Report from the GEOSS Infrastructure Development Task Team (GIDTT)

This document is submitted by the GEOSS Infrastructure Development Task Team to the Programme Board to facilitate the review and decision regarding the GEO Knowledge Hub Implementation Plan.

Since the last Programme Board meeting, the GEO Knowledge Hub Team and GEOSS Infrastructure Development Task Team (GDITT) collaborated to develop the GEO Knowledge Hub (GKH) implementation plan. This report summarizes key findings and recommends next steps to support the ongoing exploration and development of the GKH.

1 EXECUTIVE SUMMARY

The GEO Strategic Plan 2016-2025: Implementing GEOSS reads: "To realize its Vision and maximize the benefits that GEO can bring to users, through 2025, GEO defines three spheres of activity focusing on advocacy for the value of Earth observations as a fundamental component of timely information; engagement with stakeholder communities to address societal challenges; and delivery of critical data, information, and knowledge to inform decision-making." The GEOSS knowledge hub is targeting in particular the latter portion, knowledge delivery to inform decision-making.

The Expert Advisory Group (EAG) acknowledged the GEO Knowledge Hub as a complementary application to the GEOSS Platform. The recommendation of the EAG, endorsed by the Executive Committee and by the GEO-XVI Plenary was to design the GKH as a new module of the GEOSS Infrastructure. The GEO-XVI Plenary accepted the proposal for the GEO Secretariat to develop an implementation plan for development of the GKH, in consultation with the GEOSS Infrastructure Development Task Team (GIDTT) and the GEO Programme Board.

Findings and Recommendation

Following the Plenary decision, the GKH Team coordinated the development of the GKH implementation plan with the GIDTT and the Programme Board. The consensus is that the architecture of GEOSS needs to evolve to support knowledge-based products and services that are reproducible and scalable to support country-relevant, policy-relevant decision making. The GKH is an ambitious endeavor, but a very important step that is necessary to research and develop the necessary capabilities that can support GEO in the transformation of data to knowledge for decision making. There is recognition that the scope and scale of this effort is significant, has many potential benefits for the community and has broad governance, resource, sustainability and user support considerations. To guide ambitions, the GKH implementation plan provides initial steps to continue exploration, research and development activities of the GKH.

Findings

Balancing ambitions and practicality via a step approach: The proposed GKH implementation plan offers an initial strategy that balances ambitions with practicality with an incremental design and implementation approach, considering user requirements, and the future GEOSS infrastructure. Additional exploration, community engagements, and research and development in coordination with the GIDTT will improve further development of the GKH to ensure the results support the GEO community's needs. The approach includes additional prototyping and piloting activities for one year that will provide an expanded proof of concept demonstration, allow for additional engagement with stakeholders and users, development of a report of findings, lessons learned, and proposed scaling that will provide greater understanding and vital information to inform ongoing implementation.

Aligning GKH development with evolution of GEOSS Infrastructure: As part of the 2020-2022 GEO Work Programme, the GIDTT, and specifically the GEOSS Platform and Evolution Working Groups, will conduct exploratory activities, including architecture development, to determine appropriate alignment and integration of the GKH as a component in the GEOSS Infrastructure. A long-term plan that includes anticipated staffing, cost, support and other resource scaling considerations of the GKH, will be included in the report of progress at the end of the one-year period.

Recommendation

In conclusion, the GIDTT endorses the GKH Implementation Plan version 4 as proposed, on the basis of an extended GKH Proof of Concept as a step-wise approach of an incremental design and implementation process (to be aligned with the future GEOSS development in the due time) and taking into account the recommendations laid out in GIDTT GKH Report. Additionally, the GIDTT recommends endorsement by the Programme Board of the GKH Implementation plan.

Full Report

1 INTRODUCTION

The GEO Strategic Plan 2016-2025: Implementing GEOSS reads: "To realize its Vision and maximize the benefits that GEO can bring to users, through 2025, GEO defines three spheres of activity focusing on advocacy for the value of Earth observations as a fundamental component of timely information; engagement with stakeholder communities to address societal challenges; and delivery of critical data, information and knowledge to inform decision-making." The GEOSS knowledge hub is targeting in particular the latter portion, knowledge delivery to inform decision-making.

The previously established Expert Advisory Group (EAG), acknowledged the GEO Knowledge Hub as a complementary application to the GEOSS Platform. The design of the GKH is that it will be integrated with the GEO website and GEOSS Platform.[1] The recommendation of the EAG, endorsed by the Executive Committee and by the GEO-XVI Plenary[2] [3], was to design the GKH as a new module of the GEOSS Infrastructure. The GEO-XVI Plenary accepted the proposal for the GEO Secretariat to develop an implementation plan for development of the GKH, in consultation with the GEOSS Infrastructure Development Task Team and the GEO Programme Board. The GKH implementation plan upon approval by the Programme Board is planned for discussion and decision at EXCOM 52.

2 PROGRESS AND ACTIONS

The focus of the GIDTT has been to prepare inputs and recommendations to support the preparation of the GKH implementation plan. The GEO-XVI approved strategy document "Results Oriented GEOSS: A framework for transforming Earth observation data to knowledge for decision making" serves as a reference for potential contributions the GKH is envisioned to support as part of a results oriented GEOSS.

Over the past three months the GIDTT engaged in multiple discussions to build greater understanding and shared meaning to develop an implementation plan that will support the desired future for GEO. The consensus amongst the team is that the architecture of GEOSS needs to evolve to support knowledge-based products and services that are reproducible and scalable to support country-relevant, policy relevant decision making. The GKH is an ambitious endeavor, but a very important exploratory step that is necessary to research and develop the necessary capabilities that can support GEO in the transformation of data to knowledge for decision making. The GIDTT as part of the 2020-2022 work programme will conduct exploratory activities including architecture development to determine appropriate alignment and integration of the GKH as a component in the GEOSS Platform.

[1] GEO XVI Strategy Document "Results Oriented GEOSS: A framework for transforming Earth observation data to knowledge for decision making" https://drive.google.com/open?id=1iPYz1zPS3r9aWeObkn5gwbTIZIaoDOHe

[2] GEO-XVI Report "Proposed Design and Proof of Concept of the GEO Knowledge Hub" https://drive.google.com/open?id=1scxTOM_cnsV-uqGPE32_9Ji6xDuNVoXM

[3] GEO-XVI Presentation "Introduction of proposed strategy to implement Results-Oriented GEOSS" https://drive.google.com/open?id=14w8sUFjNRp_zwDxxlZ3ki64WkFGYuEBB

Figure 1 below provides the conceptual GEOSS Platform architecture with the knowledge hub as a component in the Platform. This figure is adapted from the study introducing an overall architecture to advance GEOSS and move from data to knowledge, contained in the GEOSS Evolve discussion paper entitled Challenges to be addressed in evolving the Global Earth Observations System of Systems (10 Aug 2018).

At the last meeting of the GIDTT the team supported the development of a set of findings and recommendations for the Programme Board and ExCOM to consider. The findings and recommendations generally support continued exploration and development of the GKH with proposed actions to support ongoing activities.

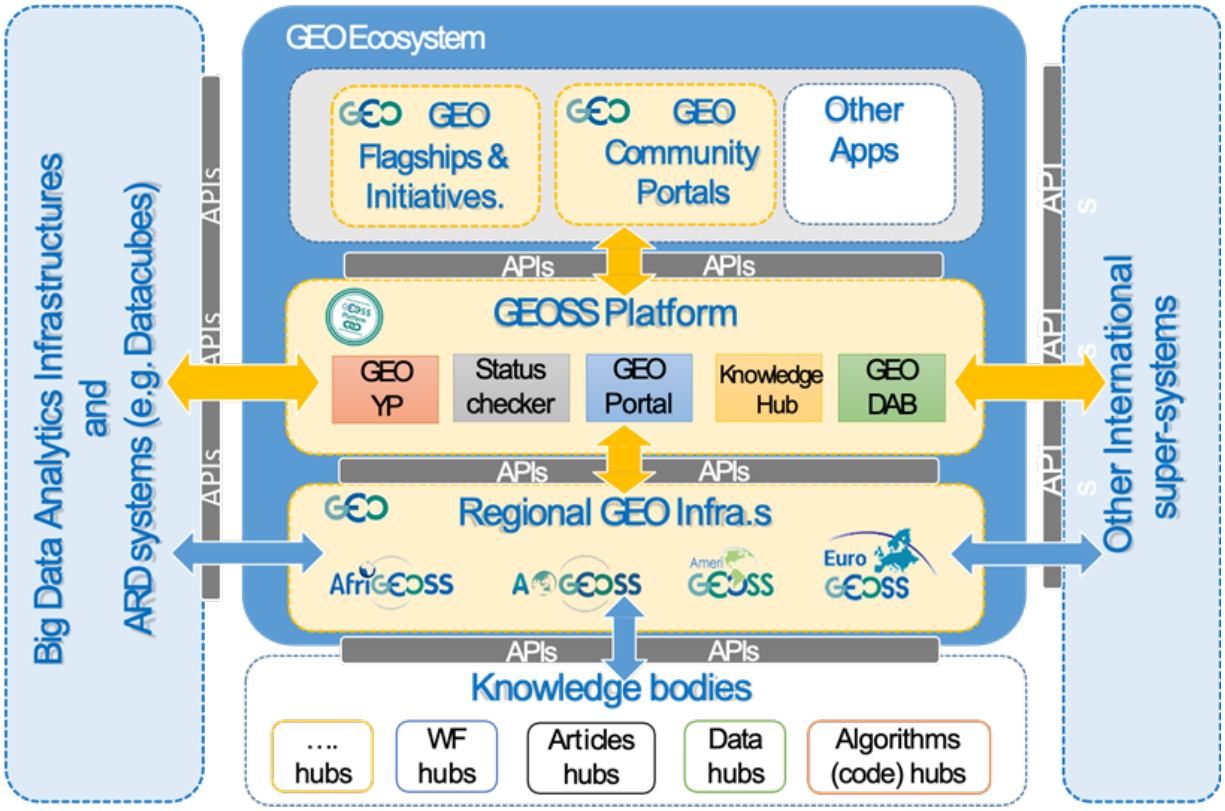

Figure 1: Community interactions within the GEO Ecosystem, including the Knowledge Hub (adapted from GEOSS Evolve study "Challenges to be addressed in evolving the Global Earth Observations System of Systems".)

3 FINDINGS AND RECOMMENDATIONS

The GIDTT composed of experts from previous GEOSS infrastructure architecture efforts related to this activity, and new team member perspectives in this section highlight findings and recommendations related to the GKH implementation plan for the Programme Board to consider. Previous research completed by the former GEO Infrastructure Implementation Board regarding levels of GEOSS implementation and delivering reproducible information to support knowledge-based decision-making serves as a blueprint in understanding challenges and provides recommendations on this subject.

In general, the GIDTT finds Draft 4 of the implementation plan has made substantial improvements that justify the technology and provides additional information that reflects a

proof of concept. However, contextual sufficiency is generally needed for a broader large-scale implementation. The GIDTT provides items for consideration related to scope, scale, resourcing, engagement and need for guidance in the below findings and recommendations. The Programme Board is asked to consider the following recommendations:

1. Scope and Scale

Finding: The GKH is an ambitious effort with a broad scope. The scope and scale of the effort as described in version 4 of the implementation plan is significant and has broad implications that will have short- and long-term implications on GEO Member contributions and planned work activities. The most prevalent implications are identified in additional findings in this document. Additional exploration, community engagements and refinements in coordination with the GIDTT will improve development of the GKH implementation plan to ensure the results support GEO Member needs.

The GIDTT provides the following scope and scaling recommendations:

1.1. Proceed with limited and defined prototyping and piloting activities that provides an expanded proof of concept demonstration, report of findings, lessons learned, and proposed scaling that will provide greater understanding and vital information to inform ongoing implementation.

1.2. The resulting outcomes of recommendation 1.1 shall be used to develop a definition that more clearly defines the GKH, identify capabilities to implement in the GEOSS Platform, and the scenarios that are appropriate for use.

1.3. The proposed strategy to manage GKH ambitions and scalability is to proceed with a step-wise incremental design and implementation approach, considering also the outcomes of the GIDTT dealing with user requirements, and the future GEOSS infrastructure architecture.

1.4. Ongoing exploration and development to implement the GKH be limited to one year. After the first year of implementation, additional consideration be given GIDTT, GEO Sec, PB and ExCom by relevant communities in further scaling and adoption.

2. Resourcing

Previous findings indicated significant resources will be necessary to extract and document the tacit knowledge of domain experts, making available the process, workflows and models used to frame and address scientific and policy-relevant questions, and to link the relevant data so that it can be processed in a transparent and reproducible manner.[4] General concern exists amongst the community related to resource commitment that will be required by producers, providers, GEOSS Infrastructure components and from the GEO Secretariat who is already committing a number of resources to this cause. A greater understanding of investment and resourcing will garner support and support development of an implementation plan that has adequate resourcing.

The GIDTT provides the following resource recommendations:

2.1. Engage domain experts in understanding the level of effort and investment that will be required by GEO members and contributors to support their

[4] GEO ExCOM 34 Report from the Infrastructure Implementation Board
https://drive.google.com/open?id=1BekWvZ6OYlaANzyQ6a4FgOZVkOJ19LL1

contributions to the GKH. Incorporate feedback into the development of the implementation plan.

2.2. A long-term investment plan that includes costs associated with integration of the GEOSS Platform, staffing and scaling of the GKH, and operations and maintenance of the GKH should be included in the report of progress at the end of the one-year period that is recommended.

3. Engagement

Understandably, the current development approach has been with a limited audience to support the exploratory phase of the GKH. Now that the GKH has received an endorsement from the GEO Plenary, greater engagement with the community is needed to understand the approach and to assess levels of readiness in the GEO Community. Engagement with the community will improve assessment of readiness and help develop the implementation plan.

The GIDTT provides the following engagement recommendations:

3.1. Additional outreach is recommended to a broader community of users to better understand the current state, gather requirements, capabilities and limitations that may include national and or organizational policy restrictions.

3.2. Interaction with the Data Sharing and Data Management task is necessary to determine alignment of principles, guidance, workflow approval and other processes that may be necessary.

3.3. Immediately engage with the GEOSS Platform team to improve understanding and to increase transparency in development and operations.

3.4. Solicit participation from the GEOSS Platform team, providers and the user community in this development phase of the GKH to provide contributions and recommendations that can inform the development of a long-term implementation plan.

3.5. Provide regular updates on activities related to the current implementation in regard to developers and users.

4 CONCLUSION

In conclusion, the GIDTT proposes the endorsement of the GKH Implementation Plan version 4.1 as proposed, on the basis of an extended GKH Proof of Concept as a step-wise approach of an incremental design and implementation process (to be aligned with the future GEOSS development in the due time) and taking into account the recommendations laid out in this Executive Summary.

ANNEX A – TIMELINE

Timeline for GKH Implementation Plan

== Version 2 ==

February 28: version 2 sent to GIDTT for comments and revisions
March 2-20: Comments on version 2 from GIDTT (3 weeks)

== Version 3 ==

April 10: Version 3 sent to the GIDTT for comments and revisions
April 13-30: Comments on version 3 from GIDTT (3 weeks)
April 27-30: GIDTT meeting, preferably face to face (host: Germany?)

== Version 4 ==

May 15: Version 4 sent to the PB
May 18 - June 5: Comments on version 4 from PB (3 weeks)

== Final version ==

June 15-19: Presentation to PB and GEO Symposium
June 16: EXCOM-52 documents due (final version of IP)
July 7-8: EXCOM-52 decision