Chapter 2
Service Planning Approach and Its Application

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2.1 Introduction

In the first phase, SERVIR-HKH placed high importance on developing application products and tools to demonstrate the usefulness of Earth observation (EO) and geospatial information in supporting decision-making on various thematic areas including land cover mapping, forest fire monitoring, agriculture and food security, disasters, and air quality monitoring (Chap. 1). Although the application products and tools were prioritized based on the country needs assessments, they were largely driven by the available data, technology, and research interest of scientists (Bajracharya 2015). The products and tools were often developed with limited user interactions. The products were delivered to the users mostly in the form of online applications with interactive map visualization and often with data download capabilities. This method of product development assumed a full understanding of user needs, and that the developed products would be used by the targeted users. In reality, many of the application products ended up unused or less used by the targeted users. In some cases, there was a lack of clarity on the integration of the products and tools for decision-making within and beyond the user's organizations. Although the development of applications and tools addressed the perceived issues in the region, the limited engagement of partners in the development and validation process failed to produce user-friendly information per user expectations. Consequently, this limited the use of the applications and tools.

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The institutional and operational aspects beyond science and technology were not sufficiently considered for the long-term sustainability of the application products. For products and tools to be used and operationalized, user engagement efforts need to be increased such that partner organizations, including government agencies, co-develop these products and tools, and have increased ownership of them (Bajracharya 2015, Chap. 17). Based on these lessons through the years, we realized that the mere connection between user consultations and the application products that have been developed are not adequate for achieving the intended sustainable impacts. Co-development among a SERVIR hub and stakeholder organizations requires a clear understanding of the information-driven decision-making challenges, the usefulness of the products, and formal partnerships. Therefore, there is a need for a pathway to encourage stakeholder communities and potential users to be active collaborators during the iterative stages of problem definition, product development, and delivery stages.

In this context, SERVIR developed a service planning approach in 2017 as a structured pathway to deal with these challenges and to shift the focus from developing application products to building services in collaboration with its partners to support their mandated responsibilities. SERVIR defines a "service" holistically as either data, information, tools, products, platforms, and training, or a suite of all these items offered to a stakeholder. Service planning, therefore, is a systematic process of designing and integrating user needs and preferences into the service delivery approach, to ensure that the process is responsive and effective. The service planning approach integrates stakeholders, partners, and the broader user communities into service planning discussions, starting with the identification of local challenges, then going through the design, tailoring, and delivery of services that use EO and geospatial information to address these challenges. In addition, identifying existing mechanisms where services can be integrated for sustainability is another important aspect of service planning. The service planning approach was adopted by all SERVIR hubs which continue to learn from practical applications. In this chapter, we highlight the modalities of the service planning approach and its implementation at SERVIR-HKH hub.

2.2 Service Planning Approach

The service planning approach provides a well-defined process for end-to-end implementation of service by actively engaging stakeholders, partners, and end users, starting from service conceptualization to adoption. The systematic engagement of users in service planning ensures the usability of the service, improves the service quality, and creates a pathway to the sustainability of the service. It aims to articulate the intended impact upfront through the development of a theory of change (ToC). Great attention is paid to maximizing the impact of the service through effective co-development and sustained delivery with the partners. The approach aims to include diverse voices and perspectives and engages

representatives across gender and geographic regions for developing and providing customizable solutions. Service planning starts with user consultations, and the user engagement should continue over time, incorporating user feedback and allowing for the adaptive management of the service design and development. In most cases, the impact of the service will relate to improved decision-making and policy action and response, in areas such as environmental and natural resource management, disaster preparedness, food security, sustainable livelihoods, and resilience to shocks and stresses. Monitoring, evaluation, and learning (MEL) throughout the service cycle allow for the assessment of the service's ToC (Chap. 18).

The service planning approach can be presented as a cycle that iteratively defines the problem and identifies solutions to address it for making a positive impact (Fig. 2.1). The cycle is envisioned in three stages: needs assessment, service design, and delivery. A robust, easy-to-use service planning toolkit (SPT 2017), was developed in 2017 as a resource to provide applied guidance on the implementation of the service planning approach. This toolkit is a resource for designing user-centric geospatial information services that achieve meaningful impacts. The cyclical approach of service planning allows for constant improvement, refinement, and adaptation to changing contexts and changing information. A number of steps and activities are suggested for each of the three stages of service planning.

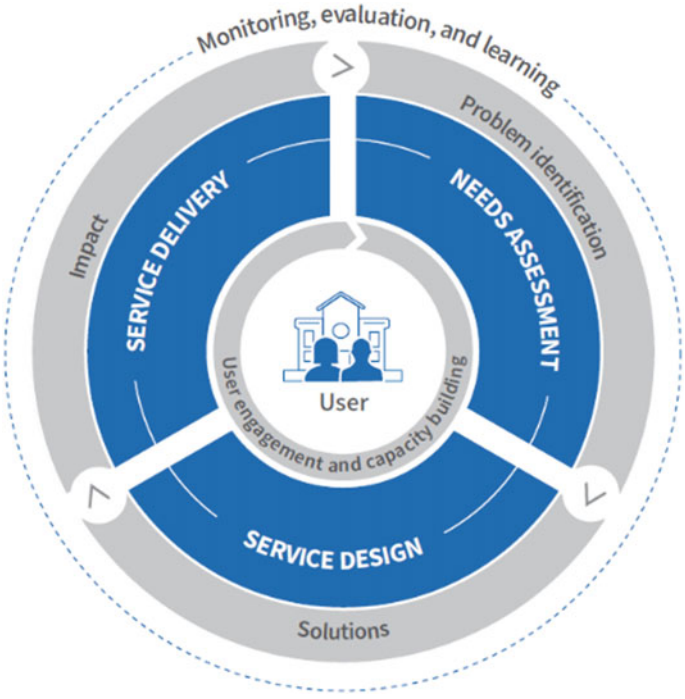

Fig. 2.1 Service planning lifecycle

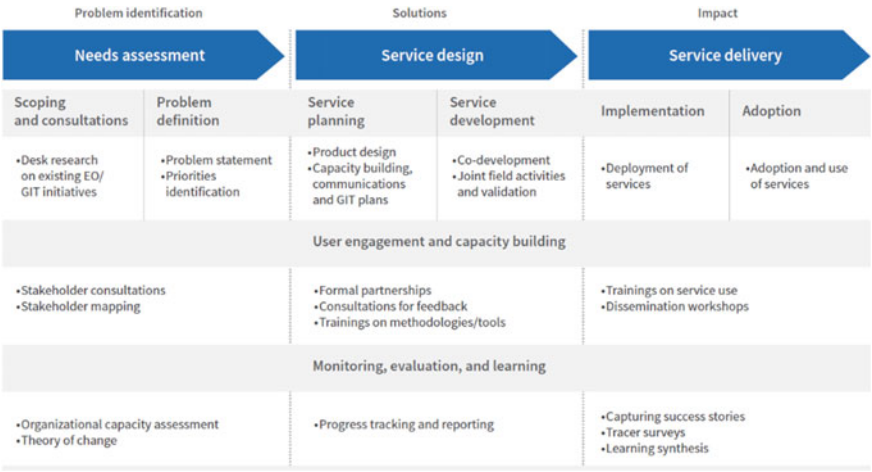

Fig. 2.2 Steps followed in service planning

The toolkit includes guidance for consultation and needs assessment for effective problem identification, with recommendations for workshop agendas and activities; stakeholder mapping; service design; and monitoring, evaluation, and learning, with templates for developing a ToC.

Here, we present the implementation of the service planning approach with examples from one of our services on the regional land cover monitoring system (RLCMS). The land cover monitoring system is being developed at the HKH regional and national levels (NLCMS) in Afghanistan, Bangladesh, Myanmar, and Nepal to address the need for consistent and efficient mapping which can be replicated on an annual basis. Details of the overall service on RLCMS are presented in Chap. 6.

2.3 Steps in Service Planning

Service planning is broadly designed in three stages (Fig. 2.2): problem identification which focuses on a clear understanding of needs; providing solutions through service design; and achieving impact through service delivery which is ensured by proper implementation and adoption by the intended users. User engagement and capacity building are considered as key activities throughout the service planning cycle. Moreover, the learnings from monitoring and evaluation are applied iteratively to improve service planning across all of its stages.

2.3.1 Stage 1: Needs Assessment

Scoping and Consultation

The needs assessment begins with a scoping and consultation process by engaging stakeholders to identify the user needs in a selected thematic area. Taking stock of related activities is important; the review of previous tools and applications of SERVIR as well as those being developed by other organizations in a given thematic area helps to understand the problems in broad terms. It is important to accurately capture the existing problems and challenges, to prioritize among multiple problems, and to understand the context of the problems and the underlying assumptions. An effective approach is to organize consultation workshops to bring people together to engage in dialog to identify the needs, priorities, and challenges. A structured format is followed for the workshops which is designed to be relevant for regional, national, and local consultations, even with a few stakeholders. Some context-specific customization is also done in the design of the workshop as needed.

The capacities among different organizations and users relevant to the service are also discussed during the workshop. This is followed by the organizational capacity assessments of selected organizations which would be partners in the co-development of the service. Capacity assessment includes meetings with key influencers, focus group discussions, semi-structured interviews, and technical assessment questionnaire surveys. The outputs from this step include a situational analysis of the problems in the particular thematic area and of the key priorities and capacities of the stakeholders. Consultation and needs assessment are perceived as continuous processes, required to be conducted or revised even during service design and delivery, in order to refine, adapt, and accommodate the findings during the implementation process.

During the implementation of RLCMS, a regional consultation workshop was organized in Bangkok where the national representatives from Afghanistan, Nepal, Bangladesh, and Myanmar participated, along with co-development partners from SERVIR-Mekong, FAO, SilvaCarbon, and the US Forest Service (USFS). The goal of the workshop was to learn from the national contexts as well as to understand common issues from the service development perspective. The deliberations on technical approaches and methodologies were useful in bringing all the participants to a common understanding of the needs and proposed solutions. Each country had different land cover mapping initiatives undertaken in the past with varying approaches and definitions of classes. Looking at the broader needs and country-specific priorities, it was evident that a common methodology would address the needs. However, specific considerations were required to define and derive certain land cover classes in each country. Similarly, national workshops were organized for each country, including for the wider user groups from these countries, so as to identify national needs and priorities, and the requirements for designing tailored solutions for countries within a regional system. An example of the different steps in the service planning of RLCMS is presented in Fig. 2.3.

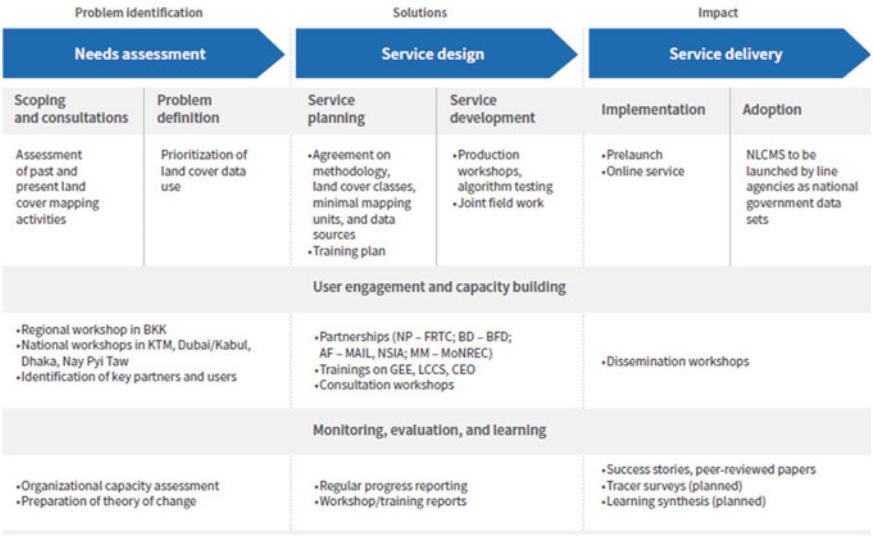

Fig. 2.3 Example of service planning implemented for a land cover monitoring system

Problem Definition

The next step in the needs assessment is to define the problem. Usually, many problems are brought up during the consultation workshops, which are discussed and then prioritized. Many of these problems are beyond the scope of SERVIR or the solutions are not feasible with the currently available EO information and geospatial technologies. Therefore, the problem is explicitly defined in the context of the solutions that will be provided by the service. At this stage, efforts are made to make it clear "why" the service will be developed and "what" problems will it address.

A stakeholder mapping exercise was carried out to identify the major stakeholders and users. It gives an understanding of institutional mandates and key players in the thematic area. The stakeholder mapping tool (SPT 2017) analyzes relationships and identifies gaps and opportunities related to the achievement of a particular goal by looking into the details of stakeholder practices or behaviors to desired outcomes. In addition, the tool helps to refine the understanding about stakeholders' ability to facilitate service design, implementation, and uptake; identify roles for services and opportunities to leverage other related activities; and to fathom the links between the services and the decision-making processes. In short, stakeholder mapping helps in identifying the targeted beneficiaries and in finding out potential partners who can play specific roles in co-development and delivery of the service.

While there are many approaches to stakeholder mapping, the service planning toolkit recommends information flow as a basis since SERVIR's work usually revolves around strengthening evidence-based decision-making. With this view, the

main stakeholder types are considered as: (i) data collector—persons or institutions responsible for collecting primary or secondary data; (ii) data analyzers—entities involved in the analysis of data for the preparation of products and tools; (iii) intermediaries—responsible for the communication or dissemination of information between the data analyzers, decision makers, and beneficiaries; (iv) enablers—those not directly involved in the information system, but who influence the policy environment; (v) decision makers/end users—those with the authority to make decisions based on the data, products, and tools produced by the information system; and (vi), beneficiaries—those who benefit from the decisions informed by the system. A single stakeholder can fall into multiple categories. An example of a stakeholder map in the context of the National Land Cover Monitoring System for Nepal is illustrated in Fig. 2.4.

In this case, FRTC is the organization mandated to conduct land cover mapping in Nepal. It was the logical partner for SERVIR to engage to co-develop the service. Other sectoral departments or subnational offices such as the Department of Forests and Soil Conservation (DoFSC) were involved as data analyzer/producer since it is directly responsible for the forest sector data. Other agencies like the Department of National Parks and Wildlife Conservation (DNPWC), the Ministry of Agriculture and Livestock Development (MoALD), and the Central Bureau of Statistics (CBS) play the role of intermediaries which lend support in the communication, dissemination, and use of the information services. The end users include

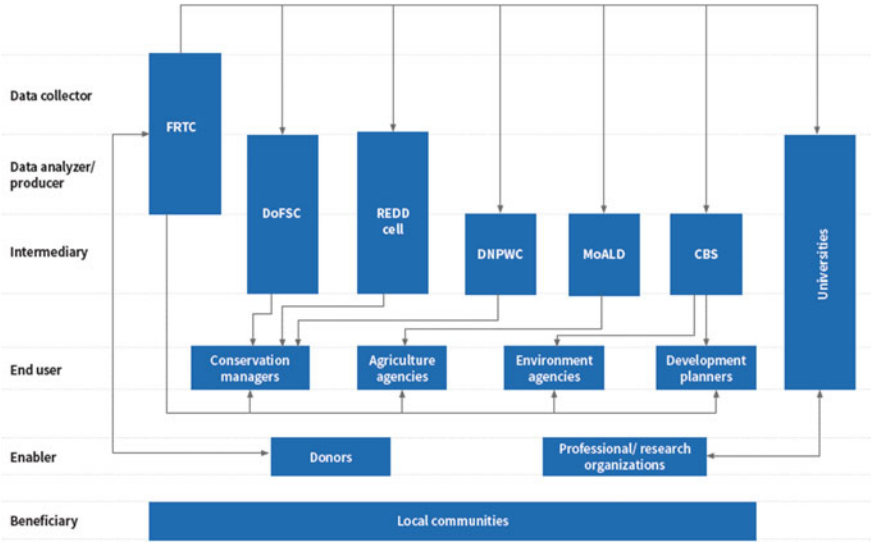

Fig. 2.4 Example of stakeholder map and information flow for the National Land Cover Monitoring, Nepal. Forest Research and Training Center (FRTC), Department of Forests and Soil Conservation (DoFSC), Department of National Parks and Wildlife Conservation (DNPWC), Ministry of Agriculture and Livestock Development (MoALD), and Central Bureau of Statistics (CBS)

conservation managers, development planners, and agricultural and environmental agencies which use the information in their decision-making process. Donor agencies and professional/research organizations are considered as enablers as they influence the policies for use or the reach of the service. The beneficiaries are those who benefit from the more accurate and timely information and management decisions made by the implementing partners, which include farmers, local communities, and the private sector.

Another component of problem identification is developing a ToC which defines the pathways to achieve the intended impacts from the service. The ToC is a comprehensive description and illustration of how and why the desired change is expected to happen in a particular context (https://www.theoryofchange.org/). It starts with the desired impacts and works backwards to identify the conditions or outcomes that must be in place to achieve those impacts. Clear outcome and impact statements are formulated to guide the planning, monitoring, and evaluation process, and to track the changes brought about by the use of the service to measure its impact. The ToC is considered as an ongoing process of reflection to explore change and how it happens while implementing the service (Vogel 2012). A brief template of ToC for RLCMS is provided in Table 2.1.

Table 2.1 Theory of change for the regional land cover monitoring system

Impacts	Sustainable land management, reduced loss of biodiversity, and enhancement of forest cover
Outcomes	Enhanced capacity of partners/stakeholders in monitoring changes in land cover for effective management
Outputs	• Annual land cover maps for the HKH region using a unified methodology, classification schema, and data sets • Annual national land cover maps based on nationally accepted classification schema • Web-based data visualization and analysis system for dissemination of land cover data and change information • Trained professionals in land cover mapping and monitoring
Inputs	• Consultations and stakeholder engagement for co-development of the classification schema and methodology • Land cover mapping and change analysis methodology (using Google Earth Engine and Landsat data) • Training of partners • Dissemination (workshops) on the complete system
Assumptions	• Stakeholders will use the annual land cover information in decision-making • The land cover classification system will overcome the technical challenges in mountainous and shadow-dominated areas • Sufficient cloud-free Landsat images will be available for the region • Google Earth Engine will be available as an open system for image analysis
Sustainability strategy	The capacity of the partner will be enhanced, and the whole methodology and system will be customized and automated for easy adoption by partners

At the end of the needs assessment stage, it is expected that we have a clear sense of the problems to address; an understanding of the information environment around the service and of the roles of the implementing partners, users, and beneficiaries; required inputs, including data and human resources; knowing about the capacity gaps of the different stakeholders; comprehending the relationships between the stakeholders and understanding their roles, and how they can contribute to the development and use of the service; and a well-defined ToC for the service.

2.3.2 Stage 2: Service Design

The design step sets up an environment of collaboration with the implementing partners on service design; development of data sets, products, and tools; on necessary capacity building activities; and on the dissemination strategy to support uptake.

Service design is the critical phase in which the hub and implementing partners come together to formulate a functional service. During this phase, they come to a consensus on the service requirements and the anticipated impact on a defined problem. The key driver of service design is a commitment by all parties to plan, implement, and sustain an effective response to the problem at hand. Partnerships are established with key organizations that have committed to the co-design and development of the service through formal instruments such as a memorandum of understanding (MoU) or a letter of intent (LoI), or via data-sharing agreements, depending upon the nature of the organizational setup. Sometimes, this process is lengthy due to the procedural requirements of government bureaucracies. However, work usually can advance under mutual, informal understandings between the agencies while formal relationships are being pursued. A partnership landscape in the context of RLCMS is given in Fig. 2.5.

Service Planning

Following the consultations and needs assessment and stakeholder mapping, service planning begins with consensus on a service concept and evolves into detailed planning to make the concept a reality. The service concept enhances concurrence in technical approaches and capacity building approaches; cultivates relationships, consolidating long-term user buy-in and ownership; and documents key aspects of developing and implementing the service. It helps to articulate the service vision, leading to impacts, and reflects an understanding of baseline technical capacity, data availability, gaps, and trainings and capacity needs. Besides, it is helpful to specify the technical details and other activities related to the various components of service design and delivery, including about products, data management, and capacity building. The service concept is supported by three additional documents: product definition document (PDD); data management definition document (DMDD); and training definition document (TDD). The PDD provides a

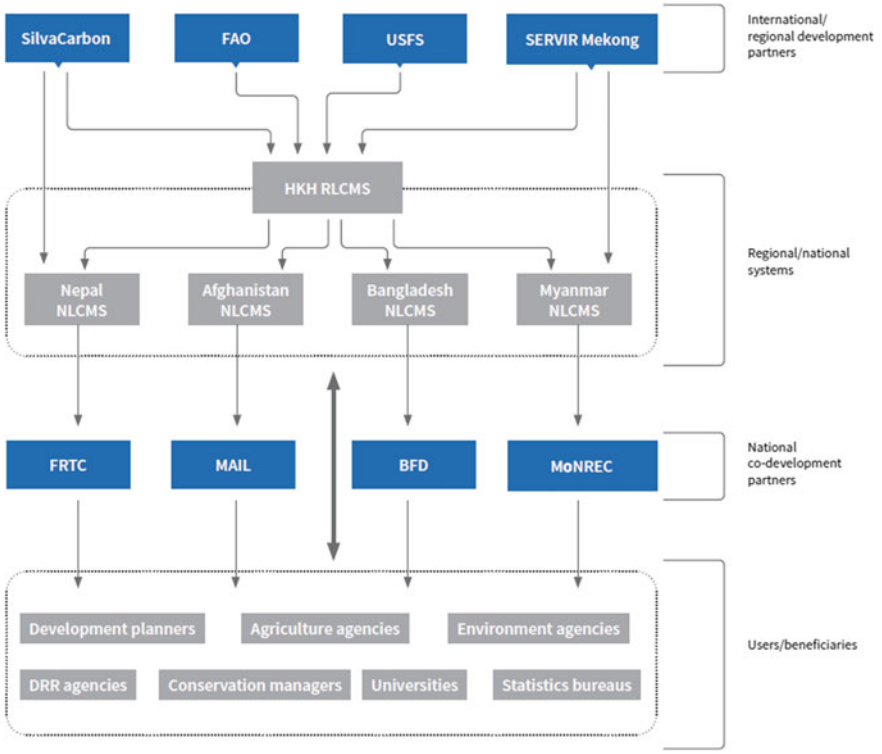

Fig. 2.5 Example of the partnership landscape for regional/national land cover monitoring systems. Forest Research and Training Center (FRTC), Ministry of Agriculture, Irrigation, and Livestock (MAIL), Bangladesh Forest Department (BFD), Ministry of Natural Resources and Environmental Conservation (MoNREC), Disaster Risk Reduction (DRR), United States Forest Service (USFS), Food and Agriculture Organization (FAO), Hindu Kush Himalaya Regional Land Cover Monitoring System (HKH RLCMS), and National Land Cover Monitoring System (NLCMS)

comprehensive technical approach to service development, including the roles of respective partners. In the case of RLCMS, the PDD includes details such as methodologies on using the Google Earth Engine (GEE), employing Landsat as the primary data source, and accessing Collect Earth Online for data collection through high-resolution satellite images, classification approaches, and minimum mapping units.

The DMDD describes the creation of platforms to support a service and also outlines a structured arrangement for data sharing. This document ensures sustainability, and data-sharing considerations for new data platforms are factored in at the start of the service design process. The TDD provides an overview of the anticipated capacity building and training activities. For RLCMS, a number of trainings on land cover classification and GEE were conducted for the selected staff from the partner organizations in each country. The training activities were

designed as structured courses, production workshops, and on-the-job training. Collaboration with SilvaCarbon, USFS, FAO, and the SERVIR-Mekong hub were clearly defined for specific inputs during the training exercises.

Service Development

The next step after service design is the development of system components as defined in the PDD. Technical teams, consisting of relevant professionals from the hub, the NASA Science Coordination Office, the Applied Science Team and partner organizations, work together in the development of the different products contributing to the service.

User engagement during this phase includes regular meetings and consultation workshops organized jointly with the co-development partners. These consultations can be seen as follow-up activities to the needs assessment step; here, the primary focus is to provide updates on the development process and to receive feedback from the stakeholders. These consultations are useful in confirming the alignment of service development with the identified needs and priorities, which may have deviated to some extent from the previous findings. Any modifications that are required due to technical or institutional challenges are also identified through these user consultations. The frequent and regular engagement among service developers, users, and beneficiaries sets up the service implementers to achieve the intended outcomes.

Following the plans specified in the TDD, the major activity during this phase is organizing trainings to the targeted staff on the various software tools that are used in product development. Structured class room style training, on-the-job training, and production workshops are the modalities usually adopted for capacity building. During this phase, the RLCMS saw a series of trainings at the hub, and for co-development partners on GEE, there were also joint workshops for finalizing the land cover primitives and classes, as well as joint fieldwork. The strong sense of ownership demonstrated by the co-development partners, which are also nationally mandated organizations, ensured the utility and sustainability of the service in the long run.

2.3.3 Stage 3: Service Delivery

Service Implementation

At this stage, all the products planned under the service are finalized. The feedback and endorsement from the relevant line agencies are received through dissemination workshops. The accuracy of the data and information products are ensured using standard accuracy assessment methods. The online platform is developed to serve the data to the users with features for interactive visualization.

The beta version of land cover data for Nepal was released at a prelaunch workshop jointly organized by FRTC and SERVIR-HKH to which the relevant

stakeholders were invited. An online application, as well as a mobile app, was developed to receive users' feedback on areas where the land cover was wrongly classified. After incorporating the users' feedback as well as after additional field verification from FRTC, the data were finalized. Further workshops are planned for endorsement from the sectorial agencies. The data will be finally released as the national land cover data set produced by the Government of Nepal.

Adoption

Dissemination workshops and orientation/training on the use of services are organized for broader awareness and adoption of the data and information generated through the service. With proper completion of all the stages of service development and implementation, it is expected that the data and information products will be used by the intended stakeholders and users in their decision-making process, thereby bringing positive impacts on policies and on communities. The evidence of the adoption and use will be captured through news articles, published papers, and the narration of success stories.

Performance Monitoring, Evaluation, and Learning

The MEL practice (Chap. 18) is considered as an essential component of the service planning approach, and it spans through the full cycle. MEL also evolves to expand the use of impact-driven planning and monitoring tools.

During the needs assessment of stage 1, MEL focuses on organizational capacity assessments and developing a ToC for the service. The ToC captures the "how" and "why" of the desired change in a particular context and brings clarity to the logic underpinning MEL. The MEL tools ensure the identification of changing perspectives, inputs, activities, outputs, outcomes, and impacts; promote effective implementation and sustainability of the services; identify measurements for progress; and highlight the logic of a service concept.

The MEL tools capture periodic progress through a number of predefined indicators. The metrics used for the indicators help in identifying whether the activities are going in the right direction in achieving the results as planned during the design and development of the service. During the service delivery stage, MEL helps in systematically capturing success stories. Capturing success stories are encouraged at this stage to demonstrate the utility of the services and attract more users who can benefit from them. MEL tools, like tracer survey and the repetition of organizational capacity assessment, help us in identifying the changes, and we have been able to bring as well as show us the areas of improvement for effective adoption of the service.

2.4 Experiences from Adopting the Service Planning Approach

As discussed in Chap. 1, the first phase of SERVIR-HKH started with the technological possibilities from EO applications and matching them with the users' demands in designing and developing products. The service approach has brought a paradigm shift in developing products or solutions by putting the "problems" first and working backwards from the desired impacts and outcomes toward the intermediate outputs and inputs that are required. SERVIR's capacity building goals are better achieved through a service approach that is composed of needs assessments, tools, products, and training; these are required to solve the identified problems. The service planning toolkit provides a guide to consider the full cycle of service planning. However, the tools need to be applied by taking into consideration the experience and context that are unique to each service. SERVIR works on the four service areas of agriculture and food security; land use, land cover, and ecosystems; water and hydro–climatic disasters; and weather and climate land cover and ecosystems, water and related disasters, and weather and climate (Chap. 1). The development outcomes, stakeholders, and challenges that span these four service areas are rather diverse, and therefore, the technical complexities also vary in the design of services. On the other hand, some problems in these service areas are interrelated. For example, an extreme weather event causes floods and landslides, which can destroy farms and bring changes in land cover types. Therefore, it becomes important to keep in mind the cross-connections among the services, products, and stakeholders. To address this, we came up with a matrix of products and services (Table 2.2) to identify the overlaps.

As with the services, the users also overlap and interact for different services. For example, the hydro-met agencies, with whom we co-develop services related to streamflow, weather, and climate, are often mandated to provide information to stakeholders in other service areas related to agriculture, water resources management, and disaster risk reduction. The capacities of the users and their access to the information systems also vary within a country and in the region. Therefore, user engagement and capacity building plans need customization according to the context. Another experience that we gathered from the service design and user engagement process is that there are substantial differences in the attitude of the institutions in the region. For instance, some are more open to experimenting with and adopting new technologies and information sharing, while others are very reticent to change (probably because they may face significant institutional risks in deviating from the current information and technology workflows; or the resources may be limited to participate in co-development). This demands a differentiated approach in engaging with partners and users.

From our experience, we have learnt that the service planning process usually takes more than three years, from the stage of needs assessment to the phase of service delivery. During this period, there are sometimes significant changes in the external landscapes, such as the start of larger projects at the national level dealing

Table 2.2 Products and services matrix

Products	Services								
	Regional drought monitoring and early warning	Agromet advisory service at national/ local levels planning	Food security vulnerability information system	In-season wheat crop area assessment	Enhancing flood early warning system (EWS)	River/ floodplain information management	Regional land cover monitoring	Forest vulnerability and management information	Monitoring extreme weather
South Asia land data assimilation system	X	X			X				
Regional drought indices analysis and visualization system	X								
Quantification of the total terrestrial water storage anomaly and groundwater anomaly	X	X			X				
Quantification of snow water equivalent	X	X			X				
Agromet advisory support portal		X							
Crop-type map for major crops (rice, wheat, maize)		X							

(continued)

Table 2.2 (continued)

Products	Services								
	Regional drought monitoring and early warning	Agromet advisory service at national/ local levels planning	Food security vulnerability information system	In-season wheat crop area assessment	Enhancing flood early warning system (EWS)	River/ floodplain information management	Regional land cover monitoring	Forest vulnerability and management information	Monitoring extreme weather
Food security information system			X						
Wheat area assessment and mapping system				X					
Mobile application for field data collection		X		X					
Regional hydrological model for discharge monitoring and forecast					X				
National/ regional-level viewer for visualization of ECMWF/GLOFAS					X				
Floodplain information portal						X			

(continued)

Table 2.2 (continued)

Products	Services								
	Regional drought monitoring and early warning	Agromet advisory service at national/ local levels planning	Food security vulnerability information system	In-season wheat crop area assessment	Enhancing flood early warning system (EWS)	River/ floodplain information management	Regional land cover monitoring	Forest vulnerability and management information	Monitoring extreme weather
Regional land cover monitoring system							X		
Forest vulnerability and degradation mapping								X	
Resilient forest management system								X	
Short-term weather forecasting					X				X
Extreme weather monitoring									X
Damage assessment due to extreme weather									X

with the same issues on which SERVIR has been working, or changes in the organizational structure of the government which directly affect the individuals and organizations partnering in co-development. The service design process must adapt to these external dynamics as we move into service delivery. Similarly, new technological platforms may emerge during the implementation phase, which can have a significant impact on product design. These changing landscapes, whether triggered by internal changes in government, by external influences from development and donor agencies, or by scientific and technological progress, further underscore the importance of iterating with users in reassessing and refining the needs, ToC, and intended outcomes of the services which are to be co-developed.

Although dissemination workshops were planned for RLCMS, it was not possible to organize the workshops physically during the final stages of service development due to safety issues and travel restrictions that were enacted to protect the citizenry from the COVID-19 pandemic. As an adaptation measure, SERVIR-HKH took to the virtual meeting platform to engage with the partners and stakeholders in order to disseminate the service; this has helped us achieve the expected outputs/outcomes as in the case of conventional meetings.

2.5 Conclusion

The keys to the service planning approach are to engage with the stakeholders in jointly focusing on problem identification, solutions, and impacts. While focusing on these keys, the approach encapsulates stakeholder consultation and needs assessment, stakeholder mapping, service design, monitoring and evaluation, and service delivery. User engagement, gender considerations, capacity building, and effective communication approaches are also fundamental aspects to improving service delivery and the sustainability of the services. To guide the successful implementation of the service planning approach, SERVIR was able to develop a service planning toolkit with four sets of tools. Each tool provides an opportunity to the hubs and the implementing partners to consider: (1) disproportionate effects of a development problem on audiences, (2) whether their needs are adequately addressed, and (3) whether the design and delivery of services can be strengthened to help reduce their vulnerability. The service concept and theory of change documents have advanced our ability to account for and integrate the needs of our stakeholders through the co-development of services. In this chapter, we have briefly described how implementing the service planning approach relies on the expertise and careful interpretation of the challenges faced by the implementing partners. Before the implementation of the service planning approach, the development of products lacked a shared vision to create sustainable information services in partnership with national or regional stakeholders. In addition to making the hub services more effective, the service planning approach adopted by the global network of SERVIR hubs, USAID, and NASA has enabled knowledge sharing among science and development practitioners in the Americas, Africa, and Asia. Enhanced

by knowledge exchanges, the systematic documentation, consistency, and shared expectations of the service planning approach have enabled SERVIR hubs to find solutions in terms of data products, tools, platforms, methods, user engagement, capacity building, and outreach strategies from one region to another.

References

Bajracharya (2015) A hub's perspective on five years of collaboration. SERVIR Himalaya report. ICIMOD, Kathmandu, 34p

Bajracharya B, Irwin D, Thapa RB, Matin MA (2021) Earth observation applications in the Hindu Kush Himalaya region—evolution and adoptions. In: Earth observation science and applications for risk reduction and enhanced resilience in Hindu Kush Himalaya region (Chap. 1). Springer International Publishing, Cham. https://doi.org/10.1007/978-3-030-73569-2_1 (this volume)

Lalu MK, Ahmad F, Bhattarai G (2021) Approach and process for effective planning, monitoring, and evaluation. In: Earth observation science and applications for risk reduction and enhanced resilience in Hindu Kush Himalaya region (Chap 18). Springer International Publishing, Cham. https://doi.org/10.1007/978-3-030-73569-2_18 (this volume)

Service Planning Toolkit (SPT) (2017) https://www.servirglobal.net/Portals/0/Documents/ServicePlanningToolkit_2017-09-19.pdf

Shakya N, Pathak SR et al (2021) User engagement for sustaining services. In: Earth observation science and applications for risk reduction and enhanced resilience in Hindu Kush Himalaya region (Chap 17). Springer International Publishing, Cham. https://doi.org/10.1007/978-3-030-73569-2_17 (this volume)

Uddin K, Matin MA et al (2021) Regional land cover monitoring system for Hindu Kush Himalaya. In: Earth observation science and applications for risk reduction and enhanced resilience in Hindu Kush Himalaya region (Chap 6). Springer International Publishing, Cham. https://doi.org/10.1007/978-3-030-73569-2_17 (this volume)

Vogel I (2012) Review of the use of 'Theory of Change' in international development, DFID. www.theoryofchange.org