JOINT COOPERATION PROGRAMME BANGLADESH – THE NETHERLANDS

Technical Note 7

User Demand Assessment and Development Progress of the App BDP2100

Information for Impact

JOINT COOPERATION PROGRAMME

Bangladesh Netherlands

Knowledge development for a prosperous delta

JCP Technical Note 7

User Demand Assessment and Development Progress of the App BDP2100

Information for Impact

September 2020

Developing the partnership for applied research by

Document information

Document Title	User Demand Assessment and Development Progress of the App BDP2100.
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Reference	Technical Note 7

Dissemination level

☐Technical Report
☑Technical Note
☐Planning and Progress Report
☐Others

Dissemination level

☐Public
☑Other Programme Partners
☑Restricted to a specific group
☐Confidential

Document Version and Review Management

Version No.	Status	Date	Author(s)	Review	Approval
1	Draft	29-Mar-2020	MR, CTS	HD	
2	Draft	24-Sept-2020	MR, CTS	NS	WO

Key Project Information

This document is an output of the Joint Cooperation Programme (JCP) Bangladesh – the Netherlands

Grant agreement No.	DHA/OS/2018/4000001952
Grant organization	Embassy of the Kingdom of the Netherlands (EKN)
Project manager	William Oliemans
Project start date	December 2018
Project duration	4 years
Coordinating organization	Stichting Deltares
Partner organizations	Center for Environmental and Geographic Information Services (CEGIS), Institute of Water Modeling (IWM), Wageningen University and Research (WUR)

SUMMARY AND CONCLUSIONS

In the Joint Cooperation Program (JCP)[1], a 4-year knowledge cooperation between applied research institutes in Bangladesh and the Netherlands, practical solutions are being developed to support the implementation of the Bangladesh Delta Plan 2100 (BDP2100). One of the projects within JCP is the Project 'Information for Impact'. The objective of this project is to develop an easily accessible app for smart phones that will make available information on the BDP2100. The project Information for Impact is led by the Center for Environment and Geographical Information Services (CEGIS). This report is a technical note and describes the user demand assessment and the app development process.

The app for smart phones makes information on BDP2100 available through a smart user interface and by connecting to a database at a server while leaving the original data with the original user. A knowledge app to make the BDP2100 information accessible to a wide range of users is being prepared in the JCP sub-project Information for Impact.

The users have indicated their demands as follows:

- The app has easily accessible information regarding BDP2100
- The app also provides information on related themes, like Water Resources, Agriculture, Environment and Disaster, Socio Economic, Spatial Planning and Land Use, and Climate
- The app will be developed to generate its own funds for maintenance and update as a business model (this will be elaborated on once a first app has been developed)
- The app uses data from the Knowledge Portal of BDP2100, sharing the information (not necessarily the data)
- At a later stage it may be explored to incorporate an interaction functionality in the app.

The project team has developed the system architecture of the app, with considerations for the presentation (user interface), web server, web service, and database. Further an entity-relationship model (ER model) has been developed. This ER model defines the data/information infrastructure which can be implemented in a database. Finally, considerations regarding the system requirements have been noted. Based on this, a functional first version of the app can be developed. Meanwhile, the business model of the app will be developed further.

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[1] See for more information: JCP Website, JCP Facebook Page

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ACRONYMS AND ABBREVIATIONS

AKB	Agro Knowledge Bank
BDP2100	Bangladesh Delta Plan 2100
BADC	Bangladesh Agricultural Development Corporation
BIWTA	Bangladesh Inland Water Transport Authority
BUET	Bangladesh University of Engineering and Technology
BRKB	Bangladesh Rice Knowledge Bank
CEGIS	Center for Environment and Geographical Information Systems
DWKD	Dhaka Water Knowledge Days
GDP	Gross Domestic Product
GED	General Economics Division (of the Planning Commission)
GOB	Government of Bangladesh
ICT	Information Communication Technology
IIS	Internet Information Services
IT	Information Technology
IWM	Institute of Water Modelling
JCP	Joint Cooperation Programme Bangladesh – the Netherlands
LGED	Local Government Engineering Department
SIBDP	Support to the Implementation of the Bangladesh Delta Plan
UI	User Interface
WARPO	Water Resources Planning Organization
WUR	Wageningen University Research

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1. USER DEMAND ASSESSMENT

1.1. Introduction

Bangladesh is a rapidly growing country and expected to achieve the middle-income status by the year 2021. In the pursuit of development, the government of Bangladesh (GOB) took a pro-active approach in addressing major challenges related to adaptive delta management and sustainable development. The government has approved the Bangladesh Delta Plan 2100 (BDP2100) with the aim to ensure water and food security, as well as economic progress. The plan is expected to boost the country's Gross Domestic Product (GDP) growth by another 1.5 percent by the year 2030.

During preparation of the Bangladesh Delta Plan 2100, the Knowledge and Information Portal was developed to provide information services to support planners and decision makers in participatory and interactive planning and decision-making processes. It contains number of data layers on water resources, disaster management, spatial planning and land use, environmental management, food security, economics, finance and other basic data. The Portal will be regularly updated with recent data and information. The updating will be performed under the Support to Implementation of Bangladesh Delta plan (SIBDP) project. After completion of the SIBDP project, the General Economics Division (GED) can update the portal with the assistance of CEGIS. Gathering spatial and temporal data layers, policy documents and other technical reports is thus a continuous process. Several knowledge-based tools were developed under the BDP2100 to support planning, decision making and the implementation process for Sustainable Delta Management. In addition to the previous work of knowledge portal development, an app (location) based information service will be developed through this project to support the implementation of the BDP2100.

Nowadays, most of the people of the country are using smartphones and other internet-usable devices to collect information on topics of interest. The number of smart phone users, ICT facilities and internet connections are rapidly expanding in Bangladesh. The use of mobiles as information service tool is also gaining popularity. Using mobile applications as a means for updating information services, the knowledge portal can become an innovative solution, and through smart data analysis, we can eventually provide information to the wide range of planners, decision makers, plan implementers, specialists, researchers, media and the people. Innovative app will allow easy access to the information and engage them in participatory and interactive planning process, ensuring quick and efficient sharing of information and decision-making.

The app is being developed based on data layers in the Knowledge and Information Portal of BDP2100. The app will deliver location specific information about water availability, temperature, flood risk, soil parameters, crops, agricultural practices, and also spatial planning and climate risk and vulnerability related information. The app will further demonstrate the potential of using the information services which will strengthen or facilitate the BDP implementation.

1.2. Background of the Study

Although the Knowledge and Information Portal of BDP2100 consisting of several data layers including water resources, disaster management, spatial planning and land use, environmental management, food security, economics, finance and basic data, many people however, are unaware about the knowledge portal. At the same time, there is a wide array of information available, from which it is difficult to choose right information to support planning and decision making. Moreover, the potential users are not well conversant with the information they might get from the portal. Mobile phones with smart application are now available everywhere in Bangladesh which helps access to all sorts of information. Therefore, as a start, this project aims to design and develop an app (smart phone app) based information platform to provide location-based information service that will support in planning and decision making in line with the activities of Adaptive Delta Management.

1.3. Objectives of User Demand Assessment

This project is about developing an app for smart phones to make available information on BDP. The main objective of user demand assessment is to identify the user needs, requirements and opinions to assess the usability of the app as an information services tool and to identify gaps between the expectations of stakeholders and app services. Requirements have been justified based on interactions with the user through consultation process i.e. workshops, group discussions, meetings and interview. The specific objectives of demand assessment are to:

- share the app frame work with stakeholders
- understand the stakeholders requirements
- identify data and information requirements

1.4. Reviewing apps

Smartphone apps are a modern and advanced technology. It has come up for the new generation in the form of digital platform with advisory service for the general public. Some national apps like Fosholi, Pesticide Prescriber, Agriculture Information Service, Bangladesh Rice Knowledge Bank (BRKB), Fish Advice, Agro Knowledge Bank (AKB) are intended to educate the people about the agriculture and agro based facts and information. The objective of the application is to be aware and deliver proven scientific evidence on agriculture. This is an icon and menu based app for the Bangladeshi Agriculturists. We also reviewed some international apps like globe climate, ClimaticWatch, UN Climate Change, MyFloodRisk, Climate Change Awareness are social media platform with a goal to bring people together and raise awareness about climate change and how it impacts our environment and ecology. All these apps provide comprehensive facts causes and effects of climate change. These are also the icons and menu based mobile apps for international community. Using these apps one can get detailed information on how to plan for future. Furthermore, one can also know about the implementation, management and maintenance of the climate resilient. After reviewing all these it is understand that apps the Knowledge App need to combine with following features:

- Interactive information presentation;
- Icon and menu based mobile app;
- User friendly information navigation;
- Popular Android-oriented design interface for better performance of knowledge app.

1.5. Methodology of User's Demand Assessment

To map the user demand for the app on BDP2100 we have organised series of workshops, group and informal discussions with the stakeholders of GED, BWDB, WARPO, LGED, SIBDP, BUET and BADC. The app development team shared the initial concepts, purpose and scope of the app to get feedback, suggestions and comments from the participants on the functionalities and flow of the application. The mock up design and proposed primary functions of the app was presented in three different workshops: Joint Cooperation Programme Bangladesh – the Netherlands (JCP) inception workshop, Delta Forum sharing workshop at General Economic Division (GED) (Figure 1), Planning Commission, dated 17 June 2019 and Dhaka Water Knowledge Days (DWKD), Dhaka, 27-31 October 2019. The participants in the workshops frequently asked open and obvious questions and requested to share their needs, design of app, developing platform and information technology.

Figure 1 Delta Forum Consultation Meeting

The app development team conducted one-on-one user feedback sessions with the professionals of GED, SIBDP and CEGIS. The team requested the participants to give their information requirement, design and expected functionalities. Moreover, the team also discussed with other IT experts of CEGIS regarding database structure, system architecture and development platform of the app (Figure 2). Many brainstorming sessions among the app development team were organized to finalize the features of the app. Storyboard was created to illustrate the interaction between user interfaces and components.
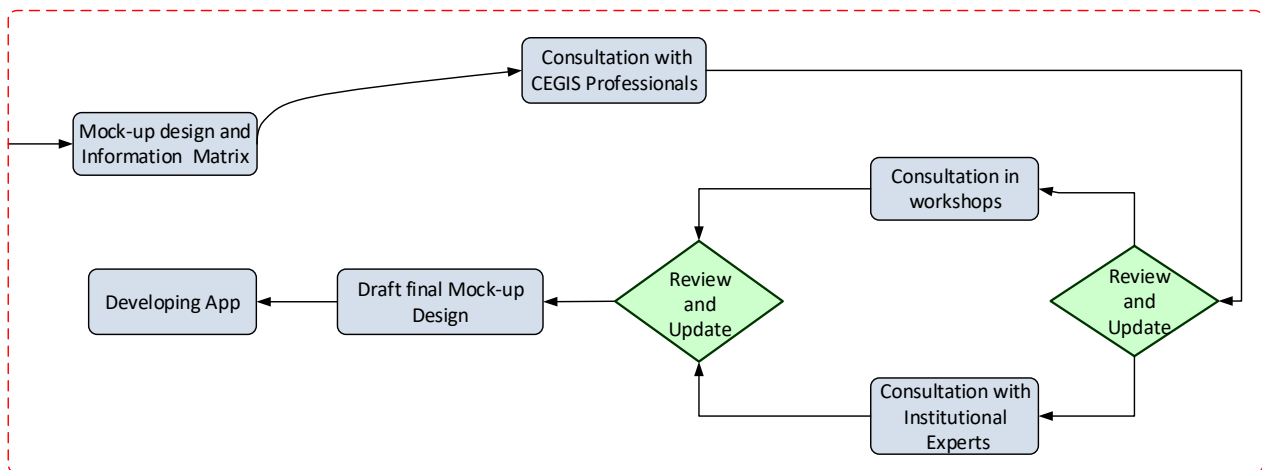

Figure 2 Process of the User Demand Assessment

1.6. Mock-up App Design

A mock-up design of the app has been developed using PowerPoint to visualize the app user interface of the information services to implement Bangladesh Delta Plan 2100 (Figure 3). We have collected feedback from stakeholders on the mock-up design in order to improve the design. can perceive, interact and communicate with mock-up more easily and effectively. Thus, they can involve themselves to discuss in various improvements in user interface (UI) design, logo, icons, colour scheme, outlook and feel of the app. The mock-up includes buttons, menus, sub-menus and features, which illustrates the connections between different screens and navigation path through the app. The mock-up presents information as map, chart, table and text format. Several spatial and non-spatial data layers are used for developing mock-up. It describes general usability and allow users to involve in the designing process.
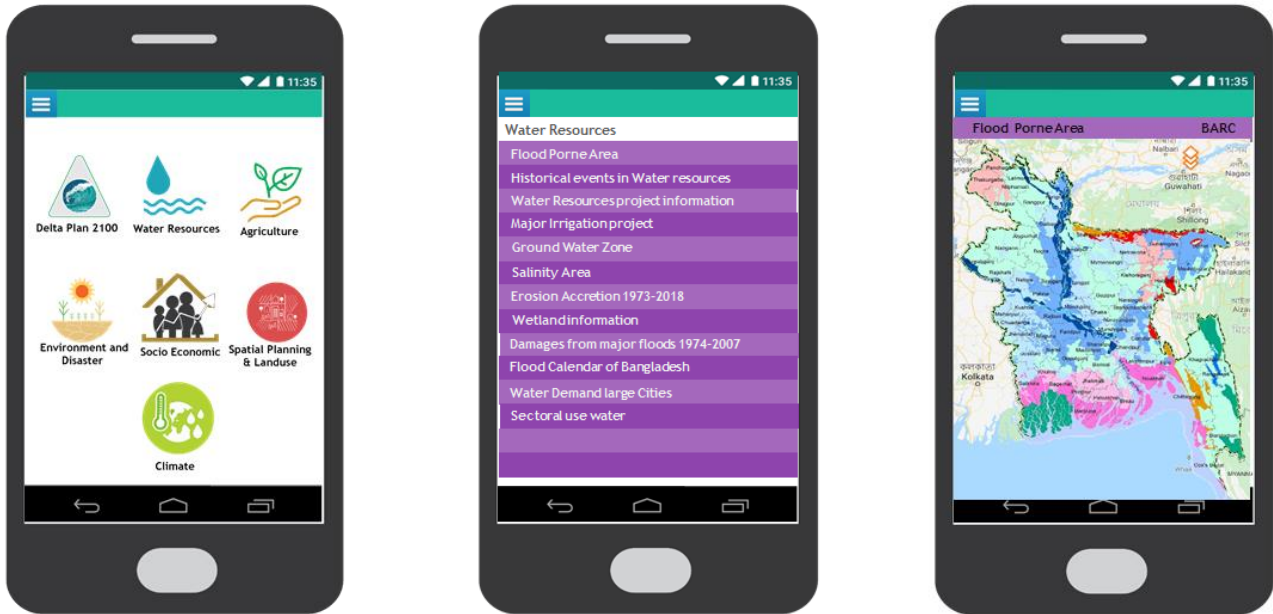
Figure 3 Mock-Up Design of the Application

1.7. Results of Workshops

The app development team identified internal and external stakeholders. Internal stakeholders were from CEGIS who have the expertise in their own subjects such as Water resources, Agriculture, Fisheries, Climate change, Ecology and IT. The External Stakeholders were from GED, BWDB, BMD, IWM, BIWTA, WARPO, BUET, SIBDP interested in exchanging knowledge and information.

Majority of the stakeholders expressed their keen interest of mobile app to interact with the information. Stakeholders expected a sophisticated mobile app that will have usable features as well as elegant design. They preferred the Android-based app as it is most common and popular device among the users. Moreover, they recommended the menu and icon based most user friendly and interactive information navigation facilities in the app including all standard functionalities such as zooming, panning, different map views. Users expressed number of information thematic area such as Delta Plan 2100, Water Resources, Agriculture, Environment & Disaster, Socio Economic, Spatial Planning & Land use and Climate. Most of the participants have showed interests in having some contents available also offline. Mock-up design was updated with the feedback and ideas given by the stakeholders and applied it in the development stage.

2. DESIGN AND DEVELOPMENT OF MOBILE APP APPLICATION

The focus of this study is to develop an effective and efficient app that can provide information services to support implementation of Bangladesh Delta Plan 2100. Presently, the app development is in progress and a minimal viable product is available. The user will get location specific critical decision-making information in their pockets. The mobile app will generate table, chart and map for providing information to the stakeholders. PostgrsSQL database is being used as backend database for the App. Java language is being used for front end design and analysis. The main interface will help to access each module of the app.

2.1. Modules

The app comprises of seven functional modules such as Delta Plan 2100, Water Resources, Agriculture, Environment & Disaster, Socio Economic, Spatial Planning & Land use and Climate. It will use information from Bangladesh Delta Plan knowledge portal. Each module will contain distinct user interface which interacts with number of data layers including tabular and spatial data. The mobile (android) app will be publicly available in the Google Play Store. Brief descriptions of the modules are narrated below.

Delta Plan 2100: This module will include Bangladesh Delta Plan related information. User can able to obtain information on key facts of Delta Plan 2100, delta management strategies, delta opportunities, delta challenges, delta scenario, investment projects, etc. which will help them to long term integrated and holistic plan to support delta plan implementation.

Water Resources: This module will contain information regarding water resources and river system management, which are essential components for water resources planning, challenges and management issues. It will include historical events in water resources, water resources development projects, major irrigation project, flood prone area, ground water zone, salinity area, major flood damage, erosion and accretion, water demand, etc.

Agriculture: This module will include information on food security, agricultural technology and critical information such as crop area, crop suitability, food production and demand, drought information, irrigation coverage, food availability, fish production, crop calendar, boro and aman coverage, fertilizer use, land type, etc.

Environment and Disaster: This module will contain environmental and disaster information such as natural hazards, arsenic contamination, cyclone affected area, drought, river erosion and accretion, natural hazards, flood extent map, salinity intrusion, damages resulting from major floods, protected areas, etc.

Socio Economic: This module will provide socio-economic information including population distribution and density of rural and urban population, household income, poverty, safe drinking water, sectoral employment, literacy rate, settlement location, household information, population projection for the planners and the decision-makers.

Spatial Planning & Land use: This module will incorporate General Land use, Land Type, Physiographic units, Forest land, Bio-Ecological Zone, Ecosystems, Char Land, Urban Land use data.

2.2. Overview of the Database

The database will be installed and configured on data server. It will contain data, views, triggers and stored-procedure. It will execute views, trigger and store-procedure for data manipulation. The Geojson File Server will be used for storing spatial data.

2.3. Design and Development of System Architecture

Depending on the requirements identified and functionalities determined in the need assessment, a logical model or framework of the overall system is developed (Figure 4). The system is to be designed and developed using the standard four-tier architecture of app development. It consists of the following layers:

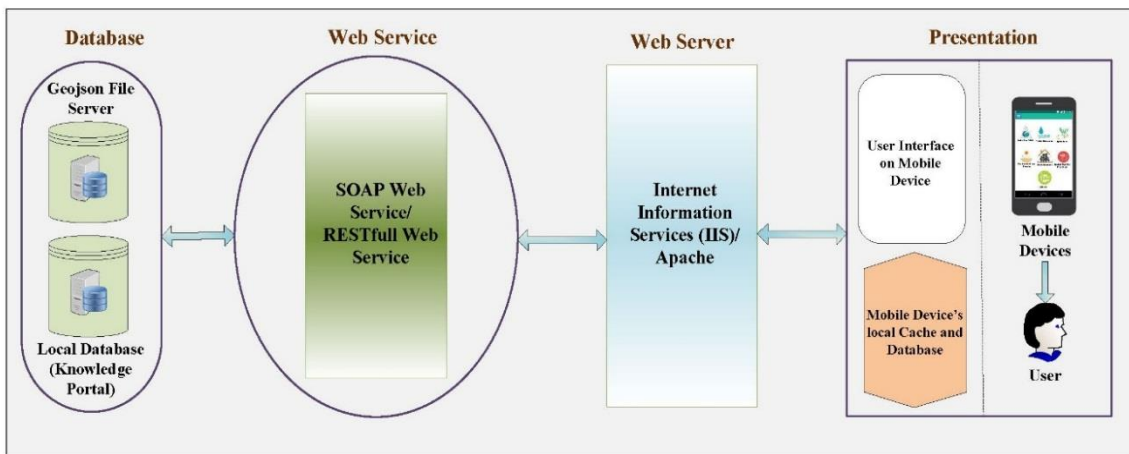- Presentation (user-interface)
- Web server
- Web Service
- Database

Figure 4 System Architecture of App

Presentation

The presentation layer is a user-interface that a user uses to interact with the application. This layer contains an interface of seven thematic areas. This layer is being developed using Java and in support of Android Studies.

Web server

The main component of a web-enabled application is the web server. It is a program that manages, delivers and allows users to communicate with the server for data service through the internet. The web server is being configured using Internet Information Services (IIS)/ Apache.

Web Service

The web service consists of business and data components. The business component is used to impose different business rules and logic. The data component is responsible for retrieving data from the server. The application layer is being developed using SOAP Web Service/ RESTfull WEB Service.

2.4. ER Diagram

An entity–relationship model (or ER model) describes interrelated issues of interest in a specific domain of knowledge. A basic ER model is composed of entity types (which classify the things of interest) and specifies relationships that can exist between entities (instances of those entity types). In case of App, an ER model is commonly formed to represent business needs required to perform business processes. Consequently, the ER model becomes an abstract data model

that defines a data or information structure which can be implemented in a database, typically a relational database (Figure 5).
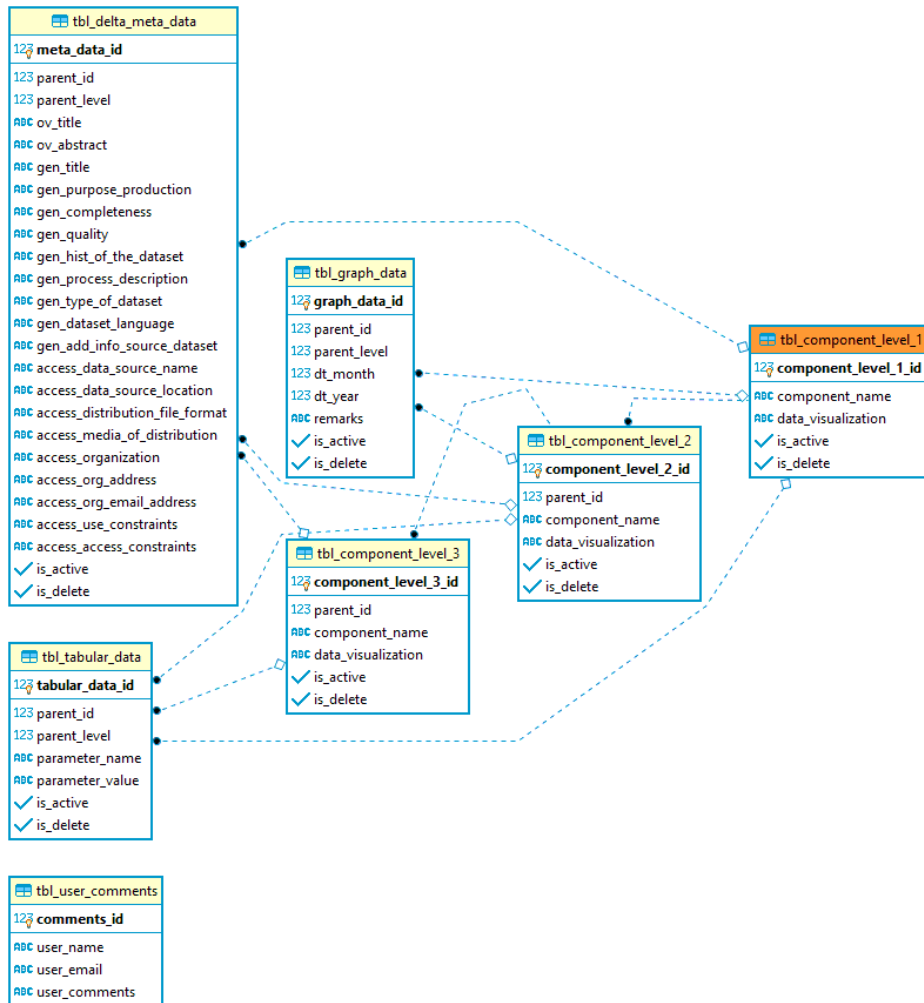
Figure 5 Entity–Relationship Model

2.5. System Requirement

The system requirement of the App and technology used is given in the table below.

Table 1 System Requirement

Item	Description
Software	
Development Language	Java
Front-end Design	XML (Extensible Mark-up Language)

Item	Description
Development Tools	Android Studio 3.5.1
GIS Tools for map rendering	Geo Sever or Map Box
SDK Version	Minimum 19 (KitKat) to up to date
Gradle Version	5.4.1
App storage	Play Store
Database server	Windows/Linus
Database	PostgreSQL 11/ SQLite (open-source relational database)
Spatial Database	PostgreSQL 11

ANNEX A. WORK PROGRESS AND PLAN FOR 2020

Activities of work progress and plan for 2020 (KP App)

Table 2 Activities of work progress and plan for 2020

Sl. No	Major components of Project	Activities Required	Activity progress	Present Status	Deadline	Deliverables
I	User demand assessment	Literature/Documents and App review	Reviewed both technical and user aspect of the existing Android based apps and along with its design and categories information services	Draft report completed and will be reflected in user demand report		
		Consultation workshop with stakeholder	Consultations workshop in the inception workshop, seminar on Delta forum, Dhaka Water Knowledge Day 2019. Consultation with CEGIS professionals regarding technical and user aspect of the app Bilateral consultation with the PD, SIBDP and other officials	Completed		End of December 2019
		Report on user demand and supply regarding information services	Completed	Completed	End of December, 2019	End of December, 2019

Sl. No	Major components of Project	Activities Required	Activity progress	Present Status	Deadline	Deliverables
2	Mock-up design	Mock-up design framework	Step by Step consultation meetings with sector wise Specialists of CEGIS and other stakeholders	Mock-up design completed	End of December, 2019	End of December, 2019
3	Functional design and development	Database design	A draft design has been completed in consultation with database experts of CEGIS	50% progress	End of March, 2020	
		Consultation workshop	Step wise through consultation meetings and workshops with stakeholders	80% progress	End of March, 2020	
		Development of app	In-Progress	20% progress	End of September 2020	
		Data preparation and analysis	In-Progress	20% progress	End of September 2020	
		First version of app			First version will publish in Mid of June, 2020	
		App demonstration			End of September, 2020	
		Feedback workshop			October, 2020	
		Revise app functionality and design			November 2020	
		Launching			December, 2020	
4	Training and capacity building	Strengthening of Professionals	Training in The Netherlands:		First Quarter 2020	

Sl. No	Major components of Project	Activities Required	Activity progress	Present Status	Deadline	Deliverables
			Training on mobile application development technique, cloud – based geospatial database for app technology and development of sustainable business model for app Training in Bangladesh: Programming on mobile application			

ANNEX B. LIST OF THEMATIC LAYERS

Tentative Data List of Knowledge App

Table 3 Tentative Data List of Knowledge App

Thematic group	Thematic type	Thematic layers	Visualization format
Delta Plan 2100	Key facts Delta Plan 2100	Key facts Delta Plan 2100	Text/Table
Delta Plan 2100	Delta management strategies	Delta management strategies	Text /Table
Delta Plan 2100	Delta opportunities	Delta opportunities	Table
Delta Plan 2100	Delta challenges	Delta challenges	Table
Delta Plan 2100	Delta Scenario	Macroeconomic Indicators	Graph/Chart
Delta Plan 2100	Delta Scenario	Employment and Poverty	Graph/Chart
Delta Plan 2100	Delta Scenario	GDP per Capita	Graph/Chart
Delta Plan 2100	Delta Scenario	Population Dynamics	Graph/Chart
Delta Plan 2100	Delta Scenario	Labour Force Dynamics	Graph/Chart
Delta Plan 2100	Delta Scenario	Migration Dynamics	Graph/Chart
Delta Plan 2100	Delta Scenario	Climate Change	Table
Delta Plan 2100	Investment projects	Investment projects	Table
Water Resources	Historical events in Water resources	Historical events in Water resources	Table
Water Resources	Water Resources development projects	Water Resources development projects	Table
Water Resources	Major Irrigation project	Major Irrigation project	Table
Water Resources	Flood Prone area	Flood Prone area	Map
Water Resources	Ground Water Zone	Ground Water Zone	Map
Water Resources	Salinity Area	Salinity Area	Map
Water Resources	Major Flood Damage	Major Flood Damage	Map
Water Resources	Erosion Accretion 1973-2017	Erosion Accretion 1973-2017	Map

Thematic group	Thematic type	Thematic layers	Visualization format
Water Resources	Water Demand large Cities	Water Demand large Cities	Map
Water Resources	Sectoral use of water	Sectoral use of water	Map
Agriculture	Crop Area	Crop Area	Map
Agriculture	Crop Suitability	Crop Suitability	Map
Agriculture	Food Production and Demand	Food Production and Demand	Map
Agriculture	Drought Information	Drought Information	Map
Agriculture	Irrigation Coverage	Irrigation Coverage	Map
Agriculture	Food availability	Food availability	Map
Agriculture	Fish production	Fish production	Map
Agriculture	Crop calendar	Crop calendar	Map
Agriculture	Boro and Aman Coverage	Boro and Aman Coverage	Map
Environment and Disaster	Natural hazards	Natural hazards	Map
Environment and Disaster	Arsenic Contamination	Arsenic Contamination	Map
Environment and Disaster	Cyclone Affected Area	Cyclone Affected Area	Map
Environment and Disaster	Drought	Drought	Map
Environment and Disaster	River Erosion and Accretion	River Erosion and Accretion	Map
Environment and Disaster	Natural hazards	Natural hazards	Table
Environment and Disaster	Flood Extent Map	Flood Extent Map	Map
Environment and Disaster	Salinity Intrusion	Salinity Intrusion	Map
Environment and Disaster	Damages resulting from major floods	Damages resulting from major floods	Table
Environment and Disaster	Protected Areas of Bangladesh	Protected Areas of Bangladesh	Map
Environment and Disaster	Water Quality Indicators of Selected Rivers	Water Quality Indicators of Selected Rivers	Table
Socio Economic	Population distribution and density	Population distribution and density	Table
Socio Economic	Rural and Urban Population	Rural and Urban Population	Table

Thematic group	Thematic type	Thematic layers	Visualization format
Socio Economic	Household Income	Household Income	Table
Socio Economic	Poverty	Poverty	Table
Socio Economic	Save Drinking Water	Save Drinking Water	Table
Socio Economic	Sectoral Employment	Sectoral Employment	Table
Socio Economic	Literacy Rate	Literacy Rate	Table
Socio Economic	Settlement Location	Settlement Location	Map
Socio Economic	Household information	Household information	Map
Socio Economic	Population Projection	Population Projection	Table
Spatial Planning & Land use	General Land use	General Land use	Map
Spatial Planning & Land use	Land Type	Land Type	Map
Spatial Planning & Land use	Physiographic	Physiographic	Map
Spatial Planning & Land use	Forest land	Forest land	Map
Spatial Planning & Land use	Bio-Ecological Zone	Bio-Ecological Zone	Map
Spatial Planning & Land use	Eco-system	Eco-system	Map
Spatial Planning & Land use	Char Land	Char Land	Map
Spatial Planning & Land use	Urban Land use	Urban Land use	Map

ANNEX C. PROJECT FACT SHEET

Research Project Fact Sheet	
Date	April 16, 2019
Version Number	2.1
Status of Fact Sheet	Draft ☐ Final ☒
Author(s)	Md. Rahman

Project Name	App based information Services to Support BDP-2100 Implementation (KP App)
Project Description and Summary	Bangladesh is a rapidly growing country and hopeful in reaching middle income country by 2021. The government of Bangladesh takes a pro-active approach in addressing major challenges related to adaptive delta management and sustainable development. The government has approved the Bangladesh Delta Plan 2100 with the aim to ensure water and food security, as well as economic progress. The plan is expected to boost the country's GDP growth by another 1.5 percent by 2030.
	The Knowledge and Information Portal was developed during the preparation of Bangladesh Delta Plan 2100 to provide information services to support planners and decision makers in participatory and interactive planning and decision making processes. It contains many data layers on water resources, disaster management, spatial planning and land use, environmental management, food security, economics, finance and other basic data. The Portal will be regular updated, in order to include recent data and information. The update can be done by SIBDP2100 during project perion. After completion of SIBDP2100 project, GED can update with the assistance of CEGIS. During Gathering geographical data layers, studies, policy documents and other technical reports is thus a continuous process. A number of knowledge tools were developed under the BDP2100 to support planning, decision making and the implementation process for Sustainable Delta Management. In addition to the previous work of knowledge portal development, through this project, an App(lication) based information Services tool to support the implementation of the BDP-2100 will be developed.
	Nowadays, it's common that people own smartphones and other internet-capable devices. The number of mobile phone users, ICT facilities and internet connections are rapidly expanding in Bangladesh. The use of mobiles as information service tools is also gaining popularity. Using mobile applications as means to update information services such as the knowledge portal can become an innovative solution, and can through smart data analysis, can eventually provide information to the wide range of planners, decision makers, planning impelementers, specialists, reseachers, media and the general public. Innovative app will allow users to access information and engage them in participatory and interactive planning process, ensuring quick and efficient sharing of information.

Many people however, are unaware about the knowledge portal – so they do not know well what information they may get from there (demand side). At the same time, there is a wide array of information available, so how to choose which information to include within the app (supply side). The knowledge question is then centred around how to match demand with supply and explore the business model for such an app.

The app will be developed on the basis of data layers in the Knowledge and Information Portal of Bangladesh Delta Plan 2100. The app will deliver location specific information about water availability, critical temperature thresholds, flood risk, soil parameters, crops, agricultural practices, and also spatial planning and climate risk and vulnerability related information. The app will further demonstrate the potential of the information services and will further strengthen or facilitate the BDP implementation.

Figure1: App based Information Service

The question how information can be used for planning has been expressed by both General Economics Division (GED) and Department of Agriculture Extension DAE. Therefore, as a start, we will focus on a case study related to planning in an area where changes related to water availability are occuring, like the Barind region.

The main objective of the project:

This project aims to design and development of an app (mobile app) based information platform to provide location based information service that will support planning and decision making in line with the activities of Adaptive Delta Management.

Key activities are:

1. Function design of the app-based information platform: we will organise end-user workshops to define together with the stakeholders the set up of the app based platform (user-defined app platform) in order to provide the information on environment, climate, agricultural, landuse and water availability to support planning and decision making processes about Adaptive Delta Management.First workshop will focus on the identify what

	type of information stakeholders needed. Based on this, we will develop a series of mock-ups of the user-interface of the app that will be discussed by the end-users in the next workshop. This will result in refined mock-ups (functional design) of the app based information platform that will meet the end-user requirements.
	2. Technical development of the app based information platform. The functional design (mock-ups) will transalted into software development requirements. Software engineers will develop the app based on these requirements.
	3. Demonstration of the applicability of the app together with stakeholders by an end user-defined case study.
	4. To set up a business case for further development of the app based information platform, including maintenance and technical support.
	5. Training and capacity building to enhance the capability of end-users in using the app-based information platform
	•
	Figure 2: Development Process of app
Knowledge Client	Overall, General Economics Division (GED), Planning Commission and GED's knowledge clients (All Ministries, BWDB,BIWTA, LGED, DAE, DoE, BDP office, etc) are knowledge clients for information services. In the case proposed, GED, DAE and BMDA.
Knowledge Client Needs	• Developing an effective and efficient mobile app to facilitate information and knowledge services using smart phones • Strengthening the use of Information and knowledge services to support planning, decision making and the implementation process of the Bangladesh Delta Plan 2100 • Fill the knowledge gap / raise awareness on the benefits of adaptation and adaptive delta management processes
Project Impact (Environmental, Capacity, Economic, SDGs, etc.)	• Ease of getting information on different environmental parameters and climatic issues • Enhance the capacity of users, planners, researchers, decision makers • Reduce cost and time required for collecting information • Ensure the quality of data and information

	• Maximize the use of Knowledge and Information capture under the Knowledge Portal of the Bangladesh Delta Plan 2100 • SDG:1 End poverty , SDG:2 achieve food security and improved nutrition and promote sustainable agriculture SDG:4 Quality Education, SDG:6 Ensure availability and sustainable management of water and sanitation for all SDG12: Responsible Consumption and Production, SDG13: Climate Action
Project Outputs	(1) Report focussing on matching demand and supply regarding information services (project objective, activities, need assessment, methodology of app, database) (2) Android based App for providing information services (3) business model for the app (4) Trained staff at GED's and GED's knowledge clients (5) Receive feedback from stakeholders
Duration of Project (months)	24

Project Maturity	More than 2 JCP Partners?	Achievable within JCP Period?	Clearly addresses knowledge client needs?
	⊠	⊠	⊠

Potential for Upscaling	In the future upscaling, we aim to extend involvement of broader communities providing benefits of information services through the app. Based on feedback from the App user, improvement of the application by expending the information coverage will be considered. Future climate risk and vulnerability information will be incorporated into the app for spatial planning. The app will be updated and upscaled in a multi-platform interface allowing users to use this app in any smart mobile phone. The app will be customized based on different institutional and cultural requirements.

Project Lead Organization	Center for Environmental and Geographic Information Services (CEGIS)

Project Partners within JCP	WUR	Choose an item.	Choose an item.	Choose an item.

External Project Partners	Provide, if applicable, the names of external project partners

Person Months per organization (PM)	Organization	Person Months
	CEGIS	10
	WUR	2
	Choose an item.	

	Choose an item.	
Required Expertise	**Organization**	**Required Expertise**
	CEGIS	Project Management, App Developer / Designer, Information Specialist, Database Administrator / Designer, Consultation Specialist
	WUR	Advisor app design and information services
	Choose an item.	
Links with other JCP Projects	Water-food Nexus- make it real Urban Water Quality Management Meta Model	
Links with external Projects	Support to the Implementation of the Bangladesh Delta Plan 2100 (SIBDP2100)	

** if additional man month is required to implement this project, JCP will consider to allocate man months.

ANNEX D. LIST OF REPORTS/PUBLICATIONS JCP

27th September 2020

Technical Reports

These reports are reports, often related to project deliverables, and are expected to be shared with external stakeholders. Examples are Workshop / Seminar reports (DWKD e.g.), and key project deliverables meant for knowledge clients

Technical Notes

These reports are for internal dissemination and sharing. This includes intermediate project deliverables, field visit report/ mission reports as well as more administrative/management documents explaining procedures and sharing short notes. Examples of these reports are the Incubator Procedure, the ToT Report and/or short memos

#	Name	Date	Author(s)
TN1	Reporting Procedure	10-02-2020	Nishchal Sardjoe
TN2	Background to the Own Contribution.	14-10-2019	William Oliemans, Nishchal Sardjoe
TN3	Background Document Specification of Costs and Declaration of Costs	16-10-2019	Nishchal Sardjoe
TN4	Incubator Procedure	19-01-2020	Nishchal Sardjoe
TN5	JCP Communication Strategy In this report the overall communication strategy, distinguished on three levels, is formulated.	14-01-2020	Makame Mahmud, Catharien Terwisscha van Scheltinga
TN6	Workshop Report Pre-Hackathon. Sea Level Rise in Bangladesh This report provides the results of the pre-hackathon preparation session focusing on the effects and impacts of sea level rise as a result of among others climate change in Bangladesh.	11-12-2019	Jaap Kwadijk, William Oliemans
TN7	User Demand Assessment and Development Progress of the App BDP2100.	24-09-2020	Md. Mostafizur Rahman, Catharien Terwisscha van Scheltinga

Planning and Progress Reports

Progress Reports are explaining in detail the progress of the projects and are fairly detailed. Examples of progress reports are mid-term project reports, Annual Plans, the Project Document and the Inception Report

#	Name	Date	Author(s)
PPR1	Inception Report In the Inception Report the JCP is introduced and the plans for the remainder of the 4 years, inclusive of the projects are discussed.	28-05-2019	Nishchal Sardjoe, William Oliemans
PPR2	Annual Plan 2020	05-02-2020	Nishchal Sardjoe, William Oliemans
PPR3	Annual Narrative and Financial Progress 2019	31-03-2020	Nishchal Sardjoe, William Oliemans
PPR4	Annual Meeting 2019 The results of the first annual meeting of the JCP, held in Rajendrapur, Bangladesh is elaborated in this report. The process of selecting projects as part of the knowledge development is a key feature of this annual meeting.	15-03-2019	Nishchal Sardjoe
PPR5	Annual Narrative and Financial Progress 2020	08-04-2020	Nishchal Sardjoe, William Oliemans
PPR6	Annual Meeting 2020 During this meeting the JCP team reflected back on the developments of 2019. Lessons learned and improvements were identified.	21-03-2020	Nishchal Sardjoe