCOS: Global Climate Observing System | ☐ ISPRS: International Society for Photogrammetry and Remote Sensing |
| ☐ Argentina | ☐ Mali | ☐ CGMS: Coordination Group for Meteorological Satellites | ☐ GEBCO: General Bathymetric Chart of the Oceans | ☐ IUGS: International Union of Geological Sciences |
| ☐ Australia | ☐ Malta | ☐ CMO: Caribbean Meteorological Organization | ☐ GLOBE: Global Learning and Observations to Benefit the Environment | ☐ OGC: Open Geospatial Consortium |
| ☐ Austria | ☐ Mauritius | ☐ COSPAR: Committee on Space Research | ☐ GOOS: Global Ocean Observing System | ☐ POGO: Partnership for Observation of the Global Ocean |
| ☐ Bahrain | ☐ Mexico | ☐ DANTE: Delivery of Advanced Network Technology to Europe | ☐ GSDI: Global Spatial Data Infrastructure | ☐ SICA/CCAD: Central American Commission for the Environment and Development |
| ☐ Bangladesh | ☐ Moldova | ☐ DIVERSITAS | ☐ GTOS: Global Terrestrial Observing System | ☐ SOPAC: South Pacific Applied Geoscience Commission |
| ☐ Belgium | ☐ Morocco | ☐ ECMWF: European Centre for Medium-Range Weather Forecasts | ☐ IAG: International Association of Geodesy | ☐ START: SysTem for Analysis, Research and Training |
| ☐ Belize | ☐ Nepal | ☐ EEA: European Environmental Agency | ☐ ICIMOD: International Centre for Integrated Mountain Development | ☐ UNCBD: United Nations Convention on Biodiversity |
| ☐ Bolivia | ☐ Netherlands | ☐ eGY: Electronic Geophysical Year | ☐ ICSU: International Council for Science | ☐ UNECA: United Nations Economic Commission for Africa |
| ☐ Brazil | ☐ New Zealand | ☐ EIS-AFRICA: Environmental Information Systems - AFRICA | ☐ IEEE: Institute of Electrical and Electronics Engineers | ☐ UNEP: United Nations Environment Programme |
| ☐ Cameroon | ☐ Niger | ☐ ESA: European Space Agency | ☐ IGBP: International Geosphere-Biosphere Program | ☐ UNESCO: United Nations Educational, Scientific and Cultural Organization |
| ☐ Canada | ☐ Nigeria | ☐ ESEAS: European Sea Level Service | ☐ IGFA: International Group of Funding Agencies for Global Change Research | ☐ UNFCCC: United Nations Framework Convention on Climate Change |
| ☐ Central African Republic | ☐ Norway | ☐ ESIP: Federation of Earth Science Information Partners | ☐ IHO: International Hydrographic Organization | ☐ UNITAR: United Nations Institute for Training and Research |
| ☐ Chile | ☐ Pakistan | ☐ EUMETNET: Network of European Meteorological Services/Composite Observing System | ☐ IIASA: International Institute for Applied Systems Analysis | ☐ UNOOSA: United Nations Office for Outer Space Affairs |
| ☐ China | ☐ Panama | ☐ EUMETSAT: European Organization for the Exploitation of Meteorological Satellites | ☐ IISL: International Institute for Space Law | ☐ UNU-EHS: United Nations University, Institute for Environment and Human Security |
| ☐ Congo, Republic of the | ☐ Paraguay | ☐ EuroGeoSurveys: The Association of the Geological Surveys of the European Union | ☐ INCOSE: International Council on Systems Engineering | ☐ WCRP: World Climate Research Programme |
| ☐ Costa Rica | ☐ Peru | ☐ FAO: Food and Agriculture Organization of the United Nations | ☐ IO3C: International Ozone Commission | ☐ WFP: World Federation of Public Health Associations |
| ☐ Croatia | ☐ Philippines | | ☐ IOC: Intergovernmental Oceanographic Commission | ☐ WMO: World Meteorological Organization |
| ☐ Cyprus | ☐ Portugal | | ☐ ISC: International Seismological Centre | |
| ☐ Czech Republic | ☐ Romania | | ☐ ISCGM: International Steering Committee for Global Mapping | |
| ☐ Denmark | ☐ Russian Federation | | | |
| ☐ Egypt | ☐ Slovakia | | | |
| ☐ Estonia | ☐ Slovenia | | | |
| ☐ European Commission | ☐ South Africa | | | |
| ☐ Finland | ☐ Spain | | | |
| ☐ France | ☐ Sudan | | | |
| ☐ Germany | ☐ Sweden | | | |
| ☐ Greece | ☐ Switzerland | | | |
| ☐ Guinea, Republic of | ☐ Thailand | | | |
| ☐ Guinea-Bissau | ☐ The Bahamas | | | |
| ☐ Honduras | ☐ Tunisia | | | |
| ☐ Hungary | ☐ Turkey | | | |
| ☐ Iceland | ☐ Uganda | | | |
| ☐ India | ☐ Ukraine | | | |
| ☐ Indonesia | ☐ United Kingdom | | | |
| ☐ Iran | ☐ United States | | | |
| ☐ Ireland | ☐ Uzbekistan | | | |
| ☐ Israel | ☐ AARSE: African Association of Remote Sensing of the Environment | | | |
| ☐ Italy | ☐ ADIE: Association for the Development of Environmental Information | | | |
| ☐ Japan | | | | |
| ☐ Kazakhstan | | | | |
| ☐ Korea, Republic of | | | | |
| ☐ Latvia | | | | |



28. How long have you participated in GEOSS?

- | | |
|---|--|
| ☐ Less than 1 Year | ☐ 3 Years to less than 5 Years |
| ☐ 1 Year to less than 3 Years | ☐ 5 Years or Longer |

29. What positions/roles have you had in GEOSS? Please identify all current and prior positions.

- | | |
|--|--|
| ☐ Ministerial Representative | ☐ Working Group or Committee Chair |
| ☐ Executive Committee | ☐ Working Group or Committee Member |
| ☐ Secretariat Staff | ☐ Task Lead |
| ☐ Plenary Representative | ☐ Task Participant |
| ☐ Other, please specify _____ | |

The following questions are about your opinion of GEOSS.

30. What are the three most important accomplishments of GEOSS to date?

- 1 _____
- 2 _____
- 3 _____

31. What are the three greatest challenges that GEOSS has overcome to date?

- 1 _____
- 2 _____
- 3 _____

32. What are currently the three most important objectives for GEOSS implementation?

- 1 _____
- 2 _____
- 3 _____



33. What are currently the three greatest challenges to GEOSS implementation?

1 _____

2 _____

3 _____

34. How do you rate...

	Very Good	2	Neutral	4	Very Poor	Unsure
GEOSS progress toward the objectives you identified in Question 32?	☐	☐	☐	☐	☐	☐
GEOSS progress toward its Strategic Targets for 2015?	☐	☐	☐	☐	☐	☐
the communication within GEOSS, especially between committees, task teams, and other implementation groups?	☐	☐	☐	☐	☐	☐
the cooperation of members and participating organizations in the implementation of GEOSS?	☐	☐	☐	☐	☐	☐

35. Do you have any additional opinions regarding GEOSS that you would like to share with the evaluation team?

End Part III



Part IV

Please use the box below to record any thoughts, comments or suggestions that were not already captured regarding GEOSS or this survey form.

Optional: Based on your responses we may desire to ask you additional questions. By providing a name and email address below you will enable the evaluation team to make the most of your valuable input. *(Your personal information will not be associated with your responses in any results from this survey. Your personal information will not be shared with anyone outside the Evaluation Team.)*

Name _____

Email _____

GEOSS MIDTERM EVALUATION INTERVIEW GUIDE

As I've explained, an Evaluation Team has been tasked with conducting the first midterm GEOSS evaluation. The purpose of this interview is to obtain your views on GEOSS planning, implementation, and progress that has been made thus far.

The guide I am using contains a series of interview questions. I want to remind you that you are not required to answer any questions that you cannot or choose not to address. Just let me know that you would like to skip the question and I will move onto the next one on my list. Any information you provide will remain anonymous and none of your responses will be associated with you in our midterm evaluation report.

Our analysis of midterm evaluation interviews will examine trends and patterns of opinion. Once we complete all our interviews and other data collection, our midterm evaluation report will be presented to the Ministers at the next Ministerial Summit in China.

In order to keep track of what has been said, I will be taking notes as we talk. All interview notes will be destroyed at the end of the midterm evaluation. If there is ever any information that you would prefer I did not document in my notes, please just let me know.

Do you have any questions before we begin?



I. First off, I'd like you to ask you about your involvement with GEOSS...

1. How long have you been involved with GEOSS?

2. In which of the Transverse or Societal Benefit Areas do you have expertise or official responsibility?

- | | | |
|---|---------------------------------------|----------------------------------|
| ☐ Architecture | ☐ Agriculture | ☐ Energy |
| ☐ Data Management | ☐ Biodiversity | ☐ Health |
| ☐ Capacity Building | ☐ Climate | ☐ Water |
| ☐ Science and Technology | ☐ Disasters | ☐ Weather |
| ☐ User Engagement | ☐ Ecosystems | |

3. What is your current primary position or role in GEOSS?

4. Please describe your duties and responsibilities in this capacity...

5. What other positions or roles, if any, do you have or have you had in GEOSS?

II. Now, I would like to ask you some questions about the planning and implementation of GEOSS. Please answer these questions to the best of your ability whether speaking broadly or as it pertains to specific Transverse Areas and SBAs...

6. Do you consider yourself familiar with the content of the 2007 *Cape Town Declaration*?

☐ YES ☐ NO

7. Do you consider yourself familiar with the content of the *GEOSS Strategic Targets (GEO-VI, Document 12)*?

☐ YES ☐ NO

If unfamiliar with either document, skip to question 11.



8. Using the scale in front of you from 1-5 where 1 means “a great deal” and 5 means “not at all,” to what extent are the outcomes in the *GEOSS Strategic Targets* document aligned with the Ministers’ priorities and confirmations from the *Cape Town Declaration*?

A Great Deal		Moderately		Not at all	Unsure
1	2	3	4	5	6

9. Do you feel there are any key points in the Cape Town priorities that are not reflected in the Strategic Target outcomes?

10. Are the Strategic Target outcomes sufficient to meet the commitments in the Cape Town Declaration by 2015?



11. Are you familiar with the current “Task” structure of the GEOSS Work Plan?

[I’m referring to how, following GEO-IV recommendations, the Work Plan now consists of 44 Overarching Tasks to:

- Link together 2007-2009 Work Plan Tasks that share a strategic objective and/or a common methodology;
- Improve coordination and cross-fertilization of GEO activities;
- Highlight key lines of GEOSS implementation; and,
- Move the GEO Work Plan to a more strategic level.

Overarching Tasks provide a platform for communicating progress on GEOSS implementation based on the sub-tasks that underpin the Overarching Tasks. Sub-tasks are implemented by a Task team composed of Co-Leads (GEO Members and Organizations), a Point of Contact (representing one of the Co-Leads) and contributors (further Members and Organizations.)¹

☐ YES ☐ NO

If unfamiliar, skip to section IV.

12. Again, using the scale in front of you from 1-5 where 1 means “a great deal” and 5 means “not at all,” to what extent do you feel that the Strategic Target outcomes have been considered in the formulation of the Work Plan Overarching Tasks?

A Great Deal		Moderately		Not at all	Unsure
1	2	3	4	5	6

¹ GEO 2009-2011 Work Plan, Annex: Guide to Work Plan Management



13. To what extent are the Overarching Tasks sufficient to produce all of the Strategic Target outcomes?

A Great Deal		Moderately		Not at all	Unsure
1	2	3	4	5	6

14. Do you feel there any important gaps in or between the Strategic Target outcomes and Overarching Tasks?

[For example, can you identify a Strategic Target outcome that does not have a Work Plan Task or activity to support it? Or, can you identify Work Plan Tasks or activities that do not support any of the Strategic Target outcomes? Or, do you feel there are important topics that have not yet been incorporated into either document?]

☐ YES ☐ NO

○ If so, please elaborate:

15. Do you know if there is a documented process to identify gaps?

☐ YES ☐ NO

If documented process identified...

a. Do you know where it can be found?

16. Whether formally documented or not, can you describe the process by which gaps are identified and filled?

III. Now, thinking about Overarching Tasks and Sub-Task activities...

17. Is there is a documented process or formal logic model to explain the connection of task and subtask activities to GEOSS intended outcomes?

☐ YES ☐ NO

If logic model identified...

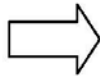
a. Do you know where it can be found?



18. Whether formally documented or not, how do the outcomes of Task and Sub-Task activities support the vision of GEOSS as a coordinated, comprehensive, and sustained Earth observations system of systems?

19. Again, using the scale in front of you... Overall, to what extent do you feel activities in the Sub-Task level are contributing to the completion of Overarching Tasks?

A Great Deal		Moderately		Not at all	Unsure
1	2	3	4	5	6



IV. Ok, now I'd like you to think about any early results of GEOSS development and implementation...

20. Using the 2nd scale in front of you where 1 means "Very Good" and 5 means "Very Poor" how do you rate GEOSS' overall progress for this point in its development and implementation?

Very Good		Neutral		Very Poor	Unsure
1	2	3	4	5	6

21. What, in your opinion, are the three most important accomplishments of GEOSS to date?

22. What, in your opinion, are the three greatest challenges that GEOSS has overcome to date?

23. Again using the 2nd scale, how do you rate the communication about the implementation of GEOSS between committees, Task teams, Communities of Practice, and other implementation groups?

Very Good		Neutral		Very Poor	Unsure
1	2	3	4	5	6



24. How do you rate the cooperation of members and participating organizations in the implementation of GEOSS?

Very Good		Neutral		Very Poor	Unsure
1	2	3	4	5	6

25. What, in your opinion, are the three greatest challenges facing GEOSS implementation today?

26. Have there been any unintended positive outcomes of GEOSS to date?

27. Have there been any unintended negative impacts of GEOSS to date?

If interviewing a Secretariat member, continue to section V.

All others skip to section VI on the last page.



V. For Secretariat Only:

As a Secretariat subject matter expert, we'd like to get your insight into the specific areas for which you are assigned. For each area, I am going to ask you the same set of questions but about specific tasks within the subject area.

Starting with: _____:
(Subject Area)

- Using the 2nd scale in front of you, how would you rate the progress on Overarching Task _____ by comparing the progress to date with the expected progress for this Task?
(Task Number)

Very Good		Neutral		Very Poor	Unsure
1	2	3	4	5	6

- In your opinion, has adequate progress been made on this Overarching Task to meet 2015 expectations?

☐ YES ☐ NO

- Do you have any additional insight about this task that would not be found in the Work Plan Progress Report?

☐ YES ☐ NO

If so, please elaborate...

Moving onto: _____:
(Subject Area)

- Using the 2nd scale in front of you, how would you rate the progress on Overarching Task _____ by comparing the progress to date with the expected progress for this Task?
(Task Number)

Very Good		Neutral		Very Poor	Unsure
1	2	3	4	5	6

- In your opinion, has adequate progress been made on this Overarching Task to meet 2015 expectations?

☐ YES ☐ NO

- Do you have any additional insight about this task that would not be found in the



Work Plan Progress Report?

☐ YES ☐ NO

If so, please elaborate...

And, lastly: _____:
(Subject Area)

1. Using the 2nd scale in front of you, how would you rate the progress on Overarching Task _____ by comparing the progress to date with the expected progress for this Task?

Very Good		Neutral		Very Poor	Unsure
1	2	3	4	5	6

2. In your opinion, has adequate progress been made on this Overarching Task to meet 2015 expectations?

☐ YES ☐ NO

3. Do you have any additional insight about this task that would not be found in the Work Plan Progress Report?

☐ YES ☐ NO

If so, please elaborate...



VI. We are nearly finished with the interview...

28. Is there anything else you would like to mention in regards to the implementation progress of GEOSS that we have not talked about during this interview?

Thank you so much for taking the time to talk with me. Your responses will help the Evaluation Team prepare an informative and useful report to present to the Ministers later this year in China.

If you have any questions or additional comments, please feel free to contact the Evaluation Team at the contact information given at the bottom of your Consent Form.

Task Case Study Question Form

GEOSS MIDTERM EVALUATION CASE STUDY GUIDE

Introduction

The GEOSS Mid-Term Evaluation Team is conducting the first evaluation of GEOSS implementation. Among multiple activities, we are conducting a high-level analysis of the entire task framework. Our working timeline does not allow an in-depth analysis of all the tasks; however, we would still like to learn from the experiences gained in the implementation of specific tasks. Therefore we have chosen to take a deeper look at a limited number of sub-tasks, selected by the team from across the 14 Transverse and Societal Benefit Areas. We are neither “investigating” nor “evaluating” the specific task you lead or your contributions to the task. We are seeking additional information and insight that will help us to clarify patterns of successes and challenges in the development of GEOSS as a system of systems and coordinating framework for Earth and environmental observations.

Below is a list of questions that will aid us in our understanding of GEOSS development. We would appreciate your response to these questions as soon as possible, and **no later than April 9th**.

Questions

Please provide an overview of Task [Insert Number and Title Here]:

What is the purpose of the task?

How do you intend to achieve that purpose?

How would you rate the progress on this task compared to your expectations?

How did inclusion of this task in GEOSS happen?

What benefit did you anticipate from contributing to GEOSS?

Is this task making satisfactory progress toward some sort of milestone or endpoint? (e.g. an operational system, an international agreement, a key report)

Would this activity still exist in some form without GEOSS?

How has inclusion in GEOSS aided progress on this task?

Have any new challenges arisen because of inclusion in GEOSS?

Do you have any comments for the evaluation team on the following items:

Needs and desires for support to achieve progress.

Provision of support by the GEOSS community (individual countries and orgs, secretariat, agencies contributing to GEOSS).

Communication within the task implementation group.

Communication to the rest of the GEOSS community.

Connections to other activities within the GEOSS framework.



Literature Review Question Guide



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.

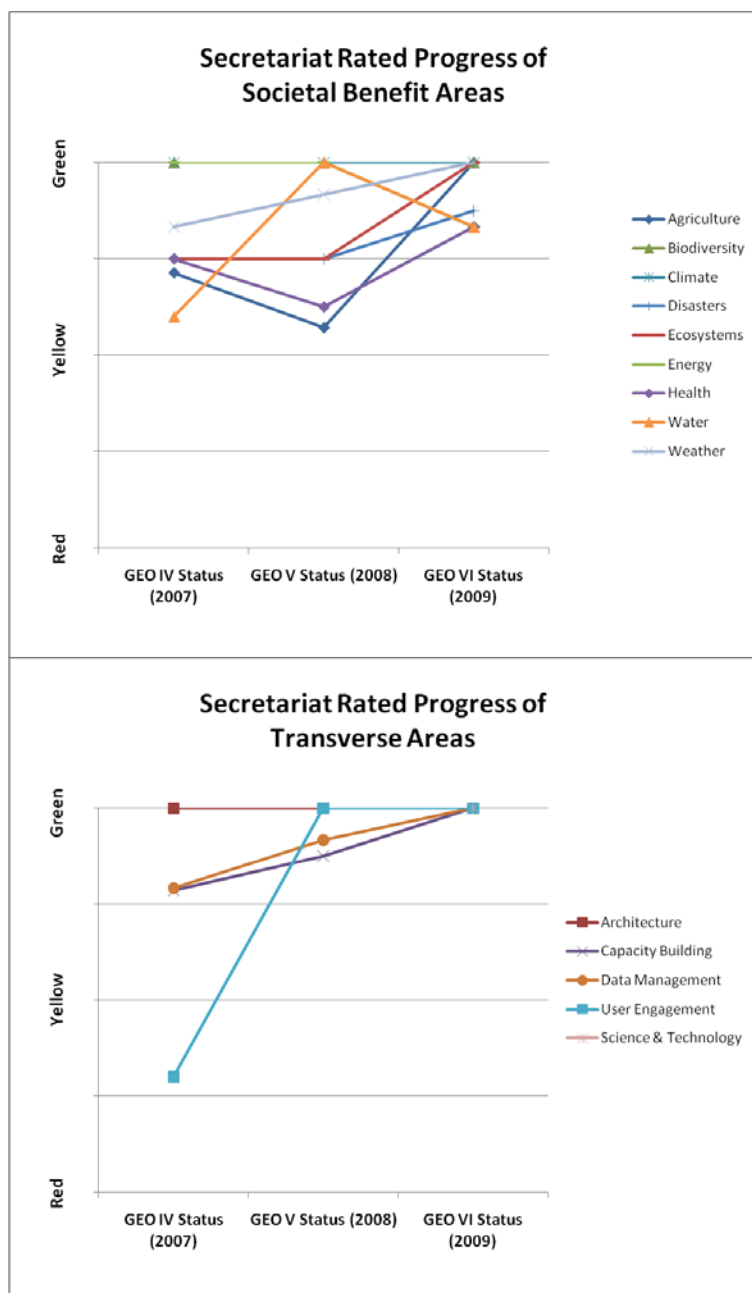
- Does the literature show evidence of *links between the described activities and the goals of GEOSS*?
- Does the literature identify any *gaps in GEOSS*?
- Does the literature indicate attempts to *fill identified gaps*?
- Does the literature show *progress or outcomes from GEOSS* activities?
- Does the literature identify any *unintended positive or negative outcomes or impacts of GEOSS* implementation?



Annex 5

Supplementary Material

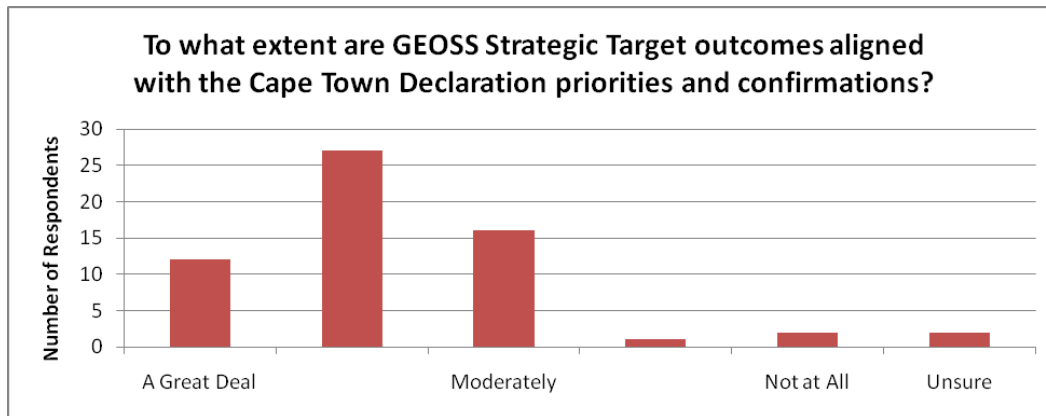
Progress Report Analysis



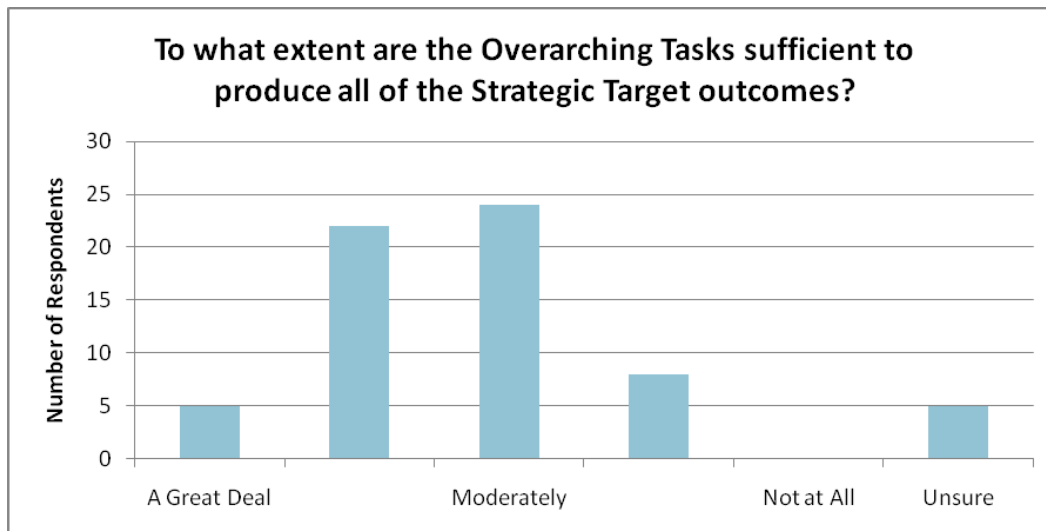
Supplement 1: The average rating, based on weighting of individual task ratings, in each of the Societal Benefit Areas and Transverse Areas from 2007 through 2009. Overall improvement in rating is seen between 2007 and 2009.



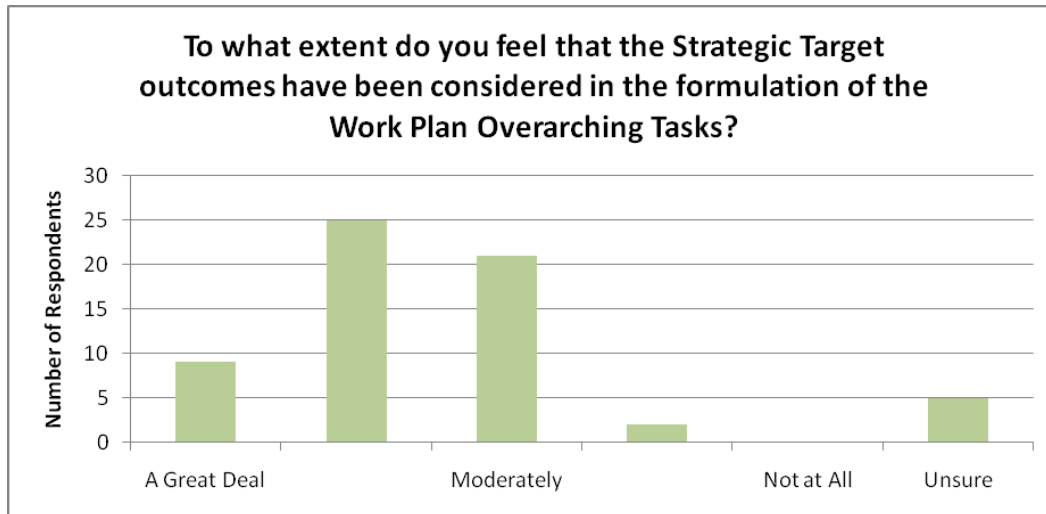
Key Informant Interview Analysis



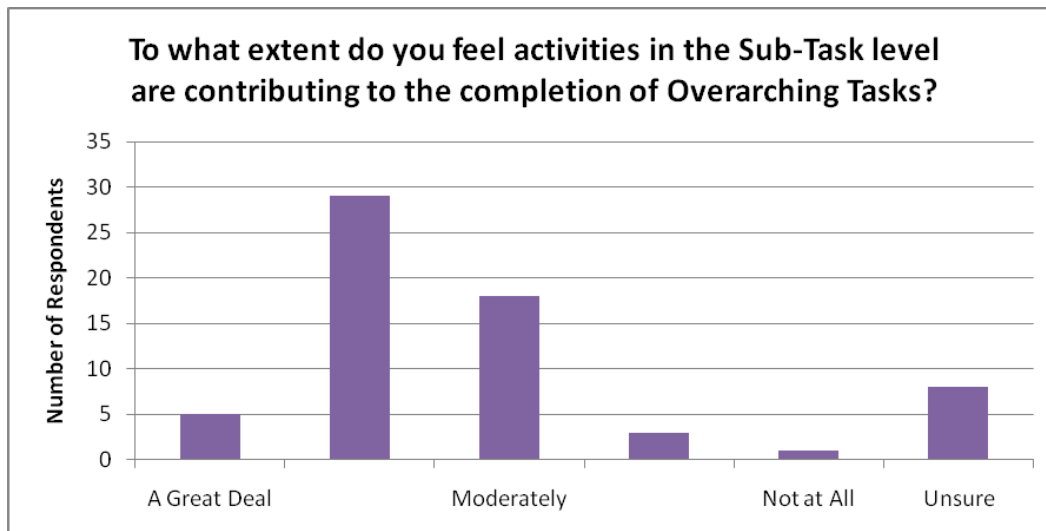
Supplement 2: Distribution of opinions on the relevance of Strategic Targets to Cape Town priorities based on interviews with key informants.



Supplement 3: Distribution of opinions on the relevance of the current tasks to achievement of implementation targets according to key informants.



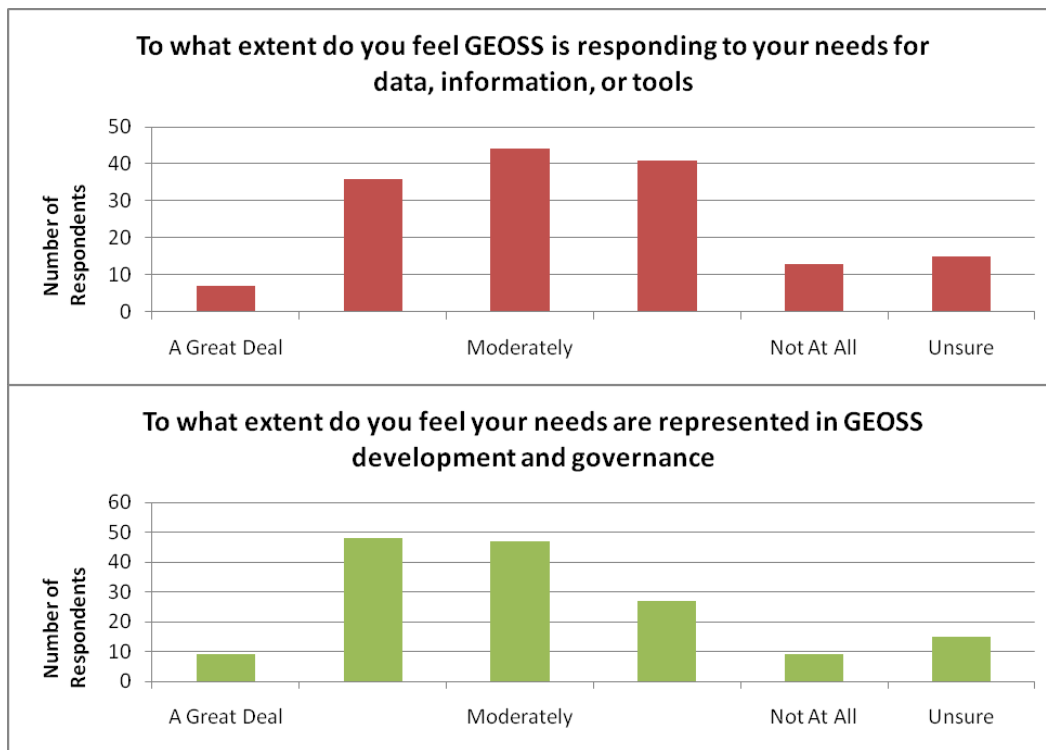
Supplement 4: Distribution of opinions on the influence of the Strategic Targets in developing the GEOSS Work Plan based on interviews with key informants.



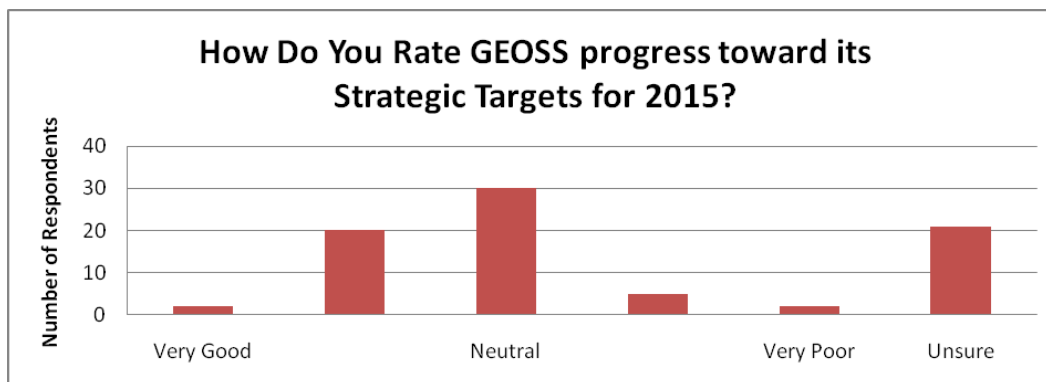
Supplement 5: Distribution of key informant opinions about the relevance of task activities to achievement of overarching tasks and, therefore, implementation targets.



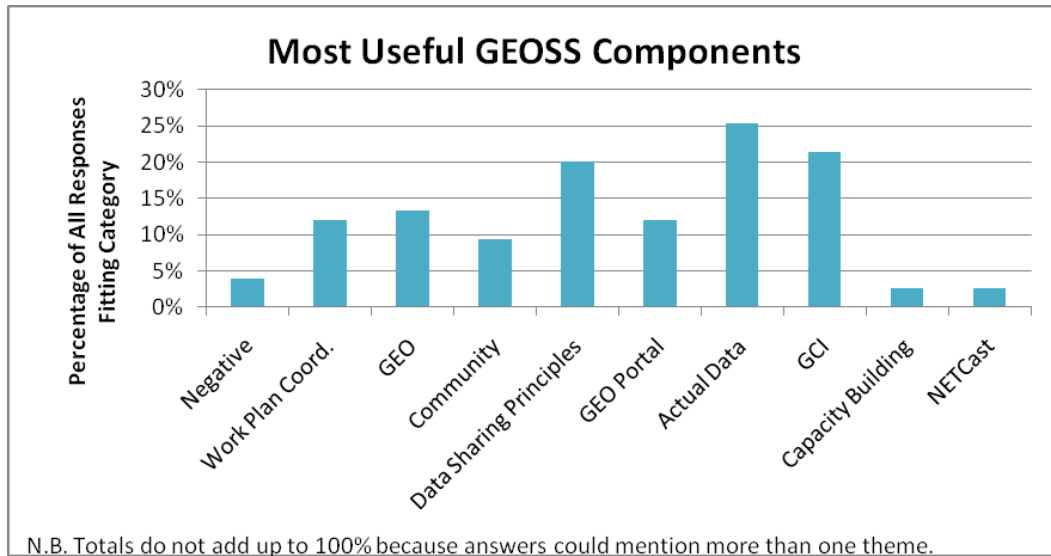
Survey Analysis



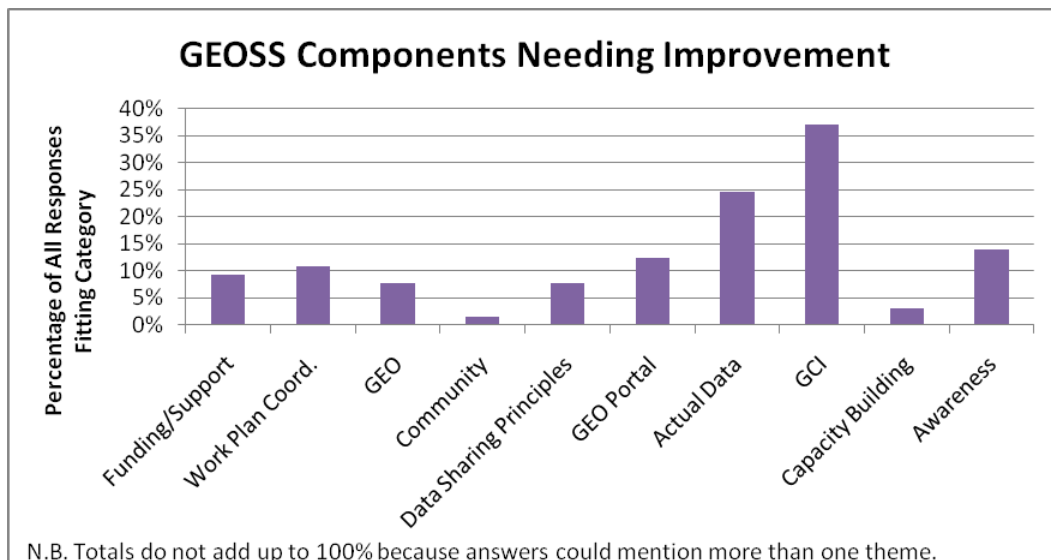
Supplement 6: These counts include “User or Contributor” and “Participant” survey respondent views on their engagement with GEOSS.



Supplement 7: This question was posed only to GEO/GEOSS “Participants” for whom familiarity with the Strategic Targets was believed to be a reasonable explanation.



Supplement 8 These values include responses from both “User or Contributor” and “Participant” survey respondents.

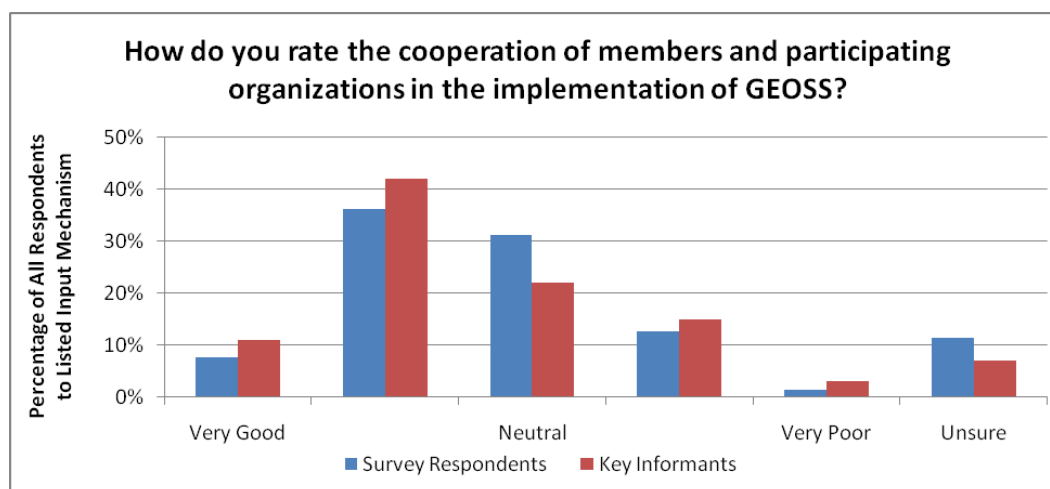


Supplement 9: These values include responses from both “User or Contributor” and “Participant” survey respondents.

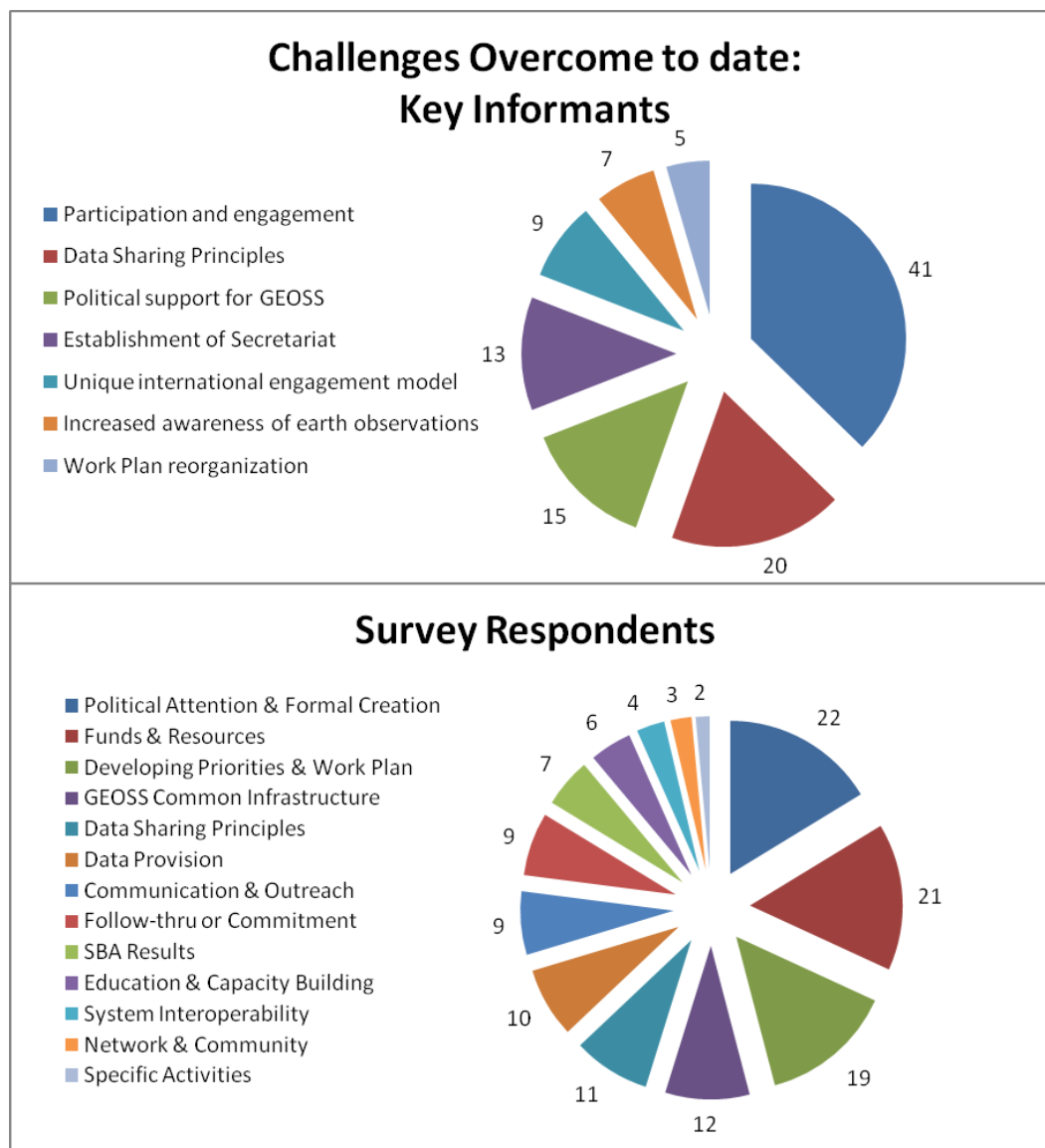


How often does GEOSS use contribute to...?					
	Fundamental Scientific Research	Predictive Model Development	Management Decisions	Policy Decisions	Education and Outreach
Always	5%	3%	3%	5%	7%
	14%	9%	17%	13%	22%
Sometimes	21%	19%	22%	23%	25%
	17%	15%	19%	20%	17%
Never	32%	38%	26%	27%	18%
Unsure	11%	15%	14%	13%	11%

Supplement 10: Proportion of survey respondents identifying contributions of GEOSS use to their activities requiring use of Earth observation information.



Supplement 11: Comparison of survey respondent and key informant ratings of the cooperation on GEOSS implementation. Key informants tended to have relatively stronger opinions than survey respondents.



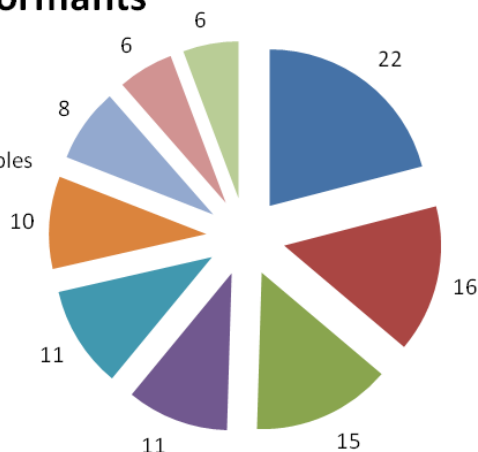
Supplement 12: The most important challenges overcome in the implementation of GEOSS so far according to key informants (top) and survey respondents (bottom). Wedges and associated values represent response frequencies rather than proportion of total responses. Respondents could provide more than one answer.



Greatest Challenges facing GEOSS Today:

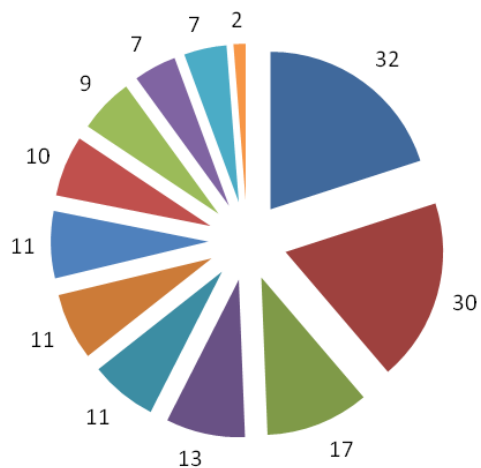
Key Informants

- Secure funding
- Sustainability
- Complete Implementation of Data Sharing Principles
- Secure budgets for the Secretariat
- Defining GEOSS' unique contribution
- Re-examine the Governance Structure of GEOSS
- Secure political support
- Increase awareness of GEOSS
- Cultivate greater participation

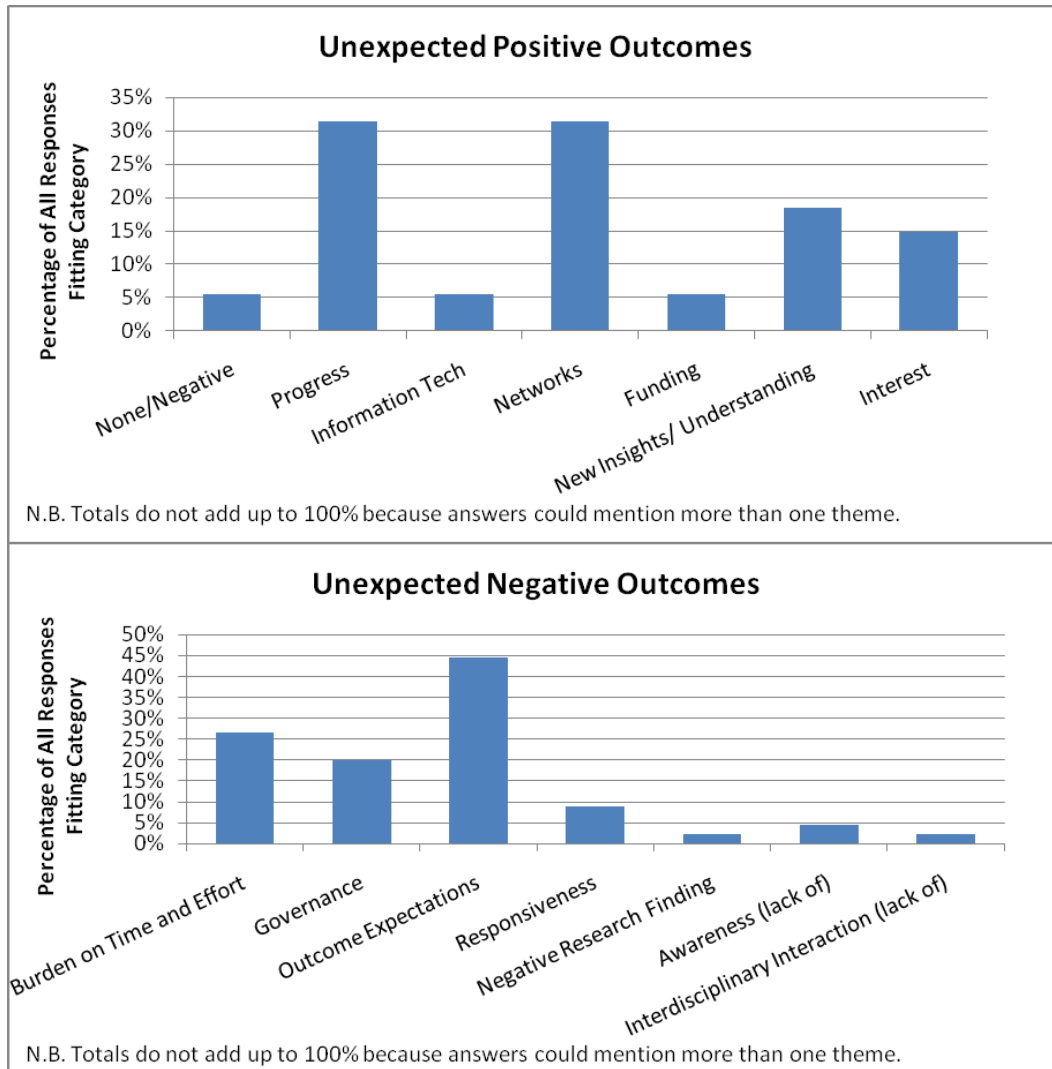


Survey Respondents

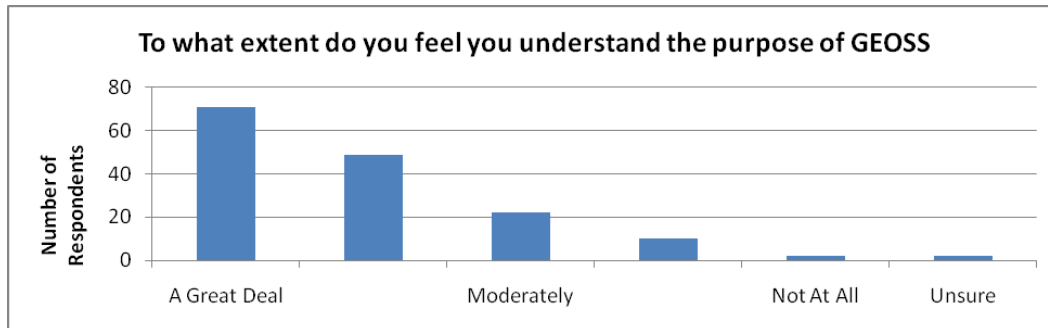
- Funds & Resources
- Follow-thru or Commitment
- Developing Priorities & Work Plan
- Data Sharing Principles
- Communication & Outreach
- Education & Capacity Building
- SBA Results
- Political Attention & Formal Creation
- Data Provision
- GEOSS Common Infrastructure
- System Interoperability
- Specific Activity



Supplement 13: The most important challenges currently facing the implementation of GEOSS according to key informants (top) and survey respondents (bottom). Wedges and associated values represent response frequencies rather than proportion of total responses. Respondents could provide more than one answer.



Supplement 14: The most important unexpected positive outcome of GEOSS, according to survey respondents, is the development of community networks. However, low expectations for GEOSS were revealed by the large proportion of respondents who identify “progress” as an unexpected outcome. On the negative side, many respondents identified unfulfilled expectations (notably funding opportunities) and additional burdens on individuals for time and effort to attend meetings and make reports to GEO.



Supplement 15: Most respondents believe they have a good understanding of GEOSS. However, other information sources point to widespread disagreement about the purpose and strategies for GEOSS implementation.

Case Study Common Themes

- Of the reviewed tasks, a large portion of the activity is attributed directly to GEOSS rather than pre-existing efforts.
- All tasks reviewed have relevance to other GEOSS tasks; however,
 - o There is a significant room for improved coordination between tasks, facilitated by the Secretariat;
 - o Without coordination, successful tasks may grow distant from the GEOSS core.
- The most successful tasks regularly use multiple forms of communication; however,
 - o In many tasks there are opportunities for improvements in communication, both within the task teams and to the rest of the GEOSS community.
- Task progress is generally seen to be meeting or exceeding expectations; however,
 - o It is often not clear how the reported progress contributes to GEOSS as a whole.
- The Secretariat and Task Leads should have a common understanding of what constitutes success for a particular task.
- There is a need for support of the task participants, particularly on the national or organization level, to enable travel and dedicated effort to coordinate individual contributions to parts of the task.
 - o Supplemental funding of the task activities through GEO was in some cases anticipated and in others is seen as a necessary next step.
- A clear purpose for the task and a clear plan for achieving that purpose catalyze progress:
 - o It is beneficial to engage the intended beneficiaries in defining the purpose;
 - o It is beneficial to engage potential participants in defining the plan.
- Early results and outputs are keys to growing and maintaining support for task activities.



- A broad-based, engaged, and dedicated community (of practice) supports the viability of tasks
 - o Provides a pool of volunteers to participate in activities;
 - o Encourages inter-task communication and uptake of products;
 - o Increases the resilience of task
- teams and reduces dependence on a few individuals.
- Voluntary nature of activities has positives and negatives; however,
 - o Most of the negatives could be overcome by wider acceptance of the idea that a “voluntary commitment” is still a “commitment”.



Annex 6

Evaluation Team Members

GEOSS Evaluation Team Membership				
Co-Chair	Family Name	First Name	Organization/Institution	Representing
	Adamec	John	National Oceanic and Atmospheric Administration	USA
✓	Budak	Michelle	Department of Fisheries and Oceans	Canada
	Eide	Lars Ingolf	Norwegian Space Centre	Norway
✓	Gevorgyan	Yana	National Oceanic and Atmospheric Administration	USA
✓	Hutchinson	Charles	Intl. Center for Remote Sensing of Environment University of Arizona	ISPRS/ESIP
	Le Quentrec	Michel	Ministere du Developpement Durable	France
	Machado	Luiz	National Institute for Space Research	Brazil
	Nakayama	Mikiyasu	University of Tokyo	Japan
	O'Har	Megan	National Oceanic and Atmospheric Administration	USA
	Vauclin	Michel	French National Centre for Scientific Research	France

