The Republic of Botswana
Ministry of State President
Department of Broadcasting Services

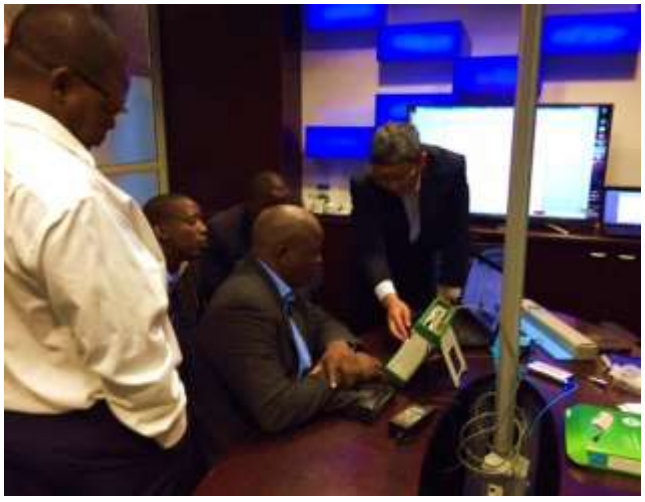
THE PROJECT
FOR
IMPLEMENTATION OF THE DIGITAL MIGRATION PROJECT
IN
REPUBLIC OF BOTSWANA
PROJECT COMPLETION REPORT

AUGUST 2016

MINISTRY OF STATE PRESIDENT
DEPARTMENT OF BROADCASTING SERVICES
AND
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
YACHIYO ENGINEERING CO., LTD.

EI
JR
16-137

Technology and Licensing WG

	
Meeting with BOCRA for ISDB-T Standards (Oct, 2014)	EWBS demonstration in DBS (Mar, 2015)
	
Installation of receivers for demonstration (June, 2015)	Meeting for technical specifications for receivers (Sep ,2015)
	
Study tour for existing studio system (Feb, 2016)	Test centre activity (June, 2016)

Public Relations WG (1/2)

Digital broadcasting demonstration in DBS (Mar, 2015)

Digital broadcasting demonstration in Airport Junction (Mar, 2015)

Digital broadcasting demonstration in Main mall (Mar, 2015)

Media briefing for digital broadcasting (April, 2015)

Media briefing for digital broadcasting (April, 2015)

Digital broadcasting seminar in Gaborone (April, 2015)

Public Relations WG (2/2)

Digital broadcasting seminar in Francistown
(May, 2015)

Digital broadcasting demonstration in rail park mall
(June, 2015)

Deigital broadasting demonstration in consumer fair
(Aug, 2015)

Deigital broadasting demonstration in consumer fair
(Aug, 2015)

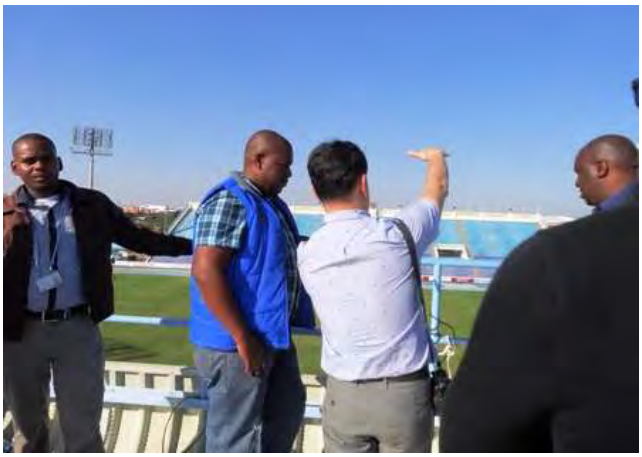
Digital broadcasting seminar in Maun
(Sep, 2015)

Digital broadcasting seminar in Serowe
(Oct, 2015)

HD Program Production WG (1/2)

	
Meeting with DFRR for edutaiment program (Feb, 2015)	HD program production of special feature news (Mar, 2015)
	
Meeting with DFRR for edutaiment program (Apr. 2015)	HD program production of special feature news (April, 2015)
	
Filming for edutaiment program (June, 2015)	Filming for edutaiment program (June, 2015)

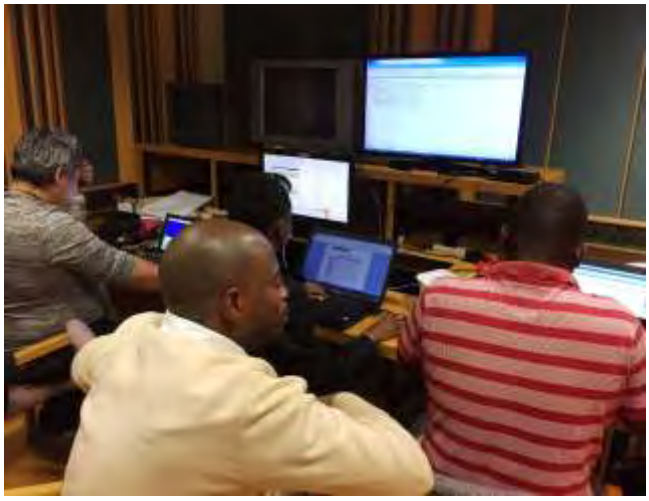
HD Program Production WG (2/2)

	
WG meeting for program production (Sep, 2015)	Post production for edutaiment program (April, 2016)
	
Preparation for Program production manual (May, 2016)	Preparation for Program production manual (May, 2016)
	
HD program production technical training (June, 2016)	HD program production technical training (June, 2016)

Programing WG

	
Programing WG meeting (Nov 2014)	Market survey in shopping mall (Mar, 2015)
	
Market survey in shopping mall (1) (Apr, 2015)	Market survey in shopping mall (2) (Apr, 2015)
	
Customer sample survey in school (April, 2016)	Customer sample survey in Hukuntsi (April, 2016)

Data Broadcasting WG

	
Data broadcasting workflow meeting (Feb, 2015)	Preparation for program-linked data broadcasting contents for live football game (Feb, 2015)
	
Data broadcasting WG meeting (May, 2015)	Data broadcasting content production training (June, 2015)
	
Data broadcasting content production training (June, 2015)	Data broadcasting contents available (July, 2016)

Other Activity (1/2)

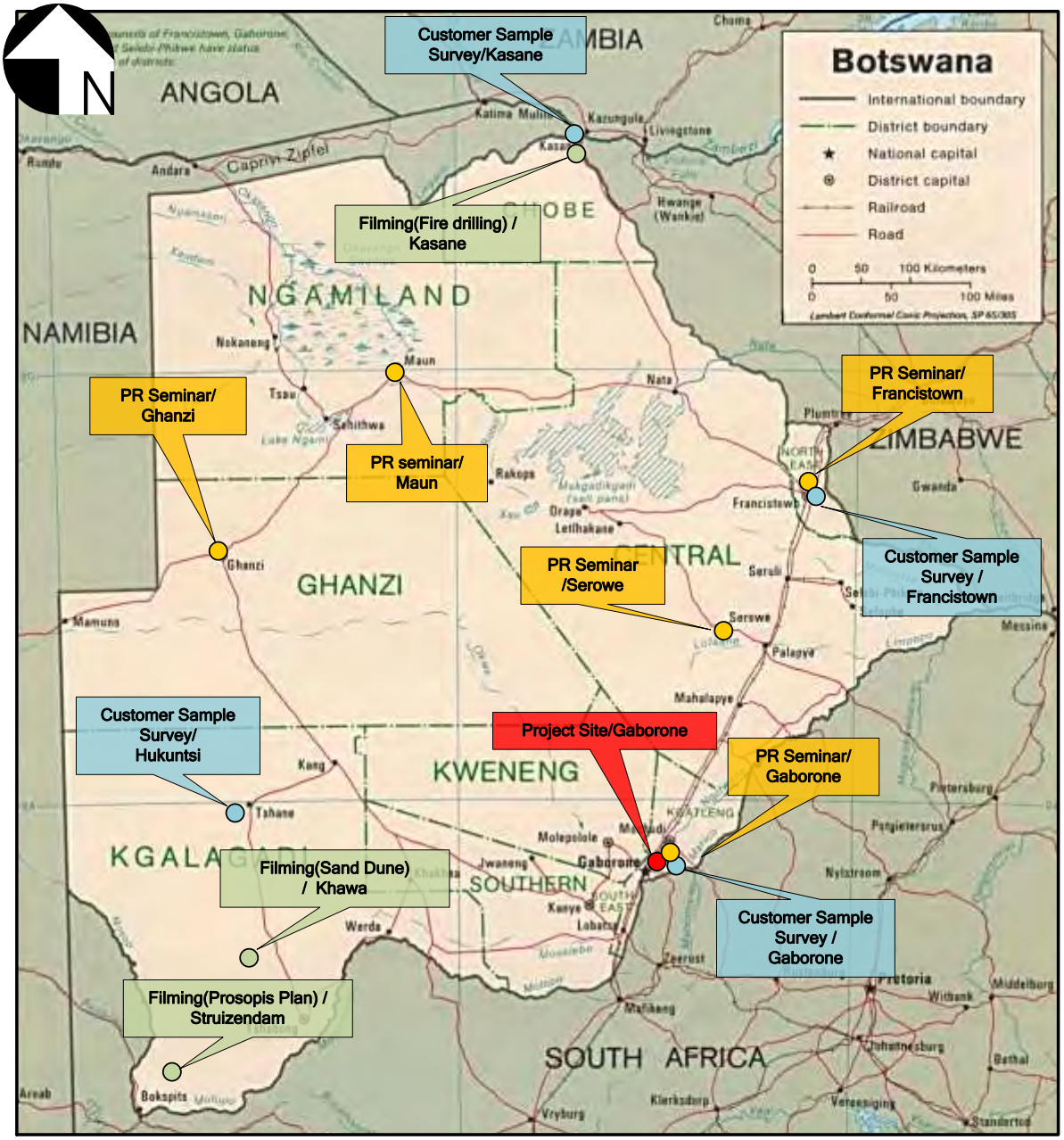
	
1St JCC meeting (Sep, 2014)	Kick-off meeting in DBS (Oct, 2014)
	
Kick-off meeting in BOCRA (Oct, 2014)	2nd JCC meeting (Mar, 2015)
	
3rd JTF meeting in Botswana (April, 2015)	3rd JCC meeting (Sep, 2015)

Other Activity (2/2)

	
4th JCC meeting (April, 2016)	5th JCC (July, 2016)
	
HD studio training in Japan (Feb, 2015)	HD studio training in Japan (Feb, 2015)
	
DTTB training Japan (Nov, 2015)	DTTB training Japan (Nov, 2015)

District

Africa



Project Location

Table of Contents

List of Figures

List of Table

Abbreviations

ARIB	Association of Radio Industries and Business
ASO	Analogue Switch Off
BML	Broadcast Markup Language
BOCRA	Botswana Communications Regulatory Authority
BTCL	Botswana Telecommunication Company Limited
BTV	Botswana Television
C/P	Counterpart
CISPR	Special International Committee on Radio Interference
DBS	Department of Broadcasting Services
DFRR	Department of Forestry and Range Resources
DPMR	Digital Portable and Mobile Receivers
DSO	Digital Switch Over
DTTB	Digital Terrestrial Television Broadcasting
DVB-T2	Digital Video Broadcasting Terrestrial 2
EWD	Eagle World Development Co., Ltd.
GOB	Government of Botswana
HD	High Definition
IDTV	Integrated Digital Television
ISDB-T	Integrated Services Digital Broadcasting – Terrestrial
ITU	International Telecommunication Union
JET	Japanese Expert Team
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
JTF	Joint Task Force
MS	Monitoring Sheet
MSP	Ministry of State President
NDMO	National Disaster Management Office
NTV	Nippon Television Network Corporation
ODA	Official Development Assistance
PDM	Project Design Matrix
PO	Plan of Operation
R/D	Record of Discussions
SADC	South African Development Community
SD	Standard Definition
SFN	Single Frequency Network
STB	Set Top Box
WG	Working Group

Chapter-I
Basic Information of the Project

Chapter I Basic Information of the Project

1.1 Country

The Department of Broadcasting Services (hereinafter referred to as "DBS") located in the Ministry of Sate President in Botswana is in charge of providing news, required information and entertainment programs to the public, and operate Radio Botswana, which is the national radio broadcasting station, and Botswana Television (hereinafter referred to as "BTV"). Terrestrial TV broadcasting was started in 2000, with programs made available nationwide by satellite starting in 2002. DBS has 48 analogues transmitting stations which cover approximately 85% of the population. The DBS belongs to the Media Division in the Ministry of State President along with the Department of Information Services that published newspapers and other such departments. DBS is comprised of Radio Botswana, BTV, Engineering and Corporate Services sections. The Engineering and Corporate Services sections provide support for both television and radio broadcasting. The only private broadcasting station operating in Botswana is eBotswana, which has only one transmitter in Gaborone hill covering approximately 60km around Gaborone.

According to the latest census conducted by the Central Statistics Office of Botswana in 2011, the penetration ratio of television in households in Botswana is 59.8%, which improved 3.0% from 3 years ago. Also according to the survey conducted by Botswana Communication Regulatory Authority (hereinafter referred to as "BOCRA"), only, 10.9% of the viewer watches television in terrestrial, while majority of the viewer, 76.4% answers that they watch television in Philibao, which is the satellite decoder. It is important for the success of digital migration to attract the viewers to the terrestrial in order for the terrestrial digital broadcasting to be enjoyed by the public. This requires producing attractive programs, to introduce new services, and to prepare proper regulations to the digital broadcasting.

BOCRA was established in accordance with the Communications Regulatory Authority Act. It is the regulatory agency concerning telecommunications and broadcasting, and is also in charge of implementation related to broadcasting policy, related bills, strategy and the establishment of standards as the office. In addition, BOCRA approves television and radio broadcasting licenses, and is in charge of monitoring programming, program content, compliance with broadcasting rules and other such issues.

In the general process of the digital migration, the regulatory ministry and responsible ministry need to develop policies relating to the digital migration, such as technology, target schedule of analogue switch off (hereinafter referred to as "ASO"), the issuing of digital broadcasting licences, the invalidation of analogue broadcasting licences, and a frequency plan. In accordance with these policies the regulator will determine the digital terrestrial broadcasting station criteria, technical standards and the ASO plan, and will announce to the industry about the necessary procedures and milestones in the digital migration. The responsible ministry needs to take measures in accordance with the communication strategy and plans to enable viewers to understand what ASO means and the need for the replacement of receivers and installation of antennas for a smooth digital migration. Broadcasting stations need to prepare a digital broadcasting network, HD studios and human resources to be able to start digital broadcasting as scheduled by the policies. It is absolutely important that the regulator, broadcasting stations and the market work together in a harmonised manner for a

successful digital migration.

1.2 Title of the Project

"Implementation of the Digital Migration Project" was agreed in the Record of Discussions (hereinafter referred to as "R/D") signed the 5th day of May, 2014.
The name of the Project was agreed as "DiMT Project" in the first JCC meeting held in the 24th day of September, 2014. DiMT stands for Digital Migration for Television.

1.3 Duration of the Project

Duration of the Project was agreed as "Two years from the Project commencement." In the R/D. The actual duration was agreed between September, 2014 and August 2016 for two years in PDM Version. 1.

1.4 Background

In February 2013, the government of Botswana (hereinafter referred to as "GOB") decided to adopt Integrated Services Digital Broadcasting - Terrestrial (hereinafter referred to as "ISDB-T") as a standard for digital television because ISDB-T has advantages of broadcasting for cars and mobile phones. In Africa, Botswana is the first country which decided to adopt ISDB-T. Botswana gives importance to urge digitalization because International Telecommunication Union (hereinafter referred to as "ITU") announced to South African Development Community (hereinafter referred to as "SADC") to completely migrate analogue broadcasting to digital by 2015.

However, there is no enough equipment such as transmitters or studio equipment for terrestrial digital broadcasting in Botswana. In addition, Botswana lacks knowledge and techniques for formulating channel planning, making show applied features of digital broadcasting and procedure, the use and maintenance of studio and broadcasting equipment. Because of the situations, Botswana requested technical cooperation for smooth migration from analogues to digital broadcasting.

Although the Republic of South Africa adopted Digital Video Broadcasting Terrestrial 2 (hereinafter referred to as "DVB-T2"), Botswana decided to adopt ISDB-T. It means that Botswana believes Japanese experience of completion of digitalization is helpful for digitalization in Botswana, Japan also believes that and hopes that ISDB-T will be adopted to other African countries by showing successful example on this project.

This project falls under the program of "Strengthening infrastructure facilities and distribution system" in the context of the Japanese assistance policy for Botswana. In addition, according to Japan's ODA policy, it is important to create the environment where Japanese companies can benefit from the business in developing countries. It is considered that the adoption of the ISDB-T in Botswana will increase business opportunities of Japanese companies.

1.5 Overall Goal and Project Purpose

1.5.1 Project outline

The Project was implemented based on Project Design Matrix (hereinafter referred to as "PDM"), which summarises project purpose, outputs, activities and overall goal of the Project. It also explains objectively verifiable indicators by which achievement of each outputs are evaluated. Important assumption is included as the factor which influences the result of the Project but is not dealt with the Project.

PDM Version.1 was approved in the first Joint Coordinating Committee (hereinafter referred to as "JCC"). The overall goal, project purpose, outputs and activities are shown in the next section. PDM has been revised for four times in order to adjust the Project to the ongoing situation of digital migration and issues arising at certain point of time during the Project.

The last version is PDM Version. 4 approved in the fourth JCC meeting held in the 22nd day of April, 2016. The details of the modifications in PDM are mentioned in Chapter II, 2-3 History of Modification of PDM. Major revisions to PDM are shown in Table 1-5-1.1. In response to the change of the situation, the revision of PDM took place periodically. The major revision took place in the third JCC meeting where interim review of the Project was conducted. In order to make the achievement of project purpose more certain, mainly three activities were added, "1-8 To establish a test centre for compliance with set specifications and receivers penetration assurance", "1-9 To develop viewers support through a call centre operation", and "2-7 To develop procurement plan of HD studio systems". Project purpose was revised to eliminate the term which only addresses DBS and secure active participation of BOCRA since the test centre is BOCRA's activity. Output 1 was also revised because the added activities deal with not only plans but also systems that actually function.

Table 1.5.1-1 Major revision to PDM

Summary	Version 1 (Sep 2014)	Version 2 (Mar 2015)	Version 3 (Sep 2015)	Version 4 (Apr 2016)
Project purpose	Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready	Same to the left	Environment for terrestrial digital broadcasting that takes advantage of the features of ISDB-T is ready	Same to the left
Output 1	Various plans necessary for migration to digital broadcasting are developed	Same to the left	Various plans and systems necessary for migration do digital broadcasting are developed	Same to the left
Output 2	DBS's capacity of producing programs including High Definition	Same to the left	Same to the left	Same to the left

Summary	Version 1 (Sep 2014)	Version 2 (Mar 2015)	Version 3 (Sep 2015)	Version 4 (Apr 2016)
	(HD) and data broadcasting is improved			

1.5.2 Project Purpose and Outputs

The overall goal, project purpose, and outputs are shown in Figure 1.5.2-1

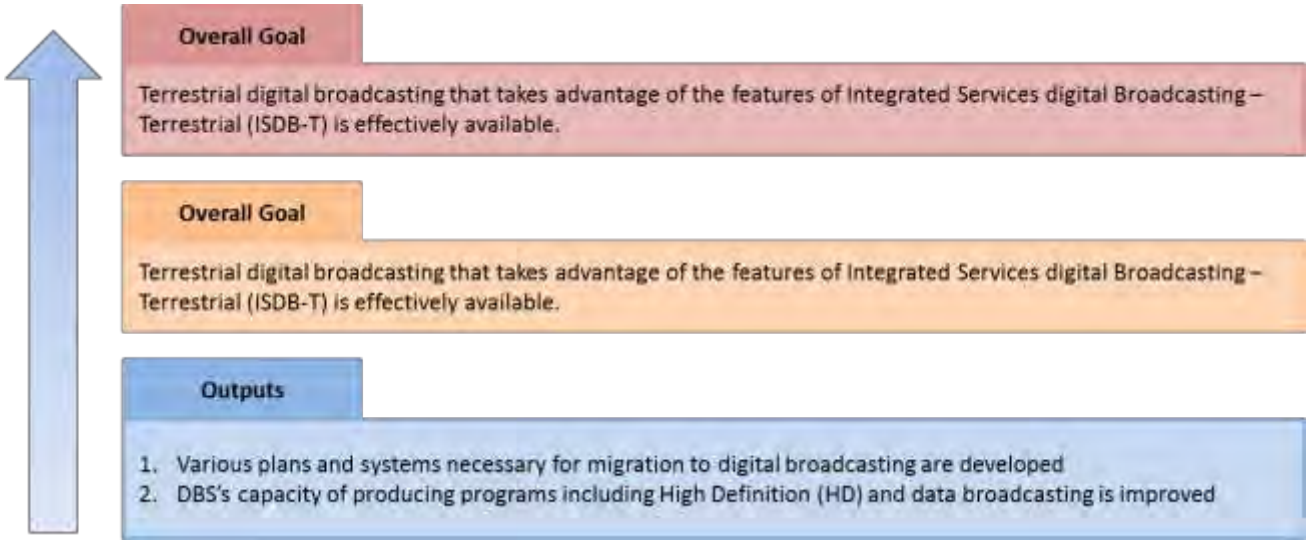


Figure 1.5.2-1 Narrative Summary of the Project

The issues and measures that were identified to be tackled in this project with regard to the digital migration in Botswana are shown in Table 1.5.2-1.

Table 1.5.2-1 Issues and Measurements to be tackled in the Project

	Issues	Measures	Output
BOCRA	Insufficient number of employees who understand ISDB-T	BOCRA is reasonably able to draw up the ASO plan based on the preliminary channel plan and guidelines for technical standards. Knowledge of ISDB-T, which is necessary for the supervision of radio waves, can be gained with the support of the ASO plan/Technical Standards Experts. In addition, training in ISDB-T will be provided in Japan.	Output 1
	ASO plan has not been determined	It is important to have a detailed channel plan particularly along the national borders. However as the current channel plan is not detailed enough, an ASO plan will be drawn up that is closely with the network rollout plan.	Output 1
	Technical standards have not been determined. Public consultation on the appropriate standards for receivers was ongoing with local organisations, but the process had not been finalised.	Technical standards have not been documented for close scrutiny. The Technical Standards WG will carry out a review of the current standards and support will be provided to produce appropriate technical standards.	Output 1
	No frequency plan has been	The overall policy on the digital migration, such as	Output

	Issues	Measures	Output
	determined.	the number of broadcasting stations to be given licences, has not yet been revealed. Advice will be given as to which frequencies should be allocated to digital broadcasting and how to use the frequencies made newly available as result of the digital migration. This advice will be provided during the process of drawing up the ASO plan.	1
	Licencing criteria for digital terrestrial broadcasting stations have not been determined.	The requirements for transmitter reliability are vague. Appropriate licencing criteria suited to the context of Botswana will be developed taking into consideration the level of transmitter reliability required.	Output 1
DBS	DBS was reasonably able to produce programmes and has a good number of employees. It has a news and current affairs department and a sports department and a production staff of nearly 40 persons. However there were not enough engineers who understand ISDB-T.	Training provided by HD Programme Production Experts and Data Broadcasting Contents Production Experts will instil the knowledge and skills needed to broadcast programmes. Training will also take place in Japan.	Output 2
	There were insufficient opportunities for employees to share knowledge and skills. Opportunities were given to certain employees only.	Training will be provided to employees who are in the front line of programme production and equipment maintenance, so that the knowledge and skills gained by the trainees will spread to the other employees. In addition, a training manual will be developed so that the knowledge and skills provided in the Project will be transferred within DBS even after the completion of the Project.	Output 2
	Equipment for studios and the broadcasting network was in the process of being procured. However the separate procurement plans were not coordinated. For example, there should be close coordination between the network rollout plan and the ASO plan, between the HD programme training and studio equipment procurement plan.	Procurement is carried out separately by the individuals responsible, with no coordination or linkage. The overall process of the digital migration will be explained by the Project Experts so that each person responsible will understand the importance of linkage in procurement activities. In addition, the liaison committee will meet periodically to exchange information so that each activity can be coordinated for a smooth digital migration.	Output 1,2
	There were not enough employees to broadcast on two channels after the digital migration.	HD programme production training will be provided to develop the capability of employees involved in programme production, and DBS employees will be given advice on effective use of the training manual so that the content of the technical transfer can take root among the employees.	Output 2
	The Department for Data Broadcasting had not been established.	The Department for Data Broadcasting will be established in DBS and training will be provided to enable DBS to broadcast Data Broadcasting programmes without support.	Output 2
	Communication strategy and plans had not been determined.	Botswana plans to distribute STBs to all households. However no distribution plan has been drawn up. Bearing this in mind, a communication	Output 1

	Issues	Measures	Output
		strategy and plans will be formulated linked to the ASO plan and DSO plan.	

1.5.3 Activities

Activities that were addressed in the Project are shown in Figure 1.5.3-1.

Activities

1 Relative to various plans for digital migration
1-1 To establish Technology and Licensing Working Group, Public Relations Working Group
1-2 To prepare ASO plan
1-3 To review Botswana ISDB-T Standards
1-4 To review terrestrial broadcasting station licensing criteria
1-6 To develop Draft Public Relations Plan for Digital Migration
1-7 To conduct public relations activities in accordance with the Draft Public Relations Plan
1-8 To establish a test centre for compliance with set specifications and receivers penetration assurance
1-9 To develop viewers support through a call centre operation

2 Relative to DBS's capacity of producing programs
2-1 To establish Program Production Working Group, Programing Working Group, and Data Broadcasting Working Group
2-2 To develop HD program production capability
2-3 To establish a section that produces data broadcasting program
2-4 To develop a training system for producing data broadcasting program
2-5 To develop programing plan of digital broadcasting, including data broadcasting, based on the market needs survey
2-6 To plan and produce program-linked and non-linked data broadcasting
2-7 To develop procurement plan of HD studio systems

Figure 1.5.3-1 Activities in the Project

Major items of the activities conducted by the Project are shown in Table 1.5.3-1.

Table 1.5.3-1 Main activities in the Project

Year	Month	Activities
2014	September	• The first Japanese expert team departed from Japan • Discussions on Work plan were held • The first Joint coordination committee (hereinafter referred to as "JCC") meeting was held • Monitoring Sheer Version .1 was submitted
	October	• Kick-off meeting for Technology and Licensing working group (hereinafter referred to as "WG") was held • Kick-off meeting for Public Relations WG was held • Kick-off meeting for Data broadcasting WG was held • Kick-off meeting for Programing WG was held
	November	• Kick-off meeting for HD program production WG was held
	December	• EWBS table in the ISDB-T standards of Botswana was agreed with National disaster management office (hereinafter referred to as "NDMO") • ISDB-T standards of Botswana was submitted to BOCRA for approval

Year	Month	Activities
2015	January	-
	February	• HD studio training in Japan was held • Digital migration was first advertised on Daily News, Television, and Radio
	March	• Public relation demonstrations were held in Shopping malls • Market research about digital broadcasting were held • The second JCC meeting was held • Monitoring Sheet Version .2 was submitted • ISDB-T Standards of Botswana was approved
2015	April	• Media briefing for digital migration was held • The third Joint Task Force meeting was held • Public relation seminar and demonstration was held in Gaborone
	May	• Public relation seminar and demonstration was held in Francistown • Public relation seminar and demonstration was held in Ghanzi
	June	• The first HD program production special feature news was broadcasted • Public relations activities by the local consultants started • The first meeting with DFRR about production of edutaiment program was held • Digital broadcasting started from the first five stations • Actual service of data broadcasting started
	July	• Production of the second HD program, edutaiment, started
	August	• Public relation seminar and demonstration was held in Consumer fair
	September	• Public relation seminar and demonstration was held in Maun • The third JCC was held • Monitoring Sheet Version .3 was submitted • R/D was amended • Filming of edutaiment program was performed • Market survey report including program schedule of data broadcasting was submitted
	October	• Public relation seminar and demonstration was held in Serowe
	November	• Digital Terrestrial Television Broadcasting (DTTB) training in Japan was held
	December	-
2016	January	-
	February	• Tender notice was issued for the procurement of test centre equipment
	March	• Public relations plan was approved • The tender was held for the procurement of test centre equipment
	April	• Customer sample survey was conducted • The fourth JCC meeting was held • Monitoring sheet Version .4 was submitted • ASO plan was submitted • Technical specifications for receivers of set top box (hereinafter referred to as “STB”, integrated digital television (hereinafter referred to as “IDTV”, and Mobile and Portable devices are approved • The contract was made between DBS and BTCL for operation of call center
	May	• HD program production manual was approved • Training plan for data broadcasting program and training material were approved
	June	-

Year	Month	Activities
	July	• Procurement plan of HD studio system was approved • Operation manual for test centre was approved • Operation manual for call centre was approved • The fifth JCC meeting was held
	August	• Completion Report was submitted

1.5.4 Plan of Operation

The Project was implemented based on the Plan of Operation (hereinafter referred to as "PO") agreed on R/D and the first JCC. Then later, PO was amended according to the amendment of PDM. The summary of PO is shown in the Figure 1.5.4-1.

Activities / Sub-Activities	Year	2014		2015				2016			Responsible Organization	
		Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Japan	Botswana
Output 1: Relative to various plans for digital migration												
1.1 To establish Technology and Licensing WG, Public Relations WG	Plan										JICA	BOCRA
	Actual											
1.2 To prepare ASO plan	Plan										JICA	DBS
	Actual											
1.3 To review Botswana ISDB-T Standards	Plan										JCIA	BOCRA
	Actual											
1.4 To review specifications for receivers	Plan										JICA	BOCRA
	Actual											
1.5 To review terrestrial broadcasting station licensing criteria	Plan										JICA	BOCRA
	Actual											
1.6 To develop draft Public Relations Plan for Digital Migration	Plan										JICA	DBS
	Actual											
1.7 To conduct public relations activities in accordance with the draft public relations plan	Plan										JICA	DBS
	Actual											
1.8 To establish a test center for compliance with set specifications and receivers penetration assurance	Plan										JICA	BOCRA
	Actual											
1.9 To develop viewers support through a call center operation	Plan										JICA	DBS
	Actual											

Activities / Sub-Activities	Year	2014		2015				2016			Responsible Organization	
		Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Japan	Botswana
Output 2: DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.												
2.1 To establish Program Production WG, Programming WG and Data Broadcasting WG	Plan										JICA	DBS
	Actual											
2.2 To develop HD program production capability	Plan										JICA	DBS
	Actual											
2.3 To establish a section that produces Data Broadcasting program	Plan										JICA	DBS
	Actual											
2.4 To develop a training system for producing Data broadcasting program	Plan										JICA	DBS
	Actual											
2.5 To develop programing plan of digital broadcasting, including Data Broadcasting, based on the market needs survey	Plan										JICA	DBS
	Actual											
2.6 To plan and produce program-linked and non-linked Data broadcasting	Plan										JICA	DBS
	Actual											
2.7 To develop procurement plan of HD studio systems	Plan										JICA	DBS
	Actual											

Figure 1.5.4-1 Summary of PO

1.5.5 Project Implementation Structure

(1) JCC

For the efficient and effective implementation of the Project, the Japanese experts provided assistance in the management of the JCC to be held under the ownership of the counterparts. The JCC was chaired by the manager of the Project, deputy permanent secretary in charge of information and broadcasting in the Ministry of State President (hereinafter referred to as "MSP"), of which DBS is a part. The JCC consists of the leaders of each WG and JICA Botswana office and Japanese experts. The structure of JCC is shown in the following figure.

1) Project Director:	Ms. Kebonye Kgabele Moepeng, Permanent Secretary, MSP
2) Project Manager:	Mr. Mogomotsi Kaboeamodimo, Deputy Permanent Secretary, Ministry of State President
3) Deputy Project Manager	Mr. Calvin Goiletswe, Chief Broadcasting Engineer, DBS
4) Leader of Technology and Licensing WG	Ditto
5) Leader of Public Relations WG	Ms. Lorato Ntuara, Copy Right, DBS
6) Leader of HD Program Production WG	Mr. Solly Nageng, Head of Program, BTV
7) Leader of Programing WG	Mr. Joel Thuto, Channel Controller, BTV
8) Leader of Data Broadcasting WG	Ms. Salome Senome, Head of Data Broadcasting Unit, BTV

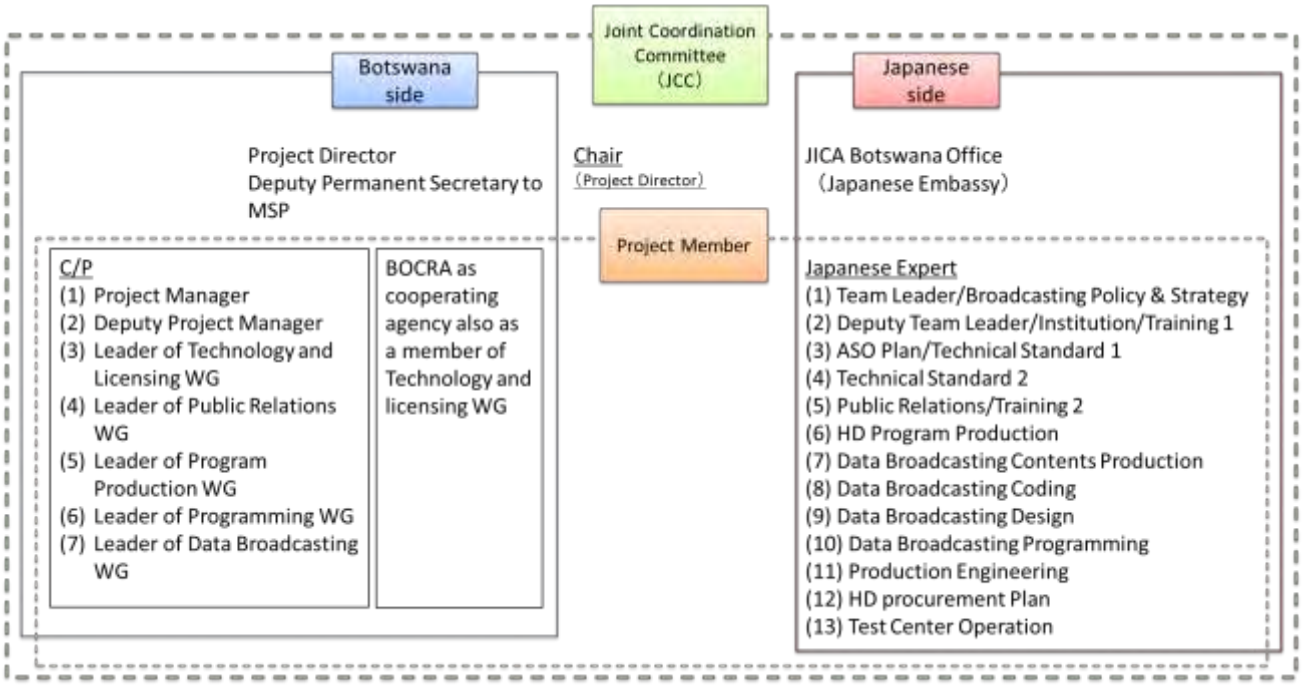


Figure 1.5.5-1 JCC structure

JCC meetings were held for a total of five times over two years. The subject of each meeting is shown below. At the JCC meeting, in order to promote ownership by the counterparts, the description of discussions and matters to be reported were given by the counterparts, assisted by the Japanese experts. The progress and review of the Project were summarized in Monitoring Sheet (herein after referred to as "MS").

1) First meeting: Annual schedule of the Project, Approval of MS Ver.1
2) Second meeting: Approval of PDM indicators, Review of overall progress of the Project
3) Third meeting: Review of overall progress of the Project (An intermediate evaluation was conducted for each activity for Output 1 and Output 2, Project Purpose and Overall Goal), confirmation of deliverables from WG.
4) Fourth meeting: Review of overall progress of the Project, analysis and examination of issues after completion of the Project
5) Fifth meeting: Presentation of the overall results of the Project

(2) Working group

The following five WG were established; Technology and Licencing Working Group, Public Relations Working Group, Programme Production Working Group, Programing Working Group and Data Broadcasting Working Group. The members are selected from relevant sections in order smoothly implement the activities. Objectives and activities of each WG are shown in Table 1.5.5-1.

Table 1.5.5-1 Objective and scope of each WG

WG	Objective	PDM Activities	Scope of Responsibility	Agencies of Members
TL	Prepare ISDB-T technical standards appropriate to Botswana and promote the smooth digital migration from the technical point of view.	1-2 To prepare ASO plan 1-3 To review Botswana ISDB-T Standards 1-4 To review specifications of receivers 1-5 To review terrestrial broadcasting station licensing criteria 1-8 To establish a test centre for compliance with set specifications and receivers penetration assurance 2-7 To develop procurement plan of HD studio systems	• Technical standards and licencing criteria for digital broadcasting • Provision of advice and exchange of ideas on other activities	• BOCRA • DBS
PR	Expedite the smooth digital migration and promote digital broadcasting	1-6 To develop Draft Public Relations Plan for Digital Migration 1-7 To conduct public relations activities in accordance with the Draft Public Relations Plan 1-9 To develop viewers	• Roadmap to ASO and Public Relation Plan • Support to call centre • Supervise the public relations activities	• MSP • BOCRA • DBS • BTV

WG	Objective	PDM Activities	Scope of Responsibility	Agencies of Members
		support through a call centre operation		
HD	Improve capacity to produce programmes and develop human resources for the digital migration	2-2 Develop HD programme production capacity.	• Development of HD programme production capacity • Provision of advice and exchange of ideas on other activities	• DBS • BTV
PG	Understand the demand for TV programmes that make use of the advantages of ISDB-T, and examine broadcasting business strategy	2-5 To develop programing plan of digital broadcasting, including data broadcasting, based on the market needs survey	• Digital broadcasting schedule. • Provision of advice and exchange of ideas on other activities	• DBS • BTV
DT	Learn operation technology for stable data broadcasting and the ability to produce advanced data broadcasting programmes	2-3 To establish as section that produce data broadcasting program 2-4 To develop a training system for producing data broadcasting program 2-6 To plan and produce program-linked and non-linked data broadcasting	• Matters relating to the establishment of the Data Broadcasting unit, the data broadcasting programme production training system, and the planning and production of data broadcasting programmes	• DBS • BTV • Other organizations providing information

(3) Japanese Expert Team Implementation Structure

The member of Japanese Expert Team (hereinafter referred to as "JET") is shown in Table 1.5.5-2.

Table 1.5.5-2 Member of JET

Nr	Work Assignment	Name	Company
1	Team Leader / Broadcasting Policy & Strategy	Mr. Naoaki NAMBU	YEC
2	Deputy Team Leader / Institution / Training 1	Mr. Katsuya TERABAYASHI	YEC
3	ASO Plan / Technical Standards 1	Mr. Yoshiki MARUYAMA	YEC (OS)
4	Technical Standards 2	Mr. Akira SAITO	YEC
5	Public Relations Plan /	Ms. Keiko UCHIUMI	YEC

Nr	Work Assignment	Name	Company
	Coordinator/Training 2		
6	HD Programme Production	Ms. Chiaki MATSUMOTO	YEC (OS)
7	Data Broadcasting Content Production	Mr. Susumu SATO	YEC (OS: Tomo-Digi)
8	Data Broadcasting Coding	Mr. Toshikazu KOJIMA	YEC (OS: Tomo-Digi)
9	Data Broadcasting Design	Mr. Fumitaka WATANABE	YEC (OS: Tomo-Digi)
10	Data Broadcasting Programing	Mr. Yuichiro HOSHI	YEC (OS: Tomo-Digi)
11	Production Engineer 1	Mr Junjiro SAITO	YEC(OS: NTV)
12	Production Engineer 2	Mr. Osamu SEINO	YEC(OS: NTV)
13	HD Procurement Plan	Mr. Kazuhiko HARIKAE	YEC
14	Test Centre Operation	Mr. Satoshi HAMANAKA	YEC(OS: J-DS)

<Note>

YEC: Yachiyo Engineering Co., Ltd.

NTV: Nippon Television Network Corporation

J-DS: Japan Digital Broadcasting Engineering System Co., Ltd.

The implementation structure of JET is show in Figure 1.5.5-2.

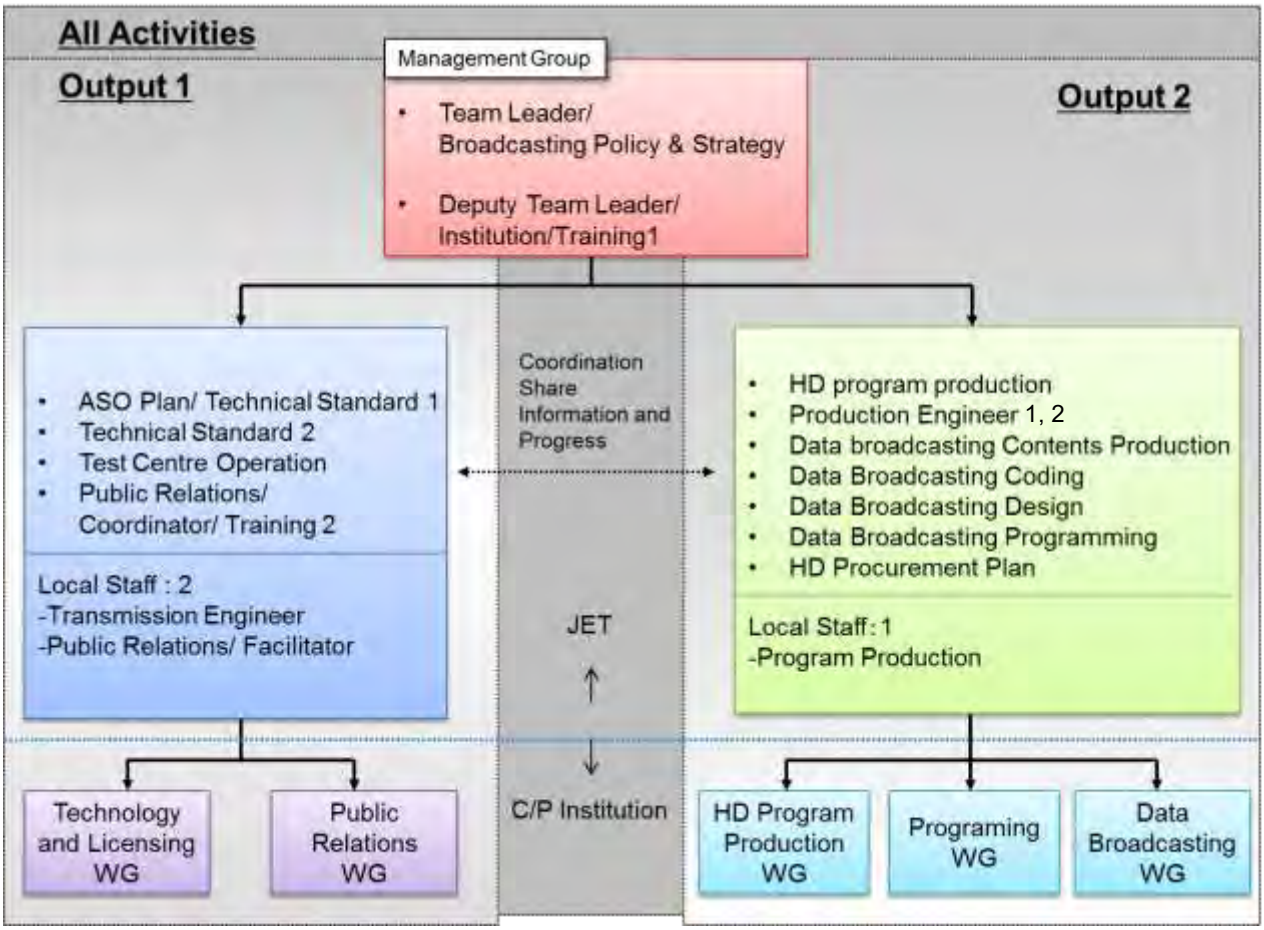


Figure 1.5.5-2 JET Implementation Structure

1.5.6 Project deliverables

During the project period, 9 official deliverables are produced and through the preparation of those deliverables, knowledge and skills are transferred to Botswana side. The deliverables and outputs prepared through the activities of the Project shown in Table 1.5.6-1.

Table 1.5.6-1 Deliverables and Outputs of the Project

No		Document	Responsible WG	Remarks
Deliverables				
1	D	HD program production manual	HD	Manual focused on the HD program production. Mainly for the production of news, documentary
2		Training material for data broadcasting program	DT	Basic training material for in-house training to understand data broadcasting.
3		Market survey report for digital migration, including programing schedule)	PG	Result of market survey including data broadcasting and draft programing schedule for digital broadcasting
4		Data broadcasting contents produced during the project period	DT	Data broadcasting contents that are produced and broadcasted during the project period
5		Botswana ISDB-T Standards and Technical specifications for receivers	TL	ISDB-T standard document tailored for Botswana context. Technical specifications for digital receivers for type approval including STB, IDTV, and DRPM
6		Public relations plan	PR	Include the budget plan and public relation activities
7		Operation manual for test centre	TL	Include the usage of equipment and procedures to receive and check the functions of receivers
8		Operation manual for call centre	PR	Include frequently asked questions and model answers, how to set up digital receivers and antennas
9		HD studio systems procurement plan	TL	Include equipment plan, budgetary plan, procurement schedule
Other Outputs				
10	O	ASO Plan	TL	ASO criteria was set as 80% of analogue service area by digital and 65% of receiver penetration
11		Training plan for data broadcasting	DT	Training plan for in-house training, also middle term plan to fill the positions and provide training to

No		Document	Responsible WG	Remarks
				them
12		Monitoring Sheet	JT	Version 1, 2, 3, 4
13		Completion Report		This document

Note: D: Official Deliverable, O: Other Output Documents, TL: Technology and Licensing WG, PR: Public Relations WG, HD: HD Program Production WG, PG: Programing WG, DT, Data Broadcasting WG
JT: Joint Work

1.6 Implementation Agency

The responsible ministry, implementing organizations, and cooperating ministry and agency of the Project are as follows.

(1) Responsible Ministry : Ministry of State President (MSP)
DBS is one of the departments in MSP

(2) Implementing Agency : Department of Broadcasting Services (DBS)
DBS operates both national television and radio station.

(3) Cooperating Ministry : Ministry of Transport and Communications (MTC)
MTC is responsible for the policy of telecommunication and broadcasting

(4) Cooperating Agency : Botswana Communications Regulatory Authority (BOCRA)
BOCRA is an independent authority to regulate broadcasting, telecommunication and postal sector established by Act.

Chapter -II
Result of the Project

Chapter II Results of the Project

2.1 Results of the Project

2.1.1 Input by the Japanese side (Planned and Actual)

2.1.1.1 Dispatch of Japanese Expert

In total thirteen Japanese experts were dispatched during the project period between September, 2014 and August 2016. The total man-month (M/M) which the Japanese experts worked in Botswana is 61.17 M/M. The actual period that Japanese experts were dispatched is shown in the Table 2.1.1.1-1.

Table 2.1.1.1-1 Dispatch schedule

No	Names	Role	Year	Period dispatched
1	Mr. Naoki Nambu	Team Leader/Policy & Strategy	2014	1st dispatch: 2nd Sep–1st Oct
			2015	2nd dispatch: 17th–38th Mar
				3rd dispatch: 11th–19th Apr
				4th dispatch: 2nd-23rd May
				5th dispatch 22nd Jun-9th July
				6th dispatch: 30th Aug–17th Sep
				7th dispatch: 27th Nov–12th Dec
			2016	8th dispatch: 19th Mar-24th Apr
				9th dispatch: 20th Jul – 2nd Aug
2	Mr. Katsuya Terabayashi	Deputy Team Leader/Institution/Training plan 1	2014	1st dispatch: 30th Aug – 8th Oct 2nd dispatch: 9th Nov-14th Dec
			2015	3rd dispatch: 26th Jan-28th Mar
				4th dispatch: 30th May – 3rd Jul
				5th dispatch: 5th – 20th Sep
			2016	6th dispatch: 24th Jan – 6th Feb
				7th dispatch: 10th Apr - 21st May
				8th dispatch: 28th May – 5th Jun
				9th dispatch: 22nd Jun -15th Jul
				10th dispatch: 26th Jul – 4th Aug
3	Mr. Yoshiki Maruyama	ASO plan/Technical Standards 1	2014	1st dispatch: 6th Sep – 4th Nov
			2015	2nd dispatch: 3rd Feb – 5th Mar
			2016	3rd dispatch: 19th Jun – 3rd Jul
4	Mr. Akira Saito	Technical Standards 2	2014	1st dispatch: 2nd Sep- 2nd Oct
			2015	2nd dispatch: 9th Mar – 6th Apr
				3rd dispatch: 22nd Apr–25th May
5	Ms. Keiko Uchiumi	Public Relations Plan/Training plan 2	2014	1st dispatch: 30th Aug -11th Oct
				2nd dispatch: 19th Nov–21st Dec
			2015	3rd dispatch: 9th Mar-22nd May
				4th dispatch: 21st Jul – 1st Oct
				5th dispatch: 23rd Nov – 9th Dec
			2016	6th dispatch: 26th Feb – 24th Apr
				7th dispatch: 1st Jul- 5th Aug

No	Names	Role	Year	Period dispatched
6	Ms. Chiaki Matsumoto	HD Program production	2014	1st dispatch: 15th Nov – 14th Dec
			2015	2nd dispatch: 15th Feb-30th Apr
				3rd dispatch: 16th Aug – 8th Nov
			2016	4th dispatch: 29th Feb – 29th May
7	Mr. Susumu Sato	Data Broadcasting Contents Production	2014	1st dispatch: 24th Oct – 14th Dec
			2015	2nd dispatch: 2nd Feb – 4th Apr
				3rd dispatch: 15th May – 3rd Jul (except 15th – 18th Jun)
			2016	4th dispatch: 6th -24th Apr
				5th dispatch: 2nd – 27th Jul
8	Mr. Toshkazu Kojima	Data Broadcasting Coding	2015	1st dispatch 10th – 28th Mar
				2nd dispatch: 22nd May – 3rd Jul
9	Mr. Rokuro Nagata	Data Broadcasting Design	2015	1st dispatch 10th – 28th Mar
				2nd dispatch: 22nd May – 3rd Jul
10	Mr. Yoshitaka Ikeda	Data Broadcasting Programming	2015	1st dispatch: 22nd Apr – 20th May
				2nd dispatch: 14th Jun - 1st Aug
11	Mr. Junjiro Saito	Production Engineer 1	2016	1st dispatch: 28th May-5th Jun
12	Mr. Osamu Seino	Production Engineer 2	2016	1st dispatch: 28th May-5th Jun
13	Mr. Kazuhiko Harikae	HD procurement plan	2016	1st dispatch: 24th Jan – 6th Feb
				2nd dispatch: 29th Jun – 27th Jul
14	Mr. Satoshi Hamanaka	Test centre operation	2016	1st dispatch: 3rd Apr – 1st Jun
				2nd dispatch: 23rd Jun – 22nd Jul

The planned schedule and actual schedule is shown in Figure 2.1.1.1-1.

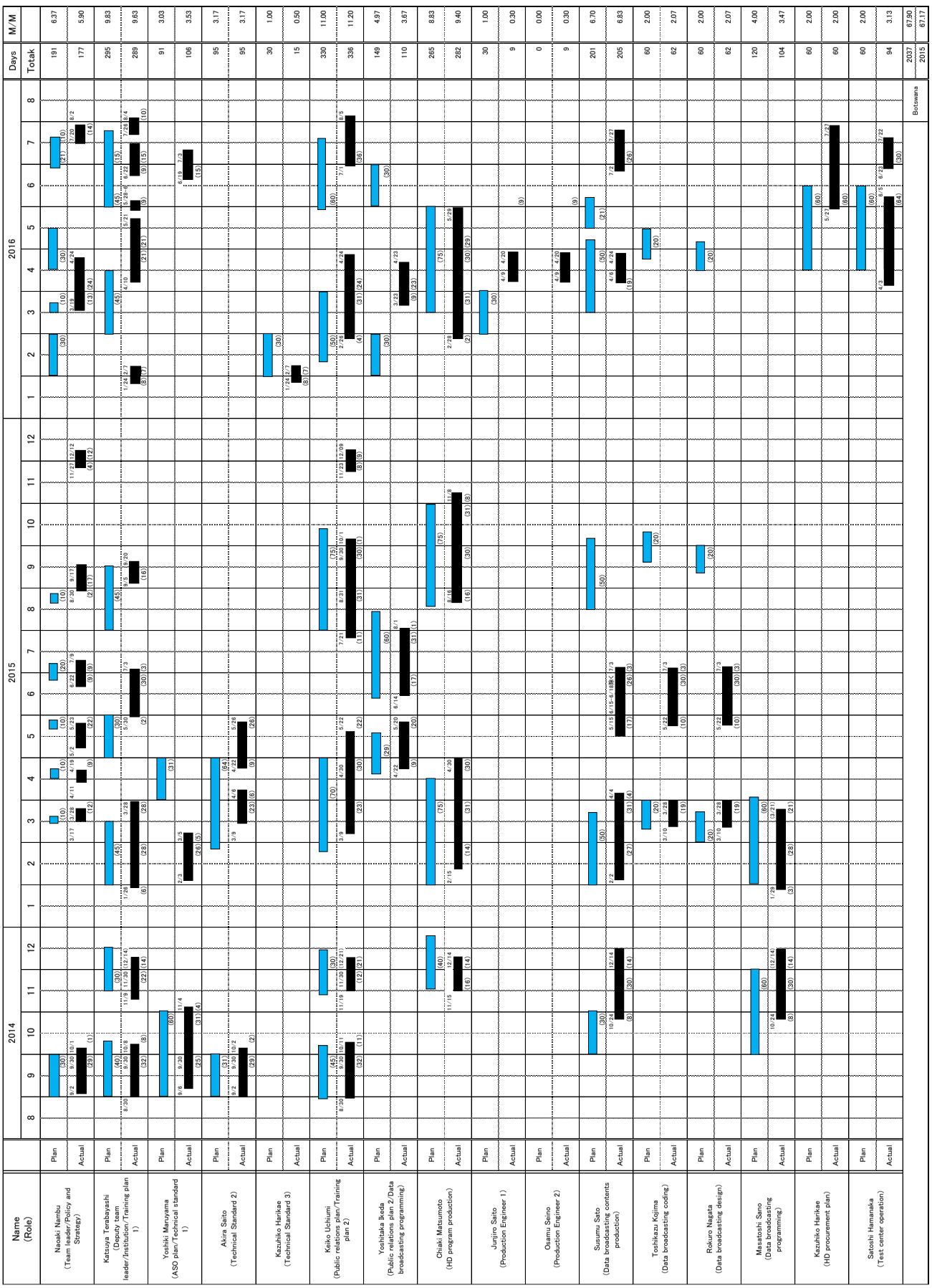


Figure 2.1.1.1-1 Dispatch Schedule

2.1.1.2 Equipment

The list of equipment provided during the Project is shown in Table 2.1.1.2-1 and 2.

Table 2.1.1.2-1 List of equipment

No	Item	Qt	Model	Recipient
1	Laptop	3	SONY (SVF 152C29W)	DBS
2	Copy Machine	1	RICHO (MP2001L)	
3	Printer	1	SUMSUNG (Xpress C410W)	
4	Projector	1	EPSON (V260X)	
5	P2 Card	5	PANASONIC (AJ-P2E064FNG)	
6	Outdoor antenna	40	EllES	
7*	IP Router 1 set	1	Cisco (1921), D-Link (DAP1360) Level one (FSW-0811)	
8*	DS TV recorder	1	DPS5001MC	
Test Centre Equipment				
9	Spectrum analyser	1	ANRITSU (MS2712E) Option MS2712E-0009 BW DEMOND Option 31 GPS receiver Option 30 ISDB-T video measurements	BOCRA
	Periodic Antenna	1	ANRITSU (2000-1747-R)	
	Magnetic Antenna	1	ANRITSU (2000-1528-R)	
	Adapter (DC to 11 GHz)	1	ANRITSU (510-102-R)	
	Adapter (DC to 18 GHz)	1	ANRITSU (1091-27-R)	
	Portable Rack	1	VISION3952228	
	Laptop	1	Lenovo G80-50	
	ISDB-T Modulator	1	DEK TEK (DTU 215)	
	Monitor	1	SANSUI SLED-50FHD	
	STB	2	EWD888	
	Matching pad (DC to 3000 MHz)	1	ANRITSU (12N50-75B)	
	Amplifier	1	EllIES	
	Rack	1	VISION3952228	
	Adopter (75 -50)	1		
	Adopter (50-50)	1		
	Attenuator -40dB	1		
	Antenna	1	DIAMOND ANTENNA	
	Antenna accessory	1	DIAMOND ANTENNA	
	Antenna accessory	1	BNCJ-NJ convertor	

Table 2.1.1.2-2 List of equipment provided by other than project budget

No	Item	Qt	Model	Recipient
1	Integrated digital television	1	Sharp (LC-32LE360D3)	BOCRA
2	Set top box	1	EWD (2000ND-BML)	
3	Mobile device	1	Sharp (AQUOS Phone SD-10D)	

No	Item	Qt	Model	Recipient
4	Mobile device	1	EWD	
5	DPMR	3	Buffalo (One-seg tuner DH-MONE/IP)	

2.1.1.3 Training in Japan

(1) HD studio training in Japan

1) Objective

By imparting skills and knowledge of the current HD television program production in studio, it is expected that DBS improves their capacity to produce HD programs and the participants of the training are expected to transfer the skills and knowledge learnt in Japan to their colleagues in DBS so that the overall capacity of program production will be enhanced.

2) Participants

Those participants were selected from the middle class of each profession. They were expected to play a role to lead digital migration in DBS. The course was aimed at providing training on program production in each profession of camera, audio, video and lighting. The program production staff of DBS was not trained enough in terms of technologies. The course provided not only program production skills but also basic knowledge on technologies which were necessary to operate and produce television programs in HD studio. The participants were expected to educate junior level of staff in each profession and improve the quality of television programs.

Table 2.1.1.3-1 List of Participants for HD studio training

Nr	Name	Roles and Positions
1.	Mr. Ernest Segokotlo	Technical Superintendent
2.	Mr. Kabelo Tamocha	Lighting Supervisor
3.	Mr. Boyboy M. Moreetsi	Senior Broadcasting Officer (Sound)
4.	Mr. Ontlametse S. Gaothuse	Senior Broadcasting Officer (Camera)
5.	Mr. Keene L. Molake	Senior Broadcasting Officer (Video)

3) Content

The contents of the training were designed to target each profession of the studio engineer. At least one lecturer was assigned from each profession in order to provide detailed lecture and respond to the questions from the participants. The contents of the training is shown in Table 2.1.1.3-2

Table 2.1.1.3-2 Contents of HD studio training

Area	Aim	Content
Camera	Acquire basic skills on camera work and filming methods with making use of the features of HD camera	• Handling of HD camera • Structural outline of HD camera, adjustment of Iris • Moving shot and focus technique

Area	Aim	Content
		• HD multi-camera work technique
Lighting	Understand the relation between the lighting work and picture quality and acquire the skills to make use of HD camera feature	• Basic of HD television lighting • Lighting design for HD studio • Different use of LED light and tungsten light • Lighting design according to the different genres of programs
Audio	Understand the latest audio technology and improve the stereo mixing technique with taking HD shooting angle into consideration	• Basic of audio encoding technology • Mixing technique with considering the viewers environment, dynamic range and average audio level • Stereo mixing technique for HD program • Sync between audio and video media and application to studio program production
Video	Acquire basic skills to basic skills necessary for studio vide engineer and understand the basic video signal and camera system, know-how to adjust camera monitor and picture quality	• Video and audio coding technique Data broadcasting coding and multiplexing, error correction technology, digital modulation and basic of OFDM technology • File base operation • Basic of HD studio system • HD camera and monitor adjustment and picture quality control.

4) Schedule

The schedule was designed as the lecture was conducted in the morning and practical training on the subject was conducted in the afternoon of that day to enhance effectiveness of the training. The comprehensive training was planned at the end of the training to practice all skills introduced during the training period and produce one short television program. The schedule during Japan is shown in Table 2.1.1.3-3.

Table 2.1.1.3-3 Schedule of HD studio training

Date	Time	Content	Venue
14th (Sat) February		Leave Botswana	
15th (Sun)		Arrive in Japan	
16th (Mon)	10:00-11:10	Briefing about stay in Japan	JICA Tokyo
	13:00-14:00	Orientation about training	NTV
	14:00-15:00	Facility tour in Nippon Television Network (CV centre, SDC centre)	
	16:00-17:00	Courtesy call to JICA	JICA headquarters
17th (Tue)	10:00-15:30	Facility tour in NTN (Editing system, Studio, News floor and studio	NTV
	1600- 1700	Courtesy call to Ministry of Internal affairs and Communication	MIC

Date	Time	Content	Venue
18th (Wed)	10:00-12:00	Lecture (Camera, Switcher)	NTV
	13:00-17:00	Workshop (Camera, Switcher)	
19th (Thr)	10:00-12:00	Lecture (Video, Colour adjustment)	NTV
	13:00-17:00	Workshop (Video, Colour adjustment)	
20th (Fri)	09:30-10:20	Courtesy call to the Botswana embassy in Japan	Embassy of Botswana
	11:30-12:00	Computer graphics	NTV
	13:00-14:00	Study tour for studio program production	
	14:00-17:00	Study tour for large OVvan	
21st (Sat)	10:10-11:40	Culture tour (Kamakura)	Kanagawa
	13:00-16:30	Study tour (Local station and Hiratsuka relay station)	
22nd (Sun)	Holiday		
23rd (Mon)	10:00-13:00	Facility tour (Multi-purpose use of the TV tower)	Sky tree tower
	14:00-16:00	Facility tour (Drama studio)	Ikuta studio
24th (Tue)	10:00-12:00	Lecture (Lighting, construction art)	NTV
	13:00-17:00	Workshop (Audio)	
25th (Wed)	10:00-12:00	Lecture (Audio)	NTV
	13:00-17:00	Workshop (Audio)	
26th (Wed)	10:00-12:00	Lecture (Integrated exercise)	NTV
	13:00-17:00	Workshop (Integrated exercise, program production)	
27th (Fri)	10:00-11:30	Debriefing and ceremony for the certificate	JICA headquarters
28th (Sat)	Leave Japan		
29th (Sun)	Arrive in Botswana		

5) Output of the training

As shown in the schedule, the training was divided into the lecture part and workshop. The workshop, which is a practical training, was usually followed by the lecture. By doing so, the participants could make use of the knowledge and skills learnt in the lecture immediately after and made the training more effective. Each profession of the participant has his area of the lecturer on a one to one basis, which also made the training highly productive.

Photos of training 1

At the end of the training, debriefing meeting was held. The following issues and opinions are presented from the participants. It was told that the text and knowledge that was learnt during the training would be transferred to the junior staff members of DBS.

Photos of training 2

- It is important to make preparation in order to prevent mistakes
- It is important to adjust equipment in advance in order to keep the quality of audio and video stable
- Each crew of the program production should be responsible for their tasks
- Each crew of the program production should be responsible for their tasks
- Understand the basic of HD camera shooting with considering the difference in screen aspect
- Understand the importance of team building for program production
- Understand the importance of human resources development

(2) Digital terrestrial television broadcasting (DTTB) training in Japan

1) Objective

The ISDB-T digital transmitting system is a new technology for DBS and it is required to develop human resources to properly operate and maintain those transmitter systems and its network. The training aimed for the participants to gain basic technological knowledge and skills on digital broadcasting and learn how to design digital broadcasting network and concept and practical skills of radio propagation simulation. The focus was put on the practical training on the coverage simulation and radio wave measurement.

2) Participants

The participants were selected from the transmitting engineers of DBS who is responsible for the operation and maintenance of the digital transmitting network. One participant was selected from BOCRA, who is also managing frequencies and monitoring radio wave transmitted. The participants of the training is shown in Table 2.1.1.3-4

Table 2.1.1.3-4 List of Participants for DTTB training

Nr	Name	Roles and Positions
1.	Ms. Constance Kolaatamo	Principal Broadcasting Engineer
2.	Mr. Didibeng Modisengane	Chief Broadcasting Engineer
3.	Mr. Maibi Gastlolwe	Principal Broadcasting Engineer
4.	Mr. Kenna Goemekgabo	Technical Superintendent
5.	Mr. Samuel Mpaesele	Manager spectrum monitoring and maintenance (BOCRA)

3) Content

The contents of the training were designed to improve the skills and knowledge of transmitting engineers to operate and maintain ISDB-T digital transmitters and also design digital broadcasting network. Particular emphasis was placed on practical exercise of simulation and field radio wave measurement because DBS has a plan to improve digital coverage by installing gap fillers. The contents of the training are shown in Table 2.1.1.3-5.

Table 2.1.1.3-5 Contents of DTTB training

Aim	Content
To gain basic technological knowledge and skills on digital broadcasting	• Concept of digital broadcasting • Future broadcasting services
To gain basic knowledge and skills on digital broadcasting transmitting system	• Construction, maintenance and updates of the transmitting station • Transmitting facilities inside the broadcasting station • Maintenance of transmitters in the relay station
To learn how to design digital broadcasting network and concept and practical skills of radio propagation simulation	• Japanese example of simulation methods • Simulation exercise for channel plan of Botswana • Radio wave measurement in the field • Analysis of the result of radio wave measurement

4) Schedule

The schedule was designed to include practical excise in order for the participants to acquire skills and knowledge that are required to perform their tasks in Botswana. The schedule during Japan is shown in Table 2.1.1.3-6.

Table 2.1.1.3-6 Schedule of DTTB training

Date	Time	Content	Venue
30th (Sat) October		Leave Botswana	
1st (Sun) November		Arrive in Japan	
2nd (Mon)	10:00-11:10	Briefing about stay in Japan	JICA Tokyo
	14:00-15:00	Orientation about training	NTV
	15:00-16:30	Facility tour in Nippon Television Network (CV centre, SDC centre)	
3rd (Tue)	10:00-12:00	Introduction to digital broadcasting	NTV
	13:00- 15:00	Presentation from Botswana side on their situation	
	15:00-16:30	Facility tour in NTN (News studio, Master control room, studio recording)	
4th (Wed)	10:00-12:00	Japanese broadcasting affairs from the perspective of transmitting work	NTV
	13:00-16:30	Composition, construction, operation, and maintenance of transmitting and relay stations	
5th (Thr)	10:00-12:00	Explanation of the facility of the headquarters and tour	NTV
	14:00-15:00	Multi-purpose utilization of towers	
	15:00-17:00	Observation of the inspection work in Sky tree transmitting station	
6th (Fri)	11:00-13:00	Facility tour in Maebashi relay station	Maebashi relay station
	14:00-16:30	Facility tour in Maebashi relay station	
7th (Sat)	11:00-12:30	Facility tour in Hiratsuka relay station	Kanagawa
	14:30-15:00	Culture tour (Kamakura budda)	
	15:00-16:00	Culture tour (Tsuruoka Hachimangu)	
8th (Sun)	Holiday		
9th (Mon)	09:00-11:30	Japanese simulation example (Sky tree, Shiba station, comparison of two stations)	NTV
	12:30-15:00	Discussion on the channel plan of Botswana	
	16:00-17:00	Courtesy call to the Ministry of Internal affairs and Communication in Japan	MIC
10th (Tue)	11:00-13:00	Field radio wave measurement	Kiryu relay station
	14:30-16:00	Field radio wave measurement	
11th(Wed)	10:00-12:00	Examination of the result of simulation and actual field radio wave measurement	NTV
	13:30-16:30	Question and Answer	
12th(Wed)	10:00-12:00	Facility tour in transmitting manufacture	Hitachi Kokusai electric Inc
	12:40-16:00	Facility tour in transmitting manufacture	
13th (Fri)	10:00-12:00	Next generation broadcasting service	NTV
	14:00-15:30	Evaluation	JICA headquarters
14th (Sat)	Leave Japan		
15th (Sun)	Arrive in Botswana		

5) Output of the training

DBS already installed digital transmitters in 45 stations and started digital broadcasting. However the participants of the training still have difficulties such as coverage simulation and field radio wave measurement, maintenance and operation of the digital transmitters. Through the observation tour and practical training in Japan, the participants learnt the transmitting technologies of digital broadcasting, and understood that the simulation is important to understand the coverage and only by doing so, the coverage and interference can be analysed.

Photos of training 1

At the end of the training, debriefing meeting was held. The following issues and opinions are presented from the participants.

Photos of training 2

- It is important to understand the exact coverage by conducting the field radio wave measurement for the operation of the digital network
- It is important to understand the necessity of electronic field measurement equipment and simulation software and examine the procurement of those in order to maintain the digital network.
- It is important to communicate with the management about the problems found in this training and to propose solutions.

2.1.1.4 Project costs

The summary of expenditures by the Japanese side during the Project is shown in Table 2-1-1-4.1.

Table 2.1.1.4-1 Summary of expenditure by the Japanese side

No	Item	Amount (Thousand Japanese yen)	Remark
1	Local staff	5,500	Three local staff members
2	Transportation	3,500	Daily transport, business trip, driver
3	Public relations activity	1,100	PR goods, rental fees of venue
4	Communication	650	Mobile for Japanese expert and local staff members
5	Consumable goods	150	Office equipment,
6	Miscellaneous expense	50	Print
Total		10,950	

2.1.2 Input by the Botswana side (Planned and Actual)

2.1.2.1 Counterpart

The member of each WG was assigned in the first JCC meeting. Technology and licensing WG was headed by the project manager of digital migration in DBS who also implements the project to establish digital broadcasting network. Public relations WG was headed by the person who is in charge of copy right of DBS. HD programing WG was headed by the head of programmes who was in charge of production and procurement of programs. Programing WG was headed by the head of channel control who was in charge of scheduling and transmitting programs. Data broadcasting WG was headed by the executive producer who later became the head of data broadcasting unit. The members of each WG were selected from relevant sections in DBS of which technology and licensing WG had participants from BOCRA. The members of each WG are shown in Table 2.1.2.1-1.

Table 2.1.2.1-1 Member of each WG

No	Name	Position	Remark
Technology and Licensing WG			
1	Calvin Goiletswe	PBE-TX (DTT)	Leader of TL WG
2	Kabo Dikolobe	CBE-BTV	
3	Didibeng Modisenyane	PBE-TX	Sub leader of TL WG
4	Bathopi Luke	Director - BOCRA	Sub leader of TL WG
5	Itumeleng Batsalelwang	DTT Expert - BOCRA	
6	Thapelo Maruping	Deputy Director - BOCRA	
7	Samuel Mpaesele	Manager - BOCRA	
8	Constance Kolaatamo	PBE-TX	
9	Galani Mothobi	PBE-BTV	
10	Maibi Gaotlolwe	PBE - TX	
11	Matshwenyego Kwada	MTC- TPS	
Public Relations WG			
1	Lorato Ntuara	Copy Right	Leader of PR WG
2	Last Rakgasa	Head of Radio Programmes	
3	Itumeleng Mmusi	Graphic Designer (BTV)	
4	Tshireletso Stoffel	Radio Botswana	
5	Omphile Ntakhwane	Daily News	
6	Ndulamo Ntopo	Public Relations	
HD Program Production WG			
1	Solly Nageng	Head of programmers	Leader of HD WG
2	Linet Habana	Ass. Commissioning Editor	
3	Gaamangwe Mathame	Programme Producer	
4	Gail Mochanang	Programme Producer	
5	Ponatshego Ponatshego	Graphic Designer	
6	Ernest Segokotlo	Engineer	
7	Ontlametse Gaothuse	Videographer	
8	Dintle Gaolebale	Studio Director (Operations)	
9	Kefilwe Mokgaotsane	Reporter News and Current affairs	

No	Name	Position	Remark
10	Audrey Bonang	Content Acquisition	
Programing WG			
1	Joel Thuto	Head of Channel	Leader of PG WG
2	Edson Malebane	Channel Controller	Leader of PG WG until Mar, 2015
3	Maipelo Montwedi	TX Producer (Programming)	
4	Lorraine Moleki	TX Producer (Programming)	
5	Morena Keipeile	Engineer	
6	Nkobi Mosipi	Marketing	
7	Phemelo Tsopito	Sports	
8	Kagiso Mapine	Executive Producer	
9	Onthatile Boti	News and Current Affairs	
Data Broadcasting WG			
1	Salome Senome	Executive producer	Leader of DT WG
2	Gaone Karele	Graphic Designer	
3	Gosaitse Koobonye	Marketing	
4	Kefilwe Leero	Programme Producer	
5	Gaotsenwe Ngwako	Sports	
6	Kedirileng Makgasa	Engineer	
7	Itumeleng Siviya	News and Current affairs	
8	Tabona Luza	Engineer	
9	Torotea Mmopi	Program Producer	
10	Beauty Sendi-Mpho	Editor	
11	Bame Mogomotsi	Acquisition	
12	Kaone Mosenti	Director	
13	Maipelo Montwedi	Programing	

2.1.2.2 Project Office

The office was provided in DBS with desks and chairs for 8 persons, when the number of Japanese experts is more than the office accommodates. Temporary office was prepared in the same floor.
The office in BOCRA was later provided in Pakalane when the test centre activity started.

2.1.2.3 Project Costs

The summary of expenditures by the Botswana side during the Project is shown in Table 2.1.2.3-1. DBS mainly procured equipment with regard to digital broadcasting including digital broadcasting network, data broadcasting facility, call centre equipment in addition to the service supplier who conducted public relations activities in rural areas in Botswana. Procurement of HD studio system was delayed and did not complete during the project period.

Table 2.1.2.3-1 Summary of expenditure by the Botswana side

No	Item	Amount (Thousand Botswana Pula)	Remark
1	Digital terrestrial network	-	Contract by DBS, exact

			amount was not disclosed
2	Data broadcasting facility	-	Contract by DBS, exact amount was not disclosed
3	Establishment of call centre	-	Contract by DBS, exact amount was not disclosed
4	Employment of the local service providers for public relations activities	7,940	Contract by DBS
5	Public relations activities	-	Owned by DBS, exact amount was not disclosed
Total		7,940	

2.1.3 Activities

2.1.3.1 Result of Activities related to Output 1: Various plans and systems necessary for Migration to Digital Broadcasting are developed

In total 9 activities have been conducted for output 1 as described in 1.5.3, the details of each activity is described in the following sections between 2.1.3.1.1 to 9.

2.1.3.1.1 To establish Technology and Licensing WG, Public Relations WG

During the discussion about the work plan, the criteria and requirements for the members of each WG were discussed. The leaders and members of each WG were officially assigned in the first JCC meeting.

2.1.3.1.2 To prepare ASO plan

Analogue Switch off plan was drafted for Botswana television to migrate digital by minimizing the negative impacts on the viewer's experience of watching television. It covers frequency allocation, technological issues of how to switch transmitters from analogues to digital, the importance of public relations activities to promote digital broadcasting services and its hindering factors. Hence, Digital switch over is also included in the plan.

(1) Network development plan of DBS

The government of Botswana established National Development Plan 10 in 2006 where the broadcasting sector is regarded as one of the fundamental infrastructures and the government set the target to expand terrestrial broadcasting services to 65% in terms of geographic coverage and 96% of population coverage.

Table 2.1.3.1.2-1 shows the list of digital transmitting stations and proposed channels for simultaneous broadcasting period. All digital transmitting stations are used by the same analogue transmitting stations. 1 to 4 cluster number in ASO column shows priority. Major cities such as Gaborone and Francistown are included in Cluster 1 and ASO will take place in those areas. For simultaneous broadcasting, channel above 49ch are repacked under channel below 48ch. Though two transmitting stations are channel 40ch and 43ch, those are considered to be changed in order to avoid interference with digital broadcasting.

Table 2.1.3.1.2-1 Transmission Site Table

No	Site	Region	Analogue		Digital		Installation
			Transmitter power (Watts)	Ch	Equivalent Digital Power (Watts)	Ch	Cluster
1	Sesung	Sebele	3000	8	750	41	1
2	Sojwe	Serowe	2000	21	500	25	2
3	Oliphant's Drift	Sebele	500	41	125	37	1
4	Mahalapye	Serowe	2000	27	500	31	1
5	Chadibe	Serowe	2000	8	500	44	3
6	Maope	Selibe Phikwe	2000	11	500	28	3
7	Serowe	Serowe	2000	42	500	46	1

No	Site	Region	Analogue		Digital		Installation
			Transmitter power (Watts)	Ch	Equivalent Digital Power (Watts)	Ch	Cluster
8	Molalatau	Selibe Phikwe	1000	33	250	21	3 Note
9	Mmashoro	Serowe	2000	34	500	30	1
10	Letlhakane	Serowe	2000	9	500	39	3
11	Matsitama	Selibe Phikwe	2000	58	500	33	4 Note
12	Mopipi	Serowe	2000	13	500	23	3
13	Motopi	Maun	2000	41	500	Pending	3
14	Francistown	Selibe Phikwe	2000	10	500	44	1 Note
15	Sekakangwe	Selibe Phikwe	2000	6	500	22	3
16	Maitengwe	Selibe Phikwe	500	41	125	35	3
17	Semowane (sowa junction)	Selibe Phikwe	1000	24	250	28	3
18	Gweta	Maun	2000	55	500	25	4
19	Pandamatenga	Kasane	500	42	125	38	3
20	Kasane	Kasane	500	25	125	36	1
21	Mabele	Kasane	500	34	125	26	4
22	Maun	Maun	500	40	125	44	1
23	Sehithwa	Maun	1000	55-> 30	250	26	4
24	Gumare	Maun	1000	24	250	28	4
25	Sepupa	Maun	3000	54-> 33	750	25	4
26	Ghanzi	Gantsi	2000	21	500	25	1
27	Tshootsha	Gantsi	1000	53-> 47	250	38	2
28	Ncojane	Gantsi	1000	22	250	30	2
29	Hukuntsi	Gantsi	2000	38	500	33	2
30	Mabutsane	Tsabong	3000	55-> 28	750	24	1
31	Werda	Tsabong	1000	23	250	31	2
32	Tshabong	Tsabong	1000	49-> 41	250	37	1
33	Middlepits	Tsabong	500	43	125	47	2
34	Bokspits	Tsabong	500	21	125	29	2
35	Mabule	Sebele	500	53-> 37	125	33	2
36	Senyamadi	Sebele	2000	43-> 26	500	45	1
37	Ntsweseolo	Sebele	1000	35	250	33	4
38	New Xade	Gantsi	1000	41	250	45	2
39	Lobatse	Sebele	2000	39	500	47	1
40	Kanye	Sebele	500	47	125	43	1
41	Kang	Gantsi	2000	40->	500	48	2

No	Site	Region	Analogue		Digital		Installation
			Transmitter power (Watts)	Ch	Equivalent Digital Power (Watts)	Ch	Cluster
				25			
42	Charleshill	Gantsi	2000	21	500	35	2
43	Selebi-Phikwe	Selibe Phikwe	5000	8	1200	39	1
44	Gabane	Sebele	10000	11	2500	24	1
45	Sebele	Sebele	5000	11	1250	24	4

Figure 2.1.3.1.2-1 shows the transmitting station location map. This shows that transmitting stations are concentrated on alongside the boarders and urban areas. In facing the digital migration, 3 transmitting stations are abandoned. This is because the neighboring transmitting station can provide coverage to those areas. However, in those areas the change in the coverage must be studied. It is also worried that the service coverage might be narrowed due to the changing characteristics of electronic waves between VHF and UHF.

Due to those problems, in conducting the review of ASO plan, DBS must analyze the coverage simulation carefully and examine if the ASO schedule is effective including communication with the viewer living in the poor reception areas.

Figure 2.1.3.1.2-1 Transmitting Station Location Map

DBS established the broadcasting network in the same manner with its analogue broadcasting network by delivering broadcasting signal to each transmitting station via satellite. In addition to the digital transmitters, equipment shown Figure 2.1.3.1.2-2 was installed. The design policy of the system is the followings;

- Redundancy of the transmitter is the same as the existing analogue broadcasting. Exciter, current and spare and power amplifier parallel.
- Monitoring of transmitter is the same as the existing analogue transmitters for remote monitoring.
- Whether the facilities can be shared must be examined.
- Generator and UPS for two hours operation will be prepared as a back-up power. In order to deal with simultaneous broadcasting period, capacity of those back-up power sources must be examined.
- Output power of analogue and digital are shared. The existing antennas, feeder cables and towers are used. However, permissible power and tower strength must be examined.
- Transmitting stations and sites are basically shared with the analogue ones.
- Satellite uplink antenna system is prepared at the studio side of BTV for digital transmission.
- At the transmitting station side, the signal received from the satellite will be divided into two. One is connected to an analogue transmitter and the other is to a digital transmitter.

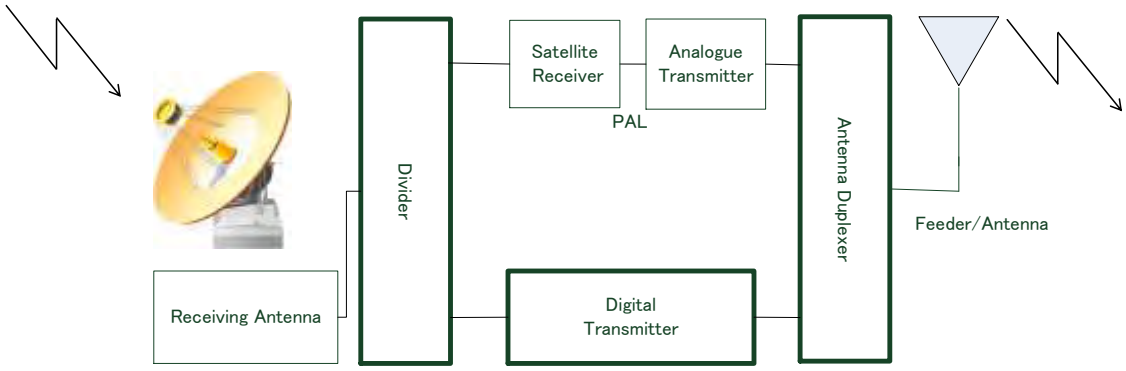


Figure 2.1.3.1.2-2 Composition of Transmitters during Simultaneous Broadcasting Period

With the above policies, DBS installed digital transmitters in the 45 analogue transmitting stations in the country. However due to the lack of the capacity in the satellite uplink, HD contents are not yet broadcasted.

The installation schedule is descried in the Figure 2.1.3.1.2-3. Although there was a delay in the installation of transmitters and preparation of UHF transmitting antennas in the analogue VHF stations, DBS started digital broadcasting in June 2015 from the first five stations of Serowe, Maun, Ghanzi, Tshabong, Sebele and eventually 45 digital transmitting stations. With regard to ASO, due to the delay of the availability of receivers in the market, the target date which is originally set in June 2016 is postponed to December, 2016.

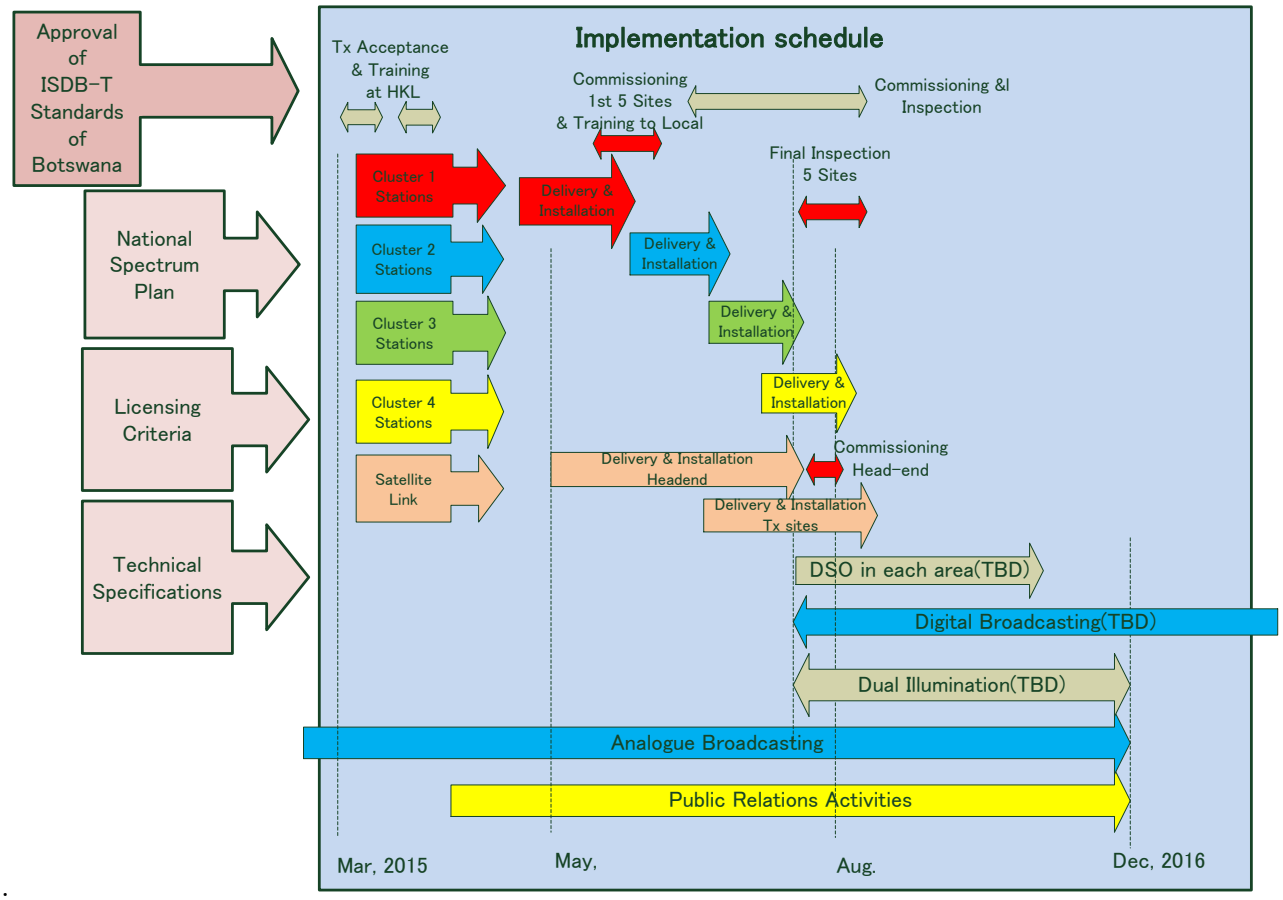


Figure 2.1.3.1.2-3 Installation Schedule

(2) Setting of ASO criteria

It was discussed that it is necessary to prepare ASO criteria by which the judgments is made whether ASO can take place or not. The coverage area of digital broadcasting and the penetration of receiver are used as an indicator for ASO criteria.

1) Service Coverage : 80 % of analogue service area

It is simulated that the 45 transmitting stations are able to provide the same coverage with the analogue broadcasting. However the criteria have been lowered because there are several stations that would be converted to UHF from VHF, which narrows the coverage due to the propagation characteristics.

2) Penetration of digital receiver 60 % of household

It was found that satellite receivers called Phillibao are available and sold in the Botswana market and prevails to approximately 75 % of the household in Botswana. The receivers enable the viewers to watch not only programs provided in other African countries via satellites but also terrestrial programs of BTV. Due to the high penetration of this satellite receiver, ASO could take place without high penetration of digital receivers. However, DBS put emphasis on digital terrestrial and its new services of data broadcasting, the criteria were set as same as the penetration rate of

analogue television in the households.

If each area covered by each transmitter satisfies those criteria, ASO can take place.

(3) Schedule of ASO

1) ASO Requirement

Digital Switch Over (hereinafter referred to as "DSO") has started from the site that completed the installation of digital transmitting system, while ASO is preferable if it starts from a model area experimentally. In particular, ASO will cause the loss of television if the viewer does not prepare receivers and if there is any areas where the digital signal cannot be received as the analogue signal. The impact of ASO is far greater than DSO. For the smooth implementation of ASO, the followings were considered.

- Equipment and facilities which the viewer must prepare to watch digital television broadcasting.
- To understand equipment and facilities that is shared by a certain group of people and makes a consensus on how to adapt them to digital broadcasting.
- To provide support on installation and setup of STB and IDTV
- To provide support to re-set up receiving channels when channel repacking takes place.
- Measures against those households who cannot receive digital signal due to poor reception.
- Satellite receivers called Philibao are available in Botswana, which enable viewers to watch BTV programs and other African channels broadcasted through satellites. The penetration of this receiver is 76.4% in Botswana, which far exceeds that of terrestrial receivers. Therefore the risk exists where the DSO does not perform in a smooth manner, if the viewers stayed in Phillibao and watched BTV through it and did not replace their analogue receivers with digital ones. In this case, if the analogue signal from satellite stopped, the viewers lose the experience of watching BTV.

2) Dual Illumination Period

Simultaneous broadcasting period must be minimized because of the operational cost of the period for the broadcasting station. However, it must be avoided that ASO takes place before the viewer prepares digital receivers.

3) DSO/ASO procedures

DBS plans to accommodate digital transmitters into the existing analogue transmitting station. Therefore if the analogue broadcasting is conducted in UHF frequencies, the following procedures will be applicable for DSO.

- Install digital transmitter into vacant space of the station.
- Install power facilities.
- Install antenna duplexer
- Connect with remote monitoring system
- Test characteristics

- Connect the existing feeder with duplexer during the night when broadcasting service is suspended.
- Convert to the test signal built in the transmitter, and then prepare for transmission from transmitting antenna.
- Conduct field strength measurement after test transmission.
- After the satellite uplink has become available, transmitting signals from the satellite is input in the transmitter. Then conduct receiving test with the actual television in the field.

In case the analogue broadcasting is in VHF, a new UHF antenna must be built. Therefore the procedures will be the followings;

- Mount an UHF antenna
- Install digital transmitter and antenna duplexer into vacant space of the station.
- Install power facilities
- Connect with remote monitoring system.
- Test characteristics.
- Connect the new feeder with transmitter.
- Convert to the test signal built in the transmitters, and then prepare for transmission from transmitting antennas.
- Conduct field strength measurement after test transmission.
- After the satellite uplink has become available, transmitting signals from the satellite is input in the transmitters. Then conduct receiving test with the actual television in the field.

In either case, the capacity of power and transmission cable have to have the capacity for both analogue and digital signal, it is important to take it consideration in advance.
If the co-channel or adjacent channels were used in the near transmitting stations, it would be better if the transmitting power was increased in a step by step up to the rated power while checking interference.
If interference was found, the transmission should be stopped immediately and measures have to be taken. The followings are the measures to be considered.

- Review transmission rated power
- Review directivity of antenna
- Change the frequency

Before taking those measures, it would be highly recommended that radio propagation simulation is used. It is recommended that field measurement points be fixed in advance and the measurement take place in the same points periodically.

4) Progress Schedule of ASO

DBS plans to conduct ASO according to the Cluster rather than the whole country once at the same time. Cluster 1 that includes major cities will start first and conduct according to the Clusters until

Cluster 4. Figure 2.1.3.1.2-4 is ASO plan. However the success of the plan depends on the installation work of transmitters. If the installation delayed, the plan must be reviewed. For providing sufficient support to the viewer, it is important to take appropriate length of simultaneous broadcasting period.

In order to implement ASO, ASO criteria of service coverage and penetration of receiver must be met as described in ASO criteria. Though the target date of ASO was set in December 2016, the schedule has to be postponed if the criteria have not been met due to aforementioned reasons. Therefore, the criteria of service coverage and penetration of receiver must be researched at the end of every month. However at the time of the completion of the Project, there are no digital receivers available in the Botswana market, which makes it difficult to conduct ASO as scheduled.

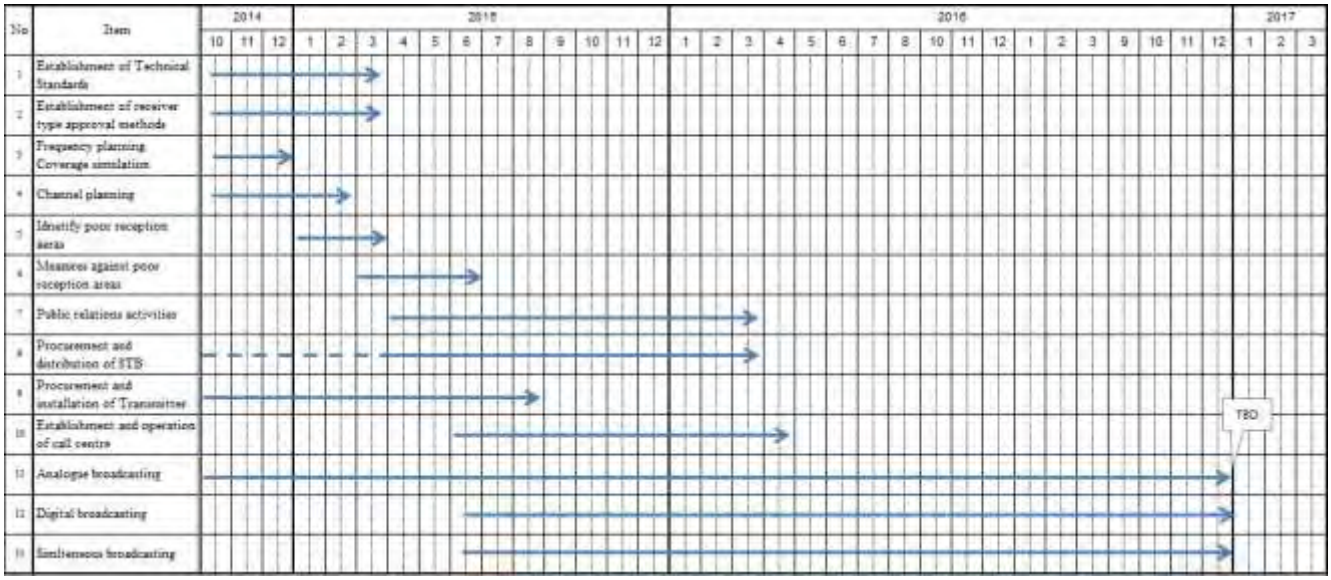


Figure 2.1.3.1.2-4 Figure ASO plan

2.1.3.1.3 To review Botswana ISDB-T Standards

ISDB-T standards of Botswana was drafted by Digital Broadcasting Experts Group (hereinafter referred to as "DiBEG"), established within ARIB to promote digital broadcasting to overseas, and provided to Botswana as the standards before the Project began. The Project provided further support to BOCRA to understand the contents of the document and facilitated its approval by BOCRA.

If Botswana produces the technical standards documents based on ISDB-T, it is going to be a huge volume and duplicates the work. Therefore the documents were prepared by referring to the technical standards that have already produced in Japan and Brazil. However each country that has adopted ISDB-T standards has its distinctive character in bandwidth, video compression, data broadcasting language and multiplexing rules. The documents were prepared by identifying the items that need amendments. The work was done with the close cooperation with Ministry of Internal Affairs and Communication and DiBEG task force. The final version was formulated as the list of items that are amended and made it as ISDB-T standards of Botswana. The process is shown in Figure 2.1.3.1.3-1

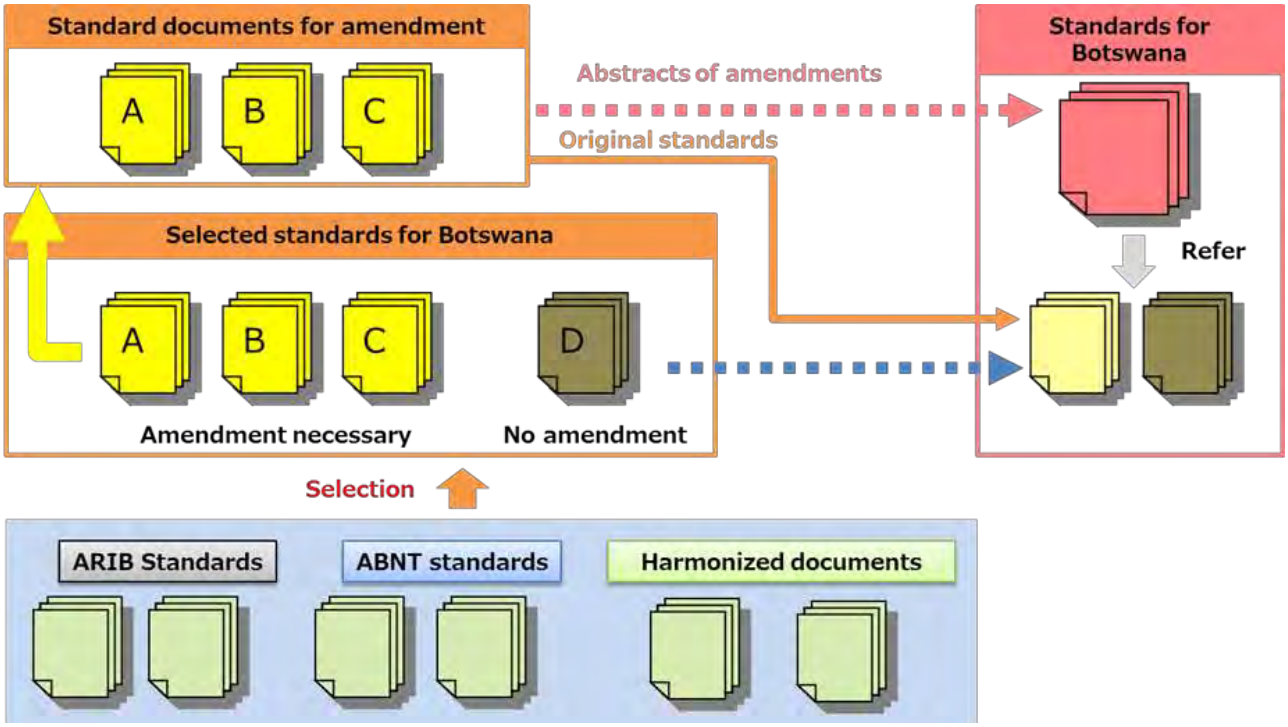


Figure 2.1.3.1.3-1 Process to produce ISDB-T Standards of Botswana

(1) Procedures to formulate the ISDB-T standards of Botswana

The document was prepared based on the standards registered in ITU-R, ITU-R BT.1306 and ISDB-T Harmonization Document PART1, HARDWARE (Receivers), ISDB-T Harmonization Document PART 3 (EWBS) were referred, which are agreed among countries which adopted ISDB-T such as Brazil. With regard to Data broadcasting, which is not established in Brazil, ARIB STB-B24 (Data broadcasting) and ARIB TR-B14 Vol13 (Data Broadcasting Operational Guidelines) were referred The main composition of standards and major items examined are shown in the Figure 2.1.3.1.3-2

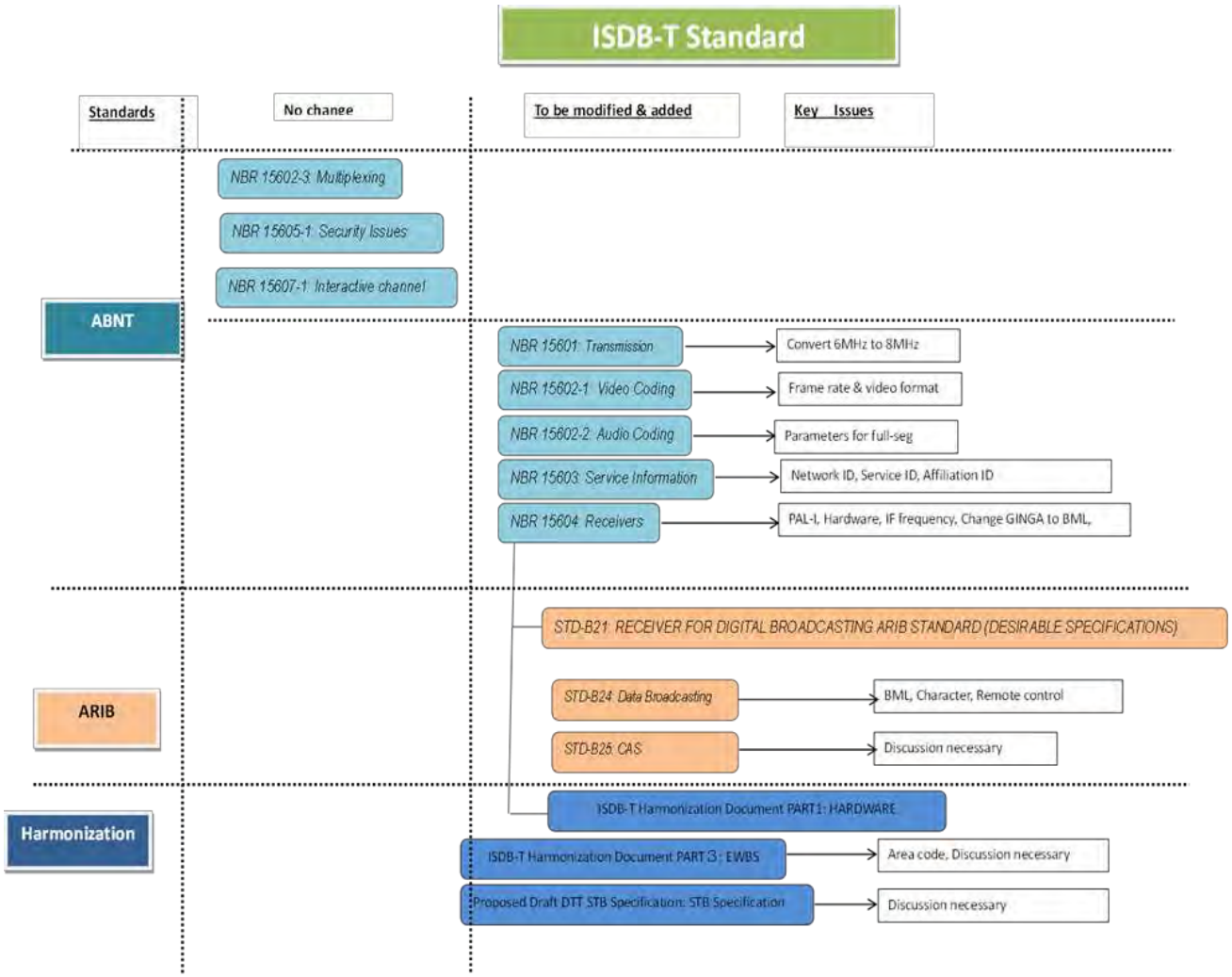


Figure 2.1.3.1.3-2 Main composition of standards

(2) ISDB-T Standards of Botswana

This document was produced to provide technical specifications of equipment and products, and to establish secure the interconnectivity/interoperability by defining ISDB-T Standards of Botswana. The document is compiled for Botswana by extracting and modifying essential parts from ARIB Standards completed in Japan and the Standards of ABNT (Associação Brasileira de Normas Técnicas) as described in Recommendation ITU-R BT.1306. Botswana Communications Regulatory Authority shall type-approve all ISDB-T equipment based on the standards defined in this document. The Annex, which is the integral part of the standards, covers the details of Botswana Standards as modified from the existing standards.

Reference Documents to the Standards were prepared as Appendix 1 and 2. The Appendix 1, Titled "Operational Guidelines for Operating ISDB-T Broadcasting" is not the integral part of the standards but gives supplementary information to the standards, and covers the operational guidelines for the general operations at broadcasting stations for digital terrestrial television broadcasting and functional specifications for digital terrestrial television equipment. The Appendix 2, "Titled "Botswana ISDB-T Standards Development Process" gives full details of how the Botswana ISDB-T standards were

developed. The document gives specific details (section and Items) and the rationale of modifications done on the existing ISDB-T standards to derive Botswana ISDB-T standard.
In order to develop the standards of ISDB-T in Botswana, the following items are to be arranged or confirmed in accordance with the situation in Botswana.

1) Transmission

Parameters are given in Table 1c) of ITU-R BT.1306. For details, ABNT NBR 15601 shall be referred as listed in Appendix 3 to Annex 1 of ITU-R BT.1306.

Because ABNT NBR 15601 is the standards for 6MHz/ch transmission bandwidth, the transmission parameters have been modified for 8MHz/ch transmission bandwidth as shown here-below. The following transmission parameters would apply;

- Symbol duration : 6/8 shorter than 6 MHz/ch
- Bandwidth : 8/6 wider than 6 MHz/ch
- IFFT sample clock : 8/6 faster than 6 MHz/ch
- Transmission bitrate : 8/6 faster than 6 MHz/ch
- Guard interval length : 6/8 shorter than 6 MHz/ch
- Channels : set by every 8 MHz
- 13 segments in 8 MHz See Annex 1 for details.

2) Video Coding

All the technical parameters related to video coding shall be in accordance with ABNT NBR 15602-1. However the frame rate of 25 Hz and 50 Hz, and the video format of 576i and 576p shall be supported and video coding parameters for full-seg services are applied to any layers except for the partial reception layer. See Annex 2 for details.

3) Audio Coding

All the technical parameters related to audio coding shall be in accordance with ABNT NBR 15602-2. However audio coding parameters for full-seg services are applied to any layers except for the partial reception layer.

4) Multiplexing

All the technical parameters related to multiplex shall be in accordance with ABNT NBR 15602-3.

5) Service information

The technical parameters related to service information shall be in accordance with ABNT NBR15603 with the following modifications;

Network ID, Service ID, and Affiliation ID shall be allocated to be respectively unique within Botswana, and Remote Control Key ID shall be allocated to be unique within each of the broadcast service areas.

6) Receiver
The technical parameters related to receivers shall be in accordance with ABNT NBR15604. The operational and technical specifications defined in document DTT001, 2, 3 shall apply.

7) Security issues
All the technical parameters related to security issues shall be in accordance with ABNT NBR 15605-1.

8) Data broadcasting
ISDB-T Standards covers multiple Data broadcasting standards such as BML, Ginga and HTML5.
All the technical methods and parameters for BML data broadcasting, subtitle and superimposed characters coding shall be in accordance with ARIB STD-B24.
The character set and character coding shall be as per Annex 6. Annex 6 gives Data broadcasting standard with respect to remote control requirements.

9) Interactive channel
All the technical parameters related to interactive channel shall be in accordance with ABNT NBR 15607-1.

10) Emergency Warning Broadcast System (EWBS)
All the technical methods and parameters shall be in accordance with ISDB-T Harmonization Document PART 3: Emergency Warning Broadcast System (EWBS).

2.1.3.1.4 To review Specifications of Receivers

Technical specifications for receivers are used for Type approval which BOCRA is mandated to conduct according to the Botswana communication regulatory authority act. The documents complemented the item of receiver in ISDB-T standards of Botswana. The receivers are categorised into three types of STB, IDTV and Mobile and Portable. And documents were prepared for each type. The documents were drafted by BOCRA and each document was also discussed in DiBEG meeting whether it matches ISDB-T standards technically.

The main point was BOCRA keeps the neutral position as a regulator in terms of broadcasting technology and took the stance to leave the market to decide the standard. BOCRA described the European standard with the Japanese standard in parallel in the technical specifications in order for the receivers for both types to be given type approval. Although DiBEG opposed to this, BOCRA explained that without description of the European standard, BOCRA cannot give type approval to those devices and the domestic manufacturers who would like to export their products cannot obtain type approval. DiBEG was not convinced and it causes confusion as to be understood as Botswana adopted both standards. However, DiBEG does not stand the position to interfere domestic issues of Botswana and requested that the European standard be restricted for the export purpose only. It was agreed that the adaptation of the Japanese standard is described in the note, “Botswana has chosen ISDB-T Standard for all the parameters using 8MHz Bandwidth” and in the main body both standards are

described in parallel.

(1) Set Top Box(STB)

The major points that are discussed are shown in Table 2.1.3.1.4-1.

Table 2.1.3.1.4-1 Main discussion for STB

No	Items	Japan	BOCRA
1	Scope	Botswana side insisted that European standards should be included into the technical specifications because manufactures in Botswana produces receivers for export purposes. Therefore it was agreed that the standards other than ISDB-T is used for outside of Botswana.	It is not suitable to regulate the broadcasting standard because it contrary to BOCRA's role as a regulator to keep technologically neutral position
2	Remote Control Unit	The type of batteries shall not be restricted only as AA or AAA	It is difficult to purchase other types of batteries in rural areas. For the convenience of the end user, either type is necessary
3	Network Functionality	Receivers are not affected by the difference of SFN and MFN. It does not have to be mentioned here.	BOCRA kept the description.
4	Modulation, FEC on OFDM, Guard Intervals, Channel/Noise Ratio, Interleaving	System C (ISDB-T standards) and ITU-R BT.1877 as optional	Both are listed in parallel. It was mentioned in Note as "Botswana has chosen ISDB-T Standard for all the parameters using 8MHz Bandwidth"
5	AC Main Power Supply, Power Plugs	The voltage described shall be for Botswana domestic use	Since other items are also applied, it is not appropriate to mention only this item
6	Manual	The restriction of the number of pages as below 10 pages shall be deleted.	It was modified as it is "Clear and easy to understand"
7	Frequency Off Set	Frequency off-set is mentioned in ISDB-T and shall be deleted.	Frequency off set means frequency deviation allowable. In order to secure the capacity of receivers, it was agreed as 125MHz
8	STB Electronic Components	It is not clear what Electronic components means	It is necessary because it means IC chip for reception.

(2) Integrated Digital Television (IDTV)

It was prepared in the same manner with STB but exclude the items related to analogue television.

(3) Mobile and Portable Devices

It was prepared based on IDTV by excluding interface, screen display, and power. The major points that are discussed are shown in Table 2.1.3.1.4-2.

Table 2.1.3.1.4-2 Main discussion for Mobile and Portable Device

No	Items	Japan	BOCRA
1	Modulation (DPMR)	QPSK, 16QAM	Full seg: Comply with Recommendation ITU-R BT.1306 System C or ITU-R BT.1877 One seg: QPSK
2	Input signal (DPMR)	No specific requirement for one-seg	Mobile and portable include full-seg device. It needs to be mentioned.

2.1.3.1.5 To review Terrestrial Broadcasting Station Licensing Criteria

BOCRA conducted public consultation about the licensing criteria of digital broadcasting and collected opinions from the public and stakeholders by themselves and wanted to expedite the process of publishing the licensing criteria. Due to the concern that the involvement of the Project in this item might delay the process of finalising it, BOCRA requested that the activity be removed from the Project in the second JCC meeting. It was concluded that the licensing criteria as a deliverables be removed from the Project and the activity only deals with the technical aspects of licensing criteria by providing advice.

(1) Consultation paper

Consultation paper was published by the BOCRA to collect opinions from the general public and stakeholders. The comments were received until 23rd January 2015 followed by the stakeholder meeting.

The objectives of the paper are request inputs on the proposed licensing framework and its scope is licensing framework for commercial television broadcasting services in the digital platform. The state broadcasting station is exempted from this licensing

The classes of licenses are divided into two. One is commercial broadcasting, operating for profit and available to the public as free to view service or through a subscription. The other is non-commercial broadcasting, fully controlled by a non-profit entity and carried on for non-profitable purposes. BOCRA prepared 9 proposals.

1) Classes of licenses

BOCRA proposed two types of licenses and further the licensing of both free to view and subscription based television.

- Commercial broadcasting

  A commercial broadcasting service is a broadcasting service operating for profit and available to the public as free to view service or through a subscription.
- Non-commercial broadcasting

A non-commercial broadcasting is a broadcasting service that is fully controlled by a non-profit entity and carried on for non-profitable purposes.

2) Coverage categories

BOCRA proposed to issue licenses for three types of television coverage classes in order to promote the market entrance and growth.

- National

  A national broadcasting service is one that has a licence to broadcast across the whole country
- Regional

  A regional broadcasting station refers to a broadcasting station licensed to broadcast in a specified region of the country.
- Locality/Zonal/Sectional

  Sectional broadcasting station applies to where pockets of places for instance in towns or villages are targeted to receive the broadcast.

3) Broadcasting frequencies

BOCRA proposed to license digital terrestrial television on UHF channel 470-698MHz in order to take advantage of availability of channels and for regional harmonization.

4) Multi and single frequency network

In order to facilitate entry to the market, and considering the size of Botswana, BOCRA proposed to license multi frequency networks.

5) License layer

BOCRA proposed different layers of licenses.

- Spectrum license

  The right to access and engage specific parts of the radio spectrum in a specified geographical locality for specified period of time.
- Broadcasting service license

  The right or permit to broadcast television content on a defied platform in a particular geographical location and for a specified time period, usually at both programme and platform level.
- Broadcasting system license

  The right allows erecting and operating a broadcasting infrastructure in a defined geographical location for a specified time period.
- Hybrid license

  The right allows combinations of any of the above rights allowed in the licensing frameworks, and the entire obligation accompanying the rights.

6) Roll out plan

BOCRA proposed to require the operators to submit their rollout plans as part of the application process and this is used as rollout obligation in the license.

7) Eligibility

In order to promote service rollout and ensure equity, BOCRA proposed to use an open and transparent method for licensing of all interested providers including the existing broadcasting stations. BOCRA also proposed to issue licenses to only locally registered companies.

8) Licensing process

BOCRA proposed to follow the tender method for the allocation of DTT licenses.

9) Programming

BOCRA proposed to prescribe an annual minimum quota in the license condition to ensure that the five year periodic quotas are achieved progressively.

(2) Stakeholder meeting

After collecting opinions from the public, BOCRA held the stakeholder meeting to discuss the proposal and opinions collected. The meeting was live and many raised many issues. In particular, the broadcasting standard was the main point to be discussed. It was inquired whether it is possible to apply the license with other types of standards except ISDB-T. From the point of view of BOCRA as a regulator, their answer was to be in a position where BOCRA is technologically neutral. Even if the licensing criteria does not specify the broadcasting standard, the licensing framework is manageable. BOCRA took the issues raised in the meeting into consideration and published broadcasting license application and assessment procedure.

2.1.3.1.6 To develop Draft Public Relations Plan for Digital Migration

(1) Procedure for producing the draft public relations plan

In order to conduct the activity, the public relation WG was established. The leader was assigned. The members of the WG were selected from all department related to public relations such as radio, television, newspaper.

The kick off meeting was held on 9th October, 2014 where the schedule and outputs are shared among the members of WG. In addition, a common understanding was made that public relations activities should be expedited to make the public understand what digital migration is and what measures they have to take because of the limited time period of ASO schedule.

At the beginning of the Project, it was planned to review the draft public relations plan that was prepared by DBS with the members of WG and implement the plan. However it was revealed that DBS did not yet draft the plan. The activity was modified as it produces the plan by the Project.

First of all, all activities considered to be necessary to cover the whole Botswana were listed. The listed activities are categorized based on the purpose of activity. Project paper was prepared for each activity to

make it possible to conduct activity without prior experience. The activity was planned during the weekly meeting.

The communication strategy that is used as a policy to contract out a part of public awareness program to tenderers was discussed in the WG. The public relations plan that is underdevelopment is prepared as it is consistent with the communication strategy. The contents of the public relations plan were proposed by the Project.

It is important to inform the whole public about digital migration before ASO. The time was limited. The target was divided into two. The prime target who includes high officials in the government, district commissioners, villages chief were selected as an influential figures in order to promote digital broadcasting. It is expected that the prime target will spread the information to the secondary target group.

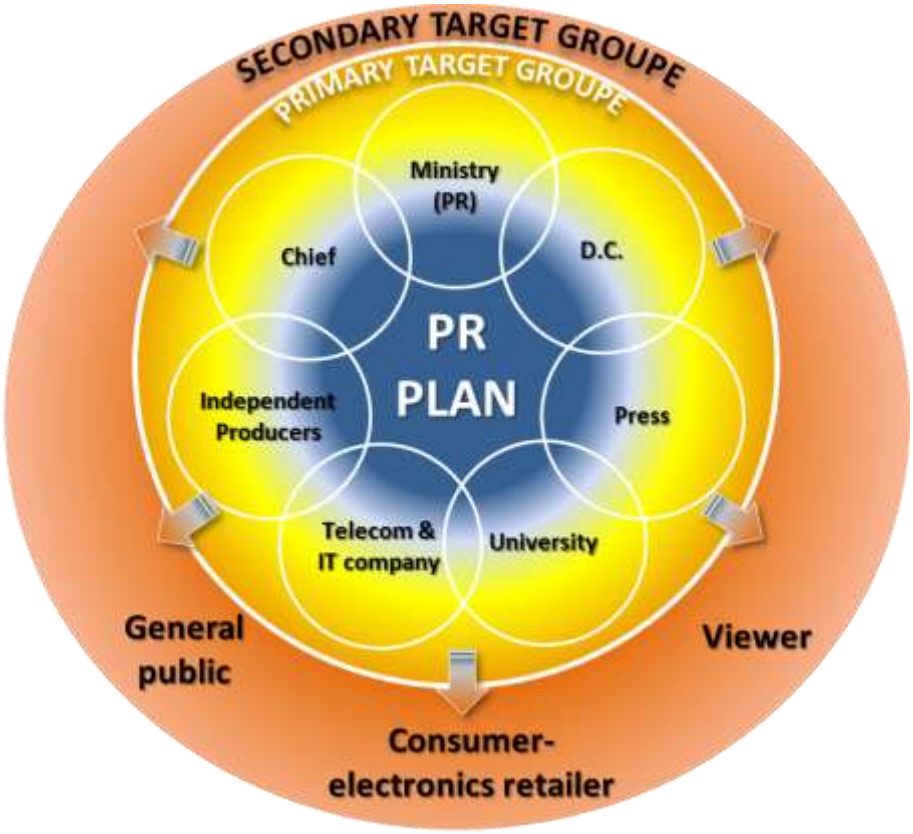


Figure 2.1.3.1.6-1 Target group for Public Relations Plan

(2) Contents of Public relations plan

In drafting the public relations plan, the first point considered was how it is possible to promote digital migration to the whole population of Botswana since the plan is not only for the WG but it addresses all the people involved in the digital migration. The contents were developed with taking this point into account. This led to the idea that the plan started from the background of digital migration and covered the strategy and policy of public relation activities, and details of each activity.

All the items considered to be necessary for public relation plan were listed and the plan was prepared based on the contents agreed in the WG. The contents are shown in Table 2.1.3.1.6-1

Table 2.1.3.1.6-1 Table of Contents for the Public Relations Plan

Contents	
Preface	
Chapter 1	Background and Current Status
Chapter 2	Purpose of Public Relations Plan
Chapter 3	The Basic Concept of Public Relations Plan
Chapter 4	Target of the Public Relations Plan
Chapter 5	Public Relations Activities
Chapter 6	Receivers Penetration
Chapter 7	Call Centre Establishment and Operation
Chapter 8	Budget Estimation
Chapter 9	Performance Target of Public Relations Plan
Appendix	Project Paper, Time Table, Invitees List etc.

The plan aims to inform the public about digital migration, focusing on the following areas for viewers.

- to comprehend digital migration in Botswana
- to learn the benefits from digitalization
- to know the time of digital switch over and analogue switch off
- to gain understanding of preparation for watching DTTB

The plan deals with the four different categories of activities. 1. Information provision generally targets the general public to inform them of the digital migration by mass media, 2. Public relations campaign targets a particular part of the public to provide an opportunity to experience digital broadcasting, 3. Receiver penetration covers how to distribute digital receivers to particular places such as public space, the district commission to promote digital broadcasting, 4 Viewer assistance plan provides the actions to be taken by the viewers in order to watch digital broadcasting.

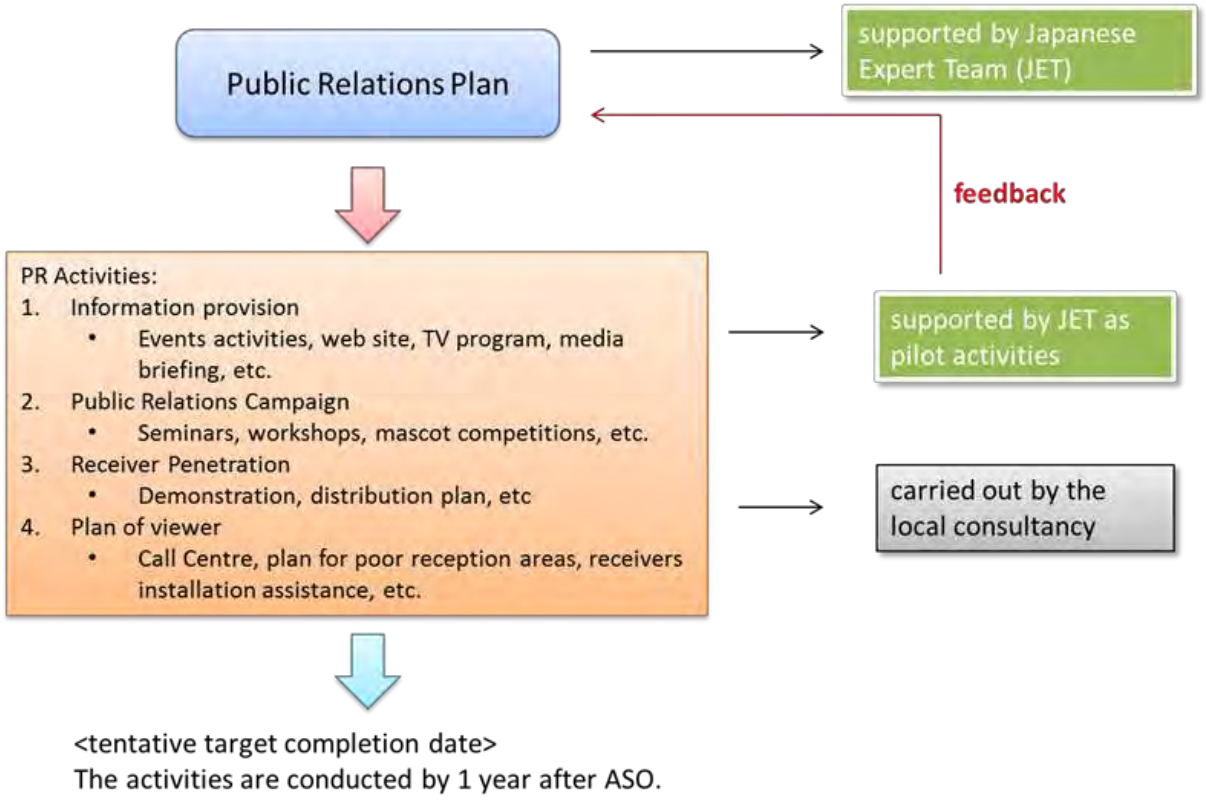


Figure 2.1.3.1.6-2 Framework of Public relations plan

Activities are categorised into four areas

1) Information Provision

Objective of the information provision is notification the progress of DTTB migration by providing the information like a milestone or related information of when DTTB migration start. Provide of the documents described the necessity of the DTTB migration to promote the understanding of DTTB migration. Activities of information provision are

- Events Notification
- Introduction of New Technologies
- Press Briefing
- Build Web Page
- TB Advert
- Radio Advert

2) Public Relations Campaign

Objective of the Public relations campaign is experience learning of DTTB or participation of PR activities make the participants rise awareness of DTTB and advertise it as PR partners to the public. These PR partners may have a possibility of come up with fresh ideas. By incorporating the ideas into next plan, PR campaign can be amended more effectively. Activities of the Public Relations Campaign are

- Digital Migration Seminar

- Visiting Workshop
- Competitions

3) Receiver Penetration

Objective of the Receiver Penetration is introduction of receivers essential for watching DTTB. Activities of the Receiver penetration are

- Demonstration
- Pilot Project for receivers provision

4) Viewer Assistance Plan

Objective of the Viewer Assistance Plan is to support viewers especially poor reception area and elderly person for smooth digital migration. The activity of viewer assistance plan is

- Call Centre Establishment and Operation

2.1.3.1.7 To conduct Public Relations Activities in accordance with the Draft Public Relations Plan

(1) Activities conducted by the Project

The following activities are addressed by the Project.

1) Promotion activities in DBS

It is turned out that the members in DBS themselves are not aware of the digital migration and do not have enough knowledge on digital migration and many of them regard digital migration as a project that has no connection with them. Therefore the WG proposed that promotion be addressed to the members of DBS first before addressed to the public in order to involve them and make them actively participate in the Project. The activities proposed are the presentation of digital migration at regular meetings in DBS and promotion by posters. The draft design of the poster was completed. The effect of the posters will be monitored and improved as necessary. Then it will be used for promotion in the public.

2) Promotion activities to the public

Under the circumstances, most of the people are not known about digital migration, it is suggested that the television and radio are desirable tool to promote. The promotion will take place in several stages to gradually infiltrate digital migration to the public. The first step will be to make the word “digital migration” be familiar among the public. The second step is to promote the benefit of digital migration. The third step is to help viewers to take preparations for digital migration. The contents of promotion in television use the same contents as the radio. The effort will be made to use simple and easily understandable words. The program that was already produced by the BTV staff will be used as a draft to put the television spot on air. The proposal was submitted to air a television spot.

3) Demonstration

- Mall demonstration

The demonstration was held on 18th, 19th, 25th and 26th in the malls in Gaborone to promote digital broadcasting. Different types of receivers, analogue television, digital television with STB, integrated digital television were presented to experience difference in the quality of picture by the viewer. In addition, the data broadcasting which is one of the features of ISDB-T was broadcasted as a new service by which the viewer can access to the latest information at any time when it is convenient for them. Digital migration is not a familiar term in Botswana. However, actual experience of digital television has a positive impact and many of the customers stopped at the booth and listen to the explanation and questioned. The oral presentation was made by the transmitting engineers from DBS.

Shopping mall demonstration

- Ghanzi Telecommunication Fair

The project participated in the event organized by BOCRA on World Telecommunication Day in Ghanzi. Vice president and the Ministry of Communication participated in the event and experienced Data broadcasting. Though Ghanzi is one of the biggest cities in Karahari desert, there are still a lot of areas where electricity is not available and people who are not accustomed to the remote controller.

- Public service day

The Project team assisted one awareness activity in the Public Service Day or government ministries and their departments in a celebration that saw civil servants commemorating the day. Public servants through their ministries converged at the main mail and set up stalls to explain about their services and mandates hence Department of Broadcasting Department under the Ministry of State President took the opportunity to spread awareness about Digital Migration.

- Consumer fair

The demonstration has been organized in the consumer fair held between 17th and 23rd August. The demonstration has been led by public relations WG supported by transmission engineer in the past. However, data broadcasting WG took the leadership this time since the main contents of the demonstration was data broadcasting to promote the features of ISDB-T. With regard to the expected questions from visitors other than data broadcasting, transmission engineers from

Consumer fair

Sebele station were despatched and conducted demonstration.

4) Media briefing

As one of the public relation activities, the media briefing was held on the 1st of April and a public relation seminar was held on 16th April.

Table 2.1.3.1.7-1 Summary of the media briefing

Date	1 April 2015, 10:00-12:00	
Venue	216 Conference Room, Department of Broadcasting Services, Mass Media Complex	
Number of guest	57	
Organisation of guest	Broadcast station	eBotswana, BTV
	Radio station	YARONA FM, Duma FM, Radio Botswana
	News paper	Sunday STD, MmEGI, Global Post, Weekend Post, Insight Media
	Government	DBS, BOCRA, Botswana Press agency (BOPA), Government Printing and Publishing Services (GPPS), Department Information Services (DIS), Media Institute of South Africa (MISA), Botswana Government Communication and Information System (BGCIS), Office of the President

The purpose of the media briefing was to communicate with the media about digital migration in advance in order to disseminate information with regard to the digital migration to the public in an appropriate and accurate manner. The briefing began with the opening remark by Dr. Jeff Ramsay from BGCIS, followed by the introduction of the background of digital migration by Deputy Permanent Secretary (DPS). After the briefing, the demonstration was held about digital television, data broadcasting and EWBS.

Photos of media conference

30 minutes was secured for the question and answer session, however the lively interaction with the participants extended the session about 20 minutes. The major issues raised by the participants were when STBs are available and their prices, the schedule for digital migration, and economical effects by digital migration. With regard to the STB issue, the similar questions were asked through the telephone call and in the mall events.

5) Digital Migration Seminar (Gaborone, Francistown and Maun)

The first Digital Migration seminar was held in Gaborone at 16th April, 2015.

The seminar began by the introduction of the background of digital migration by Parliament ICT Committee. After the opening, the advantages of digital migration and the its schedule was presented by DBS and the technical issues were presented by BOCRA. The digital television was prepared at the backside of the venue and the environment was created where the participants experienced the features of digital broadcasting such as the quality of pictures and data broadcasting.

Digital migration seminar in Gaborone

The issues was again mainly about STBs. However some asked about the contents of the BTV programs if BTV increased the number of channel they broadcast.After the seminar, the review was conducted by the major members from DBS and BOCRA and PRWG. If BTV increases the number of channels after digital migration, it is important to explain what sorts of programs BTV will procure for the new channels to the production companies.

Table 2.1.3.1.7-2 Seminar of the Digital Migration in Gaborone

Date	16 April 2015, 9:00-14:00
Venue	Grand Palm Hotel, Okavango room 1&2
Number of guest	131 (Staff 21)
Organisation of guest	PR Heads from all Ministries, Agencies (NACA, Disaster management), Parliament ICT Committee, Representative from Ntlo Ya Dikgosi, National Strategy Office, Botswana Innovation Hub, BOCCIM, beMobile, Mascom, Orange, Multichoice Botswana, Representative from the film industry, Botswana bureau of standards, Gaborone technical college, Limkokwing University, University of Botswana, BIUST, eBotswana, Botswana Society for the Deaf, Horizon Ogilvy, Hotwire PRC and Wired Y and R, BGCIS, Scripture Union Botswana, DBS Regional Officers, DIT, E-Government, Japan embassy, Ministry internal affair and communication (Japan), JICA Botswana, BOCRA, DBS

The second public relations seminar was held in Francistown in 7th May. The advertisement in television, the radio and newspaper is continued to be broadcasted and publicised.

In response to the review of the seminar held in Gaborone, the opinion of the city office in Francistown was included in the selection of invitees. With regard to the contents of the seminar, it was suggested that the technical issues such as frequency coordination is not relevant to the public so that the contents were redesigned as those appeal to the public such as new services available and

advantages of digital broadcasting. The seminar was conducted by involving local governments. The presentation was prepared to explain digital migration and progress of each project such as installation of digital transmitters. The questions were not raised as much as in Gaborone and it was revealed that digital migration is not known to the public in the local towns yet. The demonstration was conducted by installing televisions in analogue and digital to show the difference in the quality of pictures and set top boxes were introduced.

Table 2.1.3.1.7-3 Seminar of the Digital Migration in Francistown

Date	9 May 2015, 8:30 - 14:00
Venue	Cresta Marang Gardens, Conference room
Number of guest	110 (Staff 29)
Organisation of guest	COFC (City of Francistown Council), Francistown Records Centre, Tribal Administration, Department of Mines, SADC, CIPA (Companies and Intellectual Property Authority), Meteorological Services, MYSC, DLEC, Information, CTO, Vertigo, BDF, Francistown East Lont., Agriculture, IHS Francistown, DIT, BHC, CNR, LEA, DTPR, Police, BMC, Central Ward, CMR, Town and Regional Planning, DBES, FCT, Badisa Communications, DOHS, PA, Datamined, Francistown West Constituency Office, Consumer Affaures, Education, DIS,MOH, BOCRA, DBS

The final public relations seminar which project assisted was held in Maun in 11th September, 2015. The participants of the seminar in Francistown was selected by the district commissioner. Originally more than 100 participants were expected including all the chiefs and members of the parliament. However due to the conflict with other major meetings, the actual number of participants was approximately 70. District commissioner and chief councillor made an official remarks at the beginning of the seminar and it was held as the public event involving the local administration.

Digital migration seminar in Maun

The seminar in Gaborone was held by inviting the guest from the member of PR department of each Ministry and agency and the presentation was made in English and had active questions and answers after the seminar. However in Francistown, the response from the guest was relatively little. As a result of the analysis in the WG, it was concluded that the language barrier made it difficult for the local guests to understand the contents. Therefore in the next seminar in Maun, the presentation was made in Setswana, the local language and had an active response from the guest revealing that digital migration is much expected.

Table 2.1.3.1.7-4 Seminar of the Digital Migration in Maun

Date	11 September 2015, 8:30 - 14:00
Venue	Cresta Ryley's Maun, Conference room
Number of guest	109 (Staff 35)
Organisation of guest	Future Empire Holdings, Echo, MTSC, DWA, GABZ FM,MAA, District Commissioner Office, Tribal Administration, MOESD, Land Board Office, DCEC, National Museum, Tourism, Information, DMS, LEA , Datamined, Francistown West Constituency Office, Consumer Affairs, Education, DIS, MOH, EoJ, IICA, BOCRA, DBS

6) Promotion activities in DBS

The poster has been designed based on the draft discussed in the WG. Once the approval has been obtained, the poster will be tested in DBS to obtain response and opinions from DBS staff.

Demonstration of digital broadcasting has been planned as a part of public relations activities. It is planned to distribute goods to promote digital migration in those demonstration venues. Quotations are obtained to secure the budget.

- Print T-shirt
- Ball-point pen

(2) The work with the local consultants with regard to the public relation activities

It is important to conduct the public relation activities in the whole of Botswana. However, due to the time and budget constraint, it was difficult for the Project to cover all villages and towns across Botswana. DBS hired the local consultants for pubic relation activities to cover the whole Botswana. The Project conducted a pilot seminar and demonstration and the local consultants used the same method and conduct public relation activities in other part of Botswana, In total three companies were hired for this purpose and the area was divided into three. Each company took the responsibility for each area. The activity was conducted three in parallel.

The demarcation has been discussed between the local consultant companies of public education on the migration by the tender project and JICA project.

- The question was raised whether there is a fixed time of the completing of the tender project. The tender processes should be speeded up to kick start the overdue public education.
- Biggest issue is people are requesting for set top boxes and how they can be attained. The issue was raised during the mall demonstrations as to how we are addressing the question of when the set top boxes will be available and its price.
- The following information should be consistent when communicate with the public, availability of receivers, the likely cost of receivers and when and where those can be purchased. In order to be consistent, a frequently asked question list and exemplary answers should be prepared.
- During these demonstrations, information going out to the public should be handled by the leader of the events to ensure consistency in information disseminations.

The tender project that was given to three local companies to conduct public awareness programs has started from the second week of June. Three clusters have been created to be allocated to each company. The following table is the allocation of the districts and villages for each Cluster.

Table 2.1.3.1.7-5 Cluster for Public Awareness Program

Cluster	Region
Cluster 1	Kgalagadi, Gantsi, Ngamiland districts
Cluster 2	Central, Chobe,North East districts
Cluster 3	Kweneng, Katleng, Southern district

However, of the three consultants companies, the one that has been allocated the area of Gaborone/South East district and neighbouring places is not performing well and has been called for an assessment meeting with management of DBS on two occasions. Therefore, it was decided by DBS management to pay more attention to their activities and promotional material. The Project will provide the company with assistance by sharing project paper and draft public relations plan as the company is able to perform public relations activities to communicate with the public in an effective manner.

There are other activities which the Public Relations team will take part in fully being the Consumer Fair in August (17th – 23rd), Open Day (State President) on a date to be confirmed and also the Maun Seminar which is the last seminar of the three. Two seminars have already been held in Gaborone and Francistown to sensitize people about Digital Migration.

The Public Relations activities by the consultant company in and around Gaborone (Vertigo) are continuing. They are mainly doing media activities such as radio and television interviews, mall activations and kgotla appearances. Two companies that are responsible for rural areas have halted their activities since they have completed the areas where the public relation activities take place. Also the lack of available STB makes it difficult to explain digital migration in the public relation activities.

(3) Result of the customer sample survey

At the end of the Project, customer sample survey was conducted for one week in the four cities of Botswana, Goborone, Francistown, Kasane, Hukuntsi. The result shows that in major cities in Botswana, more than 80% of population knows about digital migration, even the small city where the seminar was not conduced, almost 70% of population knows digital migration. The activity has a positive impact and the same method could be applied for ASO process.

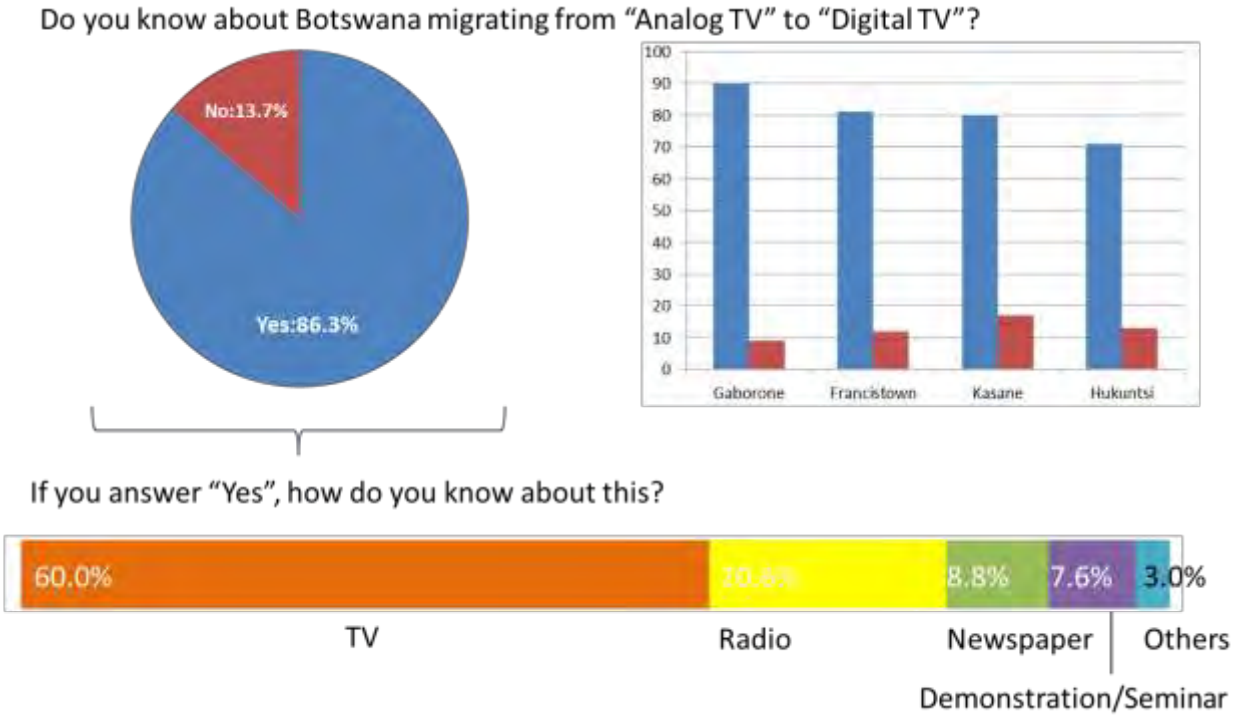


Figure 2.1.3.1.7-1 Result of the customer sample survey

2.1.3.1.8 To establish a Test centre for compliance with Set Specifications and Receivers Penetration Assurance

The activity was added in the third JCC meeting followed by the conclusion of R/D in order to support establishment and operation of the test centre in BOCRA. The test centre was planned to be established to prevent the inferior quality of digital receivers coming into the Botswana market and provide assurance to the viewers to purchase digital receivers that are functionally compatible with the broadcasting standards and services in Botswana. BOCRA originally conducted Type approval for all telecommunication and radio equipment by publishing technical specifications for each type of equipment. The device test is conducted as a part of type approval processes.

The test centre was established under the technical services department. The director of the department is responsible for the activity and one senior engineer is assigned to conduct the activity.

Figure 2.1.3.1.8-1 BOCRA organization chart

(1) The relation between Type approval process and test centre

BOCRA is mandated to conduct Type approval according to Communication Regulatory Authority Act. The existing procedure and guideline states that the application is processed based on the document submitted by the applicants. Type approval is assessed based on the technical specifications published by BOCRA. The technical specifications that were published by BOCRA only include minimum requirements and do not specify functions that are particular to ISDB-T standards. The test centre conducts the equipment test on the items that are particular to ISDB-T standards and publicizes the result to give assurance to the consumers who expect to use the digital receivers with the services particular to ISDB-T standards. The applicant of the digital receivers submits the equipment to be tested. BOCRA is going to publicise the public notice to announce that the application of type approval for digital terrestrial television receivers requires submission of actual devices in addition to application documents.

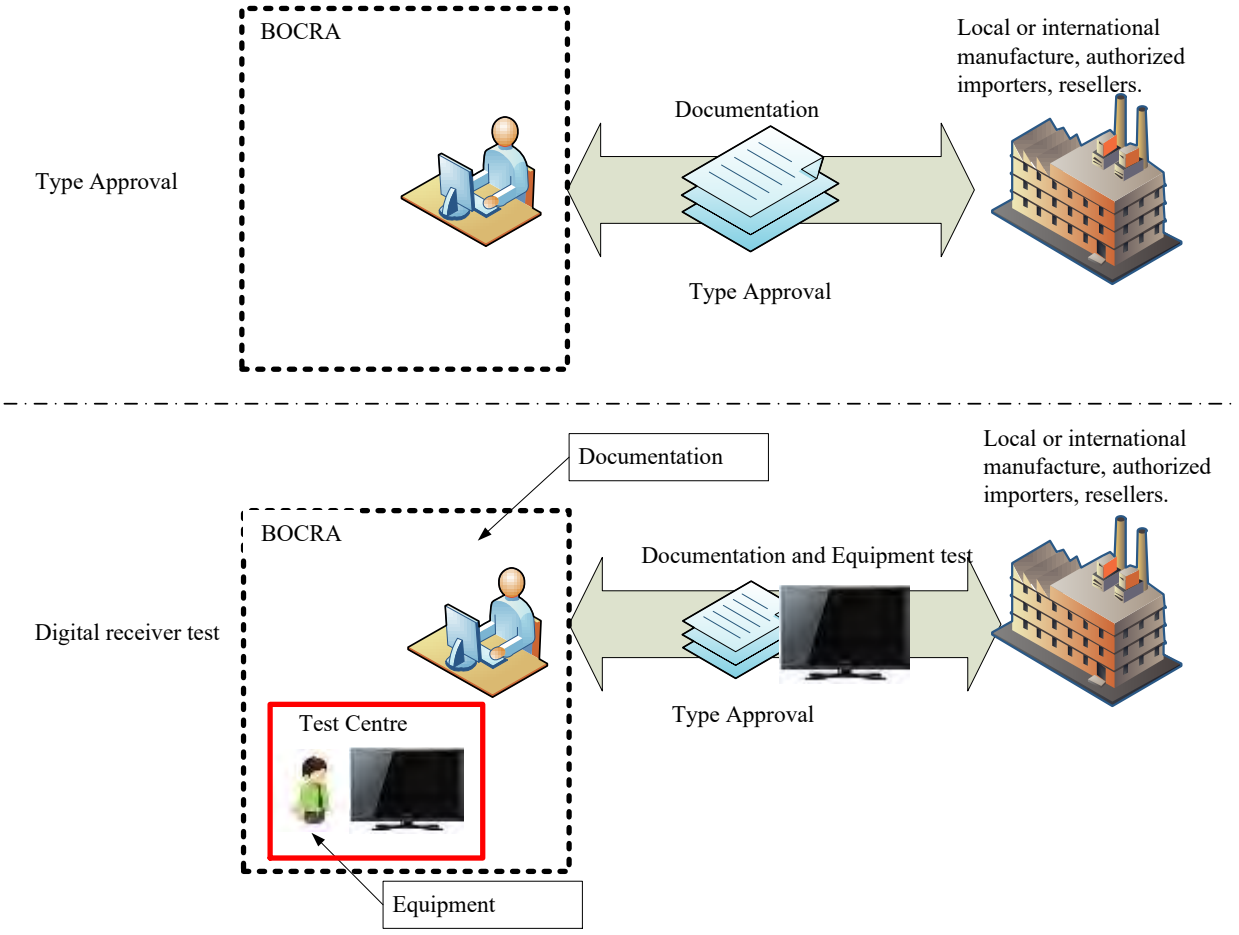


Figure 2.1.3.1.8-2 Type approval and Test centre

(2) Preparation of Test centre operation manual

1) Technical specifications

The first step taken was to confirm the contents of the technical specifications published by BOCRA

and choose the items that should be tested in the test centre.

The items were selected from the technical specifications of STB, IDTV, and DPMR. In addition to that, Data broadcasting is included since Botswana put emphasis on data broadcasting in digital migration. The following criteria were set to select the measurement items.

- Compatibility with technical specifications
- Capacity of measurement equipment
- Without mechanical works to dismount the sample device

The result of the selection of measurement items is shown in Table 2.1.3.1.8-1. The methods to measure the selected items were tested with the equipment to have been planned to be provided to BOCRA. The methods were discussed and agreed with the counterpart of BOCRA.

Table 2.1.3.1.8-1 Result of selection of measurement item

No	Feature	Description/functionality/Specification	Result	Remarks
1	On/Off button	Switches the IDTV power on or off.	Adopted	-
2	On Screen Display	Presents the channel programme Number or Programme guide on the screen.	Adopted	-
3	Electronic Programme Guide (EPG)	Lists the schedules, displays them on screen once operated.	Adopted	-
4	Auto Search	The unit will perform an automatic search for channels. (Manual search optional)	Adopted	−
5	Signal strength and Quality level	Indicates signal strength and quality level (reception).	Adopted	−
6	Languages	English is the official language, IDTV Operational Manual should be in English. Setswana is optional.	Adopted	−
7	Remote Control Unit	Commands and execute the full IDTV functions. Small in size and using AA or AAA batteries.	Adopted	−

No	Feature	Description/functionality/Specification	Result	Remarks
8	Channels	The IDTV software must store up to 100 programmes selectable at random per user's requirements.	Adopted	–
9	Warranty	The IDTV shall carry a minimum of 12 months (1 Year) warranty	Adopted	–
10	Operations Manual	Clear and easy to understand with basic trouble shooting and pictorial illustrations.	Adopted	–
11	Conditional Access (optional)	Optional and shall not prohibit viewers on free-to-air DTT channels	Excluded	Optional
12	Input Impedance	75 Ω	Excluded	It requires dismounts of the device and other measurement equipment. This can be measured by reception test
13	AC Mains Power supply	220 V ±20 V 50 Hz (±2 Hz)	excluded	It requires other measurement equipment. This can be checked by power test
14	Power plugs	BS 1363, 4573, 546 - 3pin	Adopted	-
15	Modulation	In compliance with the GE06 Channelling Plan of Recommedation ITU-R BT.1306 System C[1] or ITU-R BT.1877	Adopted	-
16	FEC on OFDM	Comply with Recommendation ITU-R BT.1306 System C[1] or ITU-R BT.1877	Excluded	Reception test
17	Input signal	0 dBm to -78.4 dBm Or -35 dBm to -85 dBm	Partially adopted	0 dBm to -78.4 dBm was set as measurement item。 -35 dBm to -85 dBm was not included as a result of discussion with BOCRA

No	Feature	Description/functionality/Specification	Result	Remarks
18	Frequency	UHF (470 - 694 MHz), and VHF (174 - 230 MHz) Optional	Partially adopted	VHF optional
19	Signal Bandwidth	8 MHz Channelization Plan of GE06	Adopted	-
20	Guard intervals	Comply with Recommendation ITU-R BT.1306 System C[1] or ITU-R BT.1877	Excluded	It requires other measurement equipment. Botswana does not operate SFN
21	Channel/Noise Ratio	Recommendation ITU-R BT.1306 System C[1] or ITU-R BT.1877	Absorbed in other measurement item	Reception test
22	Interleaving	Comply with Recommendation ITU-R BT.1306 System C[1] or ITU-R BT.1877	Absorbed in other measurement item	Reception test
23	Video decoding	MPEG-4 (H.264)	Absorbed in other measurement item	Reception test
24	Aspect Ratio	4:3 and 16:9	Absorbed in other measurement item	Reception test
25	Frame frequency	25 Hz	Absorbed in other measurement item	Reception test
26	Conditional Access	Smart card /software applicable (Optional)	Excluded	Optional
27	RAM	128 Mbytes (DDRAM) 8 Mbytes (Flash)	Excluded	It requires dismounts of the device. This could be detected by the processing speed of the device
28	Processor	≥300 MHz	Excluded	It requires dismounts of the device. This could be detected by the processing speed of the device
29	Bit stream conversion	MPEG-2 ISO/IEC 13818	Absorbed in other measurement item	Reception test
30	Audio decoding	MPEG-4 AAC are required. Sampling rate: 32 kHz, 44.1 kHz and 48 kHz (Dolby and other related approved audio decoding optional)	Absorbed in other measurement item	Reception test

No	Feature	Description/functionality/Specification	Result	Remarks
31	Serial Interface	RS 232 or USB	Adopted	–
32	Audio mode	Single track/dual track/stereo	Absorbed in other measurement item	Reception test
33	GE06 channelization Plan	Compliant	Absorbed in other measurement item	Reception test
34	Intrinsic immunity	EN 55020 or CISPR 20	Excluded	It requires other measurement equipment and anechoic chamber
35	Intrinsic radiation	EN 55013 or CISPR 13	Excluded	It requires other measurement equipment and anechoic chamber
36	Voltage Fluctuations	EN 61000-3-3/IEC 61000-3-3	Excluded	It requires other measurement equipments

2) Measurement equipment

Table 2.1.3.1.8-2 shows the list of equipment procured by the Project in order to operate the test centre.

The measurement equipment was checked when it was delivered and confirmed that it operates normal. The result of the measurement can be a threshold value of the equipment.

Table 2.1.3.1.8-2 list of items procured for Test centre

No	Category of Good	Maker	Product Name
1	Spectrum Analyzer	Anritsu	MS2712E SPECTRUM MASTER
2	Spectrum Analyzer	Anritsu	MS2712E-009 OPTION 9 20MHz BW DEMOD
3	Spectrum Analyzer	Anritsu	MS2712E-0031 OPTION 31 GPS receiver
4	Spectrum Analyzer	Anritsu	MS2712E-0030 OPTION 30 DIGITAL VIDEO MESUREMENTS
5	Antenna	Anritsu	2000-1747-R Log Periodic Antenna
6	Antenna	Anritsu	2000-1528-R MAGNETIC ANTENNA
7	Spectrum Analyzer Accessory	Anritsu	510-102-R ADAPTER DC TO 11GHz N(m) - N(m) 90 DEGREES RIGHT ANGLE 50ohm
8	Spectrum Analyzer Accessory	Anritsu	1091-27-R ADAPTER DC TO 18GHz N(m) - SMA(m) 90 50ohm
9	Spectrum Analyzer Accessory	Anritsu	12N50-75B Matching pad DC to 3000MHz N(m)-75ohm N(f) 50ohm
10	Computer	Lenovo	Lenovo G80-50 (HP E-LITE 17)
11	RF signal modulator	DekTec	DTU-215 TS CONVERTER

No	Category of Good	Maker	Product Name
12	Monitor	SANSUI	SLED-50FHD
13	Set Top Box	EWD	EWD 888 STB
14	Amplifier	ELLIES	ABSBP
15	RF signal adapter		Adapter 75ohm F(J) 50ohm N(P)
16	Attenuator		Attenuator- fixed -40dB 75ohm F(J) - F(J)
17	Rack		VISION3952228
18	Antenna	DIAMOND ANTENNA	RH795
19	Antenna Accessory	DIAMOND ANTENNA	DP-MRX
20	Antenna Accessory		BNCJ-NJ convertor

The test transport stream was provided by the Project. The test stream was converted to RF signal by the TS converter. Each receiver is tested whether it can decode the test signal and play video and audio, other ISDB-T particular functions. Figure 2-1-3-1-8.3 shows the operational diagram of the measurement equipment. RF Analyser is used to check the signal quality of the test transport stream to check whether it is the problem of the receiver or the signal if the receiver did not play the signal according to the test procedures. Reference was made to the manual of measurement equipment in producing the operation and maintenance methods of the measurement equipment.

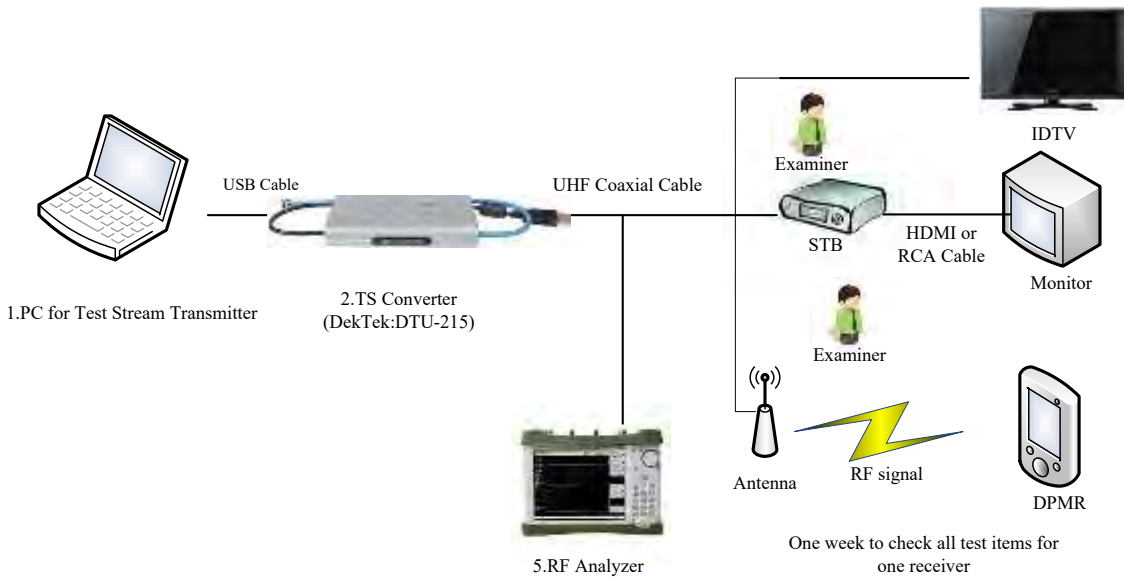


Figure 2.1.3.1.8-3 Operational diagram of measurement equipment

3) Preparation of operation manual

It is important that the test centre secures the level of test quality, while the volume of the work should not be large to speed up the publication of the result of the test.

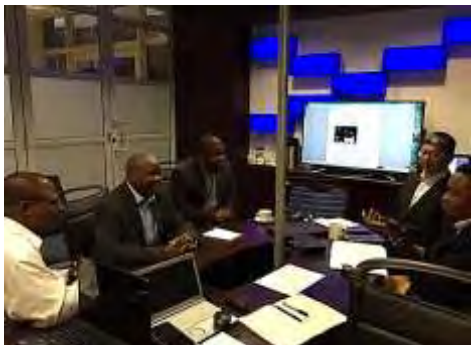
The manual was prepared based on the discussion with the staff members of BOCRA who were assigned for this activity. The contents of the manual were agreed that it includes the followings.

Table 2.1.3.1.8-3 Contents of the manual

No	Table of contents	Feature
1	Test centre	Purpose of test centre, organization chart of BOCRA, overview of the test centre
2	Technical assurance check	Target device for the technical assurance check, measurement equipment, procedure for the check,
3	Publication	Purpose of publication, result of technical assurance check, publication procedure
4	Preservation of the document	Purpose of archiving, procedure for archiving, list of document to be archived
5	Document format	Document format to be used for technical assurance check
6	Reference	Reference document for the manual

4) Training

The training was conducted for each type of receiver, STB, IDTV and Mobile and portable device to the members of the technical services department. Table 2.1.3.1.8-4 shows the list of the participant. The training was conducted based on the draft test centre manual. The test procedures were examined during the training. During the training, comments were made by the participants and those were reflected on the draft test centre operation manual.



Training in BOCRA

Table 2.1.3.1.8-4 List of participant

No	Name	Position
1	Tebogo Ketshabile	Senior Engineer
2	Samuel Mapaesele	Manager
3	Sexton Segobaetso	Manager
4	Ogotseng Mogopodi	Manager

(3) Future of Test centre

BOCRA would like to conduct device check in all the equipment mandated to conduct type approval, which currently BOCRA requests the applicants that they obtain device check results from the designated laboratory. Due to the budget constraints and technical capacity, it has not been realized in other equipment such as cellular phones, modems, telephones, satellite station and so on and so forth. BOCRA has an intention to improve the capacity of the test centre to expand the range of devices which BOCRA themselves can conduct technical investigation.

2.1.3.1.9 To Develop Viewers Support Through a Call Centre Operation

The call centre activity was included in the Project at the third JCC meeting, which is necessary to provide support to the viewer that is particular to him or her. While seminars, demonstration other form of public relations activity can engage with a large number of viewers at one time, the call centre can address problems specific to individual viewer. Japanese experience of running a call centre was considered to be necessary for DBS to operate the call centre.

(1) The demarcation of the work between BCTL

DBS contracted with BTCL about setup of the call centre. The equipment is provided by BTCL and initial training for operators is provided by BTCL. The answering manual for the operators were prepared by the Project.

(2) Call centre manual

The mission of the call centre was discussed among members of WG and agreed as to enable all the citizens to enjoy the benefits of digital broadcasting and promote broadcasting culture and tot contribute to the access to the public service information by the advantages and features of digital migration. In order to fulfil its mission, three tasks are given to the call centre; 1) telephone correspondence and consultation, 2) recording and creating data base, and 3) creation of webpage for digital migration.

The structure of call centre operation was defined in the manual where the manger is responsible for the unexpected questions and management of the call centre, while operators are given training and provide answers to the viewer. Engineers are also included in the operation to respond to the questions that need technical knowledge. Figure 2.1.3.1.9-1 shows the structure of call centre operation.

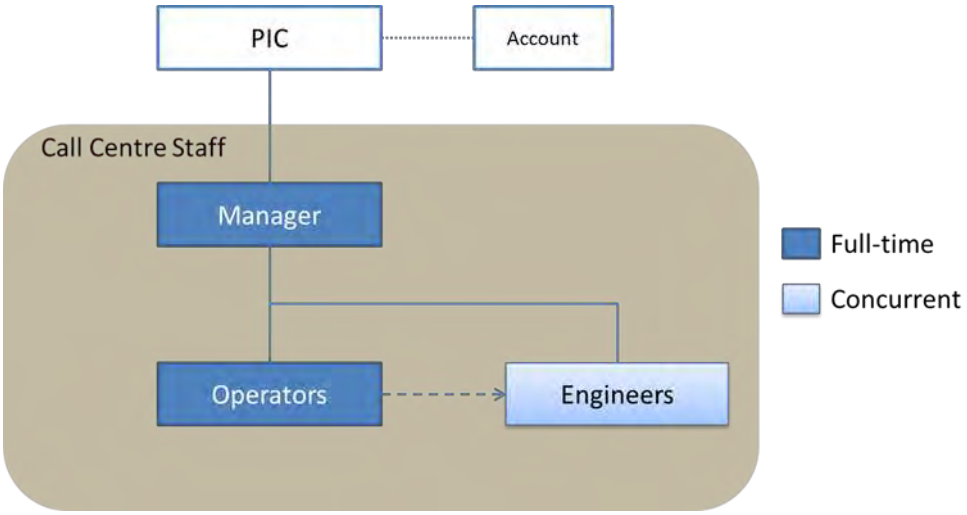


Figure 2.1.3.1.9-1 Structure of call centre operation

The manual also focussed on the telephone manner. Based on the assumption that the viewer does not necessarily understand the problems or sometimes is frustrated or even gets angry, the answering manner was discussed where the operator is in a position of the viewer and listens carefully and gives prompt answer. In case that the operator alone cannot handle the problems or questions, the issues is forwarded

to the manager.

Recording is placed as an important task of the call centre. Frequently asked questions are recorded and uploaded on the website managed by the call centre Figure 2.1.3.1.9-2 shows the structure of website.

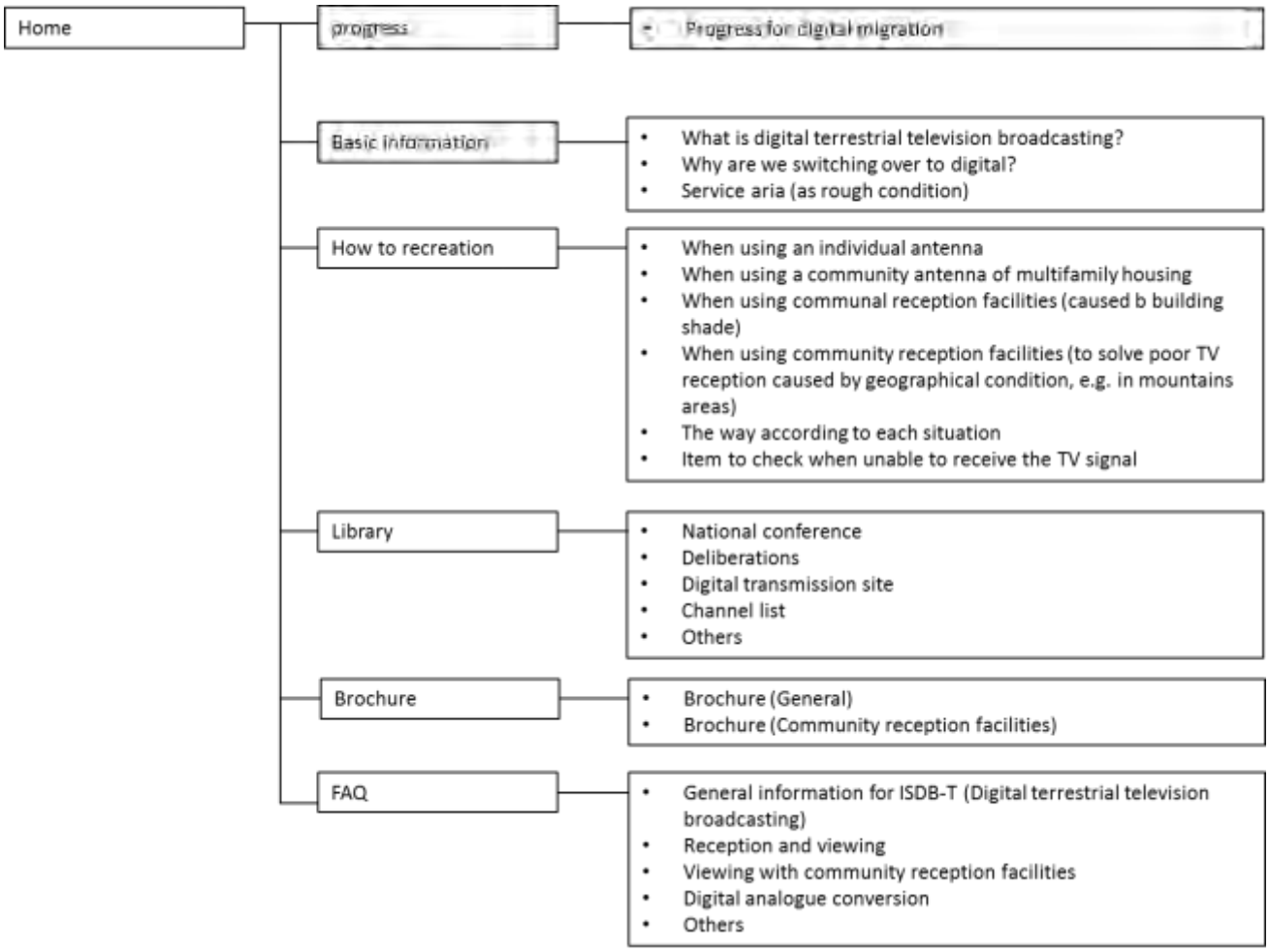


Figure 2.1.3.1.9-2 Structure of website

Operation of website is closely integrated into the call centre operation. While telephone consultation provide detailed guidance and answer to the specific issues of individual viewer, website can address to a large number of viewer and provide information at any given time if the viewer has access to the Internet. This also can reduce the volume of work of the call centre. Frequently asked questions can be referred to the website.

Since the operation did not start at the end of the Project. Training program was considered and included in the manual so that DBS can provide appropriate training to the operator with assistance from BTCL. Table 2.1.3.1.9-1 shows the training program

Table 2.1.3.1.9-1 Training program for Call centre

	Content		Lecturer	Purpose
Day 1	Basics of digital migration	・ Why is digital migration needed ・ Milestone of digital migration ・ Necessary equipment for digital migration ・ Relevant ministries and agencies ・ About ISDB-T ・ About data broadcasting	Leader of digital migration project	Understand why digital migration is necessary, features of ISDB-T and why Botswana adopted different broadcasting standards form neighbouring countries.
	How to use necessary equipment for watching digital broadcasting	・ STB ・ Antenna type and how to install it ・ Character or indoor and outdoor antenna	Leader of digital migration project	Explain what kinds of equipment is needed to watch digital broadcasting and how to install them; information will be given to even those who have not seen digital broadcasting equipment before
Day 2	How to use call centre equipment	・ How to use telephone ・ About recording device ・ Transfer of phone	BTCL	Learn how to use call centre equipment
	Basic telephone manner	・ Phrasing ・ Voicing ・ Clear and succinct manner	BTCL and PR officer	Learn telephone manner including method of delivery and way to make good impression
Day 3	Role play	・ Role play should be carried out in pair and introduced by using the actual equipment	Leader of digital migration project/PR officer	Practice telephone manner in pairs. Review how to operate equipment by using actual equipment. Conduct role play several times and change pairs. Practice in front of the participants, evaluate each other and establish the telephone manner
	Test for understanding	・ Evaluate the understanding by using the basic knowledge on digital migration (paper	Leader of digital migration project	Confirm the basic knowledge about digital migration through written examination. If there is any question that is not answered correctly, the

	Content		Lecturer	Purpose
		exam)		question is explained again for correct understanding

Establishment of call centre is undergoing at the time of the completion of the project. DBS with close cooperation with BTCL will operate call centre based on the manual produced by the Project.

2.1.3.2 Output 2: DBS's Capacity of producing programs including High Definition (HD) and Data Broadcasting is improved.

In total 7 activities have been conducted for output 2 as described in 1.5.3, the details of each activity is described in the following sections between 2.1.3.2.1 to 7.

2.1.3.2.1 To Establish Program Production WG, Programing WG, and Data Broadcasting WG

During the discussion on the work plan, the criteria and requirements for the members of each WG was discussed. The leaders and members of each WG were officially assigned in the first JCC meeting.

2.1.3.2.2 To Develop HD program production capability

The training plan of HD program production which is necessary to enhance the capability of BTV staff to produce HD programs was created based on the current situation and future prospects of increasing the number of service channels due to digitalization. The staff can create and produce different types of the programs compared to the ones already produced or broadcasted in order to diversify the existing types and contents of the programs that reflect tastes, needs, and response of the viewers.

The technical side of the training has been provided in Japan in February, 2015 for two weeks and at BTV for 5 days from the end of May to early June, 2016. The training included the planning live broadcast, use of HD studio, cameras, lighting, audio and video.

BTV started its broadcasting service in 2000. Although the rate of the staff leaving their jobs is low, the experience of producing television programs is relatively young. It is required to establish a system to transfer personal experience and knowledge of the senior or experienced staff members to the junior level of staff members in order to enhance the capability of producing programs as a broadcasting station.

The training plan was designed to improve skills and technique to produce programs in HD format at BTV. The result of the training and materials can provide BTV to implement its self-sustainable in-house training.

(1) Program production capacity of BTV

BTV has 124 staff members at the time of October 2014. The number of staff in each section is under the manager of BTV; 28 staff members in News and current affairs, 24 staff members in program schedule, 8 staff members in sports, 11 staff members in channel control, 52 staff members in program production.

The broadcasting hour of BTV is between 12:00 and 23:30 in weekdays, 12:00 and 02:00 in Friday, and 11:00 and 02:00 in weekends. The staff members are working in shift, assigning the necessary tasks to the necessary staff members on a daily basis. There is no particular problem in the organizational system in relation to the technical aspect of performing broadcasting services.

On the other hand, particular efforts are not made to systematically improve the capability of individual staff member. There is no training plan with regard to program production. Individual staff member improves his or her skills and knowledge through the actual work and the systematic training is not planned at the organizational level. Table 2.1.3.2.2-1 shows the number of staff members in each section in BTV

Table 2.1.3.2.2-1 Number of staff in BTV

Nr	Section	Number	Professions
1	News and Current Affairs	28	・Producer ・Reporter
2	Program Schedule	24	・Producer
3	Sports	8	・Producer ・Reporter
4	Channel Control	11	・Transmission producer
5	Program Production	52	・Technical Director ・Camera ・Audio ・Lighting ・Video

Most of the staff members in BTV have been working continuously. Although the history of BTV as a broadcasting station is relatively young, production experience of individual staff member has been accumulated and some production staffs have good skills and knowledge. In addition, there are many who learnt program production overseas. Domestically, Botswana University offers courses for Bachelor degree in Media and broadcasting is included in the course where the theory is taught.

However, the program production involves several staff having different task, skills and responsibility. Production staff usually include producer, director, reporter, camera, audio, video engineer, and editor. In addition, each professional skill cannot be mastered from only learning and knowing the theory. There are many skills cannot be taught by the books. For example, how to choose an interesting topic, how to collect necessary information, how to execute interviews and choose questions for the interview, how to write a good script, how to create impressive sequence in editing, are the skills staff must obtain from the experience and actual program production.

It is important for the staff to transfer individual experience, skills, and knowledge to other staff in order to train each other and sustain the ability to produce programs.

(2) On the job training

Along the research and analysis of the current situation and needs of BTV, JET closely discussed how to conduct trainings with the leader and the members of the working groups several times. In order to establish an environment in which the C/P would be able to focus in earnest on the training, the training has taken the form of practical OJT, produce programs that would actually be broadcast. Since BTV is expecting to increase the number of its programs, it will be necessary to broadcast different kinds of program with different content and angles to the programs aired so far; therefore, the training has aimed to take a new approach. In addition, the curriculum was planned so as to train as many members of staff as possible in the production of high-quality programs in HD format. Therefore, the training has taken a graded approach through the 3 basic processes of pre-production, production and post-production. The following chart shows the basic process of program production.

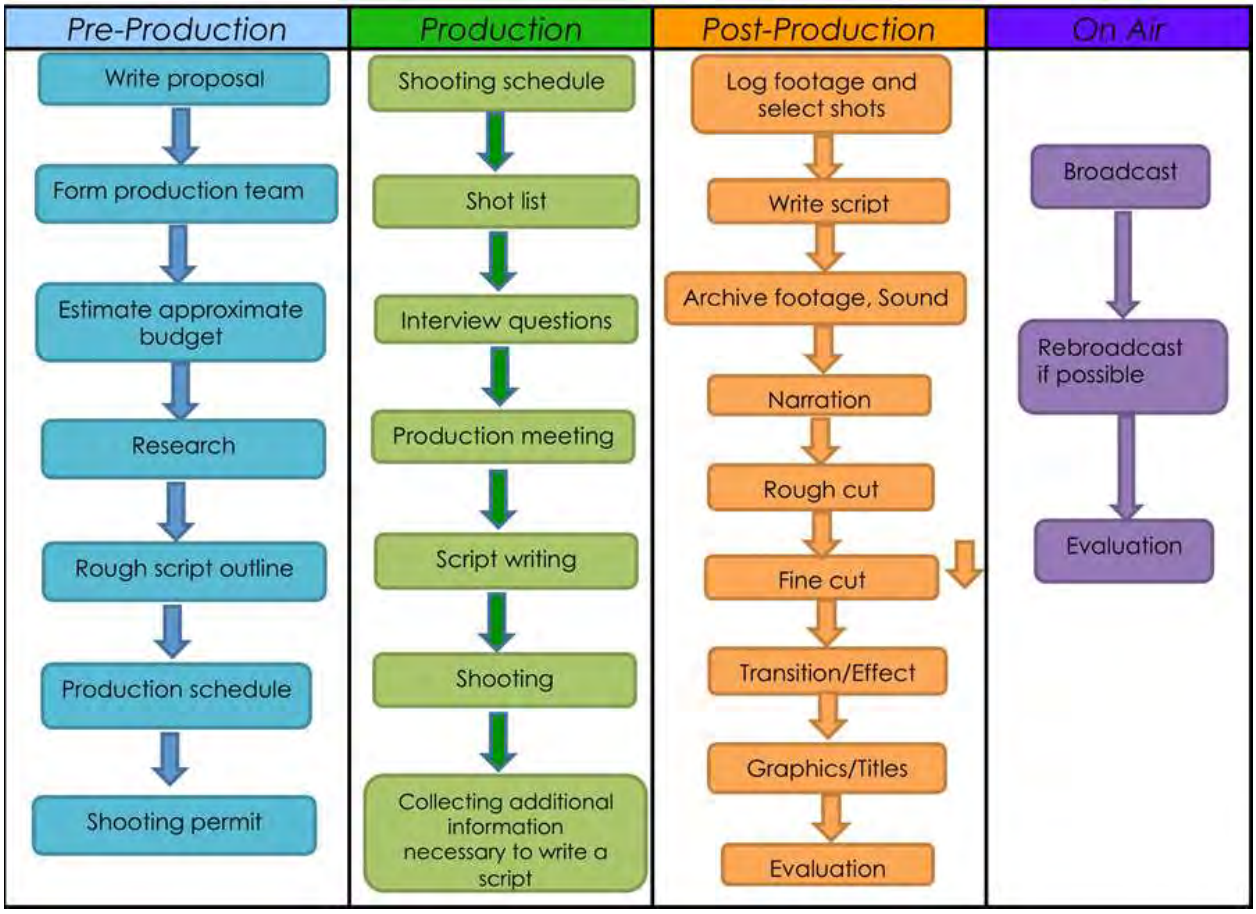


Figure 2.1.3.2.2-1 Basic process of Program production

Often BTV staff do not have enough time to go through every step in three stages of production, however, during the OJT, the WG members have been encouraged to take each step to complete the programs. Training materials were provided to help the members to properly plan and execute their production.

The following Table 2.1.3.2.2-2 shows the numbers of the OJT have conducted and the numbers of the attendance in each month. The table does not include the actual shooting days, editing days, and the days the WG members have worked on their own. Months shaded in blue indicate the dispatch of the expert.

Table 2.1.3.2.2-2 Number of the OJT

Year and Month (JET dispatch days at BTV)	Numbers of OJT	Numbers of Attendance
November, 2014 (17 ~ 30)	3	9
December, 2014 (1 ~ 12)	3	12
January, 2015	0	0
February, 2015 (17 ~ 28: 12 days)	4	16
March, 2015 (1 ~ 31: 31 days)	4	28
April, 2015 (1 ~ 28: 28 days)	4	27
May, 2015	2	4
June, 2015	3	16
July, 2015	1	4

Year and Month (JET dispatch days at BTV)	Numbers of OJT	Numbers of Attendance
August, 2015 (18 ~ 31: 14 days)	3	13
September, 2015 (1 ~ 30: 30 days)	4	19
October, 2015 (1 ~ 31: 31 days)	4	28
November, 2015 (1 ~ 6: 6 days)	1	4
December, 2015	1	7
January, 2016	0	0
February, 2016	2	7
March, 2016 (1 ~ 31: 31 days)	5	17
April, 2016 (1 ~ 30: 30 days)	4	13
May, 2016 (1 ~ 27: 27 days)	4	13

The content of the OJT has been discussed with WG members and decided as indicated in Table 2.1.3.2.2-3.

Table 2.1.3.2.2-3 Content of the OJT

Program	Content
Informational News Feature: Collaboration production of HD PP and PR WG	Spread the news of BTV becoming "DIGITAL" and promote the digital TV broadcasting This news program is able to provide information on digital broadcasting to the people of Botswana, how the digital migration at BTV is proceeding, difference from the SD format, etc. It also promotes the cooperative relations between Botswana and Japanese government.
Edutainment Program:	Nature and Life in Botswana with High Definition Technology This program is targeted to the audience in all ages from children to the older generation. Using the feature of the HD technology, not only capturing nature and landscapes of Botswana, but also current issues of the forest, how government of Botswana is dealing with issues to protect forest, activities and efforts of Department of Forestry and Range Resource (DFRR).
HD Technical Training	HD Live Operational Training Football is very popular in Botswana and BTV covers 60 Botswana Premier League games during a season and other live sports events, depending on the year. Use of HD cameras will be able to show more activities on the screen. This training was targeted to the live broadcast operational team.

1) Informational news feature

Originally three segments have planned by the members, however, due to the delay of the penetration of the set top box to the public and decision of the specification of STB, the members considered not to be appropriate to produce the second news. Therefore, only the first news has been produced and on-aired. Table 2.1.3.2.2-4 is the actual plan and content the members proposed.

Table 2.1.3.2.2-4 Original Plan of the Contents of Informational Feature News

Segment	Content
Digital Migration, What is it? First Broadcast Date: 17 June, 2015	In this feature WG proposes to give the viewers detail about the history of the concept of digital migration and how Botswana finally opted to go the Japan route. Tentative interviewees are as follows: • DPS, Representing Information and Broadcasting Services - talking about where it all started, lobbing/discussions etc • Japan Team Leader • Project counterpart as the Technical Lead • General Manager; Botswana Television, Talking about preparations, mobilization, what is in place. What is going to happen and what it means to the viewers.
How much do we know? Awareness	This feature will create awareness about Digital Migration. It will show progress being made towards the Launch Date. At this point we hope equipment will have begun to arrive and we can showcase all these developments to build up the hype. Tentative interviewees and locations/events are as follows: • Demonstration of set top box at the mall, Talk to the Public • Interview BTV Staff – HD cameras, studios, editing room • Interview General Manager (BTV), Project Team Leader • Public Relations, Seminar for media and selected guests
The Countdown	WG expects this feature to serve as a simple count-down program, showcasing last minute preparations for the final Day and address issues like preparedness and latest updates from everybody involved. At this stage we intend to interview the following people. Tentative interviewees and locations/events are as follows: • Installation of transmitting stations and digital antenna • The Minister, Japanese Ambassador, General Manager (BTV) • Mr. Calvin Goiletswe, Technical Preparedness, Public • HD cameras at Live Football Game, Data broadcasting team

Pre-production of the first segment of the news feature started in February, 2015. After the preparation, the crew shot interviews of the key persons and the demonstration events that Public Relations Working Group conducted and executed. Table 2.1.3.2.2-5 shows the short list.

Table 2.1.3.2.2-5 Shot List of Program contents

	Shot List
Interviews	- DPS, Deputy Permanent Secretary, Information and Broadcasting, Project Manager, Ministry of State President, Mr. Mogomotsi Kaboeamodimo - Project Team Leader, Mr. Naoaki Nambu - Project Counterpart, Mr. Calvin Goiletswe - Deputy Director Corporate Communications, BOCRA, Mr. Aron Nyelesi - Ambassador Extraordinary and Plenipotentiary of Japan to the Republic of Botswana, Mr. Masahiro Onishi

	Shot List
Events	13 & 14 March, 2015 : PR event and Market Survey at Airport Junction 21 March, 2015 : PR event and Market Survey at Main Mall 9 April, 2015 : Media Briefing at BTV 16 April, 2015 : Digital Migration Seminar at The Grand Palm

Unfortunately, many technical issues on post-production were raised, since BTV has not been equipped with HD editing system yet, therefore, the members had to rely on the cooperation of Educational TV staff and equipment. A part of the footage stored was lost and arrangement with an editor was a challenge, however, the producers have managed to complete the first segment and it was broadcasted on 17 June, 2015 and re-broadcasted 3 times. Since BTV is not able to on-air only in HD format yet, it was converted to SD format.

2) Edutainment

The WG has decided to feature the current issues of the forest in Botswana for the edutainment program. Forest is one of the most important natural resources for wild life and daily life of people. The government of Botswana has been dealing with the issues to protect the forest, however most of people know very little about the activities and projects conducted by the Department of Forestry and Range Resources (DFRR). The members agreed it is a good opportunity to educate audience in all ages about how important it is to protect the forest, as well as to disseminate the projects by DFRR. At the initial meeting in March, 2015 DFRR agreed to cooperate with production and pre-production started immediately. After exchanging information, producers decided the projects to cover. The format of the program was decided to be a series of 5 minutes programs. Short programs can be broadcasted numbers of times repeatedly.

The shooting was done in June and September, 2015. Table 2.1.3.2.2-6 shows the projects the crew covered, locations, and descriptions of the projects.

Table 2.1.3.2.2-6 DFRR Projects

Month, Year	Location	Projects	Description
June, 2015	Kasane	Wild Fire Management Veld Fire Drilling	This project is funded and executed by Australian government. In several areas local fire fighters are trained to manage the wild fire safely and effectively.
September, 2015	Struizendam	Prosopis Management	Planted prosopis trees provide shade and reduce soil erosion in dry lands. On the other hand, they cause damage to the native biodiversity, production system due to the absorption of extensive amount of water that people live in the area needs.

Month, Year	Location	Projects	Description
September, 2015	Khawa	Stabilization of Sand Dunes	In Kgalagadi region the sand dunes invade houses of people who live nearby and cause various problems. DFRR implements the countermeasures by using various trees and grass species.
September, 2015	Maun	Basketry Community Project	This is a community project supported by DFRR. Women weave various types of basketry from Mokolwane trees.
September, 2015	Maun	Planting Trees	Trees are planted to reduce depletion of the forest and in some areas to prevent soil and sand erosion.

Since BTV has not been equipped with HD editing system yet, the WG had to rely on the cooperation and support of Educational TV that has the HD post-production equipment. However, due to their busy production schedule and availability of the editor, post-production has delayed for many months.

The WG members have made tremendous effort to write scrip, select shots, and edit the episodes. The following Table 2.1.3.2.2-7 show the episodes have been completed, broadcasted, and re-broadcasted frequently.

Table 2.1.3.2.2-7 List of the Episodes

No.	Name of the Projects/Episodes	Duration	First Broadcast Day
1	Prosopis Plant Management	4’30”	May 16, 2016
2	Stabilization of Sand Dunes	5’00”	May 25, 2016
3	Basketry	5’00”	July 18, 2016
4	Wild Fire Management	5’00”	July 25, 2016

3) HD technical training

The technical training was held over two weeks targeting mainly the staff members form operation section. The main part of the training was to improve the production skills in live sport broadcast.

Table 2.1.3.2.2-8 HD technical training schedule

Date	Time	Content	Remark
30th May (Mon)	10:00-12:00	Courtesy call to relevant persons	BTV GM/Mr. Nagang/ Mr. Goiletswe/Mr. Galani
	14:00-15:00	Preparation and facility tour	BTV/arrange one person to guide facilities
31st May (Tue)	10:00-12:00	<Opening Discussion> Introduction of overall training and discussions regarding to the technical	BTV Board Room

Date	Time	Content	Remark
		issues of production	
	13:00-15:00	<Lecture> Planning of live sports broadcast	BTV Board Room
1st June (Wed)	10:00-12:00	<Lecture> Planning of live sports broadcast	BTV Board Room
	13:00-16:00	<Workshop> How to use HD cameras, microphones, cables at the stadium during the live broadcast	National Stadium Transport be arranged by BTV
2nd June (Thu)	10:00-12:00	<Lecture> Common skills to shoot in HD camera	BTV Board Room
	13:00-15:00	<Workshop: Training in the HD studio) How to manage and operate the HD equipment and the HD studio	BTV Studio HD studio and its control be reserved
3rd June (Fri)	10:00-12:00	<Lecture> How to manage various kinds of live broadcast The most advanced production techniques and skills	BTV Board Room
	13:00-14:00	Wrap up	BTV Board Room

(3) HD Program production manual

BTV has been producing a good number of live programs such as daily news, Botswana Premier League football games, and various other events throughout the countries including programs using the BTV studios, such as talk shows. Most of the programs are live or recorded in the studio or on location and there are hardly any programs originally planned and edited. (See the Table 1-1) Therefore, the level of the techniques and skills of the staff is relatively high. However, the techniques and skills of staff do not reach the enough level to create originally-proposed and planned programs. This manual focuses on procedure of basic program production to produce edited original programs, considering HD (high definition) format. However, the shooting techniques in HD format will be useful for camera works for live broadcast and studio programs, and editing techniques can be applied to switching the cameras.

The main objective of the production manual is to show the new staff how to produce HD programs step by step, as well as to improve knowledge, skills, techniques of the program production of the experienced staff. Utilization of the manual would help producers to properly plan and execute their production. Botswana Television (BTV) is becoming digital and is expected to increase the number of the programs. Therefore, this manual, targeted to all news, production, and technical staff of BTV, will support to create different kinds of programs with different content and angles. The content is basically divided to the following parts:

Table 2.1.3.2.2-9 Content of Training Material

Chapter		Content
1	Production Process of HD Television Programs	1.1 Program Production Process 1.2 Production Crew 1.3 Pre-production 1.4 Production 1.5 Post-production
2	Pre-production (Preparation before filming)	2.1 Proposing A Story Idea 2.2 Budget 2.3 Research 2.4 Scriptwriting 2.5 Story Structure and Script Outline 2.6 Production Schedule 2.7 Pre-Production Flow Example: Step by Step
3	Production (Shooting)	3.1 Shooting Schedule 3.2 Interview 3.3 Aspect Ratio 3.4 Visual 3.5 Audio Recording for HDTV (Stereo) 3.6 Production Flow Example: Step by Step
4	Post-production (Editing and completing the program)	4.1 Pre-Editing 4.2 Basic Editing Decisions 4.3 Editing Techniques 4.4 Transitions 4.5 Continuity 4.6 Ethics 4.7 Post-Production Flow Example: Step by Step
5	Evaluation of the programs	5.1 Pre Broacasting 5.1 Post Broacasting
6	Annex (Blank form and format)	Annex 1 Blank Proposal Sheet Annex 2 Blank Script Outline Annex 3 Blank Shooting Schedule Annex 4 Blank Shot List Annex 5 Blank Log Sheet
7	Reference	4 books

During the activity attention was paid as to establish an environment in which the members would be able to focus in earnest on the training. Lectures were minimized during OJT and programs that would actually be broadcast were produced. After digitalization, BTV is expecting to have more channels and needs to increase the number of its programs. Currently most of the programs produced at BTV are live or recorded in the studios without much of the editing, therefore, OJT was mainly focused on producing the originally planned programs considering HD format. The manual was also designed as it improves the in house production skills

that need editing work. Most of the staff members have learned production skills from the experience, the training has taken a graded approach through the 3 basic processes of pre-production, production and post-production.

2.1.3.2.3 To establish as section that produce data broadcasting program

Data broadcasting service requires different skills and capabilities from the normal television services. Data broadcasting contents are provided in the forms of text and still pictures so it is required that news and sports programs be made as such forms. In addition, the contents are made by BML, which also requires different skills to produce television programs with filming pictures by cameras and editing pictures. Data broadcasting contents that are produced are multiplexed by contents management system (herein after referred to as "CMS") to be broadcasted. Data broadcasting unit was established in BTV in order to produce Data broadcasting contents and broadcast them.

(1) Establishment of Data broadcasting unit

Data broadcasting unit is located under the channel control section. Data broadcasting unit plays a role not only to plan and produce data broadcasting contents but also is responsible for sending data broadcasting contents to the transmission system, for which the channel control section is responsible. The channel section was only responsible for transmitting normal television programs according to the programing schedule. However after data broadcasting unit was situated under the channel section, this section is also responsible for transmitting data broadcasting contents. With regard to the planning, production and collection of information necessary for data broadcasting contents, the unit has to closely work with news and current affair, programmes, and sports section that are responsible for the source of the information, and sales and marketing section for dealing with advertisements.

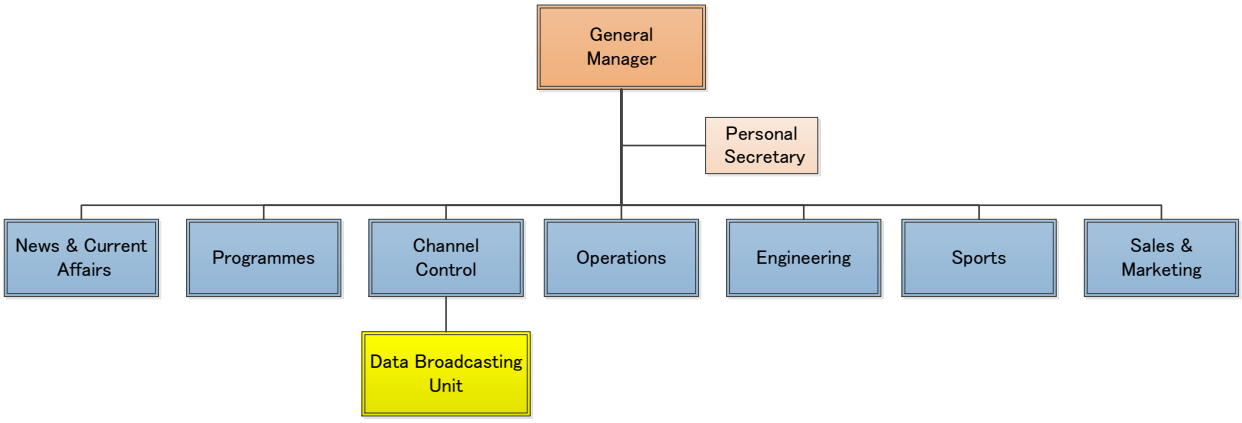


Figure 2.1.3.2.3-1 Organization Chart of BTV with Data Broadcasting Unit

It was discussed that in addition to Head of Data broadcasting unit, two supervisors, production and technical, Data producer, Data operator, Photographer, Coding engineer, Graphic designer, System engineer are required. The number of staff member necessary for the operation of the unit is shown in the following figure. The number was fixed based on the operational scale of BTV. Four staff members are assigned in each profession with one manager.

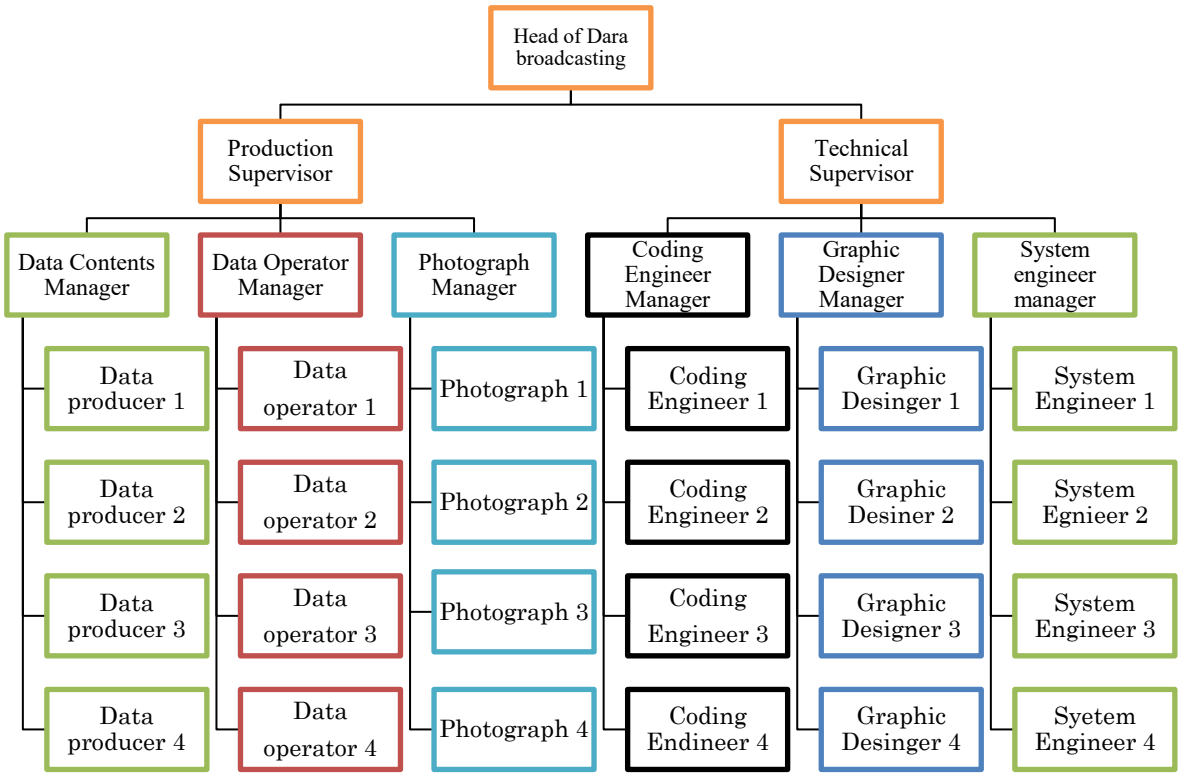


Figure 2.1.3.2.3-2 Personnel in Data Broadcasting Unit

(2) Requirements for the staff members of Data broadcasting unit

The requirement for the staff members of Data broadcasting unit was discussed. Table 2.1.3.2.3-1 shows the summary of the requirements for each position and profession.

Table 2.1.3.2.3-1 Task and Skills required for each position

No	Position	Tasks	Knowledge, Skills required
1	Head of Data broadcasting	• Acts as first line editor for data program before broadcast. • Ensuring professionalism in the production of television data programs and agreements(data procedure and work flow) • Responsible for the development of data content strategy and guidelines. • Monitors and evaluates data program content and assists decision making on the way forward. • Assists in the formulation and implementation of broadcasting policies (data Broadcasting). • Maintains an atmosphere which encourages creativity and innovation • Supervises staff, utilization of resources	• Extensive knowledge in television production and data content at senior level • Able to demonstrate high level of editorial judgment and an appreciation of opportunities and challenges for Btv in providing data content • Able to lead Btv's data broadcasting editorial team in planning and delivering data content and services which will meet strategic aims.

No	Position	Tasks	Knowledge, Skills required
		and all activities of the section. • To be responsible for data programming budget and management accounts ensuring that targets are met. • Provides/recommend on the job training.	• Appreciation of changing technology and working practices across the broadcasting industry and how to make effective use of them. • Degree in media fields.
2	Data producer	• Develop a pitch documents by following data casting procedure for template development • Develop ideas, selecting performers, guests, presenters and create content scripts. (Synopsis) • Determine the specific approach and format of each data program template and content. • Co-work with video producers and news reporters to liaise with content owners for purposes of negotiations and creating contract agreements (events negotiations). • Co- works with operators, marketing, and transmission producers, graphic Designer, photographer, Coders and CMS Engineers for all on air content. • Handles location shoots , shot list and copyright clearances (pictures) • Selects personalities for content and to appear on camera, including guests, hosts, artists and co-work to coordinate productions. • Ensures program production meets work flow.	• Knowledgeable in Television program production and Studio control fields. • Computer literate and typing skills. • Knowledge in camera work (still and video pictures) is an added advantage. • Degree in media or related fields.
3	Data operator	• All Data content input/ typing into CMS for all scheduled programming (updating news, logs standings, etc) • Formatting Data content according to template specifications • Updating templates during live productions (sport results, pictures, progress of events/live games, news, and statistics) • Co-work with producer, Coder and graphic designer to create template for related content (special events) for	• Computer literate, typing skills and knowledgeable in TV program production and Studio control fields. • Advanced Diploma/ Higher National Diploma in secretarial Study or related fields.

No	Position	Tasks	Knowledge, Skills required
		operation.	
4	Photographers	• Takes professional pictures for daily data content updates, (Live and recorded programs, news, sports marketing, etc.) • Co work with graphic designers and Marketing for optimal pictures. • Co-work with producer to come up with a shot list. • Manage picture archive.	• Knowledgeable in professional camera work (still images)- video pictures is an added advantage. • Knowledgeable in TV production • Degree in media studies or related
5	Coding Engineer	• Creating templates (adding functionality to the wireframe/mono media/graphic work) • Provide support to operators during manual operation of related content (live/recorded) • Upgrade template and make sure it meets set top box specifications • Co-work with CMS engineer on templates that use CMS data broadcasting systems • System and equipment Maintenance	• Well vested in HTML language Web application programming fields, and understanding UI design and CMS system. (BML field is the best) • Degree in software or related engineering field
6	Graphic designer	• Mono Media creation (pictures, buttons, logs, icons) • Design dimensions and specifications to be used by coding engineers • Co-working with producers to design templates • Co-works with coding engineer and CMS engineer to upgrade or change templates • Format pictures for daily data content updates (programs, news, sports marketing etc.)	• Knowledgeable in TV or Web Graphic designing with Adobe creative suits fields. • Knowledge or training on BML & HTML Language • Degree in graphic or related fields
7	System engineer	• To ensure that data CMS is always running for broadcast (CAR and studio equipment and broadcast) • Monitor Data broadcasting signal • Manage system users (passwords creation and reset, content operation and simulation) • System and equipment Maintenance • Managing data content stream/ television output.	• Well vested in PHP language Web server application programming fields, and understanding Data source management. (BML field is the best) • Degree in software or network or related engineering fields.

2.1.3.2.4 To develop a training system for producing data broadcasting program

The objectives of the activity is to provide training necessary for the lunch of data broadcasting service and collect all the contents of the training that took place in BTV during the project period and produce a guideline for the training to develop capabilities of staff members to operate and maintain the service of data broadcasting after the completion of the project.

(1) Data broadcasting training

The production of data broadcasting contents needs the following procedures. In the planning stage, the pitch document is developed where suitable information for data broadcasting contents is determined, and information and images that are included in the form of data broadcasting contents are defined. In the designing stage, composition and design of the screen are defined based on the discussion in the planning stage. In the production stage, the contents are coded by BML language as it can be broadcasted in the data broadcasting format. The data broadcasting contents that are produced are sent to CMS and verified by a responsible person. Then, it is broadcasted.

Figure 2.1.3.2.4-1 Operational procedure of data broadcasting

In the project, the training was planned in each stage of the operational procedures. The contents of the training and their deliverables are described. It is possible that those who received training in the Project conduct the same training to the newly recruited staff members to data broadcasting unit. An approximate period that is required for each training stage is shown in the table below.

Table 2.1.3.2.4-1 Contents of the Training and its Required Period

No	Training Contents	Required Period
1	Basic of Data Broadcasting	2 weeks
2	Planning	1 week
3	Designing	1 week
4	Production	4 weeks The period was set for those who have some extent of experience in computer programing such as java language to gain basic skills in BML because coding requires the basic knowledge in computer programing.
5	Verification	1 week
6	Broadcasting	1 week

1) Planning

At the planning stage, planning is conducted as how contents are produced as data broadcasting contents. Data broadcasting contents differ from normal television programs in terms of its contents. Data broadcasting contents heavily rely on character data and still pictures and the way it is displayed on the screen has a certain regulation. Data broadcasting contents can be accessed at any point in time when viewers operate their controllers so that viewers do not miss the contents. It is necessary to consider those pros and cons in planning data broadcasting contents.

In BTV, a document called Pitch Document has been developed to plan specifications of data broadcasting contents such as functions and contents. By using the same format, it is possible to produce data broadcasting contents for other contents in a smooth manner.

2) Designing

Based on the specifications defined in Pitch Document, the composition and design of each screen is defined in the designing stage. In BTV the document called, Screen Specifications, has been developed to define the design of the screen.

3) Production

At the production stage, detailed design is conducted to define the functions and designs of data broadcasting contents. Based on that, data broadcasting contents are produced and coded as those can be displayed in BML browser.

The technical designs are designed by the coding engineer to determine how the contents will be arranged and organized prior to coding and afterwards the template design specifications are used for the actual implementation of the data broadcasting contents. After the coding is complete the contents are tested to determine if they fit the set specifications.

BTV has one coding engineer who received basic training workshop in Japan for two weeks about BML coding in the Project. It is necessary to further develop the skills of those engineers on BML coding. In addition, when the data broadcasting service expands, those engineers are expected to play a role to give training to the newly recruited staff members.

4) Verification

This stage involves verification about whether data broadcasting contents that are produced are displayed as those intended in a correct manner. This stage engages the data sources to determine if the data broadcasting contents developed fit their needs and those of the viewers, it involves checking the correct layout of the template and the flow of information in the template. Authorization to broadcast these contents is then given approval from the data sources and their supervisors. Also it involves determining whether the contents are appropriate for broadcasting.

5) Broadcasting

At the broadcasting stage, processes are examined on how data broadcasting contents that are produced in each section are broadcasted. The document, called Workflow, has been developed to

clarify how the process goes from the production to the actual broadcasting. The following figure is an example of the news section.

Information is collected from the news and current affair section. Then, data broadcasting producer arranges the information collected as a form of data broadcasting contents. After that, designers produce the screen design that is approved by the head of data broadcasting unit. Then, data broadcasting operator input data broadcasting contents into CMS. The data broadcasting contents that are input are approved by the head of the news and current affairs section who is responsible for the information through CMS. After the approval, the content is broadcasted.

(2) Preparation of training material

In order to create data broadcasting contents and operate the system smoothly, it is important to have comprehensive knowledge of data broadcasting. If the staff members understand not only their responsible tasks but also tasks of other staff members and the operation of the whole system, they can work effectively and the working relationship among relevant staff members will be improved. As the basic of data broadcasting, the following items are identified and the training material has been developed. The contents are shown in the table below.

Table 2.1.3.2.4-2 Contents of training material

No	Title	Content
1	Basic of Data Broadcasting	Features of digital broadcasting with ISDB-T including the service of Data broadcasting
2	Structure of Data Broadcasting	Overview and explanation on transport stream, elementary stream, carousel method, the size of the screen, mono-media (materials used in Data broadcasting), picture formats for data broadcasting
3	Data Broadcasting Coding and its language, software	Overview of BML and coding by BML
4	Overview of ECMA	Additional function about Data broadcasting
5	Basic of Data Broadcasting Content Production and Edition	Basic procedure for the production of Data broadcasting contents and basic workflow from production to transmission
6	Data Broadcasting Coding and Decoding Technology	Source information in data broadcasting content and conversion to and from data broadcasting format
7	Transmission of Data Broadcasting Content	Registration of data broadcasting contents to transmitters and equipment for data broadcasting
8	User Interface	Equipment for users and methods to produce user friendly data broadcasting contents
9	For BTV, On-The-Job training for Data broadcasting service-in process	Basic procedures to start new contents in BTV

2.1.3.2.5 To develop programing plan of digital broadcasting, including data broadcasting, based on the market needs survey

(1) Customer Sample Survey

The objective of the customer sample survey is to come up with a programming plan for digital television that includes programme-linked and non-linked data broadcasting content through the consideration of the information gathered from citizens in the survey. In order to develop a programming plan which adequately reflects viewers' opinions, the survey should investigate such topics as popular genres and programmes, viewer satisfaction, viewing habits and the need for new content.

1) Overview of the survey

The first survey was executed in five places. During the survey, totally more than one thousands questionnaires were collected. Table 2.1.3.2.5-1 shows the details of the seminars and demonstrations staged for the survey.

Table 2.1.3.2.5-1 Place and Date of Seminar/Demonstration

No	Date	Place Name	Name of Town	Type*	Remarks
1	13.03.2015 14.03.2015	Airport Junction Mall	Gaborone	D	
2	20.03.2015 21.03.2015	Main Mall	Gaborone	D	
3	16.04.2015	Gaborone International Conference Centre in the Grand Palm Hotel	Gaborone	S,D	Digital Migration Seminar
4	07.05.2015	Conference Hall in Cresta Marang Gardens	Francistown	S,D	Digital Migration Seminar
5	16.05.2015	Show Ground	Ghanzi	D	World Telecommunication and Information Society Day (WTISD) commemoration

* S: Seminar, D: Demonstration

2) Result of the survey

After collecting questionnaires, all the data were added up and analysed. Key findings from the result of this first survey are shown below:

- BTV is the most popular station in Botswana.
- About 67% of correspondents watch BTV very often.
- The frequency of watching BTV is higher as the age increase.
- The most watched and requested programme among BTV is BTV News
- Most people watch TV at evening with their family.
- The tendency of popular TV programmes and their genre has not change since 2009.

- Young generations prefer to watch international programmes than local.
- Expectation for new technology (data broadcasting, one-seg) is high.

(2) Development of programming plan of digital broadcasting

1) Current Situation regarding Programming in BTV

Before the consideration of a digital programming plan, interviews were held with staff members involved in programming to clarify the present situation with regard to programming. The findings from the interviews are shown below.

- There are 3 kinds of programme; programmes produced by BTV, programmes produced by other Ministries, and programmes that are purchased externally.
- The number of programmes made by BTV is low compared to the other programmes.
- Programmes aired between 8:00-18:00 are mainly repeats.
- The most popular programmes are broadcast from 18:00-19:00 and 20:00-21:00
- Educational programmes for students are aired on weekdays from 11:00-13:00
- The addition of a new educational channel is now under discussion within BTV.
- There is no department or section for programming in BTV.
- A programming schedule for the key station only is required; there is no need to consider local station programming.
- Advertisement scheduling is controlled by the Channel Control Division.
- There are no guidelines so far for special programmes or data broadcasting.
- There is a programming scheduling system exclusive to news programmes called the Electronic News Production System (ENPS). BTV News items are stored in the ENPS and broadcast.

2) Policies of the Digital Programming Plan

Policies for developing the digital programming plan are proposed by considering the result of the market survey and current situation of the BTV programming. The policies were prepared with the careful discussion with Data Broadcasting WG members. The policies are described below.

- BTV offers at least 3 different programmes with linked data broadcasting at initial stage of data broadcasting with consideration of the capacity of staffs for data broadcasting.
- At least one programme for linked data broadcasting are selected from the top 3 most popular programme identified by the market survey.
- At least one programme which is popular for young has linked data broadcasting.
- The most important programme, News should be provided anytime in English and Setswana.
- The contents of non-linked data broadcasting are selected based on the feasibility study
- The BTV Portal should be designed for everyone can operate with ease. A structure of portal

3) Feasibility Study of Data broadcasting content

The feasibility of data broadcasting for linked and non-linked programmes was evaluated. Table 2.1.3.2.5-2 shows the results of the evaluation. The data broadcasting programmes for BTV are proposed after taking the result of the first market survey and the policies into consideration. After

the feasibility of the programmes were discussed and examined within BTV, target programmes were decided.

Table 2.1.3.2.5-2 Feasibility of Data Broadcasting Programming

	Genre	Feasibility	Reason
Portal Programme non-linked	News	Feasible	Information is available from BTV, BOPA (The Botswana Press Agency)
	Weather	Feasible	Information is available from BTV
	Programme Schedule	Feasible	Information is available from BTV
	Market	Feasible	Information is available from BTV, although it is not possible to obtain real-time market information
	Education	Difficult	Content should be prepared in collaboration with the Ministry of Education
	Traffic Information	Difficult	There are no information sources available
	Advertisement	Feasible	Easy to operate
Programme linked	Talk show	Feasible	Easy to operate if the scenario is predetermined
	Music	Feasible	Easy to operate if the performers are predetermined
	Special event	Feasible	Depends on human resources and skill levels
	Drama	Difficult	Handling rights issues
	Movie	Difficult	Handling rights issues
	Documentary	Difficult	Handling rights issues

4) Proposed Data broadcasting programmes

The data broadcasting programmes for BTV are proposed taking the policies and the feasibility study into consideration. The proposed programmes are shown in Table 2.1.3.2.5-3.

Table 2.1.3.2.5-3 Proposed Data Broadcasting Programmes

	Genre	Programme
Non-Linked Data Broadcasting	-	News, Weather, Market info, Programme Guide, Sports, BTV info, Advertisement
Linked Data Broadcasting (Programme produced by BTV)	Talk Show	Molemo wa Kgang, Talk Back, Silent Shout
	Music	Flava Dome
	Special Event	President's Day etc.
Linked Data Broadcasting (Purchased programmes and programmes provided by other Ministries)	Documentary/Movie/ Drama	-

A total of seven kinds of information, News, weather, market information, programme guide, sports,

BTV information and advertisement, are selected for non-linked data broadcasting. Three Talk Show programmes are proposed for linked data broadcasting, namely, Molemo wa Kgang, Talk Back and Silent Shout. This is because the data source for the shows is in-house, meaning they are made by BTV, therefore it would be easier to acquire the information needed for data broadcasting.

In the Music genre, Flava Dome is selected for linked data broadcasting. As described in Chapter 4, BTV needs to focus on the younger generation. This programme is ranked the second favourite BTV programme in the 17-25 age group. This selection aims to promote BTV to the younger generation.

There are no linked data broadcasting programmes in the Documentary, Movie, and Drama genres. As noted in the feasibility study above, linked data broadcasting for these programmes is difficult because the programmes are not produced by BTV.

As a general rule data broadcasting for special events is not recommended in the initial stages. However, data broadcasting could be feasible in the case of important national holidays such as President's Day or Independence Day because the dates are fixed and there would be enough time to prepare the content.

5) Proposed Basic Structure of Non-Linked Data broadcasting

A basic structure for the proposed non-linked data broadcasting is shown in Figure 2.1.3.2.5-1 below. It is planned so as to be simple and easy for anyone to find information. There are only five layers.

All data broadcasting information can be accessed from the initial screen, called "BTV portal". BTV portal acts as the entrance to non-linked data broadcasting. Viewers first enter the portal and then go to the information they want using a remote control. The initial screen of the Portal offers 7 kinds of information: "BTV Programmes", "News/Dikgang", "Sports", "Weather", "About BTV", "Market", and "Advertisement".

"BTV Programmes" consists of three parts: "Pickup", "Schedule" and "Event". "Pickup" includes recommended programmes on BTV. Viewers can check the weekly schedule from "Schedule". If there is an event related to a programme, viewers can access the information from "Event".

News is provided in both Setswana and English from "News/Dikgang". Viewers can check not only news headlines, local and international news but also sports news or even special reports, in both languages, whenever they want. The information of BTV newsroom and the time schedule for BTV News are also available at any time.

"Sports" mainly provides information about football. People can check results, logs, fixtures, and related news. Other sports information such as boxing or volleyball can also be seen from this menu.

A variety of information can be provided via BTV Portal; the most important thing is the maintenance of a full range of information. BTV must provide an adequate and manageable amount of information, taking into consideration the number of staff members and their skill levels.

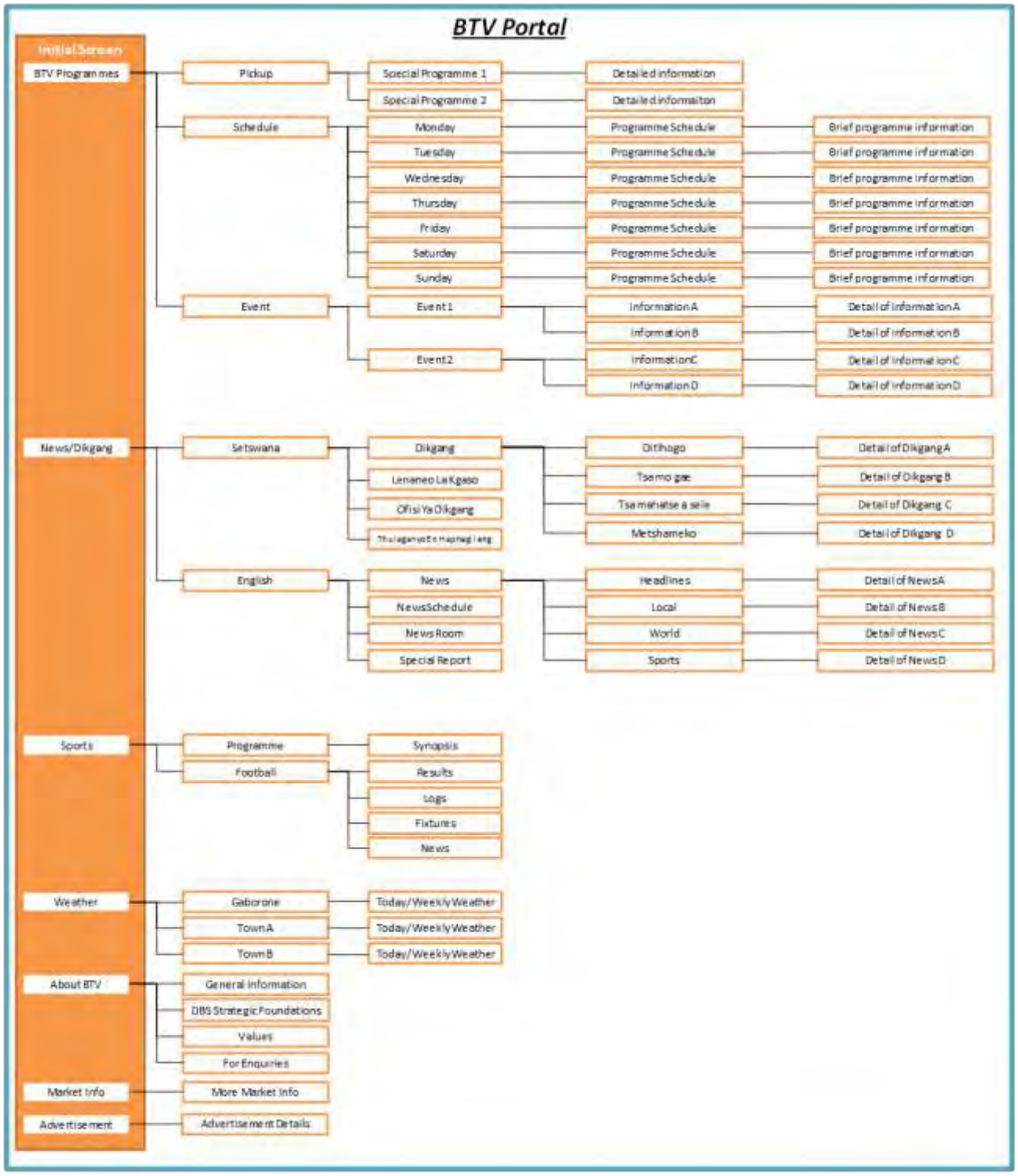


Figure 2.1.3.2.5-1 Structure of Non-linked Data Broadcasting

6) Sample of Digital Programming Schedule

The weekly digital programming schedule is proposed based on the current programming schedule. Figure 2.1.3.2.5-2 shows a sample digital schedule which includes special programmes for President's Day. Programmes with linked data broadcasting are coloured in blue. The special programmes with linked data broadcasting are coloured in yellow. The non-linked data broadcasting

is aired 24 hours a day. Viewers can switch to non-linked data broadcasting even if they are watching a linked data broadcasting programme.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
4:55	National Anthem	National Anthem	National Anthem	National Anthem	National Anthem		
4:56	Phatsima	Phatsima	Phatsima	Phatsima	Phatsima		
05:00 06:00	Setswana Bulletin rpt	Setswana Bulletin rpt	Setswana Bulletin rpt	Setswana Bulletin rpt	Setswana Bulletin rpt		
06:00 07:30	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast		
07:30 08:00							National Anthem Phatsima
08:00 08:30	Worship rpt	700 Club	Best Dance Sports	Tla Patlelong rpt	Lobebe rpt		President's Day Traditional song and dance
08:30 09:00		Maxed out rpt		Tla patlelong rpt			
09:00 09:30	Road to Rio rpt	World Equestrian rpt	Weirdest restaurant rpt	How to be Indie rpt	Tsa Botsogo rpt	Anthem	
09:30 10:00	Police rpt	Prime Time rpt	First Issues	TsaTemo Thuo rpt	Ditlhabololo rpt	Phatsima Letlhabile rpt	
10:00 11:00	Molemo wa kgang rpt	Flava Dome rpt	Matlho a phage	The Eye rpt	Mokaragana rpt	Comedy and Drama	
11:00 11:15	EBD	Biology rpt	Biology	Biology	Biology		
11:15 11:30		Maths (Form 1) rpt	Maths (Form 2)	Maths (Form 2)	Maths (Form 3)		
11:30 11:45		Chemistry rpt	Chemistry	Chemistry	Chemistry		
11:45 12:00		Design and technology rpt	Commerce	Commerce	Commerce		
12:00 12:15		Talk Back rpt	Maths Bgcse	Maths Bgcse	Maths Bgcse	EBD Rpt	
12:15 12:30			Physics	Physics	Physics		
12:30 12:45			IT	IT	IT		
12:45 13:00			Beyond school	Beyond school	Beyond school		
13:00 13:30	Dikgang	Dikgang	Dikgang	Dikgang	Dikgang		
13:30 14:00	Public Service day Poetry rpt	Property for you rpt	Pelokgale rpt	Melodi ya kgalaletso rpt	Sam Soon rpt	Enole	
14:00 14:30		My Star rpt	Batho Pele rpt				
14:30 15:00			Life with Derek Rpt	Only One Earth rpt	Tla Patlelong	Road to Rio	
15:00 15:30		Tla Patlelong	Tla Patlelong	Tla Patlelong			
15:30 16:00	Maxed out	Weird Resturants	Only one Earth	Face of the Earth	Planet 3 rpt	Choral Music and Poetry	
16:00 16:30	Life with Derek	Movie rpt	Beijin Love story rpt	From The Ground	From The Ground rpt		
16:30 17:00	How to be Indie sr						
17:00 17:30	Best Dance Sports		Melodi ya Dinno rpt	Sedibeng rpt	Motor Speedway		
17:30 18:00				Top 20 shoot-out rpt			
18:00 18:05	Ghana vs congo	News Headlines	News Headlines	News Headlines	News Headlines	Building tomorrow (SADC) Documentaries	
18:05 18:30	Itshireletse	Silent Shout	Talk Back	Molemo wa kgang	Dikopane		
18:30 19:00	Property For you	Sedibeng			World Equestrian		
19:00 20:00	Dikgang	Dikgang	Dikgang	Dikgang	Dikgang	Dikgang	Dikgang
20:00 20:30	Temo thuo	First Issues	The Eye	Ditlhabololo	Flava Dome	Mokaragana	President's Day Traditional song and dance
20:30 21:00	Pelokgale	Letlhabile		Batho pele			
21:00 22:00	News	News	News	News	News	News	News
22:00 23:00	Lobebe	Beijing Love Story	Pula Power rpt	France 24 rpt	President's Day Fashion Show	Pula Power	President's Day Traditional song and dance
23:00 23:30		France 24					
23:30 04:55							

: Linked Data Broadcasting Programme

: Special Programme

Figure 2.1.3.2.5-2 Sample of Digital Programing Schedule

2.1.3.2.6 To plan and produce program-linked and non-linked data broadcasting

Data broadcasting program can be divided into two categories, program linked and program non linked data broadcasting program. Program non-linked data broadcasting program, also called as independent program, is the programs that complete the services without being related to television programs such as weather forecast, program schedule information. On the other hands, program linked data broadcasting contents are provided with being related to television programs. The program linked data broadcasting service includes the service to display the profiles of players in the football programs or the service to display quizzes that are related to the quiz program being broadcasted.

BTV started data broadcasting services from June 2015. However the contents of the service is limited within the sources of information that can only be obtained in BTV such as BTV news, sports, programing schedule and program linked contents that are related to television program in BTV.

(1) Program production

BTV selected the following 9 services at the start of the service.

- Channel (Program info, weather, market)
- News & Current Affairs
- Sports
- Special Events
- Marketing (Advertisement)
- Flava Dome (Music show)
- Silent Shout (Talk show)
- Talk Back (Talk show)
- Molemo Wa Kgang (Talk show)

These services include both program-linked and non-linked data broadcasting.

(2) Documentation

There are 5 important spec documents in order to produce data broadcasting program.

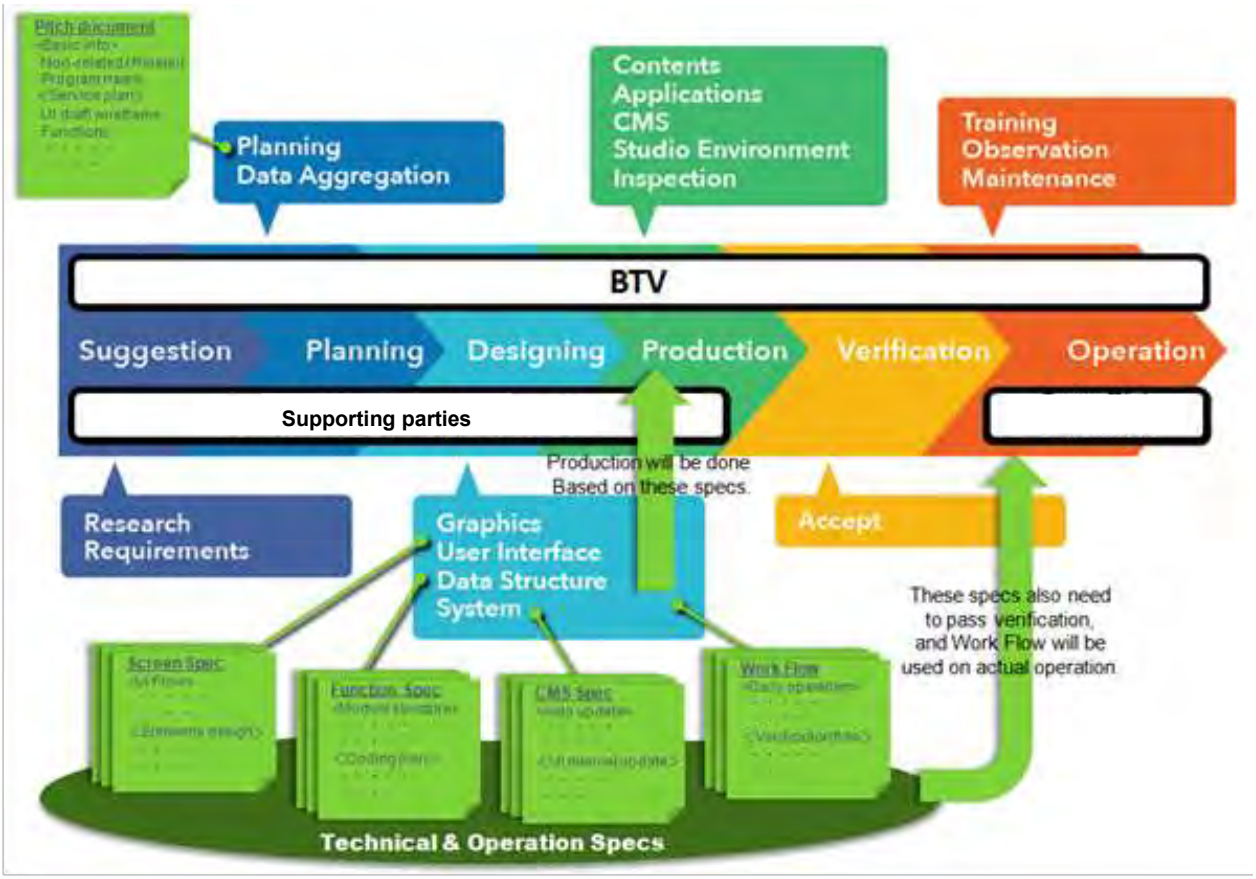


Figure 2.1.3.2.6-1 Data broadcasting program production document

1) Pitch document

Before this documentation, rough service image was discussed at the "Suggestion" stage. In this stage, detail definitions of services are required. In case of program related service, details of video program are also needed such as, on-air time, production time (Live or Pre-production), etc.

Data graphic designer helps producers to create screen image on this document. Data coding engineer helps producers to understand available functions on BML spec. Data system engineer helps producers to understand system capacity, and if additional system is needed for this new service. Further, Data system engineer needs to consider system upgrade as well.

In addition, this Pitch document needs to be accepted by Head of Datacasting unit. In case of program related service, it also needs to be accepted by Head of Program section. Moreover, the document needs to be accepted by Head of Channel in order to use new channel structure. For Datacasting advertisement, it needs to be accepted by Head of marketing.

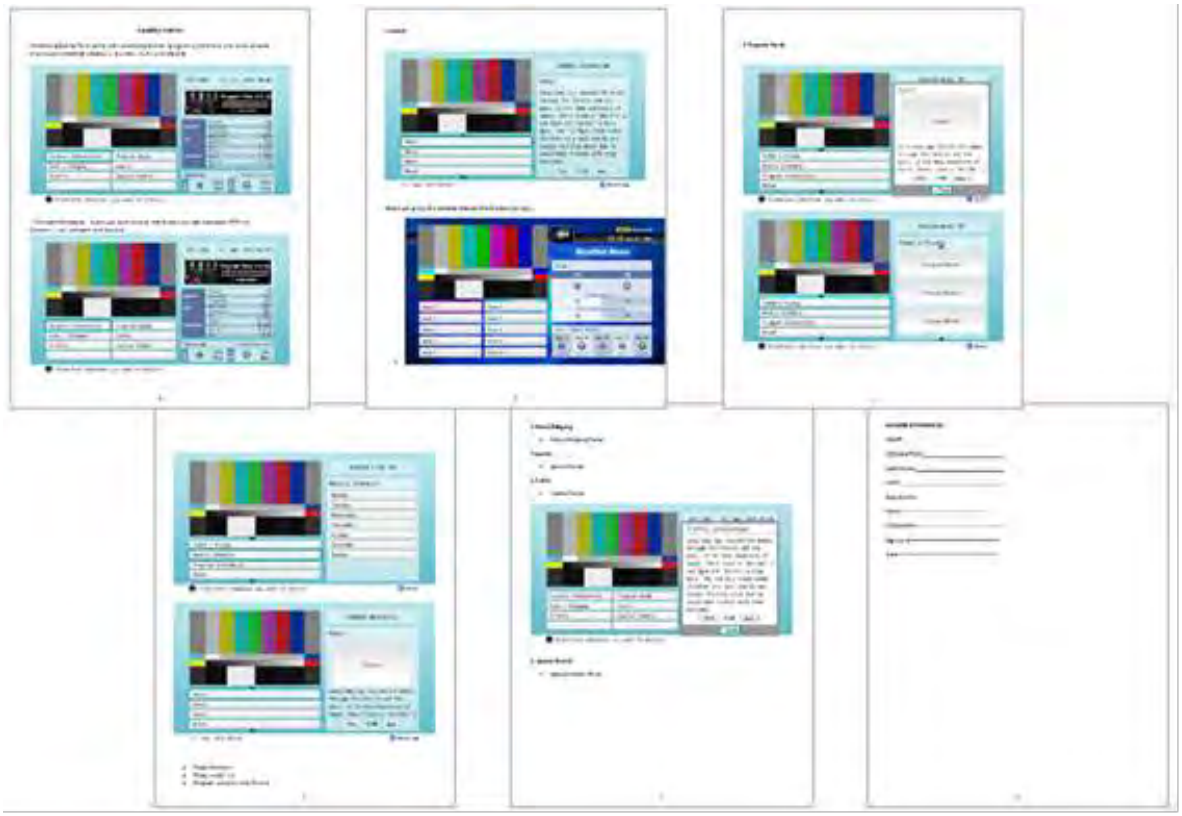


Figure 2.1.3.2.6-2 Pitch document

2) Screen specifications

According to accepted pitch document, Data graphic designer creates the technical designing spec for User interface. In creation of this Screen spec, view point of "easy to use" is very important. Datacasting is new media for viewers, and exploring information service on TV is also new experience for viewers. There is no other way to give how-to-use instructions, so each screen should be easy to understand, and needs to show the ways to reach information that viewers require.

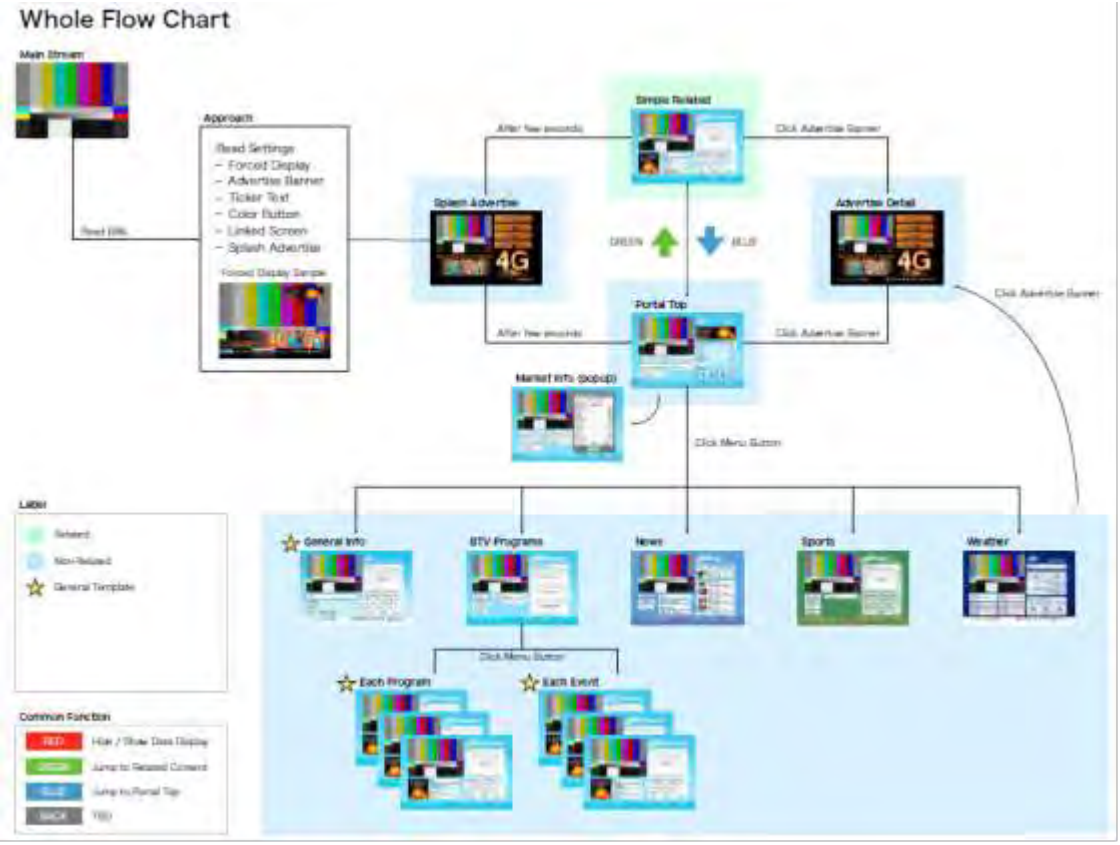


Figure 2.1.3.2.6-3 Sample of UI flow chart

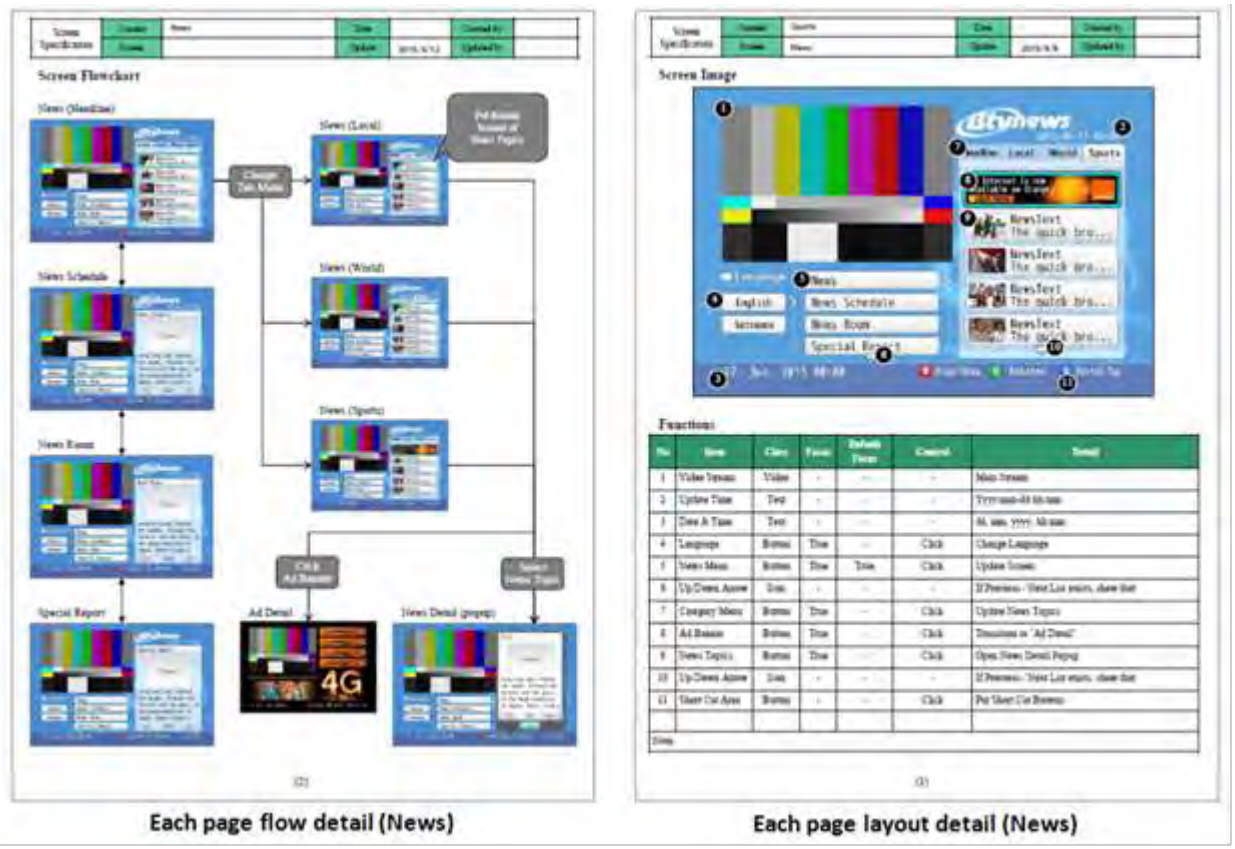


Figure 2.1.3.2.6-4 UI detail for each page

And this Screen spec needs to be accepted by Head of Datacasting unit. In case of BTV news pages, it also needs to be accepted by Head of News section. Datacasting advertisement is inserted with news articles. This document needs to be accepted by Head of marketing.

3) BML coding

According to accepted Pitch document, Data coding engineer creates this technical designing spec for Datacasting functions.

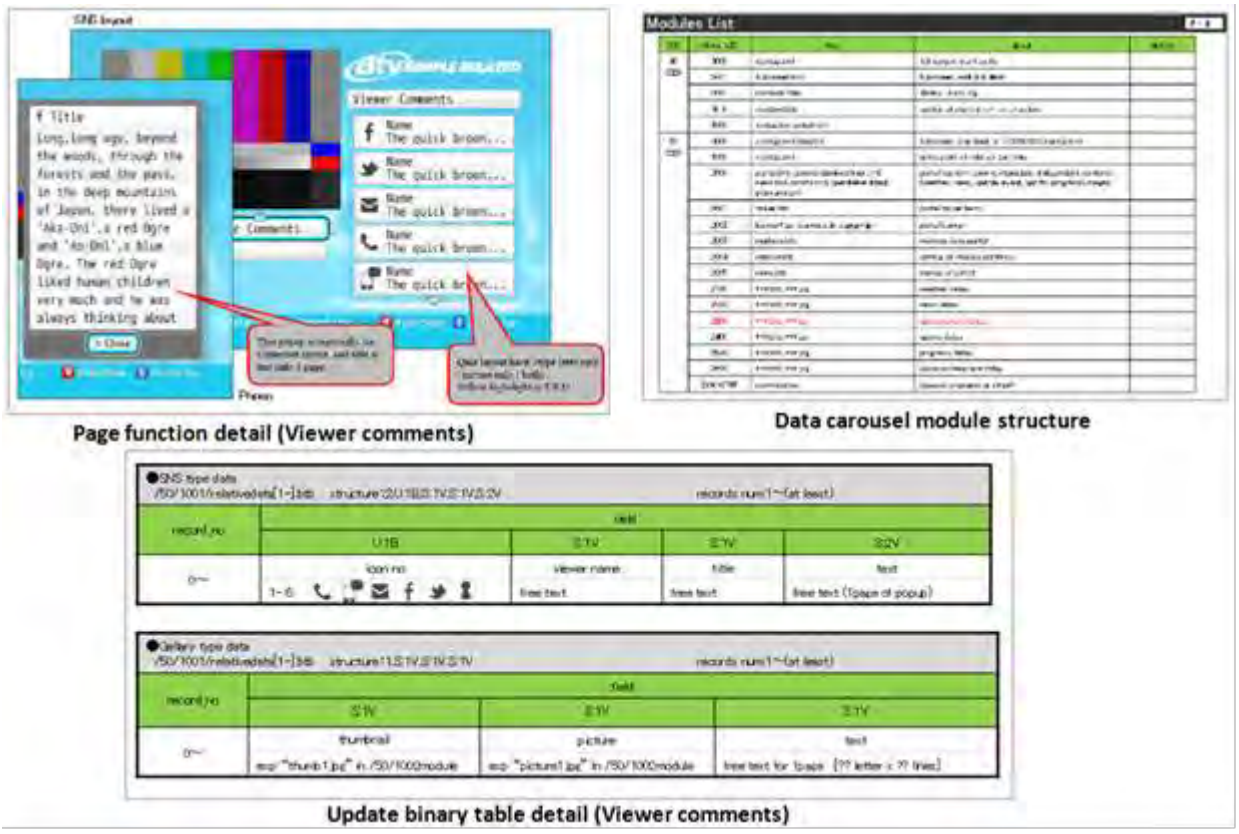


Figure 2.1.3.2.6-5 BML coding function specification

This program related template is used for multiple programs: Special events, Flava Dome (Music show), Silent Shout (Talk show), Talk Back (Talk show), and Molemo Wa Kgang (Talk show). This template includes a lot of function to cover all requirements from the programs like, image + text base information fields, picture gallery sub menu, and viewer comments sub menu. Each program can use different graphical design and page structure.

"Page function detail" is the function for each field. In the case of viewer comments, BTV can insert various comments from call-in phone, Twitter, Facebook, and Email.

"Data carousel module structure" is about data transmitting structure for program related template. Its static structure is for all allocated programs.

"Update binary table detail" indicates data source exchanging format. In the case of viewer comments, data format covers various data source from call-in phone, Twitter, Facebook, and Email.

And this Function spec needs to be accepted by Head of Datacasting unit. In case of program related template, it also needs to be accepted by each Head of Program unit. The channel structure is same as normal broadcasting, so no acceptance is needed from Channel section. However, Datacasting advertisement is inserted, so it needs to be accepted by Head of marketing

4) BML coding

According to accepted Pitch documents, Work Flow is needed to clarify each related member's daily and eventual works.

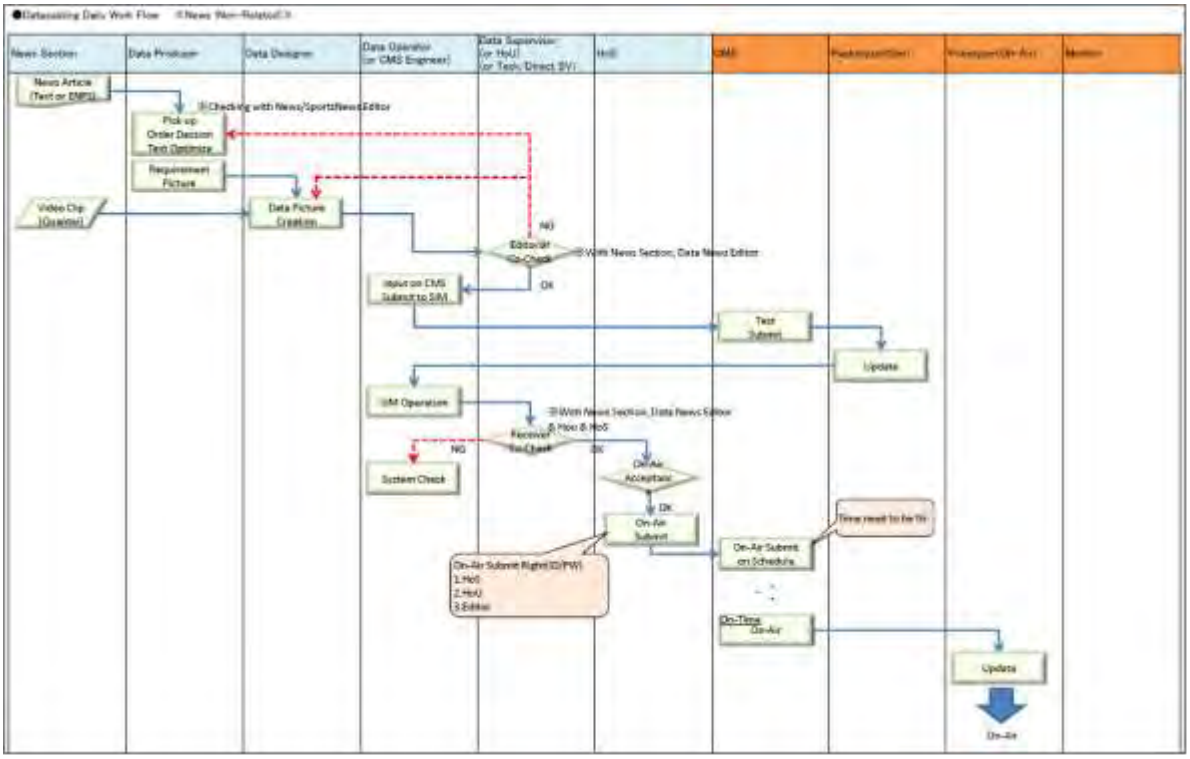


Figure 2.1.3.2.6-6 Work flow

In case of BTV news pages, all information comes from News section. There are 2 kinds of data source, one is text base news article that is managed in system of ENPS, and the other is video clip that is managed in system of Quantel Ltd. Text base news articles are picked up by Data producer together with News section editors. There is limitation for number of articles in Datacasting as Data producer picks up certain number of articles every day. Data producer orders Data designer to create pictures for picked up articles which is made using screenshot using Quantel system. After editorial co-check by Data supervisor with News section supervisor, Data operator inputs the articles on CMS, and inserts all contents on Simulator. Simulator can show actual moving Datacasting with new articles on reference STB, which is followed by receiver co-check conducted by Data supervisor with News section supervisor. After confirming On-air acceptance, Head of Datacasting unit or Data supervisor submit articles to broadcast On-air.

This kind of work flow discussion is needed for each page and service.

And this Work Flow needs to be accepted by Head of Datacasting unit. In case of BTV news pages, it also needs to be accepted by Head of News section. As channel structure is same as normal broadcasting, no acceptance is needed from Channel section. However, Datacasting advertisement is inserted with news articles, so it needs to be accepted by Head of marketing.

(3) Program production

Portal top is the first screen displayed, when viewer presses "Data" button on remote controller. On top page, Gaborone weather, market, ticker info, and advertisement rate are displayed at a glance. Weather forecast detail page provides each region's weather forecast information. Market info detail is also available when "More" button is pressed. By pressing "Green" button, program related information page displays. This program related page is provided for Special events: Flava Dome (Music show), Silent Shout (Talk show), Talk Back (Talk show), and Molemo Wa Kgang (Talk show).

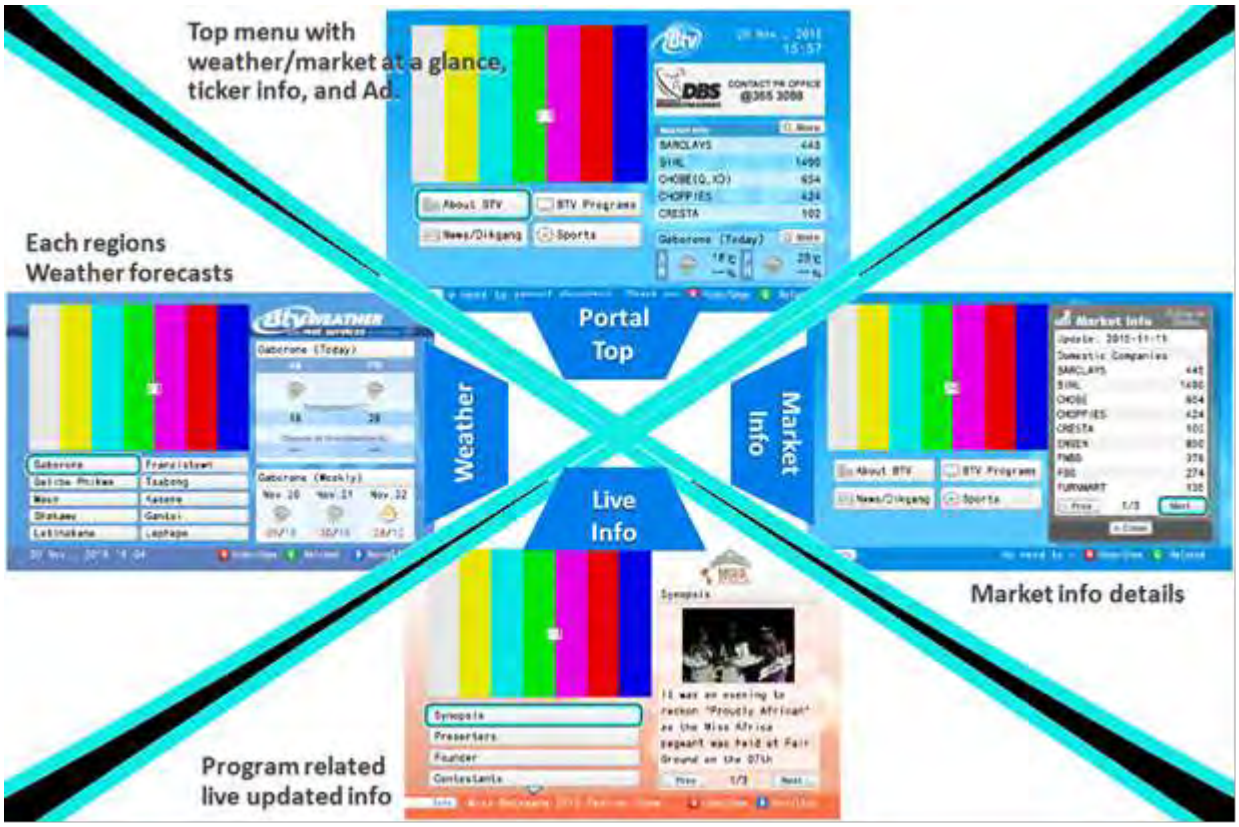


Figure 2-1-3-2-6.7 BTV data broadcasting service

Program guide page provides weekly program time table, and some pick up program information. News page provides latest news articles in both Setswana & English languages. Sports news page provide football game results, logs, fixtures, and sports news articles. BTV info page provides message from BTV.

These pages are daily or eventually updated by BTV themselves. This Datacasting service is carried out with strong cooperation with related BTV sections and units. This is the stable operated service which BTV started as one of the biggest benefits of digital migration.

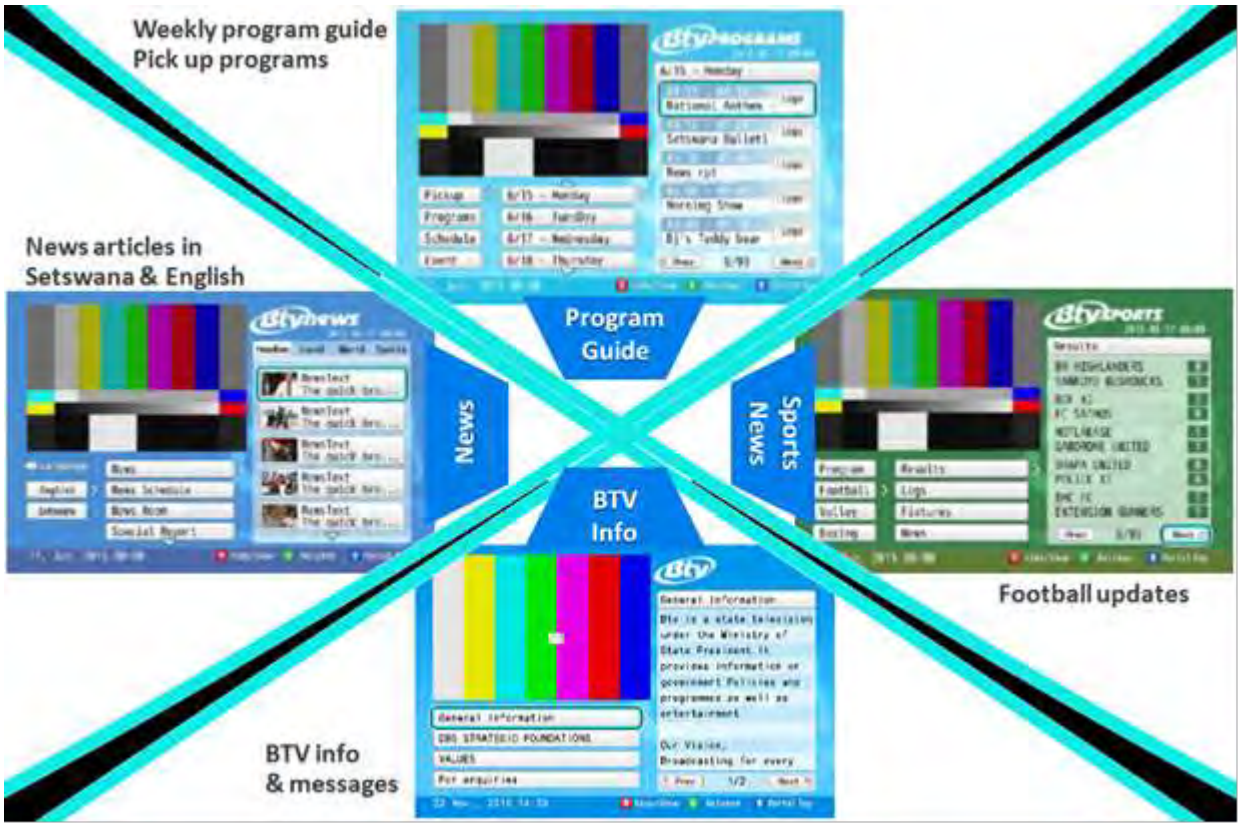


Figure 2.1.3.2.6-8 BTV data broadcasting service 2

2.1.3.2.7 To develop procurement plan of HD studio systems

(1) Analysis about existing program production system of BTV

Existing program production system of BTV is shown in Figure 2.1.3.2.7-1. The part coloured in pink has already upgraded in HD format. This part belongs to the Ministry of Education and consists of Studio 3 and broadcasting server system. On the other hand, most of equipment belong to BTV are still SD format. However, even if it is SD format equipment, file based program production workflow with broadcasting server system and non-linear editing terminal hooked up to servers through the network has been introduced in BTV.

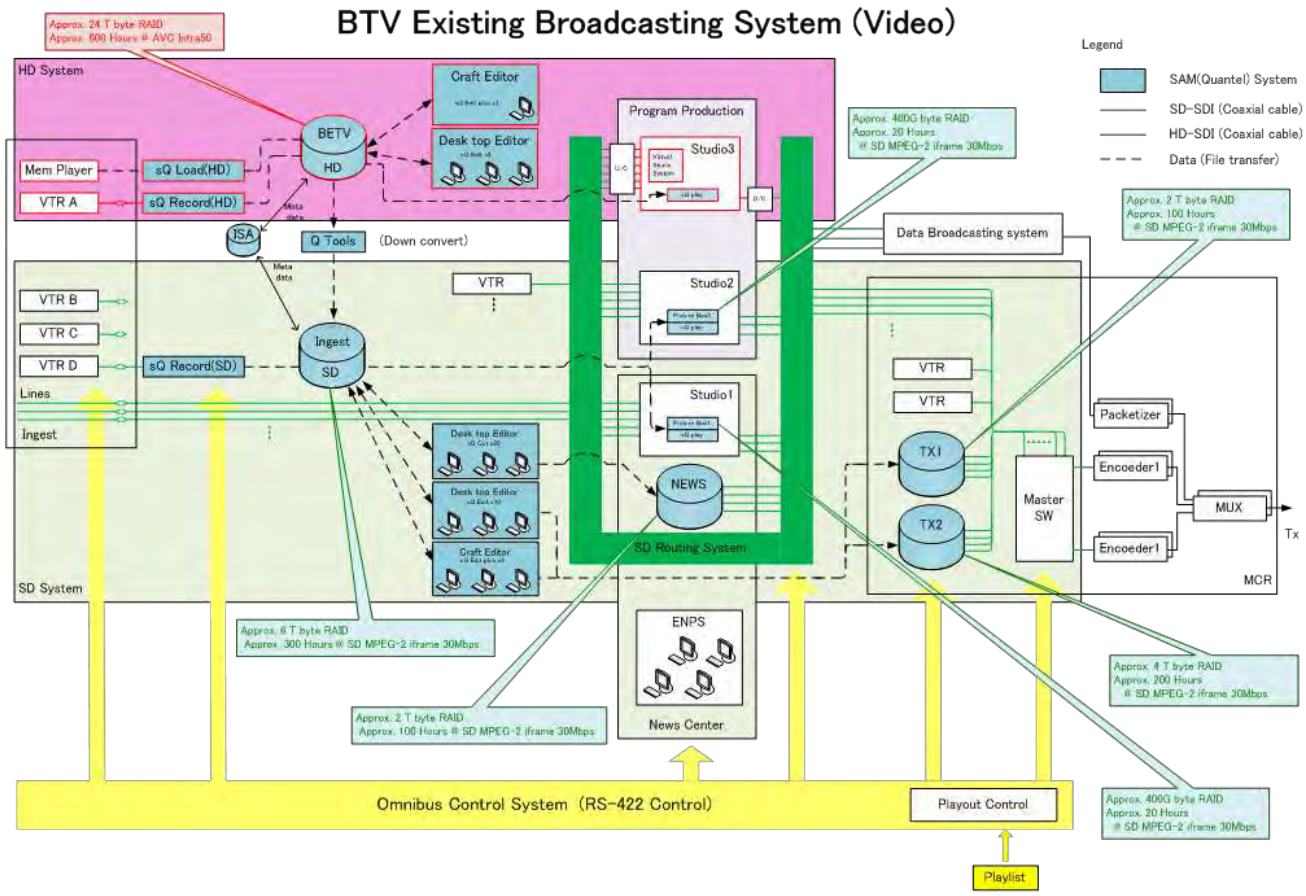


Figure 2.1.3.2.7-1 Existing broadcasting system

1) Control System

Most of the parts, i.e. Master switcher for playout, Routing system and VTRs in program production system are controlled by a centralized integrated control system by Serial control signal. The control terminals of this system are installed in Sub-control room for each studio and master control room. This control system was introduced as the control system for both Servers and off line system such as players of magnetic tape, and still plays an active role in ingesting to server, routing control and Automatic playout control with play list. This is the system by "OmniBus System" and it has been operating for more than ten years, so it needs total replacement.

2) Routing System

House format of BTV existing system is SD-SDI separate Stereo Analog Audio. Coaxial cable for SD-SDI and two audio cables for Analog Stereo Audio Signal are connected separately between systems. Routing system established by 128x128matrix switcher produced by Philips which is ageing and needs to be replaced. Because of separate stereo analogue system, both Routing Switcher for Video and for Audio are required for routing.

3) Recording Media

Even though broadcasting server system has been introduced, conventional off line operation also still remains with 1/2 inch VTR tape, 1/4 inch VTR tape and memory device. HD Studio also has 1/2 HD VTR (HDCAM).

4) Broadcasting server system/non-linear editing system

There are two server systems in BTV. One is SD based Server system which was installed more than 10 years ago, and another is HD based Server system which was installed by MoESD in recent years. The two systems were integrated by the Quantel Company (currently named SAM). They are connected together and have a common data base of video contents. In addition, video contents can be transferred through HD/SD transcoder between them.

SD Server system consists of Ingest Server which ingests video materials, News Server for news production and playout, Tx Server for playout from master control room and Non-linear editing terminals. Ingest Server is a kind of video material server which ingests video materials from Video tapes, memory, lines from satellite through encoding device and sharing video material to editing terminal for editing. After editing, contents are transferred to news server or Tx server for playout.

Configuration of Tx Server is made redundant by main and standby server. Editing terminals are 20 sets of cut edit terminals which are for simple editing of the news, 10 sets of standard editing terminals and 3 sets of craft edits for the purpose of high performance editing. Playout control terminals for SD server system are installed in Studio1 and Studio2. In addition, Local storage servers hooked up to the server system are installed in studio1 and 2. Capacity of each server are approximately 300 hours for Ingest server, 100 hours for News server, 100 hours and 200 hours for playout servers and 20 hours for Each local storage of studio 1 and 2 at the picture level Mpeg-2 iframe 30 Mbps.

News room computer system called Electronic News Production System (ENPS) has been put in place for News program production. Device control protocol of ENPS is Media object Server (MOS) protocol and connected to News Server system through MOS Gateway for communication between both systems. Video picture in News Server system can be monitored from ENPS System.

HD Server system consists of BETV Server which ingests video materials, three sets of Standard editing terminals and one set of craft editor. This system can ingest video file directly from memory device through Firewire interface in addition to SDI signal from player. Capacity of server is approximately 600 hours for BETV Server at the picture level AVC Intra 50 Mbps.

5) Playout system

Master switcher of BTV has 16ch primary inputs and is controlled by the control system mentioned on item 1) above. In addition to the above main and sub Tx servers, VTRs and lines from satellite are played out to master switcher. Outputs of master switcher are connected to encoder for digital terrestrial broadcasting.

6) Studio system

There are three Studios in BTV. Two of them, studio 1 and Studio 2 are SD System. Studio 1 is for News production with 3 sets of Camera chain and 2 M/E 19 primary inputs Production switcher. Studio 2 is for Program production with 5 sets of camera chain and 3M/E 27 primary inputs Production switcher.

Only Studio 3 which belongs to MoESD has been upgraded to HD. Studio 3 is program production studio with 5 camera chains, 3M/E production switcher and virtual studio system also.

7) Video archive

Video archive system has not been introduced/ installed yet. Video contents are archived in the shelf with magnetic video tapes. In years to come, keeping player for magnetic video tapes in good condition is going to be more difficult than today. Introducing Archive system is also important for BTV to operate HD system.

(2) Procurement plan of HD studio systems

1) Policy

Overall system block diagram for HD upgrade is shown in Figure 2-1-3-2-7.1 File base program production work flow has been introduced to BTV. The upgrade of equipment to HD shall be proceeded with the following present work flow of BTV. House format of video/audio signal shall be HD-SDI embedded audio ((SMPTE 292M). HD-SDI embedded audio signal transfers HD video signal with audio signal with one coaxial cable. The control system shall be an integrated control system as the existing system.

The number of transmitting channel shall be four channels with one redundant channel for four transmitting channels. In case of trouble or emergency, transmitting lines will be changing over to redundant channel by routing switcher.

For master control system, “Channel in a Box” (CiaB) system which has no conventional master switcher shall be introduced. Media asset management (MAM) system which is a management system for video contents shall be introduced for the purpose of re-use of video contents in the future apart from the present file based workflow with server system. MAM system also has the function of interface between archive system which is not included in this HD upgrade plan and will be introduced in the future.

Production server system and news server system shall be upgraded with the same structure as existing system. For news production, not only news server system but also ENPS system should be upgraded with keeping interface between both systems in software version.

2) System to be procured

- Broadcasting server system with editing terminals
- HD-SDI embedded audio routing system
- Production studio system
- News studio system

- MCR including sync and clock system (renewal)
- Integrated control system (renewal from existing Omnubus system)

3) Overall system diagram for HD upgrade

Overall system diagram for HD broadcasting system is shown in Figure 2.1.3.2.7-2.

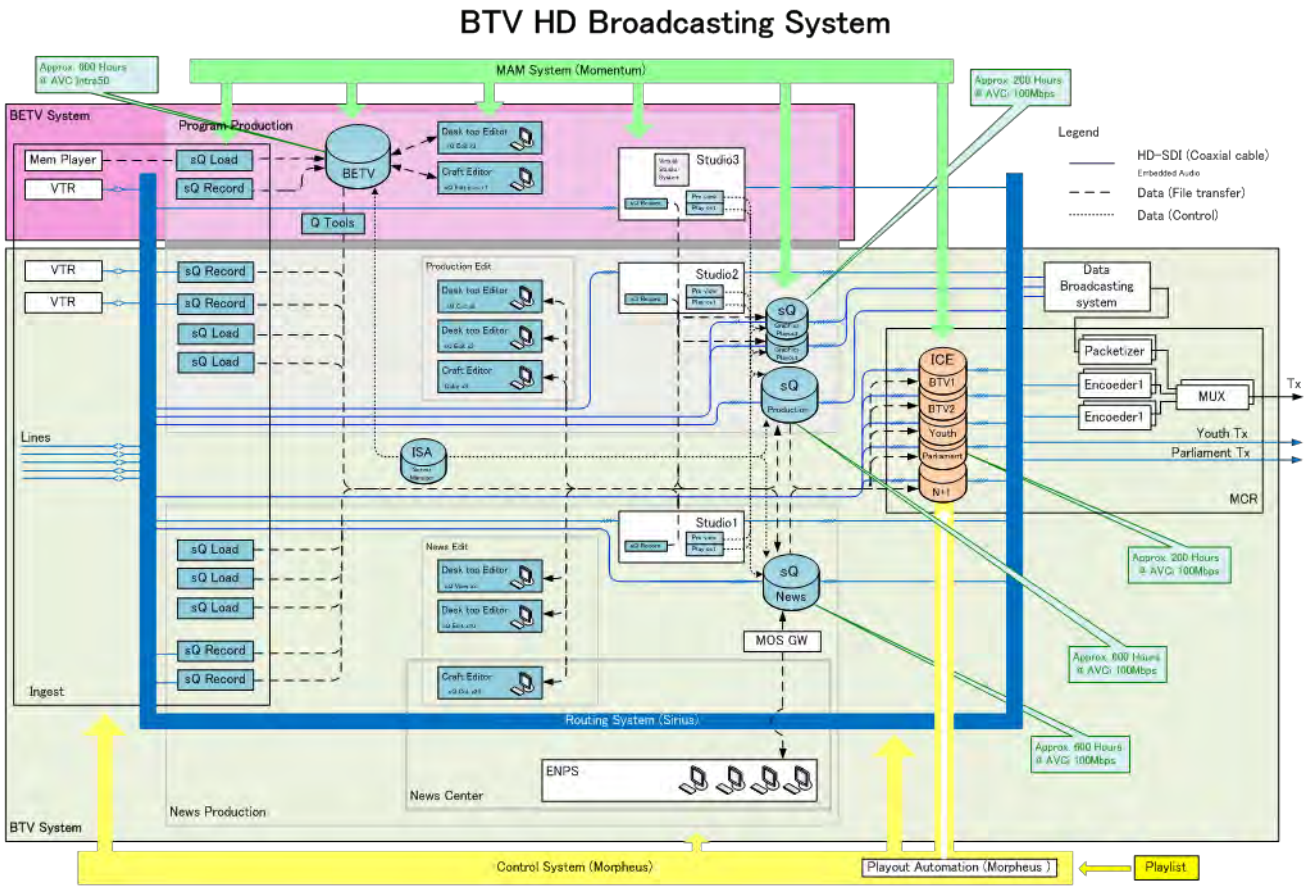


Figure 2.1.3.2.7-2 HD broadcasting system

4) Overall system diagram for HD upgrade

Most items need to be replaced for HD upgrading except studio 3, which has already been upgraded to HD. Two phase approach is proposed for the replacement of the system in order to keep the continuity of broadcasting.

Brief overview of the replacement is the followings.

1st phase : Playout system, routing system and control system

2nd phase : Studio system (news and production), server system

Concrete plan for change over is installation of new playout system in media conversion room in advance after removal of existing equipment in 1st phase. New system has to work with new playout server and control system. After starting to playout, existing system can be removed. After removal of existing master control room, the space can be used for expansion of rack room as central apparatus room.

5) Master work schedule of HD upgrading

Implementation for HD upgrading is planned in FY 2016 and 2017 as shown in Figure 2.1.3.2.7-3.

Plan for Changing Over Production equipment in BTV (Draft)

Rev 2
15th Jun, 2016

System	Control Room	Rack Room	FY2016 UP Grade Playout, Control and Routing System				FY2017 UP Grade Studio 1, 2 and Server System				Remarks
			Introduction of Playout System		Removal and Routing System Installation		Studio system installation		Server System installation		
			1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q	
Media Conversion	VTRs for Ingest		Preparation for Changing	Removal							
MCR (New)		Playout		Installation	Operation in New System						ICE
		Control System		Installation	Operation in New System						Morpheus
Routing		Philips	Preparation for Changing over		Removal	Installation	Operation in New System				Sirius 840
Control		OmniBue			Removal						
MCR (Existing)	VTRs for Ingest										
	VTR for Playout		Operation in Existing Equipment		Removal						
	Sw Control Panel										
		Master Sw									
		Tx 1, 2	Preparation for Changing over								
Contents Server		Ingest server	Operation in Existing Equipment							Removal	
		sQ Record									
									Installation	Operation in New System	Momentum MAM
											Momentum Ingest
Edit		sQ Out Edit									
		sQ Edit	Operation in Existing Equipment							Removal	
		sQ Craft Edit									
											HD sQ Out Edit
									Installation	Operation in New System	HD sQ Edit
											HD sQ Craft Edit
News Production		News Server									
		Mos GW	Operation in Existing Equipment							Removal	
		ENPS									
											HD sQ Server
									Installation	Operation in New System	Mos GW (New)
											ENPS (New)
Studio 1	Control Panel	CCU,SW					Removal/Installation	Operation in New System			
Studio 2	Control Panel	CCU,SW						Removal/Installation	Operation in New System		
Studio 3	Control Panel	CCU,SW									
		BETV									
		sQ Load									
		sQ Record	Operation in Existing Equipment								
		sQ Edit									
		sQ Craft Edit									
		sQ Play									
			Start Preparation for Chang over (Playout from Server)								
				Removal of Media Conversion room							
				Installation of temporary Playout system and Studio 2							
					Playout from New Playout system						
					Removal of Existing system (MCR, Control and Routing)						
						Installation of Routing					
							Removal and Installation of Studio 1				
								Start operation Studio 1			
								Removal and Installation of Studio 2			
									Start operation Studio 2		
									Installation of Material Server and News Server		
										Start operation Material Server and News Serve	

Figure 2.1.3.2.7-3 Change over Schedule

(3) Special attention for the procurement plan for HD studio systems

1) Paying attention to new technologies

It has been more than 10 years since HD broadcasting stated in Japan. HD format has become common and affordable in broadcasting equipment e.g., studio camera, switcher routing device and monitors. Most of the TV set in the market also supports HD format. Furthermore, Japanese government goes forward “Smart Japan ICT strategy” which includes the promotion of Ultra High Definition (UHD) format in preparation for Tokyo Olympic in 2020. UHD is video format which has higher definition than HD e.g. 4K, 8K. 4K has four times definition of HD format.

2) Concrete plan for updating each sub system

Advanced implementation of new HD playout system will make it possible to broadcast without interruption. Furthermore, concreate plan for updating each sub system, getting it across program production staff and operation plan of program production while updating are also important for avoiding confusion.

3) Preparation for change over

New playout system will be CiaB system. Most of the contents except live program and program

from lines shall be played out from CiaB playout Server. If some contents are still played out from VTR in the existing SD system, that operation should be changed to full server playout operation with the existing SD server for the preparation of migration to the new system. CiaB is the system without conventional master switcher. Inserting station logo and other video processing on master switcher shall be done inside of CiaB playout server. Transporting picture data e.g. station logo, wonted operation of inserter from remote control system / local operation terminal should be done in advance.

4) Preparation for service and maintenance

BTV already has a server system, however new HD system will be a more IT based system. IT based CiaB system will play a most important role in broadcasting. A service contract with vender will be needed for safe operation. Life time of IT based system should be taken into account; the next renovation or replacement before out of service contract should be planned.

5) Preparation for procurement of archive system

Archiving for video contents in existing system is shelf archive with magnetic tapes. For design of developed archive system, archive policy and system specification for the system e.g. size of archive system, management plan for video archive, work flow for archiving / retrieving should be studied in advance. Video archive system will keep important video contents with the history of Botswana in the future.

2.1.3.3 Activities related to the whole project (Planned and Actual)

2.1.3.3.1 JCC Meeting

In total five JCC meeting were held during the project period.

(1) First JCC meeting

The first JCC meeting was held on 24th September, 2014, 08:40-10:10 in 216 Conference Room, Department of Broadcasting Services, Mass Media Complex. The main discussion in the meeting was to approve work plan that was discussed prior to the meeting. The list of participants are shown in Table 2.1.3.3.1-1

Table 2.1.3.3.1-1 List of Participant to the first JCC

No	Name	Position	Org
Botswana side			
1	Mr. Mogomotsi Kaboeamodimo	Deputy Permanent Secretary (DPS), Ministry of State President	DBS
2	Mr. Zibani R.S. Makali	Acting General Manager Engineering	
3	Mr. Kabo Dikolob	Chief Broadcast Engineer	
4	Mr. Calvin Goiletswe	Principal Broadcast Engineer	
5	Mr. Solly Nedeng	Head of Programmers	
6	Ms.Lorato Ntuara	Copy Right Administrator	

No	Name	Position	Org
7	Ms.Salome Senome	Executive Producer	
8	Ms. Linet Habana	Assistant Commissioning Editor	
9	Mr. Edson Malebane	Head Channel Controller	
10	Mr. Bathopi Luke	Director Technical Services	BOCRA
11	Mr. Itumeleng Batsalelwang	National Digital Terrestrial Television Expert	
12	Mr. Samuel Mpaesele	Manager Maintenance and Monitoring	
Japanese side			
1	Mr. Yasuaki Aihara	Assistant Representative	JICA/JOCV Botswana Office
2	Mr. Naoaki Nambu	Team Leader/Broadcast Policy & Strategy	JET
3	Mr. Katsuya Terabayashi	Deputy Team Leader/Institution/Training Plan 1	
4	Mr. Yoshiki Maruyama	ASO Plan/Technical Standards 1	
5	Mr. Akira Saito	Technical Standards 2	
6	Ms. Keiko Uchiumi	Public Relations Plan/Coordinator/Training Plan 2	
Observer			
1	Mr. Shinichi Sakurai	Japanese Embassy in Botswana	EOJ

The agenda for the first JCC meeting is shown in Table 2.1.3.3.1-2

Table 2.1.3.3.1-2 Agenda for the first JCC meeting

No	Time	Agenda	Charge
1	08:40-08:45	Opening Remarks	Mr. Mogomotsi Kaboeamodimo
2	08:45-08:55	Introduction of Participants	Participants
3	08:55-09:25	Report of the Progress of Digital Migration in Botswana	Mr. Calvin Goiletswe (DBS) Mr. Bathopi Luke (BOCRA)
4	09:25-09:40	Explanation of Modification to PDM and Work Plan and its approval	Mr. Katsuya Terabayashi (Deputy team leader JET)
5	09:40-09:50	Introduction and approval of Members of WG	Mr. Solly Nadeng (Head of Programmers)
6	09:50-10:00	Introduction of Logo and Short Name and their approval	Mr. Katsuya Terabayashi
7		AOB:	
8	10:00-10:05	Remarks	Mr. Yasuaki Aihara (JICA)
9	10:05-10:10	Closing Remarks	Mr. Mogomotsi Kaboeamodimo

The main points discussed and agreed is the followings.

- Work plan and PDM were agreed
- Members of each WG were officially assigned
- Short mane and logo of the Project were approved as “DiMT” abbreviates “Digital Migration for

Television" The logo is shown in Figure 2.1.3.3.1-1

- Project Director, Project Manager and Deputy Project Manager were assigned as the followings.
  - Project Director : Ms. Kebonye Moepeng, Permanent Secretary, MSP
  - Project Manager : Mr. Mogomotsi Kaboeamodimo, Deputy Permanent Secretary, MSP
  - Deputy Project Manager : Mr. Calvin Goiletswe, Principal Engineer, DBS

Figure 2.1.3.3.1-1 Logo of the Project

(2) Second JCC meeting

The second JCC meeting was held on 20th March 2015, 08:30-11:40 in 216 Conference Room, Department of Broadcasting Services, Mass Media Complex. The main discussion in the meeting was to fill in the figures in Objectively Verifiable indicators in PDM. The list of participants are shown in Table 2.1.3.3.1-3

Table 2.1.3.3.1-3 list of Participant to the second JCC

No	Name	Position	Org
Botswana side			
1	Mr. Mogomotsi Kaboeamodimo	Deputy Permanent Secretary, Ministry of State President	DBS
2	Ms. Bontle Mogotlhwane	General Manager, BTV	
3	Mr. Zibani R.S. Makali	Acting General Manager Engineering	
4	Mr. Kabo Dikolob	Chief Broadcast Engineer-BTV Studios	
5	Mr. Calvin Goiletswe	Chief Broadcast Engineer deputy Project Manager, leader of Technology and Licensing WG	
6	Mr. Solly Nageng	Head of Programmer, leader of HD program production WG	
7	Ms. Lorato Ntuara	Copy Right Administrator, leader of Public relations WG	
8	Ms. Salome Senome	Executive Producer, leader of Data broadcasting WG	
9	Mr. Edson Malebane	Head Channel Controller, leader of Programing WG	
10	Mr. Itummeleng Mmusi	Member of Public Relations WG	
11	Mr. Earnest Sgokotlo	HD studio trainee	
12	Mr. Didibeng Modisenyane	Chief broadcasting engineer-TX	
13	Mr. Joel Thuto	Technical Director in Operations	
14	Mr. Bathopi Luke	Director Technical Services	BOCRA

No	Name	Position	Org
15	Mr. Tebogo Ketshabile	Spectrum management engineer	
Japanese side			
1	Mr. Akihiko Hoshino	Residential Representative	JICA/JOCV Botswana Office
2	Mr. Yasuaki Aihara	Assistant Representative	
3	Mr. Naoaki Nambu	Team Leader/Broadcast Policy & Strategy	JET
4	Mr. Katsuya Terabayashi	Deputy Team Leader/Institution/Training Plan 1	
5	Mr. Akira Saito	Technical Standards 2	
6	Ms. Keiko Uchiumi	Public Relations Plan/Training Plan2/Coordinator	
7	Ms. Chiaki Matsumoto	HD Program Production	
8	Mr. Susumu Sato	Data broadcasting Contents Production	
9	Ms. Oreneile, M Matsetse	Public Relations/Facilitator	
10	Mr. Kabelo, Nkwane	Transmitter Engineer	

The agenda for the second JCC meeting is shown in Table 2.1.3.3.1-4

Table 2.1.3.3.1-4 Agenda for the second JCC meeting

No	Time	Agenda		Charge
1	08:30-08:35	Opening Remarks		Mr. Mogomotsi Kaboeamodimo
2	08:35-08:40	Introduction of Participants		Participants
3	08:40-09:00	Progress Report from each WG	Technology and Licensing WG	Mr. Calvin Goiletswe (Mr. Akira Satio)
4	09:00-09:20		Public Relations WG	Ms. Lorato Ntuara (Ms. Keiko Uchiumi)
5	09:20-09:40		HD Program Production WG	Mr. Solly Nadeng (Ms. Chiaki Matsumoto)
6	09:40-10:00		Programing WG	Mr. Edson Malebane (Mr. Masatoshi Sano)
7	10:00-10:20		Data Broadcasting WG	Ms. Salome Senome (Mr. Susumu Sato)
8	10:20-10:40	HD studio training in Japan		Mr. Ernest Segokotlo
9	10:40-11:00	BOCRA		Mr. Bathopi Luke
10	11:00-11:10	Tea Break		
11	11:10-11:30	Review of Activities and PDM indicator		DiMT Project (Mr. Katsuya Terabayashi)
12	11:30-11:35	AOB		
13	11:35-11:40	Closing Remarks		Mr. Mogomotsi Kaboeamodimo

The main points discussed and agreed are the followings.

1) Technology and Licensing WG

It was explained that the installation of transmitters will be conducted according to four clusters set by DBS. Digital broadcasting will be available from the site that has completed the installation

works. ASO schedule has been tentatively set in March, 2016. ASO criteria have been introduced which uses the population coverage of digital broadcasting and penetration of digital receiver as indicators.

2) Public Relations WG

The progress has been reported on the mall event and TV, the Radio and Daily news adverts. The demarcation has been discussed between the local consultant companies of public education on the migration by the tender project and JICA project.

3) HD Program Production WG

It was explained that at the first training period, digital migration is taken up to produce feature news which also is used as a tool for public relations activity. During the second training period, edutainment program that takes advantage of HD format will be produced to promote HD programs. In the final training period, football game will be produced that takes advantage of HD format and Data broadcasting.

4) Programing WG

The objective of the market survey was introduced. The market survey has been conducted and scheduled with public relations activities on 13th, 14th and 20th and 21st March in popular shopping malls. The questionnaire was mainly aimed at producing program schedule for digital broadcasting. The result of the market survey has been presented.

5) Data Broadcasting WG

The section to produce Data broadcasting has been presented. The number of staff members and their professions has been introduced. Where the section is situated in the current organizational structure is not fixed yet. Given the fact that the government is downsizing its operation, the members are suggested to be filled from the current DBS staff members.

(3) Third JCC meeting

The third JCC meeting was held on 10th September, 2015, 08:30-11:40 in Cresta Riley's Hotel in Maun. The main discussion in the meeting was to conduct the interim review of the Project and amend PDM to add three activities of 1. To establish a test centre for appropriate receivers penetration, 2 To develop viewers support through a call centre operation and 3. To develop procurement plan of HD studio systems.

Table 2.1.3.3.1-5 List of Participant to the third JCC

No	Name	Position	Org
Botswana side			
1	Mr. Mogomotsi Kaboeamodimo	Deputy Permanent Secretary, Ministry of State President	DBS

No	Name	Position	Org
2	Ms. Bontle Mogotlhwane	General Manager, BTV	
3	Ms. Keitirele Mathapi	General Manager, Radio	
4	Mr. Kabo Dikolob	General Manager, Engineering	
5	Mr. Calvin Goiletswe	Chief Broadcast Engineer deputy Project Manager, leader of Technology and Licensing WG	
6	Mr. Solly Nageng	Head of Programmer, leader of HD program production WG	
7	Ms. Lorato Ntuara	Copy Right Administrator, leader of Public relations WG	
8	Ms. Salome Senome	Executive Producer, leader of Data broadcasting WG	
9	Mr. Joel Thuto	Head Channel Controller, leader of Programing WG	
10	Ms. Linet Habana	HD program production WG	
11	Mr. Thomas Malesela	Transmission Engineer, DBS	
12	Mr. Aron Nyelesi	Deputy Director Corporate Communications	BOCRA
13	Mr. Itumeleng Batsalelwang	Digital Terrestrial Television Expert	
14	Mr. Tebogo Ketshabile	Spectrum management engineer	
Japanese side			
1	Mr. Yasuaki Aihara	Assistant Representative	JICA/JOCV Botswana Office
2	Mr. Naoaki Nambu	Team Leader/Broadcast Policy & Strategy	JET
3	Mr. Katsuya Terabayashi	Deputy Team Leader/Institution/Training Plan 1	
4	Ms. Keiko Uchiumi	Public Relations Plan/Training Plan2/Coordinator	
5	Ms. Chiaki Matsumoto	HD Program Production	
6	Ms. Oreneile, M Matsetse	Public Relations/Facilitator	
7	Mr. Kabelo, Nkwane	Transmitter Engineer	
Observer			
1	Mr. Akio Yamamoto	Japanese Embassy in Botswana	EOJ

The agenda for the third JCC meeting is shown in Table 2.1.3.3.1-6

Table 2.1.3.3.1-6 Agenda for the third JCC meeting

No	Time	Agenda		Charge
1	09:30-09:45	Opening Remarks		Mr. Mogomotsi Kaboeamodimo
2	09:45-09:50	Introduction of Participants		Participants
3	09:50-10:20	Progress Report from each WG	Technology and Licensing WG	Ms. Lorato Ntuara
4	10:20-10:50		Public Relations WG	Mr. Calvin Goiletswe
5	10:50-11:10		HD Program Production WG	Mr. Solly Nageng
6	11:10-11:35		Programing WG	Mr. Joel Thuto
7	11:35-11:55		Data Broadcasting WG	Ms. Salome Senome
8	11:55-12:10	HEALTH BREAK		
9	12:10-12:45	Review of Activities and revision of PDM		Mr. Katsuya Terabayashi

10	12:45-13:00	AOB	
11	13:00-13:10	Remarks from JICA	Mr. Yasuaki Aihara
12	13:10-13:15	Closing Remarks	Mr. Mogomotsi Kaboeamodimo

The main points discussed and agreed are the followings.

1) Public Relations WG

The public relations WG gave a report of the activities carried out from April to date as the last JCC was held in March. It was reported that three companies namely Geoflux, Pego and Vertigo have been engaged on a yearlong contract individually to provide public education for Batswana about digital migration. They have been divided into three clusters according to the districts with Vertigo taking South East area, Pego under South West/North West and Geoflux assigned North East/Central. The issue of the call centre establishment is reported as it is at an advanced stage of development and expected to be functional in about six weeks. The boardroom in mass media, ground floor has been identified as the base for the call centre. The challenge faced in the WG is that they do not have answers to most of the questions posed by callers on a daily basis mostly about availability of STBs. Recommendations as the answers made were that the local companies implementing the public relations activities and the member of the WG be updated regularly to ensure correct information dissemination.

2) Technology and Licensing WG

The progress of preparation of digital broadcasting network has been reported that there are about forty five transmitting stations which have been divided into four clusters and installations are being done by the supplier at the stations.

Currently, five transmitting stations are in digital transmission operation and totally twenty transmitters have been installed including five operated transmitters.

Details of the draft ASO plan which has been presented to the WG and the WG have not been concluded while the tentative date for ASO is December 2016. The target ASO has not been fixed due to lack of receivers in the market, no policy provision on the STB and the service coverage is not yet known. The ASO criteria have been prepared and they has been decided that the service coverage of the population has to be 80 % of the current analogue coverage. For the penetration of receivers, DBS will go with the agreed 65 % set based on the agreement with SADC countries.

3) HD Program production WG

The progress of program production has been reported that the WG has produced a 15 minutes long news feature programme. In this feature the history of the concept of digital migration in Botswana, introduction of the digitalization, and the reason Botswana adopted the Japanese standard ISDB-T system have been introduced. The programme was broadcasted in June and was repeated thrice. The interviews of the representatives from the two governments Botswana and Japan as well as

BOCRA were included.

The WG is currently working on the second informational feature which is intending to look at the latest information post June 17, penetration effect of the public relations activities, feedback on the pilot project and the feedback from the people who are enjoying the digital broadcast.

The WG is also collaborating with the Department of Forestry and Range Resources to produce several 5 minutes long edutainment programme which will be broadcasted at the end of September. The crew has filmed the veld fire drilling in June, just completed filming a couple of the projects in Kgalagadi district and will continue filming around the country, including Maun area.

The technical issues of HD program production facility were raised such as HD footage storage and a HD OB van for the production of a live football game and working in collaboration with the data casting and sport section at BTV. At the moment BTV does not have a HD post-production facility, as well as an OB van in HD format, however, the initiative is ongoing to hire or acquire it for the football game.

Production Manuals do not exist at BTV and the staff usually learns how to produce programmes from the experience or senior staff. Therefore, proper manuals are planned to be completed by May, 2016. Materials in each step of the production that can help the members to organize their production have been prepared by JET and have been introduced to the members and how to use and apply the materials have been explained. The materials include a programme proposal sheet, a shot list, a shooting schedule, news check list, and some examples.

4) Programming WG

A small marketing survey was made during the public relations activities at the malls to try and understand viewing pattern and preferences of people watching BTV and profiling.

The result of the survey was collected and made a report as one of the deliverables of the technical corporation project. The summary of the report was reported with challenges and recommendations on how to make use of the report for programing schedule of BTV after digital migration.

5) Data broadcasting WG

The current structure and operation of the data broadcasting unit has been reported as it has nine core members currently and in total twenty eight officers will be required to make the unit fully operational.

The ongoing installation of equipment and preparation of facility was reported. With regard to data casting equipment, it will be completed with its installation by the end of September.

6) Review of Activities and Revision of PDM

The objective of the review was explained by JET and the achievement of each activity was analyzed as those will achieve expected results by the end of the Project.

It was examined whether the achievement of each activity will lead the Project to achieve Project Purpose. The current status of evaluation criteria for the Project was reported as to make those in higher marks by the end of the Project.

Table 2.1.3.3.1-7 Evaluation of Each Criteria

Nr	Criteria	Evaluation	Reasons
1	Relevance	High	The Project is highly relevant for both governments in terms of its development plan and aid policy.
2	Effectiveness	Need to be monitored	Though each activity is likely to achieve an expected result by the end of the Project, Project Purpose is not yet certain to be achieved. The indicator of the recognition of Data broadcasting and HD program human facility and human resources needs additional efforts to be met.
3	Efficiency	Middle	Some activities are delayed despite that the planned inputs has been done. There are some cases where the counterparts in Botswana are not available and active to the activities of the WGs.
4	Impact	Need to be monitored	It needs to be monitored what impact the achievement of activity and the project purpose have on the overall goal.
5	Sustainability	Need to be monitored	Issues such as Data broadcasting unit and the call centre need to be monitored whether they continue to expand their operations.

The revision of PDM has been proposed based on the result of the review on the progress. Additional activities were proposed in order to make the achievement of Project Purpose more certain and the evaluation of the Project higher. Those activities were subsequently agreed by the Minutes of Meeting signed on 14th September, 2016.

Table 2.1.3.3.1-8 Additional Activities

Nr	Criteria	Reasons
1	To establish a test center for appropriate receivers penetration	To facilitate the penetration of digital receivers that has Datacasting functions to contribute to the achievement of the indicator of the project purpose.
2	To develop viewers support through a call centre operation	To facilitate the penetration of digital receivers by providing detailed support to the viewers.
3	To develop procurement plan of HD studio systems	To facilitate the procurement process of HD facilities in order for those HD programmes produced in the Project to be broadcasted in HD quality.

(4) Fourth JCC meeting

The fourth JCC meeting was held on 22nd April, 2016, 07:30-08:30 in Room 216, Department of Broadcasting Services, Multi Media Complex. The main discussion in the meeting was to confirm the degree of achievement of each activity and project purpose and confirm the works left for the rest project period.

Table 2.1.3.3.1-9 list of Participant to the fourth JCC

No	Name	Position	Org
Botswana side			
1	Mr. Mogomotsi Kaboeamodimo	Deputy Permanent Secretary, Ministry of State President	DBS
1	Mr. Calvin Goiletswe	Chief Broadcast Engineer deputy Project Manager, leader of Technology and Licensing WG	
2	Mr. Solly Nageng	Head of Programmer, leader of HD program production WG	
3	Ms. Salome Senome	Executive Producer, leader of Data broadcasting WG	
4	Mr. Joel Thuto	Head Channel Controller, leader of Programing WG	
5	Ms. Linet Habana	HD program production WG	
6	Mr. Thomas Malesela	Transmission Engineer, DBS	
7	Ms. Constance Kolaatamo	Broadcasting Engineer, Technology & Licensing WG	
8	Mr. Samuel Mpaesele	Manager	BOCRA
9	Mr. Tebogo Ketshabile	Spectrum management engineer	
Japanese side			
1	Mr. Akihiko Hoshino	Residential Representative	JICA
2	Mr. Yasuaki Aihara	Assistant Representative	
3	Mr. Naoaki Nambu	Team Leader/Broadcast Policy & Strategy	JET
4	Mr. Katsuya Terabayashi	Deputy Team Leader/Institution/Training Plan 1	
5	Ms. Keiko Uchiumi	Public Relations Plan/Training Plan2/Coordinator	
6	Ms. Chiaki Matsumoto	HD Program Production	
7	Mr. Susumu Sato	Data Broadcasting Content	
8	Mr. Satoshi Hamanaka	Test Centre Operation	
7	Ms. Oreneile, M Matsetse	Public Relations/Facilitator	
8	Ms. Condy Uapingena	Program production	
9	Mr. Kabelo, Nkwane	Transmitter Engineer	
Observer			
1	Mr. Akio Yamamoto	Japanese Embassy in Botswana	EOJ

The agenda for the fourth JCC meeting is shown in Table 2.1.3.3.1-10

Table 2.1.3.3.1-10 Agenda for the fourth JCC meeting

No	Time	Agenda	Charge
1	07:30-07:40	Opening Remarks	Mr. Mogomotsi Kaboeamodimo
2	07:40-07:50	PDM revision	Mr. Katsuya Terabayashi (Deputy Team Leader of JET)
3	07:50-08:10	Achievement of each activity and project purpose	
4	08:10-08:15	AOB	
5	08:15-08:20	Closing Remarks	Mr. Mogomotsi Kaboeamodimo

The main point discussed was whether each activity will complete by the end of the Project and the project purpose is achievable at the end of the Project. It was concluded that the indicators of project purpose are not met yet because important assumption has been materialized. If the important assumptions are cleared, the indicator will be met. Therefore at the end of the project, if we complete each activity and produce outputs, the project can be concluded with the expected outputs

(5) Fifth JCC meeting

The last JCC meeting was held on 29th June, 2016, 08:30-10:40 in Room 216, Department of Broadcasting Services, Multi Media Complex. The achievement of the Project was confirmed and the action toward overall goad was discussed.

Table 2.1.3.3.1-11 List of Participant to the fifth JCC

No	Name	Position	Org
Botswana side			
1	Mr. Lesole Obonye	Director, Ministry of State President	DBS
2	Ms. Bontle Mogotlhwane	General Manager BTV	
3	Ms. Keitirele Mathapi	General Manager Radio	
4	Mr. Kabo Dikolobe	General Manager Engineering	
5	Mr. Calvin Goiletswe	Chief Broadcast Engineer deputy Project Manager, leader of Technology and Licensing WG	
6	Mr. Solly Nageng	Head of Programmer, leader of HD program production WG	
7	Ms. Salome Senome	Executive Producer, leader of Data broadcasting WG	
8	Mr. Joel Thuto	Head Channel Controller, leader of Programing WG	
9	Mr. Zibani Makali	Chief broadcasting engineer	
10	Mr. Bathopi Luke	Director Compliance	BOCRA
Japanese side			
2	Mr. Yasuaki Aihara	Assistant Representative	JICA
3	Mr. Naoaki Nambu	Team Leader/Broadcast Policy & Strategy	JET
4	Mr. Katsuya Terabayashi	Deputy Team Leader/Institution/Training Plan 1	
5	Ms. Keiko Uchiumi	Public Relations Plan/Training Plan2/Coordinator	
6	Ms. Oreneile, M Matsetse	Public Relations/Facilitator	
7	Ms. Condy Uapingena	Program production	
8	Mr. Kabelo, Nkwane	Transmitter Engineer	
Observer			
1	Mr. Akio Yamamoto	Japanese Embassy in Botswana	EOJ

The agenda for the fifth JCC meeting is shown in Table 2.1.3.3.1-11.

Table 2.1.3.3.1-12 Agenda for the fifth JCC meeting

	Time	Items	Presenter
1	08:30-08:35	Opening Remarks	Mr. Mogomotsi

	Time	Items		Presenter
				Kaboeamodimo
	08:35-08:45		Public Relations WG	Ms. Lorato Ntuara
2	08:45-09:20	Final Report from each WG / Subject	Technology and Licensing WG	Mr. Calvin Goiletswe
				BOCRA (TBD)
4	09:20-09:30		HD Program Production WG	Mr. Solly Nageng
5	09:30-09:40		Programing WG	Mr. Joel Thuto
6	09:40-09:50		Data Broadcasting WG	Ms. Salome Senome
7	09:50-10:10	Result of the final review and after completion		DiMT Project
8	10:10-10:20	AOB		
9	10:20-10:25	Closing Remarks		Mr. Naoaki Nambu
10	10:25-10:30			Mr. Akio Yamamoto
11	10:30-10:35			Mr. Yasuaki Aihara
10	10:35-10:40			Mr. Luke Bathopi

The progress and achievement of activity was reported by the leader of WG and achievement of outputs and project purpose were confirmed by using the objectively verifiable indicators. For outputs, all indicators are satisfied while project purpose did not satisfy the figure in the indicator. This was affected by the penetration of digital receivers to the households. Recommendations were made in order to achieve overall goal.

2.1.3.3.2 Participation to Joint Task Force meeting

The Join Task Force is established when the Memorandum of Understanding with the Republic of Botswana on cooperation in digital terrestrial television broadcasting is singed on July 17th 2013. The Ministry of internal affairs and communications in Japan and the Ministry of state president co-worked to smoothly introduce digital terrestrial television broadcasting in Botswana. Since that the meeting was held three times of which one was held during the project period. The third JTF meeting was held on the 15th day of April, 2015 in Botswana where Japanese experts were invited as observers. The fourth JTF meeting was held on the 8th day of July, 2016 in Japan.

(1) Third JTF meeting

The meeting was held between 09:00 and 11:00. The agenda of the meeting is shown below.

Table 2.1.3.3.2-1 Agenda for third JTF meeting

No	Time	Agenda	Charge
1	09:00-09:05	Welcome and Opening Remarks	DPS, Mr. Kaboeamodimo
2	09:05-09:10	Remarks	DG, Mr. Mori
3	09:10-09:30	Presentation 1	DBS, Mr. Dikorobe
4	09:30-09:50	Presentation 2	BOCRA, Mr. Luke
5	09:50-10:10	Successful Experience of Analog Switch-OFF	MIC, Mr. Kato

6	10:10-10:30	ISDB-T Technical Cooperation by ARIB/DiBEG	ARIB, Mr. Fujimoto
7	10:30-10:45	Discussion	Joined by all
8	10:45-10:50	Any matters arising	
9	10:50-11:00	Closing Remakrs	
10	11:00-12:30	Facility tour (Media complex)	
11	12:30-13:30	Lunch	
12	13:45-14:15	Facility tour (Sebele station)	

The progress of digital migration was presented from the Botswana side, while the Japanese successful experience of ASO was presented

(2) Fourth JTF meeting

The fourth JTF meeting was held in Japan on the 8th day of July 2016. The agenda of the meeting is shown below.

Table 2.1.3.3.2-2 Agenda for fourth JTF meeting

No	Time	Agenda	Charge
1	10:00-10:05	Opening Remarks	MIC
2	10:05-10:10		DBS
3	10:10-11:10	Progress report on ISDB-T	MIC
		Measures for distributing receiver equipment including STB	MIC
		ISDB-T International forum technical harmonization documents	ARIB/DiBEG
		Principal measures for analogues switch off	A-PAB
4	11:10-11:30	Progress report on implementation of digitalization in Botswana	DBS
5	11:30-11:50	Future cooperation between Botswana and Japan on digitalization	DBS MIC JICA ARIB/DiBEG Yachiyo Engineering
6	11:50-12:00	Closing Remarks	MIC

The main theme of the meeting was the promotion of digital receivers. Various measures experienced in Japan to promote receivers including subsidies, incentives were presented, while the Botswana side also presented the progress, issues to be addressed and risks that were arising with regard to digital receiver penetration.

2.1.3.3.3 Relations with other agencies and organizations

(1) National disaster management office

One of the features of ISDB-T is the early warning broadcasting system that transmit alarm to the

viewers by automatically switching on the television and make alarming sounds and send messages. The national disaster management office shows interest in this function and valued it. The Project closely worked with the office and set the area code which is included in the ISDB-T standards of Botswana.

(2) Other government ministries and agencies

Data broadcasting needs the source of data to produce. It was decided that news, sports, weather, market information are upgraded daily. The mechanisms are prepared to obtain information from the source organizations.

(3) Other project

As a part of HD program production, the Project decided to take up the activities of department of forestry range resources. In total two short documentary program were produced, which contributed to promote the activities of DFRR and informed the importance of forest conservation to the public.

2.2 Achievement of the Project

2.2.1 Outputs and Indicators (Target values and actual values achieved at completion)

2.2.1.1 Achievements of activities related to Output 1

Output 1 is defined as "Various plans and systems necessary for migration to digital broadcasting are developed", where the main focus was placed to produce necessary document to smoothly implement digital migration. ASO plan was first addressed to set the target. It also includes DSO schedule and relations with other relevant activities such as public relations activities. Technical standards were produced that are necessary to define the specifications of equipment and technical compatibility between transmitters and receivers. By this technical standards, broadcasting stations, manufacturers and consumers can operate and use under the same understanding. Pertaining to this technical standards, test centre manual was produced by which digital receivers are tested by BOCRA whether the device matches technical specifications of BOCRA and is safe and technically usable in Botswana. Public relations plan was also the indicator of output 1, later according to the plan, the actual activities were implemented. The status of achievement for each activity related to Output 1 is shown in Table 2.2.1.1-1. The contents and significance of those plans and systems are understood by the members of the WGs and C/Ps though the process of producing documents. Since the indicators were all met, output 1 was considered to be achieved.

Table 2.2.1.1-1 Status of Achievement for Output 1

Activity	Objectively Verifiable Indicator	Means of Verification	Status of Achievement for Objectively Verifiable Indicator
1-1 To establish Technology and Licensing WG, Public Relations WG			Technology and Licensing WG with 11 members, Public Relations WG with 6 members were established. Both are active throughout the project period.
1-2 To prepare ASO plan	1-1 ASO plan is developed	1-1 ASO plan	ASO plan has been developed and approved by the WG and approved.

Activity	Objectively Verifiable Indicator	Means of Verification	Status of Achievement for Objectively Verifiable Indicator
1-3 To review ISDB-T Standards of Botswana	1-2 Botswana ISDB-T Standards is developed	1-2 Botswana ISDB-T Standards	The document has been approved as ISDB-T Standards of Botswana by BOCRA and is available on BOCRA's website.
1-4 To review specifications of receivers	1-3 Specifications of receivers is prepared	1-3 Specifications of receivers	Technical Specifications for Set top box (STB), Integrated Digital Television (IDTV) and Mobile and Portable device have been approved and are available in BOCRA's
1-5 To review terrestrial broadcasting licensing criteria	1-4 Terrestrial broadcasting station licensing criteria are developed	1-4 Terrestrial broadcasting station licensing criteria	The document was excluded from the deliverable of the Project. After public consultation, BOCRA published the document as "Broadcasting License Application and assessment procedure"
1-6 To develop Draft public relations plan for digital migration	1-5 Draft public relations plan is developed	1-5 Draft public relations plan	Public relations plan has been developed by the WG and approved.
1-7 To conduct public relations activities in accordance with the draft public relations plan			The project organized the digital migration seminar in three major cities in Botswana and provided support and expertise to the local service suppliers who were contracted to conduct public relations activities. 86.3% of the population knows about digital migration at the end of the Project.
1-8 To establish a test centre for compliance with set specifications and receivers penetration assurance	1-6 Operation manual for the test centre is prepared	1-6 Operation manual for test centre	The test centre manual has been developed by BOCRA and JET and approved by BOCRA.
1-9 To develop viewer's support through a call centre operation	1-7 Operation manual for the call centre is prepare	1-7 Operation manual for call cenre	The call centre manual has been developed by the WG and approved. Based on the manual, the training was conducted to the staff members who are going to be assigned as a manager and operators of the call centre to manage viewer's support.

2.2.1.2 Achievement of activities related to Output 2

Output 2 was defined as "DBS's capacity of producing programs including High Definition (HD and data broadcasting is improved. The focus was placed on HD program production and data broadcasting. Both are

the features of digital broadcasting. This output was addressed mainly from two perspectives. One is to provide OJT training to actually produce programmes, the other is to produce manuals by which the staff members of DBS can conduct in-house training and improve program production skills. The status of achievement for each activity related to Output 1 is shown in Table 2.2.1.2-1. Since all the indicators are met. It was considered that outputs 2 was achieved.

Table 2.2.1.2-1 Status of Achievement for Output 2

Activity	Objectively Verifiable Indicator	Means of Verification	Status of Achievement for Objectively Verifiable Indicator
2-1 To establish Program production WG, Programing WG and Data Broadcasting WG			Program production WG with 10 members, Programing WG with 9 members and Data broadcasting WG with 13 members were established. All of them are active throughout the project period.
2-2 To develop HD program production capability	2-2 HD program production manual is developed	2-2 HD program production manual	HD program production manual has been developed by the WG and approved.
2-3 To establish a section that produces Data broadcasting program	2-1 Sections that handle data broadcasting are established in BTV	2-1 BTV Organization chart	The section has been established under the channel control section and operational. The chart is shown in the training plan for data broadcasting program
2-4 To develop a training system for producing Data broadcasting program	2-3 A training system for producing data broadcasting program is established	2-3 Training plan for data broadcasting program	Training plan for data broadcasting program has been developed by the WG and approved.
2-5 To develop programming plan of digital broadcasting, including Data broadcasting, based on the market needs survey			The result of the market survey for data broadcasting has been developed by the WG and approved, including program schedule.
2-6. To plan and produce program-non-linked Data broadcasting	2-4 Program-linked and non-linked data are broadcasted	2-4 Broadcasting program schedule	Program non-linked data broadcasting contents, program infor, weather, market, news & current affairs, sports, and four program linked data broadcasting contents, Flava dome, Silent shout, Talk back, Molemo Wa Kgang, were produced and broadcasted
2-7 To develop	2-5 Procurement	2-5 Procurement	Procurement plan of HD studio

Activity	Objectively Verifiable Indicator	Means of Verification	Status of Achievement for Objectively Verifiable Indicator
procurement plan of HD studio systems	plan of HD studio system is developed	plan of HD studio systems	systems has been developed by the WG and approved.

2.2.2 Project Purpose and Indicators (Target values and actual values achieved at completion)

Project Purpose is "Environment for the terrestrial digital broadcasting that takes advantage of the features of ISDB-T is ready". Recognition rate of data broadcasting was adopted as one of the indicators of project purpose since DBS gave significance on it as a new service of digital broadcasting. the baseline survey was conducted in order to fulfil the number. 34% was calculated from the percentage of household that possesses television multiplied by the percentage of people who answered that they would use data broadcasting if available.

Table 2.2.2-1 Status of Achievement for Project Purpose

Objectively Verifiable Indicator	Status of Achievement for Objectively Verifiable Indicator
1. 34% or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV).	• According to the customer sample survey 14.2% of customer recognizes the data broadcasting of BTV at the end of the Project. • With regard to the percentage of viewer who answered that they would like to use the data broadcasting service, improvement was observed about 30% from 59% to 89.8% during the project period.
2. Facilities and human resources planned as necessary for producing and broadcasting HD programs based on ISDB-T data broadcasting are developed	• Data broadcasting unit has been established and equipment was procured. • Digital terrestrial broadcasting network is developed • Training was provided both in Botswana and Japan in HD program and data broadcasting contents production. • HD studio system is being procured

The customer sample survey was conducted before the end of the Project. The survey period was for one week and conducted in four different areas, Gaborone, Francistown, Kasane, Hukuntsi. Surveyors conducted hearing in shopping malls, schools and other public places with the questionnaire paper and write the answer from the interviewees In total 373 questionnaires were collected of which the number of population is 343.964. The survey revealed that only 14.2 % of the people in Botswana know about data broadcasting. It is understandable because digital receivers are not available in Botswana yet.

At the time of baseline survey, digital broadcasting and receivers were not available in Botswana. There is no available data on the recognition of data broadcasting since there was no viewer who knows about digital migration or data broadcasting due to the delay of public relations activities and installation of digital receivers for demonstration purpose. The figure 34 % was calculated from the result of census and baseline survey conducted during the demonstrations and seminars of public relations activity. According to the census, 56.8% of households possess a television set. And as a result of the questionnaires distributed during the

demonstrations and seminars taking place in March and April, 2014, 59% of visitors answered that data broadcasting is useful. During the public relations activities, data broadcasting was one of the services promoted as a particular service for digital broadcasting. About 500 questionnaires were distributed during this two months of baseline survey of which approximately 430 were effective. The figure 34% was agreed based on the assumption that the viewer who currently possesses analogue broadcasting watches digital one at the end of Project. The recognition rate of 34% stems from penetration of television, 56.8% multiplied by the expectation of data broadcasting 59%.

Measures were discussed in the public relations plan in order to promote digital receivers. Distribution of STB, provision of subsidies to lower income families were discussed to make it easier for the viewer to purchase digital receivers and reduce the risks of manufacturers and retailers to bring digital receivers to the Botswana market. However those measures proposed were not taken up at the government level and did not materialize. Due to the lack of digital receivers, public relations activities particularly demonstrations and seminars were affected of their effectiveness. During the demonstrations and seminars, questions were raised when and where the receivers will be purchased. Concrete answer to the question was not given at the time of demonstrations and seminars, which also hinders the increase in the recognition rate of data broadcasting.

However the survey also showed the positive figures that 86% of the respondents know digital migration in Botswana and 89% answered they want to use data broadcasting, which improved approximately 31 % from the beginning of the Project. It suggests that PR activities and advertisement has had a good effect on the rise of the recognition of the digital migration and promotion of new services pertaining to ISDB-T standards. Figure 2.2.2-1 shows the result of the customer survey.

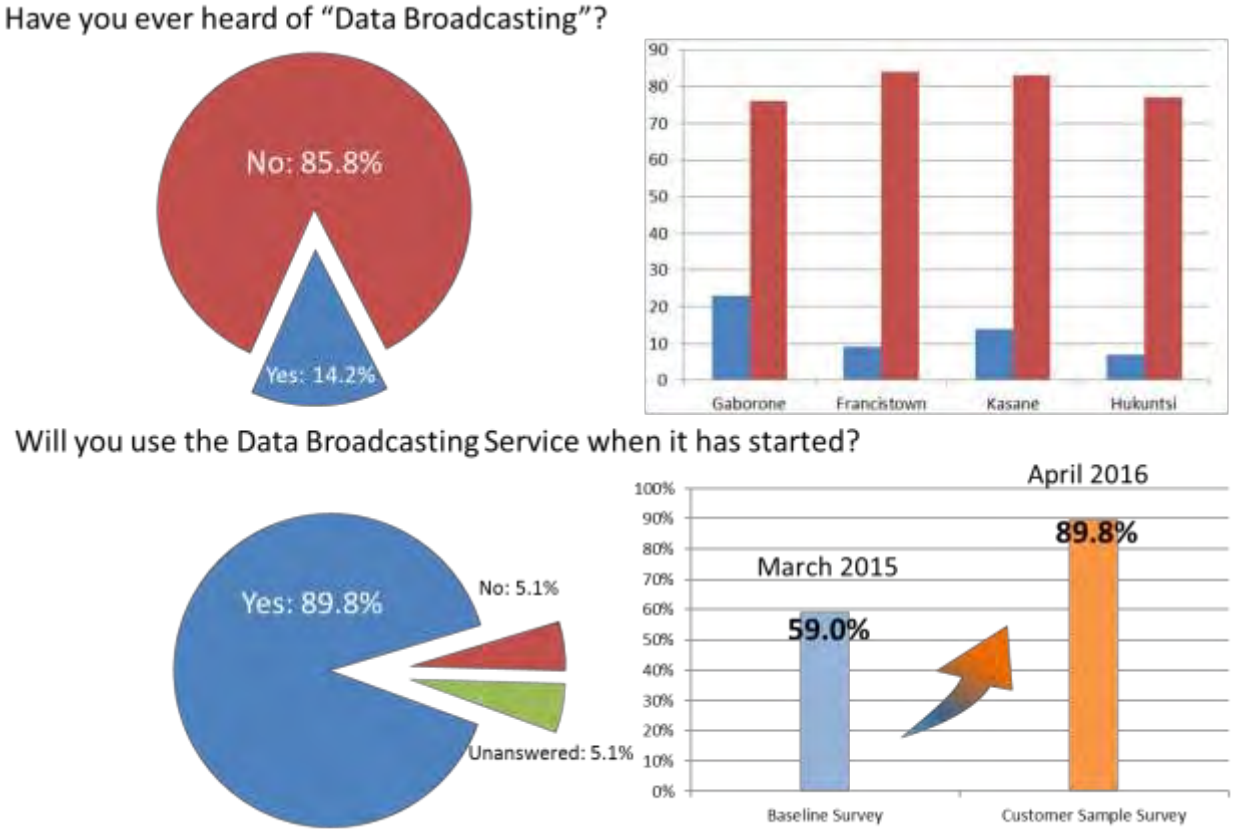


Figure 2.2.2-1 Result of the customer sample survey

The reason that the recognition rate of digital broadcasting was 14.2% and did not meet Objectively verifiable indicator is that digital receivers are not available in Botswana yet. Since data broadcasting is a new service as a television service, it is difficult for the viewers to understand without experiencing it. Given the high expectation that 89.8% of people responded that they would use the service once it has started, it is likely that the figure will be met if the digital receivers have become available. At the end of the Project, HD studio system was not completed yet. However the procurement plan was produced as one of the deliverables of the Project and if the system was procured according to the plan, it is considered that necessary facilities are prepared. With regard to the human resources for HD program production and Data broadcasting, HD studio training was conducted in Japan by inviting five studio engineers from BTV and on the job training was conducted in Botswana to produce HD program and data broadcasting contents. The training in Japan was effective. The training was taken place in the latest studio in the Nippon Television Network Corporation. Through the training, the participants leant the operation of HD studio systems and the skills and knowledge were transferred to other staff members in BTV. Later, the follow up and live sports program production training was conducted in Botswana, which improved HD program production knowledge of the staff members in BTV. In addition, two HD programs production were addressed during the project period where the members of WG produced one special feature news and four edutainment program. Although due to the lack of HD studio system, those were not edited and broadcasted in HD quality, the production skills were developed. With regard to the data broadcasting, training was conducted which includes not only the content production, but also planning, designing, operation of data broadcasting. In each stage, the format document was produced by which any member can understand the process. At the end of the project, staff members in the data broadcasting unit produces and updates 9 data broadcasting contents including program linked contents. From this observation, it is considered that necessary human resources for HD program production and data broadcasting were developed.

2.3 History of PDM Modification

PDM Version 0 was brought to Botswana at the beginning of the Project. Before the first JCC meeting, Work plan was intensively discussed to determine the scope and direction of the Project followed by the agreement in the first JCC meeting as Work plan and PDM Version. 1. PDM was revised four times during the project period. The last one is PDM Version 4 which was agreed in the fourth JCC meeting and used until the end of the Project. Table 2-3.1 shows PDM Version. 0.

Table 2.3-1 PDM Version. 0

Project Name：Implementation of the Digital Migration Project
Period of Implementation: July 2014 ～June 2016 **Target Group: Government Staff concerned with Implementation of Digital Migration**
Target Area: Whole Country of Botswana **Date: 12 Mar 2014**
Implementing Agency: Department of Broadcasting Services, Ministry of State President (DBS) **Ver. 0-7**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal			
Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available.	1. Terrestrial digital broadcasting service area covers 65% or more of Botswana (the target in NDP10). 2. * or more number of programs that linked with the data broadcasting contents are produced per year. 3. * or more number of High Definition (HD) programs are produced per year.	1. Radio Wave Measurement 2. Broadcasting Program Schedule 3. Broadcasting Program Schedulee	
Project Purpose			
Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready.	1. * % or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV). 2. Facilities and human resources planned as necessary for producing and broadcasting HD programs based on ISDB-T data broadcasting are developed.	1. Customer Sample Survey 2. Project Progress Report	• Developments of DTTB network and related equipment are executed as planned. • ISDB-T receivers are penetrated to households as planned.
Outputs			
1. Various plans necessary for migration to digital broadcasting are developed. 2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.	1-1 Roadmap towards Analogue Switch Off (ASO) is developed. 1-2 National Standards of Receivers are developed. 1-3 Terrestrial Digital Broadcasting Station Licensing Criteria are developed. 1-4 Public Relations Plan is developed. 2-1 Sections that handle data broadcasting are established in BTV. 2-2 HD Program Production Manual is developed. 2-3 A training system for producing data broadcasting program is established. 2-4 Program-linked and non-linked data are broadcasted.	1-1 ASO Roadmap 1-2 National Receiver Standards 1-3 Broadcasting Station Licensing Criteria 1-4 Public Relations Plan 2-1 BTV Organization Chart 2-2 HD Program Production Manual 2-3 Training plan for data broadcasting program 2-4 Broadcasting Program Schedule	• Various approval process by the concerned organizations are not delayed. • Staff received trainings does not resign the BTV.

Activities	Inputs		
1. Relative to various plans for digital migration 1-1 To establish Technology and Licensing Working Group, Public Relations Working Group 1-2 To review a roadmap towards ASO 1-3 To review technical standards related to ISDB-T 1-4 To develop regulations for terrestrial broadcasting station licensing criteria 1-5 To review Public Relations Plan for Digital Migration	Japanese Side 1. JICA Experts (1) Chief Advisor/Policy & Strategy (2) Institution/Training Plan (3) ASO Plan/Technical Standards (4) Public Relations Plan (5) HD Program Production (6) Data Broadcasting Contents Production (7) Data Broadcasting Programming 2. Equipment ・Data Broadcasting Contents Management System: 1 set 3. Training in Japan ・HD Studio Operations (Camera, Lighting, Audio, Video Engineer) ・Digital Terrestrial Television Broadcasting (DTTB) Training (including Data Broadcasting)	Botswana Side 1. C/P Personnel (1) Project Manager (2) Deputy Project Manager (3) Leader of Technology and Licensing Working Group (WG) (4) Leader of Public Relations WG (5) Leader of Program Production WG (6) Leader of Programming WG (7) Leader of Data Broadcasting WG 2. Members of Working Groups 3. Project Office for Experts (in both BOCRA and DBS) 4. Project Vehicles: 2 cars 5. Existing BTV's facilities and equipment that can be utilized for Terrestrial Digital Broadcasting 6. All equipment that should be procured during the Implementation Period of the Technical Cooperation Project for migration to ISDB-T	• C/P personnel continue to work on the Project. • Staff received trainings does not resign the BTV.
2. Relative to DBS's capacity of producing programs 2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcasting Working Group 2-2 To develop HD program production capability 2-3 To establish a section that produce data broadcasting program 2-4 To develop a training system for producing data broadcasting program 2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey 2-6 To plan and produce program-linked and non-linked data broadcasting			**Preconditions** • Relevant ministries and agencies are ready to cooperate for migration to terrestrial digital broadcasting.

2.3.1 PDM Version. 1

PDM Version 1 was agreed in the first JCC meeting. Table 2.3.1-1 shows the difference between PDM Version. 0 and 1. The major modifications are two of the document, ASO plan and public relations plan which were considered that there were drafts at the time of detailed design stage, did not exist. Therefore for those two documents, instead of reviewing, it was agreed that the Project produces from scratch. The other modification is that BOCRA requested that the support be provided to produce technical specifications for digital receivers, which BOCRA is mandated to produce to conduct type approval.

Table 2.3.1-1 Modifications in PDM from Version.0 to Version.1

Nr	Items modified	Version.0	Version.1	Reason
1	Activities 1-2	1-2 To review a roadmap towards ASO	1-2 To prepare ASO Plan	It was found that DBS does not have an official roadmap during the discussion over the work plan. The activity was modified to prepare instead of review.
2	Activities 1-3	1-3 To review technical standards related to ISDB-T	1-3 To review Botswana ISDB-T Standards	The activity was modified as it matches with an exact name of the document to be reviewed.
3	Activities 1-4		1-4 To review specifications of receivers	BOCRA requested that technical specifications for receivers be supported by the Project.
4	Activities 1-4	1-4 To develop regulations for terrestrial broadcasting station licensing criteria	1-5 To prepare terrestrial broadcasting station licensing criteria	The activity was modified as it prepares the document itself since it does not have related regulations without the criteria itself.
5	Activities 1-5	1-5 To review Public Relations Plan for Digital Migration	1-6 To develop draft Public Relations Plan for Digital Migration	It was found that DBS does not have an official public relations plan during the discussion over the work plan. The activity was modified to develop instead of review.
6	Objectively Verifiable Indicators, Output1, 1-1	1-1 Roadmap towards ASO is developed	1-1 ASO plan is developed	It was modified as it matches with the name of the document developed
7	Objectively Verifiable Indicators, Output1, 1-2	1-2 National Standards are developed	1-2 ISDB-T Standards is prepared	It was modified as it matches with the name of the document prepared

Nr	Items modified	Version.0	Version.1	Reason
8	Objectively Verifiable Indicators, Output1, 1-3		1-3 Specifications of receivers is prepared	It was added as the indicator of the additional activity
9	Objectively Verifiable Indicators, Output1, 1-3	1-3	1-4 *only the number was changed according to the above modification	
10	Objectively Verifiable Indicators, Output1, 1-5	1-4 Public Relations Plan is developed	1-5 Draft Public Relations Plan is developed	It was modified as it matches with the activity
11	Means of Verification 1-1	1-1 ASO Roadmap	1-1 ASO Plan	Ditto
12	Means of Verification 1-2	1-2 National Receiver Standards	1-2 Botswana ISDB-T Standards	Ditto
13	Means of Verification 1-3		1-3 Specifications of receivers	It was added as the means of verification of the additional activity
14	Means of Verification 1-4	1-3	1-4 *only the number was changed according to the above modification	
15	Means of Verification 1-4	1-4 Public Relations Plan	1-5 Draft Public Relations Plan	It was modified as it matches with the activity
16	Important Assumption Output	Staff received training does not resign BTV	Staff received training does not resign DBS	It was modified as DBS includes staff members of BTV
17	Important Assumption Activities	Staff received training does not resign BTV	Staff received training does not resign BTV	It was modified as DBS includes staff members of BTV
18	Input Japanese side	(1) Chief Advisor/Policy & Strategy (2) Institution/Training Plan (3) ASO Plan/Technical Standards (4) Public Relations Plan (5) HD Program Production (6) Data Broadcasting Contents	(1) Chief Advisor/Policy & Strategy (2) Institution/Training Plan 1 (3) ASO Plan/Technical Standards 1 (4) Technical Standards 2 (5) Public Relations Plan/Training Plan 2/Coordinator (6) HD Program	• In order to facilitate the work to set up standards before the commencement of digital broadcasting, ASO Plan/Technical Standards was divided into two experts • Data Broadcasting Coding and Data Broadcasting Design were added since data broadcasting needs a various skills. Therefore

Nr	Items modified	Version.0	Version.1	Reason
		Production (7) Data Broadcasting Programming	Production (7) Data Broadcasting Contents Production (8) Data Broadcasting Coding (9) Data Broadcasting Design (10)Data Broadcasting Programming	one expert cannot deal with
19	Preconditions	Relevant ministries and agencies are ready to cooperate for migration to terrestrial digital broadcasting	Digital migration plan is not excluded from the national development plan.	It was modified to remove ambiguous item

2.3.2 PDM Version. 2

PDM Version 2 was agreed in the second JCC meeting. Table 2.3.2-1 shows the difference between PDM Version. 1 and 2. The main modifications were to put figures in indicators which were vacated until the baseline survey was completed. Important assumption was added since the procurement of HD studio system which there was a plan at the time of detailed design stage was not implemented as planned and if it did not take place, it hinders the achievement of project purpose. BOCRA requested that licensing criteria be excluded from the deliverable of the Project since BOCRA already conducted public consultation and started the work. The involvement of the Project might delay the establishment of licensing criteria. Instead of developing, the activity was agreed to review the licensing criteria from the same point of view of stakeholder. Implementation of public relations activities is also included since the methods and knowledge used in Japan is useful and to be learnt in conducting public relations activities in Botswana too. With regard to HD program production, the main training at BTV took place from the point of view of director. It was requested by DBS that technical training also be provided at BTV to improve production capacity so that Japanese expert for that purpose was added.

Table 2.3.2-1 Modifications in PDM from Version.1 to Version.2

Nr.	Items modified	Version. 1	Version .2	Reasons
1	Objectively Verifiable Indicators Overall Goal 2	○ or more number of programs that linked with the data broadcasting contents are produced per year.	3 or more number of programs that linked with the data broadcasting contents are produced per year.	The figure was calculated by the number of television programs produced by BTV and the number of staff in television program production and proposed number of staff in Dara broadcasting section. 19*16/112=3

Nr.	Items modified	Version. 1	Version .2	Reasons
2	Objectively Verifiable Indicators Overall Goal 3	○ or more number of High Definition (HD) programs are produced per year.	20 or more number of High Definition (HD) programs are produced per year.	The figure was calculated from the number of programs currently produced by BTV and it was assumed that BTV will produce those in HD. 19≒20
3	Objectively Verifiable Indicators Project Purpose 1	○% or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV)	34% or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV)	The figure was calculated by multiplying the percentage of respondents who valued data broadcasting and the percentage of households who own working television. 59%*56.8%=34%
4	Important Assumption Project purpose	non	Development of HD Studio systems are executed as planned	If those systems are not procured by DBS, project purpose is not achievable.
5	Activities 1-5	To develop terrestrial broadcasting station licensing criteria	To review terrestrial broadcasting station licensing criteria	BOCRA requested that DiMT project should not deal with this activity since BOCRA has already made some progresses and conducted public consultation workshop. Instead of developing it, the review will be conducted to provide comments on it.
6	Activities 1-7	Non	To conduct public relations activities in accordance with the Draft Public Relations Plan for Digital Migration	To support the implementation of the draft public relations plan and monitor the public education awareness activities conducted by the tender project.
7	Inputs JICA Experts	Non	(11) Production Engineering	Production Engineering has been added to the members of JICA experts to provide support to program production from the technical point of view.

Nr.	Items modified	Version. 1	Version .2	Reasons
8	Inputs Equipment	Data Broadcasting Contents Management System: 1 set	Deleted	Data Broadcasting Contents Management System will be procured by DBS in the tender project.
9	Input Training in Japan	3. Training in Japan	2. Training in Japan	Equipment has been deleted so that the number was moved up.
10	Note	*Procurement of CMS will be determined later	Deleted	Data Broadcasting Contents Management System will be procured by DBS in the tender project.

2.3.3 PDM Version. 3

PDM Version 3 was agreed in the second JCC meeting. Table 2.3.3-1 shows the difference between PDM Version. 2 and 3. In response to the interim review conducted in third JCC meeting, major change took place. Three activities were added for test centre and call centre operation and preparation of HD studio procurement plan. Test centre activity was added since the technical specifications by which BOCRA gives type approval to digital receiver only define the minimum requirement and do not include specific functions such as data broadcasting. Therefore there was a possibility that low spec model of digital receivers prevail and hinder the achievement of project purpose. By the test centre testing the function and publicising the result, it was aimed to provide incentives to the viewer to purchase digital receivers that have functions to enjoy ISDB-T specific services. Cell centre was also included since DBS started procurement of call centre service and the experience of Japanese call centre is necessary. Though it was listed in important assumption, HD studio procurement plan was added to facilitate the procurement process. If HD studio system was not procured, it also hinders the achievement of project purpose and overall goal since HD program is one of the features of digital broadcasting and main incentives for the viewer to purchase digital receivers, the number of HD program produced is also included in the indicator.

Table 2.3.3-1 Modifications in PDM from Version.2 to Version.3

Nr.	Items modified	Version. 2	Version .3	Reasons
1	Project Purpose	Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready	Environment for the terrestrial digital broadcasting that takes advantage of the features of ISDB-T is ready.	If Project Purpose focuses on DBS, BOCRA might be viewed as they are engaged in a project which only supports DBS, which makes it difficult for BOCRA, regulatory authority who has to take a neutral position, to be involved in the Project.
2	Means of verification Project	Project Progress Report	Project Monthly Report	To use the correct name of the document

Nr.	Items modified	Version. 2	Version .3	Reasons
	Purpose 2			
3	Output 1	Various plans necessary for migration to digital broadcasting are developed.	Various plans and systems necessary for migration to digital broadcasting are developed.	The additional activities such as call centre and test centre are not about plans only but systems for digital migration.
4	Activities 1		1-8. To establish a test centre for compliance with set specifications and receivers penetration assurance	In order to promote digital receivers that can use the services that take advantages of the features of ISDB-T, have BOCRA have capacity to check the function of Data broadcasting when they receive application of Type Approval
5	Objectively Verifiable Indicator 1-6	Non	1-6. Operation manual for the test centre is prepared	
6	Means of Verification	Non	1-6. Operation manual for test centre	
7	Input 3. Equipment		Test Centre Equipment: 1set	
8	Activities 1		1-9. To develop viewers support through a call centre operation	Though the current public relations activities deal with the whole viewer, at the time of ASO or when digital receivers become available in the market, support that is suited to the needs of each viewer such as the installation of digital receiver and measures against poor reception is required.
9	Objectively Verifiable Indicator 1-7	Non	1-7. Operation manual for the call centre is prepared	
10	Means of Verification	Non	1-7. Operation manual for call centre.	
11	Activities 2		2-7 To develop procurement plan of HD studio systems	If Master Control Room, TV studio, HD editing systems and necessary equipment and facilities to produce and transmit programs are not urgently procured, it is difficult to produce HD programs and achieve Project Purpose.
12	Objectively Verifiable Indicator 2-5	Non	2-5. Procurement plan of HD studio systems is developed	
13	Means of Verification	Non	2-5. Procurement Plan of HD Studio Systems	
14	Input 1. JICA Experts		(12) HD Procurement Plan	

2.3.4 PDM Version. 4

PDM Version 4 was agreed in the second JCC meeting. Table 2.3.4-1 shows the difference between PDM Version. 3 and 4. The modification is the profession of Japanese expert. Since the test centre activity involves practical usage of equipment, it was agreed that the activity be supported by the engineer specialized in rather than technical standards who specialized in documentation.

Table 2.3.4-1 Modifications in PDM from Version.3 to Version.4

Nr.	Items to be modified	Version. 3	Version .4	Reasons
1	Inputs Japanese Side	-	(13) Test Centre Operation	In order to address, activity of "1-8 To establish a test centre for compliance with set specifications and receivers penetration assurance", originally technical standard expert were dispatched. However, the work involves engineering works, dealing with spectrum analyser, modulator. Instead of dispatching technical standard expert specialized in documentation, test centre operation expert was newly appointed.

PDM Version.4 that was agreed and addressed at the end of the Project is shown in Table 2-3-4.2.

Table 2.3.4-2 PDM Version. 4

Project Name : Implementation of the Digital Migration Project
Period of Implementation: July 2014 ～June 2016 **Target Group: Government Staff concerned with Implementation of Digital Migration**
Target Area: Whole Country of Botswana **Date: 22 April 2016**
Implementing Agency: Department of Broadcasting Services, Ministry of State President (DBS) **Version. 4**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal			
Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available.	1. Terrestrial digital broadcasting service area covers 65% or more of Botswana (the target in NDP10). 2. 3 or more number of programs that linked with the data broadcasting contents are produced per year. 3. 20 or more number of High Definition (HD) programs are produced per year.	1. Radio Wave Measurement 2. Broadcasting Program Schedule 3. Broadcasting Program Schedule	
Project Purpose			
Environment for the terrestrial digital broadcasting that takes advantage of the features of ISDB-T is ready.	1. 34% or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV). 2. Facilities and human resources planned as necessary for producing and broadcasting HD programs based on ISDB-T data broadcasting are developed.	1. Customer Sample Survey 2. Project Monthly Report	• Developments of DTTB network and related equipment are executed as planned • Developments of HD studio systems are executed as planned. • ISDB-T receivers are penetrated to households as planned
Outputs			
1. Various plans and systems necessary for migration to digital broadcasting are developed. 2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.	1-1. Analogue Switch Off (ASO) Plan is developed. 1-2. Botswana ISDB-T Standards is developed. 1-3. Specifications of receivers is prepared. 1-4. Terrestrial broadcasting station licensing criteria are developed. 1-5. Draft Public Relations Plan is developed. 1-6. Operation manual for the test centre is prepared. 1-7. Operation manual for the call centre is prepared. 2-1. Sections that handle data broadcasting are established in BTV. 2-2. HD Program Production Manual is developed. 2-3. A training system for producing data broadcasting program is established. 2-4. Program-linked and non-linked data are broadcasted. 2-5. Procurement plan of HD studio systems is developed.	1-1 ASO Plan 1-2. Botswana ISDB-T Standards 1-3. Specifications of receivers 1-4. Terrestrial broadcasting station licensing criteria 1-5. Draft Public Relations Plan 1-6. Operation manual for test centre 1-7. Operation manual for call centre 2-1. BTV Organization Chart 2-2. HD Program Production Manual 2-3. Training plan for data broadcasting program 2-4. Broadcasting Program Schedule 2-5. Procurement Plan of HD Studio Systems	• Various approval process by the concerned organizations are not delayed. • Staff received trainings does not resign DBS

Activities	Inputs		
1. Relative to various plans for digital migration 1-1 To establish Technology and Licensing Working Group, Public Relations Working Group 1-2 To prepare ASO plan 1-3 To review Botswana ISDB-T Standards 1-4 To review specifications of receivers 1-5 To review terrestrial broadcasting station licensing criteria 1-6 To develop Draft Public Relations Plan for Digital Migration 1-7 To conduct public relations activities in accordance with the Draft Public Relations Plan 1-8 To establish a test centre for appropriate receivers 1-9 To develop viewers support through a call centre operation 2. Relative to DBS's capacity of producing programs 2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcasting Working Group 2-2 To develop HD program production capability 2-3 To establish a section that produce data broadcasting program 2-4 To develop a training system for producing data broadcasting program 2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey 2-6 To plan and produce program-linked and non-linked data broadcasting 2-7 To develop procurement plan of HD studio systems	Japanese Side 1. JICA Experts (1) Team Leader/Policy & Strategy (2) Institution/Training Plan 1 (3) ASO Plan/Technical Standards 1 (4) Technical Standards 2 (5) Public Relations Plan/Training Plan 2 (6) HD Program Production (7) Data Broadcasting Contents Production (8) Data Broadcasting Coding (9) Data Broadcasting Design (10) Data Broadcasting Programming (11) Production Engineering (12) HD Procurement Plan (13) Test Centre Operation 2. Training in Japan ・HD Studio Operations (Camera, Lighting, Audio, Video Engineer) ・Digital Terrestrial Television Broadcasting (DTTB) Training (including Data Broadcasting) 3. Equipment Test Centre Equipment: 1 set	Botswana Side 1. C/P Personnel (1) Project Manager (2) Deputy Project Manager (3) Leader of Technology and Licensing Working Group (WG) (4) Leader of Public Relations WG (5) Leader of Program Production WG (6) Leader of Programming WG (7) Leader of Data Broadcasting WG 2. Members of Working Groups 3. Project Office for Experts (in both BOCRA and DBS) 4. Project Vehicles: 2 cars 5. Existing BTV's facilities and equipment that can be utilized for Terrestrial Digital Broadcasting 6. All equipment that should be procured during the Implementation Period of the Technical Cooperation Project for migration to ISDB-T	• C/P personnel continue to work on the Project. • Staff received trainings does not resign DBS. Preconditions • Digital migration plan is not excluded from the national development plan.

Chapter-III
Result of the Joint Review

Chapter III Results of the Joint Review

3.1 Results of Review based on DAC Evaluation Criteria

Evaluation of the Project was conducted by the project team as an interim review taken place in September, 2015, and terminal review in July, 2016.

3.1.1 Interim Review

The interim review was conducted after one year since the beginning of the Project, September, 2015, a half point of the two years project. The objectives of the regular progress interim review were to evaluate the level of achievement of each activity and find out the issues to be addressed for the rest project period in order to achieve project purpose. The review was conducted mainly by those who were involved in the Project. The achievements and outputs of the Project were analysed and confirmed. The review conducted in this regular progress review was agreed in the third JCC meeting.

The results and the process of implementation were evaluated from the point of view of the following five criteria set by DAC.

- Relevance : Do the project purpose and the overall goal correspond to the needs and priorities of the government of Botswana and Japan
- Effectiveness : To what extent has the project purpose been achieved by the project outputs
- Efficiency : To what extent have personnel, material, and financial inputs been converted into project outputs
- Impacts : The impacts of the project are the positive and negative effects brought about by the Project. They include direct and indirect effects, as well as expected and unexpected effects
- Sustainability : Sustainability means that the benefits gained through a project are maintained after its completion

(1) General achievement

Each activity was proceeding according to the Plan of Operation (PO). However there were some activities such as HD program production and Public relations activities that were hindered because of the delay in the works that are specified in important assumption, namely development of DTTB network, HD studio systems and digital receivers were not penetrated to the public.

With regard to HD program production, HD cameras were available. However, HD studio and editing system were not prepared yet so that footages that were shot in HD quality could not be edited, stored or broadcasted in HD quality and program production was conducted in SD quality as in the case before. Program production activities were mainly provided from the point of view of director to produce programs that make use of features of HD quality so that procurement plan of master control systems and TV studio systems were not assisted in the Project. However it was concluded in the review that it is necessary that HD studio system be procured as soon as possible since it has a great impact on achievement of project purpose.

Though data broadcasting services are under operation, the viewers could not experience the service since the digital receivers that decode data broadcasting were not available in the market. There were two issues that were hindering the penetration of digital receiver. One was that technical specification that gives type approval to digital receivers was not established yet. The other was that public promotion was not effectively conducted because of the delay in the preparation of digital broadcasting network. Due to the lack of live digital signal, demonstration of digital broadcasting services in each venue was not effectively conducted. Data broadcasting is one of the features of ISDB-T and BTV put their effort as a new service that starts with digital migration. It is also used as objectively verifiable indicators in PDM. Since the penetration of digital receiver and development of DTTB network were specified in important assumption and were not subject of the activity of the Project, it was necessary to take some measures for the achievement of project purpose.

(2) Achievement of outputs

1) The status of achievement for Output 1, Various plans necessary for migration to digital broadcasting are developed. Achievement of each activity at the time of interim review is shown in Table 3.1.1-1

Table 3.1.1-1 Status of Achievement for Output 1

Objectively Verifiable Indicator	Status of Achievement for Objectively Verifiable Indicator
1-1 Analogues Switch Off (ASO) plan is developed	• ASO plan (draft) has been completed. ASO criteria have been set as 1. 60% penetration of digital receiver and 2. 80% digital broadcasting service coverage over that of analogue. The target was set in December, 2016. • The issue remained is to approve ASO plan (draft) and conduct survey about the status of achievement for ASO criteria and publicize to the public on a certain date. DBS has to conduct this since the Project ends in August, 2016
1-2 Botswana ISDB-T standards is developed	• The document has been approved as ISDB-T Standards of Botswana by BOCRA.
1-3 Specifications of receivers is prepared.	• Technical Specifications for Set top box, Integrated Digital Television (IDTV) and Mobile and Portable device are being prepared and discussed with BOCRA. • The issue remained is those technical specifications define only minimum requirements so that how to check if data broadcasting that is one of the features of ISDB-T is displayed correctly and protect the viewers from unexpected purchase of receivers that do not display data broadcasting.
1-4 Terrestrial Digital Broadcasting Station Licensing Criteria are developed	• BOCRA has conducted a public consultation and collect opinions from the stakeholders. BOCRA is finalizing it by incorporating the comments received.

Objectively Verifiable Indicator	Status of Achievement for Objectively Verifiable Indicator
1-5 Draft Public Relations Plan is developed	• Public relations activities are going on without establishing public relations plan. The work is underway to complete the public relation plan by December, 2015. It is desirable to establish public relations plan as soon as possible that includes distribution plan of digital receivers and establishment and operation of call center and make use of the plan for the public relations activity.

With regard to Output1, Various plans necessary for migration to digital broadcasting are addressed as planned and by the end of the Project, those would be established.

The contents and importance of those plans are understood by the members of the WGs and C/Ps though the process to produce those plans. The work to be addressed was to review the plans according to the progress of digital migration and implement the plan. During this stage, it is important to make the plans known to the public and examine the feasibility of implementing the plans.

The target date of ASO was post phoned from March to December, 2016 given the preparation of digital broadcasting network and the penetration of digital receivers. Since the Project will end by that time, DBS has to manage the ASO plan and implement it.

With regard to the receiver specifications, technical specifications were being prepared for the devices that were planned. However, the technical specifications only define the minimum requirements for the receivers due to the policy of BOCRA and whether additional functions be equipped was left to the market principle. BOCRA conducts type approval based on the technical specifications, there is a possibility that the receivers that do not have functions to display Data broadcasting or other ISDB-T featured functions or affordable receivers may be penetrated in the market and confuse the viewers. It is necessary to examine how to check the functions of Data broadcasting and prevent the viewers from confused.

Though the public relations activities were the most important activities for digital migration in terms of the support to the viewers, the establishment of the plan was delayed. Though public relation activities that were included in the public relations plan started as pilot projects, those projects were not harmonized or coordinated because the budget and impact of those activities were not examined. In particular, distribution plan of digital receivers to let the digital receivers penetrate to the public and establishment of the call center became important contents of the public relations plan. It was urgent to establish the plan as early as possible.

2) The status of achievement for Output 2, DBS's capacity of producing programs including High Definition (HD) and Data broadcasting is improved. Achievement of each activity at the time of interim review is shown in Table 3.1.1-2

Table 3.1.1-2 Status of Achievement for Output 2

Objectively Verifiable Indicator	Status of Achievement for Objectively Verifiable Indicator
2-1 Sections that handle Data broadcasting are established in BTV	• Data broadcasting unit has been established under Channel Control section in BTV. Though seven staff members are assigned, those are from other sections of BTV and still hold positions in old sections. • The issue remained is how to secure budget and recruit new staff members who dedicate to the unit and provide training to those newly recruited staff members.
2-2 HD Program Production Manual is developed	• Preparation of Program production manual is underway. The outline of the manual has been fixed. • Skills and knowledge to improve program production capacity are transferred to C/Ps through OJT. Special feature news about digital migration has been produced and broadcasted. The WG is working on edutainment program. The manual is going to be developed by collecting those that are provided during the production of the programs.
2-3 A training system for producing Data broadcasting program is established	• The environment where Data broadcasting training can be conducted has been established. Training has been provided from the planning, designing, production to operation. The training plan will be prepared by collecting those that are used during the Project.
2-4 Program linked and non-linked Data are broadcasted.	• With regard to program non-linked Data broadcasting programs, portal, BTV news and BTV program schedule and weather has been produced. With regard to program linked Data broadcasting programs, Molemo Wa Kgang, Silent Shout, Flava Dome, Talk Back will be planned and football game will be planned in next Feb.

With regard to HD program production, the WG had participation from different sections to produce HD programs. It was the case that one section was responsible for producing a program. However by having members from different sections, the team work was improved and the importance of sharing information was reviewed.

Though the filming was conducted by HD camera, there was no editing systems that could use HD footages so that the quality of picture was downgraded to SD quality while keeping the 16:9 angle. During the process of editing, in order to take measures to keep the quality of picture when downgrade to SD, the examination was conducted among producers and technical engineers. Communication among different professions was improved.

However due to the delay of procurement of Master Control Room, HD studio facilities and HD editing systems, it was impossible to broadcast in HD quality. HD program is the most visible change that comes with digital migration and it is considered to be an incentive to replace old analogue receivers with digital receivers. It is also true that the number of HD program production

is set as objectively verifiable indicator for overall goal. It was concluded that those would be procured as early as possible.

DBS puts effort in Data broadcasting as one of the features of digital migration and prepared a tender to procure necessary equipment. Data broadcasting was established and training was provided in the Project. At the time of establishment, seven staff members have been assigned in the unit and those were still holding the positions in other sections. Since all the staff members had positions in other sections, the workload was high. In case of the event, the staff members were requested to work late or even during the holiday. When all the equipment necessary such as CMS was procured in the tender project, content production and management which were currently dealt by the staff members would be automated and it was expected that the workload would be reduced. If we consider that DBS would expand the service and increase the content, it was required that DBS recruit new staff members who dedicate to the work of the unit and provide necessary training.

(3) Probability to achieve project purpose

With regard to Project Purpose "Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready." it was likely to achieve if the Project conducted the activities in the proposal.

Table 3.1.1-3 Status of Achievement for Project Purpose

Objectively Verifiable Indicator	Status of Achievement for Objectively Verifiable Indicator
1. 34 % or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV).	• There is no available data about the recognition of Data broadcasting at this moment. DBS put priority on Data broadcasting when conducting public relations activities. However, if digital receiver that can display Data broadcasting were not penetrated in the market, it might hinder to achieve this.
2. Facilities and human resources planned as necessary for producing and broadcasting HD programs based on ISDB-T data broadcasting are developed	• Data broadcasting unit has been established. Transmission system and content management system has been procured by tender. Staff members need to be recruited. Procurement of Master Control Room, TV studio and HD editing systems have been delayed so that Important Assumption may appear.

With regard to the first indicator, Data broadcasting was promoted in seminars and public relations activities as one of the pillars of digital migration. Activities were conducted as it would achieves the indicator. However, it was not confirmed when digital receivers would be available in the market. And the establishment of digital broadcasting network was delayed.

It was probable that digital receivers would be penetrated in the market. It was considered that those receivers which were purchased by the viewer would be a cheap one that only displays television programs without having additional functions to display Data broadcasting or EWBS. It this case, the viewer may not recognize digital broadcasting that takes advantage of the features of ISDB-T and the

34 % of recognition that is in the indicator might not be achieved.

With regard to the second indicator, the environment where Data broadcasting contents were produced and broadcasted was established. However, the workload of those who were assigned in Data broadcasting unit was too high because they held positons in other sections too. If we consider the expansion of service, it was necessary to recruit new staff members.

Though it did not appear in the indicator, HD program is one of the features of ISDB-T and the most visible change the viewer can recognize and becomes an incentive for the viewer to replace their old receivers with digital receivers. Lack of HD facilities hinders HD program production training so that it is necessary to procure HD facilities as early as possible.

(4) Evaluation by five evaluation criteria

The result of evaluation by five evaluation criteria at the interim review is shown in Table 3.1.1-4.

Table 3.1.1-4 Result of five evaluation criteria

No	Criteria	Result
1	Relevance	High
2	Effectiveness	Need to be monitored
3	Efficiency	Middle
4	Impact	Need to be monitored
5	Sustainability	Need to be monitored

1) Relevance

- Compatibility with development policy of Botswana

  The Project has a high compatibility with the development policy of Botswana. Botswana implements National Development Plan 10 (NDP10) based on Vision 2016. Educated and Informed Nation is one of the pillars of Vision 2016 and promotes the use of Information and Communication Technology. Digital migration of broadcasting is placed in one of the programs to achieve it. ISDB-T which Botswana adopted has Data broadcasting function and is expected to contribute to solving social and economic issues such as distance learning and health project. Therefore relevance between the Project and development policy of Botswana is high.

- Compatibility with aid policy of Japan

  The government of Japan put priority in 1) preparation of infrastructure for economic development and 2) development of deprived areas for Botswana. This project is placed in the program to strengthen information and communication technology infrastructure in 1).

  The government of Japan deals with various activities to promote ISDB-T standards to other countries in partnership with the private sector. The government of Japan made a cabinet decision called Declaration of Creation of IT Nation with the latest Technology and placed the expert of ICT infrastructure as the pillar of development strategy.

  ISDB-T is developed and implemented in Japan. Though Mobile service and Data broadcasting

service are available in other standards, those are not effectively used as in the case of Japan. Therefore the needs of support in those services are considered to be high.

2) Effectiveness

- Probability to achieve project purpose

  The Project was proceeding to achieve Project Purpose with achieving a certain result in each activity.

- Status of Important assumption

  Status of Important Assumption "Developments of DTTB network and related equipment are executed as planned", "Developments of HD studio systems are executed as planned", and "ISDB-T receivers are penetrated to households as planned" is as follows.

  Though there was some delay in the installation of digital transmitters, the construction of digital broadcasting network started and it was highly probable that the network would be procured as planned. With regard to the procurement of HD studio system, it was necessary to examine procurement plan of master control room, TV studio including upgrading procedures since it affects the program production schedule. Though it was necessary to produce specifications for the interface between those which were already procured such as Data broadcasting equipment and those which were going to be procured such as master control room, DBS did not have enough capacity and experience to design specifications and requested support from the Project.

  With regard to the support to the viewer, DBS already decided to establish a call center to provide support to the viewer for them to properly migrate to digital broadcasting. However, because of the lack of experience and knowledge in the management of the call center, the actual operation did not start yet. In order for the call center to provide support to the viewer in an appropriate manner, measures had to be taken.

3) Efficiency

- Correlation between input, activity and the result of each activity

  Japanese expert were dispatched as almost scheduled and its number and professions were considered to be appropriate. The time of dispatch was also flexible and appropriate in response to the needs of DBS.

  With regard to Output 1, there was a delay in preparing public relations plan. This was because public relations plan tried to include call center and distribution of digital receivers which were not planned originally and necessary examination was underway. There was also a delay in establishing technical specifications in order to coordinate with Japanese stakeholders.

  With regard to Output 2, there was a delay in producing programing schedule for digital broadcasting. This was because implementation of the market survey was delayed due to the lack of digital receivers in the market.

  Those delays were discussed in every JCC and appropriate actions were taken to revise the schedule so that it was considered that the Project was well managed.

- Implementation structure of the Project

  JCC meeting was held once in a half year and each activity was implemented and managed by WG. The members of WG held positions in their sections and departments and were not dedicated members of WG. Therefore the participation to WG and its activity was not active in some WG. There was a case where even while Japanese experts were in Botswana, the core members of WG did not have enough time to engage with the activity with Japanese expert, which caused delay in preparing plans and implementing activities.

4) Impact

Achievement of Overall Goal "Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available" depended on DBS's capacity to operate digital broadcasting and how much other ministries and private companies and broadcasting stations understood the benefit of ISDB-T functions and make use of them. If the capacity of Data broadcasting unit was improved and the new service that was collaborated with other ministries and agencies was emerged, the achievement of Overall Goal was highly probable.

Objectively Verifiable Indicator for Overall Goal, "Terrestrial digital broadcasting service area covers 65% or more of Botswana (the target in NDP10)", ".3 or more number of programs that linked with the data broadcasting contents are produced per year", and "20 or more number of High Definition (HD) programs were produced per year" already achieved in a certain level. If important assumption was realized, it is difficult to achieve them, in particular the third indicator would not be achieved without the provision of HD facilities.

5) Sustainability

- Technical

  With regard to Type Approval procedures, there was a possibility that digital receivers that could use the service taking advantage of ISDB-T functions were not penetrated in the market because technical specification only define the minimum requirements for digital receivers. This was because information was not shared in the industry and there was a lack in the knowledge of digital services for importers and retailers. Therefore it is important for BOCRA to publicize information about receivers apart from type approval so that the viewer would not be confused to select receivers they need.

  With regard to public relation activities, it was expected that the work would be concentrated at the time of ASO. In particular, ASO is planned after the end of the Project. It was worried if the operation of the call center was managed by DBS. Therefore it is required to prepare operation manual for the call center by expecting the issues arising at the time of ASO.

  With regard to HD program production, there was no significant difference in the production process and structure. The difference was only quality and angle and minor difference caused by the audio to shift stereo so that the change is limited. It was considered that attractive program would be produced if those who received training in the Project had more experience to produce

programs. One the other hand, Data broadcasting was a new service and needs new skills to produce programs. There was not enough staff members assigned in the unit. It was important to continue to provide training. After the completion of the Project, it is required that the staff members of the unit acquire new skills by themselves and start new services by collaborating with other ministries and agencies. At this moment, there were no staff members who properly conduct those works so that it was required that DBS secures a certain budgets to continue to provide training to those assigned in Data broadcasting unit. If there was a gap between the number of programs that need to be produced and the number of staff members, it is worth examining to outsource a part of the work.

- Institution and structure
  In order to expand the service of Data broadcasting, it is necessary to recruit new staff members who dedicate themselves to the work of the unit. If the budget for recruiting new staff members and new staff members are assigned in the unit, sustainability of the Project is improved.

It was concluded that the Project already achieved a certain level of results. The result of five evaluation criteria is High in Relevance Middle in Efficiency and others are Need to be monitored. In PDM Version.2, it was highly probable that Important Assumption appeared and the recognition of Data broadcasting was influenced by the delay of the penetration of digital receivers, which would hinder the achievement of Project Purpose and Overall Goal. In order for the results of each activity to lead to the achievement of Project Purpose and Overall Goal, it was necessary to add some activities.

(5) Proposal

From the result of the evaluation, proposal was made. Activities that were planned in PDM Version.2 would be completed by the end of the project period with achieving the results. However in order to make the achievement of Project Purpose secured, it was necessary to address the following activities in the Project.

1) Change of Project purpose

Project Purpose in PDM Version.2 was “Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready”. However since this focuses on DBS, it was difficult to obtain an active participation from BOCRA, who was a main actor in Output 1. If Project Purpose focuses on DBS, BOCRA might be viewed as they are engaged in a project which only supports DBS, which made it difficult for BOCRA, regulatory authority who has to take a neutral position, to be involved in the Project. Therefore, Project Purpose needed to be changed to “Environment for the terrestrial digital broadcasting that takes advantage of the features of ISDB-T is ready.” This change did not bring any substantial change in the Project and it was a forward looking change to prepare the environment as one Botswana.

2) Amendment of output 1

Output 1 was "Various plans necessary for migration to digital broadcasting are developed". However, since the Project would conduct the following additional activities, this should be replaced with "Various plans and systems necessary for migration to digital broadcasting are developed. This was because the additional activities are not about plans but systems for digital migration.

- Penetration of digital receivers
  - Establishment of test centre for receivers

    In order to promote digital receivers that can use the services that take advantages of the features of ISDB-T, it was important to have BOCRA had capacity to check the function of Data broadcasting when they receive application of type approval.

    By doing this, Botswana can check the function of Data broadcasting in digital receivers even after the completion of the Project. For example if BOCRA attaches sticker to prove that the receiver can display Data broadcasting, the viewer feels safe to purchase those receivers, which promote receivers that use the advantages of the features of ISDB-T.
  - Establishment of call centre

    Though the current public relations activities dealt with the whole viewer, at the time of ASO or when digital receivers become available in the market, support that is suited to the needs of each viewer such as the installation of digital receiver and measures against poor reception is required. For the success of digital migration, the establishment of call center that provides detailed support to the viewer by answering their questions is necessary. Though questions from the viewer were answered at this moment, there was a limitation in its activity without enough staff members and equipment. If the government of Botswana distributed digital receivers in free of charge or subsidized prices to a certain viewer, it is possible to provide receivers to those viewers through the call center. ASO was planned after the completion of the Project, it is necessary to prepare an operation manual for the call center to be operated in an appropriate manner even after the completion of the Project.
- Procurement of HD facilities

  With regard to HD program production, if Master Control Room, TV studio, HD editing systems and necessary equipment and facilities to produce and transmit programs were not urgently procured, it was difficult to produce HD programs. While conducting both analogue and digital broadcasting, all the system except transmitting stations, STL and Data broadcasting system had to be upgraded to HD so that it was important to examine the procedure to upgrade facilities and interface between each facility. DBS procures individual system without comprehensive procurement plan so that there was a possibility that those procured first might be utilized effectively or might not work with those procured later because of the interface incompatibility.

  It was important to dispatch an expert to prepare procurement plan which includes conceptual design, necessary equipment and its specification, budget estimate and procurement schedule, and urge DBS to procure as early as possible. A part of the training that could not be conducted

because of the lack of equipment, it was supplemented by the training held in Japan and consideration was given as DBS can improve their production capacity by themselves.

3.1.2 Terminal Review

The terminal review was conducted by the Project of the joint team between the members of WG and Japanese experts during July, 2016.

(1) The purpose of joint terminal evaluation

The purposes of the joint terminal evaluation are the followings;

1) To verify the achievements of the project activities, outputs and implementation processes, in comparison with PCM and PO.
2) To identify factors both positively and negatively affected the Project.
3) To evaluate the project in terms of the five evaluation criteria, relevance, effectiveness, efficiency, impact and sustainability
4) Based on the evaluation results, to make recommendations to be considered after the project completion

(2) Achievement and implementation process of the Project

1) Outputs

As described the detail in Chapter 2-2, Achievement of the Project, the summary of output is shown in Table 3.1.2-1.

Table 3.1.2-1 Summary of output

Outputs	No	Indicators	Results
Output 1 Various plans and systems necessary for migration to digital broadcasting are developed	1-1	Analogues switch off plan is developed	Achieved
	1-2	Botswana ISDB-T standards is developed	Achieved
	1-3	Specifications of receivers are prepared	Achieved
	1-4	Terrestrial broadcasting station licensing criteria are developed	Achieved
	1-5	Draft public relations plan is developed	Achieved
	1-6	Operation manual for the test centre is prepared	Achieved
	1-7	Operation manual for the call centre is prepared	Achieved
Output 2 DBS's capacity o producing programs including High Definition (HD) and data broadcasting is improved	2-1	Sections that handle data broadcasting are established in BTV	Achieved
	2-2	HD program production manual is developed	Achieved
	2-3	A training system for producing data broadcasting program is established	Achieved
	2-4	Program-linked and non-linked data are broadcasted	Achieved
	2-5	Procurement plan of HD studio systems is developed	Achieved

2) Project purpose

As described the detail in Chapter 2-2, Achievement of the Project, the summary of project purpose is shown in Table 3.1.2-2.

Table 3.1.2-2 Summary of project purpose

Project purpose	No	Indicators	Results
Environment for the terrestrial digital broadcasting that takes advantage of the features of ISDB-T is ready	1	34% or more customers recognize the terrestrial data broadcasting of Botswana television	Unlikely to be achieved
	2	Facilities and human resources planned as necessary for producing and broadcasting HD programs based on ISDB-T data broadcasting are developed	Unlikely to be achieved

Note: Reasons that indicators have not been achieved are explained in hindering factors in the next.

The figure 34 % was not achieved due to the availability of digital receivers in Botswana. The figure is based on the assumption that the viewer who watches analogue broadcasting also watches digital broadcasting at the end of the Project. However at the time of the termination of the project, there is no digital receiver available in the Botswana market. The customer sample survey revealed that only 14.2 % of people recognize data broadcasting service. The survey also showed that almost 90 % of people have high expectation on data broadcasting service. If the receivers become available in the market and penetrate to the households, the figure is achievable. In addition, the effectiveness of public relations activity was also hindered. During the process of producing public relations plan, various measures were discussed on how to promote digital receivers including provision subsidies, government procurements or some measures to provide instalments for low income households. Those were not discussed at the government level and did not materialize. Even the set top boxes that were procured for the trial and demonstration purpose were not distributed to the public, which also hindered the increase in the recognition rate of data broadcasting.

For indicator 2, HD studio system is not established in BTV and at the time of the termination of the Project, program production still cannot perform in HD quality. If the studio systems are procured according to the procurement plan of HD studio systems, the indicator will be achieved.

(3) Evaluation based on the five evaluation criteria

1) Relevance: High

As described in the interim review, the overall goal and project purpose are consistent with the development plan of Botswana and aid policies of Japan.

2) Effectiveness: Moderate

Judging from the achievement level of the outputs, a large progress has been made toward digital migration and in achieving the project purpose. However, two of the objectively verifiable indicators have not been met at the time of termination of the Project. The recognition rate of data broadcasting remains 14.2 % while the indicator requires 34 %. The degree of achievement against the figure of the indicator was 35 %. This was considered to be effected by the penetration of digital

receivers to households. Data broadcasting is a completely new service and without the viewer experiencing it, it is difficult to be recognized and spread the service. Although public relations activity achieved a great result, spreading the idea of digital migration from almost 0 to 86.3 % of people, promoting data broadcasting from 59 % to approximately 90 % of people saying they would like to use it, the lack of available digital receivers hindered achievement of the indicator. If the receivers were available and a certain percentage of the viewer actually experienced data broadcasting, it would have had a synergetic effect and promoted data broadcasting more. . At this moment, it is unclear when digital receivers will become available in the Botswana market. The government of Botswana attempted to invite manufacturers to the market. Once the receivers are available, the activities addressed in the Project greatly contribute to the achievement of project purpose.

With regard to the second objectively verifiable indicator, it was achieved except HD studio systems. 5 studio operation engineers and 5 transmitting engineers were invited to Japan for HD studio and ISDB-T transmitting training respectively. HD program production training was conducted on OJT base in BTV and produced one special feature news and 4 edutainment programs. Those were broadcasted by converting SD quality. Data broadcasting content production training was also conducted in BTV and the data broadcasting contents are broadcasted and updated every day. Digital broadcasting network and Data broadcasting system were procured and are broadcasting digital programs. Except HD studio systems that enable to edit and produce programs in HD quality, necessary human resources and facilities are considered to be completed..

3) Efficiency: Moderate

Progress has been made in producing outputs, from the level of achievement of the indicators. In general, the inputs have been appropriate in producing outputs in terms of timing, quality and quantity. Efficiency is considered to be moderate with the following specifics.

- Japanese experts have been dispatched as scheduled and produced expected outputs with the members of WG from DBS.
- DBS established a digital broadcasting network and procured data broadcasting facilities by their own expenses, though there was a little delay. This created a synergetic effect in public relations activities and program production.
- DBS also hired local service providers for public relations activities, which greatly enhanced the capacity to engage with the local populations by covering some of the local areas where the Project could not cover because of the limitation of time and budgets, and contributed to the promotion of digital migration.
- Office space for Japanese experts is not enough due to the space constraints. The office in DBS only accommodate up to four Japanese experts. When the number of Japanese expert exceeds it, it was sometime the case that DBS could not provide additional transport services and office space.

4) Impact: High

The likelihood of achievement of the overall goal is high once important assumptions are met. Though the details are described in Chapter 4, the positive impacts of the Project are the followings.

- Through the implementation of the Project, the members of WG and DBS understood digital migration and the importance of public relations activities and provision of attractive services for the successful migration to digital.
- The members of the WG are positive to produce programs in HD quality and are actively learning the technology and skills. Data broadcasting is also available and DBS continue to improve its capacity by planning the next project to start a new service of e-government and provide further training to the staff members.
- Data broadcasting is positioned as a part of e-government project. This improves the capacity of the government to disseminate information and cooperation between different ministries and agencies and improves access to information by the public.
- The number of channels available in BTV has increased, though the program is the repetition of the once broadcasted in the past. This will create an opportunity for other government ministries and program productions to supply television programs from their point of views that diversify the program contents and provide choices to the viewers.

5) Sustainability: Moderate

From policy and institutional aspect, digital migration is specified in the national development plan and continued to be the government policy. The Botswana government put emphasis on the promotion of ICT technology as well as cultural richness. Data broadcasting is regarded as important service both to utilize ICT technology and disseminate information to the public in an effective manner. The program production is expected to create more employment opportunities for the youth. Music and dance are one of the areas the government also culturally promotes the locals.

The only factor that is concerned is the availability of digital receivers. If the market principal does not provide the receiver, the measures have to be taken at the policy level.

From organizational aspect, DBS has already those sections and units in place to continue digital migration. The members of WG who were engaged in the Project will play a central role in each section and unit in implementing each plan. In addition, DBS planned to procure HD facilities and prepared another project to improve the service of data broadcasting by securing the budges. It is likely that digital migration and new services further makes progress even after the Project. However in some plans produced in the Project, the level of participation by the members of WG is not necessarily high. It might cause some difficulties in the implementation of those plans produced in the project period. Particularly, ASO needs close cooperation between regulators, broadcasting stations, viewers, retailers of digital television and receivers, and monitoring of ASO criteria. The actual implementation has to be addressed solely by DBS.

From financial aspect, DBS has already allocated a certain budget for digital migration, 130 million BWP in financial year 2015/2016 and necessary budgets for the succeeding years. For the public support, the call centre preparation is already started. The contract has already made to lease the

equipment for 5 years and provide training to 15 staff members. The upgrade of HD studio system is going to take place in two consecutive years for which the budget is already secured for the first year. Data broadcasting unit also secured a budget for start new services as a three years project. The government of Botswana and DBS has a financial capacity to continue digital migration.

From technical aspect, DBS has a technical capacity to maintain digital system and produce HD programs and data broadcasting contents with assistance and training from manufacturers and integrators whom DBS procures the equipment. Although the manual and training plan that were produced by the Project will help new staff members to learn and acquire necessary skills on the current operation, additional training is required if DBS would like to start new services. However the staff members have enough grounds to understand and operate new digital services if proper training was provided.

(4) Conclusion

Since the beginning of the Project, both Japanese experts and DBS have been working together to achieve project purpose. Based on the results of implementation and level of achievements in each output and project purpose, result of analysis of the Project can be summarized in Table 3.1.2-3.

Table 3.1.2-3 Result of analysis of the Project

No	Evaluation criteria	Result
1	Relevance	High
2	Effectiveness	Moderate
3	Efficiency	Moderate
4	Impact	High
5	Sustainability	Moderate

3.2 Key Factors Affecting Implementation and Outcomes

Each activity was relatively successfully implemented and achieved a certain result. In terms of the indicator, all outputs satisfied the indicators and are achieved. However there are some factors affecting the implementation and outcomes. Specific items are described in the followings.

(1) Contributing factors

- The regular conduct of the JCC meeting made it possible to review the progress of each activity and take measures against delays or changing circumstances in a timely manner.
- The holistic approach of digital migration made a communication between different departments and sections in DBS better. Originally the digital migration was regarded as the procurement of facilities and establishment of the digital network by the staff members of DBS. However, since the Project dealt with a wide range of activities from public relations activities, program production to technical specifications, the staff members involved in the Project understood that cooperation and information sharing is important for the success of digital migration.

- DBS has a strong connection with other media department in the government. Digital migration has become widely known word in Botswana. Campaigns and advertisement made in radio, television and newspaper have largely contributed to the promotion of digital migration, which also gives incentives to the members of the Project to actively engage with the activities.
- The Project shouldered a part of expenses for operation of activities. The expenses include the provision of public promotion goods such as pencil, T-shirt, transportation costs for news and material gathering in the field. Since the expenses of the budget in DBS needs lengthy process, the financial support to the operation of activities made it possible to implement some activities on time and contributed to the effective implementation of the activity.

(2) Hindering factors

- The penetration of ISDB-T receivers to the household hindered the achievement of project purpose. During demonstration and public relations activities, there are not digital receivers available in the market, which made it difficult to make the activities effective and also hindered the increase in the recognition rate of data broadcasting. Since Botswana is the first market that adopted 8MHz ISDB-T standard and developed a digital broadcasting network, there is no available receiver. Given the size of the market and unfamiliarity of the country, it is difficult for the manufacturers to export their products. The lack of the receivers significantly hindered the achievement of project purpose, the recognition rate of data broadcasting. However, the expectation of the viewers and investment by BTV in data broadcasting is high. Once the receivers are available and affordable in the market, it is highly likely that the indicator will be met.
- With regard to HD program production facilities, originally it was not included in the activity and left to DBS to implement because before the start of the Project, DBS had a plan to procure them. However, it turned out that those are not procured in time and need a support to review and prepare the plan in detail. The activity was added, once the plan is executed by DBS, the indicator is likely to be achieved.
- Participation of the members of WG to the activities is not necessarily high throughout the project period. It is because digital migration project is an additional work for most of the staff members in the WG and they also hold positions in their departments and sections and carry their routine works and responsibilities, which made it difficult for them to commit and dedicate to the activities.
- The office and transport are not sometime available for Japanese experts because of the miscommunication with other cooperating agencies and budget constraints. Particularly, early stage of the Project, the office is not available in BOCRA and the Japanese expert in charge had to visit BOCRA for meetings which disturbed communications with his counterpart and caused miscommunication and delay in the progress of activity. Also the lack of transportation sometimes impeded the timely implementation of activities.

3.3 Evaluation on the results of the Project Risk Management

The risk of the Project was well managed during the project period. Through the monitoring process and JCC meeting, the delay of the activity and issues to be addressed for the achievement of project purpose were

controlled of which particular are described in the followings.

(1) Lack of equipment for HD program production

Throughout the project period, HD editing system was not available for BTV. The HD system was owned by BETV, which made it sometimes difficult for the members of WG to edit the footages that were shot by the Project. In addition to that, the footages that were shot in HD could only be stored in the server owned BETV. Because of the capacity of the server, the stored footages were sometimes deleted and editing terminals were not available in time, which delayed the program production work. The P2 card that can store the footage was procured by the Project to temporally keep the footages for the HD program production activities. The use of HD edition terminal was arranged and requested by the head of program and general manager of BTV to BETV to solve the problem. Although there were some delays in the work, the problem was properly addressed and the activity was completed as planned by the handling of the Project.

(2) HD studio system procurement plan

Though DBS originally had a plan to procure and upgrade studio system to HD and it was excluded from the project activity when the Project was formulated at the beginning and the procurement of HD system was placed in important assumption in PDM. However, the progress of the procurement was not clear and there was a possibility that due to the delay of the procurement, the project purpose could not be achieved. Due to the request from DBS, the activity was included in the Project in the third JCC meeting to help achieve the project purpose.

(3) Test centre operation

BOCRA established technical specifications for digital terrestrial receivers with the minimum requirements. There was a risk that digital receivers that are not compatible with the broadcasting standards of Botswana or do not have functions to play ISDB-T particular services will prevail in the market. BOCRA requested to provide support to conduct test centre to check the functions of digital receivers based on the technical specifications set by BOCRA and additional ISDB-T services to provide assurance and incentive to customers. The successful operation of test centre with type approval procedures will prevent the poor quality of digital receivers from coming into the market and contribute to the penetration of digital receivers to the household.

3.4 Lessons Learnt

The task of digital migration could be divided into three areas from the point of view of broadcasting stations. The first is the transmitting work. The second is program production work. The last part is the reception work. The first two works are relatively easy to implement if the station has enough technical and financial capacity. And in case of Botswana, during the project period, those are in sight. However the difficult and unpredictable part of the work is reception work whether and when the viewer will purchase and shift to digital broadcasting. This part of the work needs close cooperation with regulator, broadcasting station and the viewer in addition to the strong political leadership. If the country would like to complete digital migration and analogue switch

off as scheduled, it is necessary to take measures to provide incentives to the viewer to replace their old analogue receivers with digital ones. This requires policies such as provision of subsidies, distribution of receivers or instalment payment to the low income households. Those measures should be taken while public relation activities are going on so that it produces synergetic effects both to promote digital broadcasting and promote take up of digital receivers. Most of people in Botswana now know digital migration in Botswana. Yet it is few people who experience and watch digital broadcasting. Digital broadcasting started almost one year ago at the time of completion of the Project. Penetration of digital receivers takes time. Provision and implementation of policies with regard to the promotion of digital receivers should take place as earlier as once digital migration is planned. The lessons learnt by the Project is shown in Table 3.4-1

Table 3.4-1 Lessons learnt

No	Lesson learnt	Content
1	Preparation of digital receivers	The lack of available digital receivers significantly delays digital migration. At the end of the Project, although digital broadcasting services available including data broadcasting, there were few viewers who can watch digital broadcasting in Botswana. Particularly in a small market such as Botswana, the market might not be able to provide digital receivers. At the planning stage of digital migration with the establishment of broadcasting side, the receiver side must be considered. If the market cannot provide digital receivers, the government should prepare necessary policies such as distribution or provision of subsidies to the viewer. In case of Botswana, though necessary budgets were allocated for the broadcasting stations to upgrade digital transmitting network and studio systems as well as content acquisition, there was no policy or budget for provision of digital receivers. Technical specifications for receivers also need to be developed before the commencement of digital broadcasting. However, due to the discussion over broadcasting standards, the establishment was delayed in Botswana, which also made it difficult for the manufactures to produce digital receivers on time.
2	Necessity of the market survey	In case of Botswana, it was not clear how the viewer watches television at the beginning of the Project. The satellite viewing is more popular than terrestrial. It is very important for broadcasting stations and policy makers to have the baseline data which sufficiently covers the items related to digital migration. The different country has different viewing custom of television. While most of the people watch terrestrial in Japan, the viewers in Botswana watch television by satellite decoder called Philibao. The different viewing custom needs different approach to digital migration. If the satellite is more viewed than terrestrial, more efforts should be placed on promotion of digital terrestrial than digital migration itself in order to acquire viewership. The proper market survey enables to formulate a strategy and policy to effectively implement digital migration. It is recommended that the broadcasting station examines to periodically conduct a market survey to understand viewing habits and the needs of the viewer.
3	Establishment	Digital migration needs a close cooperation between relevant agencies and

No	Lesson learnt	Content
	of cross sectional unit and political leadership	organizations. If an example was taken for ASO, the regulator can facilitate by setting the valid term in analogue broadcasting licenses, which needs agreement among broadcasting stations. If the project is dealt by the normal operation of each organization, it is sometimes the case that the bureaucracy and the interest of each party prevent smooth communication. In case of Botswana, digital migration of television only takes place in the national broadcasting station and the private broadcasting station stays in analogue and there is no concrete date when the private broadcasting station adopts digital broadcasting. Though there was a plan to create a project management office (hereinafter referred to as "PMO") that coordinates necessary activities among relevant agencies, it was not realized in Botswana. The lack of PMO made it difficult to address digital migration as a government project which involves all relevant agencies and produce a roadmap that includes digital migration master plan, milestone and schedules, amendment of relevant laws and policies, preparation of human resources and necessary facilities and equipment of the policy maker, regulator, broadcasting station, manufacturer and viewer. At the beginning of digital migration, the cross sectional unit with a strong political leadership should be formulated in order to coordinate relevant issues.
4	Cooperation with other projects	In case of Botswana, apart from JICA technical cooperation project, DBS started many project in parallel such as establishment of the digital network, call centre, implementation of public relation activities, procurement of data broadcasting facilities. Each project was controlled by different departments and responsible persons. And those are not necessarily coordinated so is the relation between JICA technical cooperation project and other projects. It would be recommended that the organization or regular meeting be arranged to exchange the progress of each project.
5	Appropriate timing of the start of digital broadcasting and availability of receivers	In order to meet the deadline set by ITU, DBS established the digital broadcasting network. If there is a time gap between the readiness of the network and availability of digital receivers, it is difficult to set the target of ASO and implement it. Although it is usually the case that the uptakes of digital receivers delay to the start of digital broadcasting and without digital broadcasting, the viewer would not take the receiver, the proper duration should be planned and the policy maker and broadcasting station should plan to promote digital broadcasting according to the schedule. This could be coordinated in the cross sectional unit that coordinate different activities of relevant agencies. If the simulcasting period is long, it is going to be a burden for the broadcasting stations to operate and maintain the old analogue network while operating the new digital one. It is recommended that the readiness of the receivers be considered in rolling out the network and other

No	Lesson learnt	Content
		services.
6	Make use of local companies and organizations	The promotion of digital television needs the grass roots level of activities in addition to the nation-wide activity such as the advertisement by the television and radio. In the local areas in Botswana, the viewers only understand the local language and sometimes technologically have disadvantages. The different level of people needs the different level of promotion activities that is only enabled by the grass root level of activity. In case of Japan, a new organization was formulated to promote digital broadcasting for a certain period. The office was placed in each prefecture to support the viewer. DBS hired the local service supplier to conduct public relations activities, A certain organization that operates for a limited time period should be formulated to promote digital migration and support the viewer. This is also need to be addressed not only by a task of a broadcasting station as DBS conducted, but also as a business to be addressed as a government project by a cross sectional unit.
7	Scope of the project should be focused according to the priority	The project took a holistic approach to provide support to almost all areas necessary for digital migration from preparation of technical standards to human resource development of program production and data broadcasting. The inputs were dispersed and each expert has his or her activity responsible, which made it difficult to link each activity. In order to implement activities more effectively, it would be better to focus on the prioritized area and put inputs. Inputs is limited in terms of duration and experts, it should be prioritized at the detailed design stage in what activities the recipient country needs assistance at most and what areas the Japanese assistance can be effective at most.

Chapter -IV
For the Achievement of Overall Goals after the Project Completion

Chapter IV For the Achievement of Overall Goals after the Project Completion

4.1 Prospects to achieve Overall Goal

Overall goal of the Project and its indicators are shown in Table 4.1-1. Digital migration remains as a prioritized area in DBS and national development plan 11 which has not been publicised yet though. Given the level of commitment and efforts currently going on, it is likely that the overall goal is to be achieved. However, at the time of the termination of the Project, there is no available digital receiver in the Botswana market. Although it does not directly affect achievement of each indicator, the penetration of digital receiver in the market which is listed in important assumption hinders achievement of overall goal if it were not fulfilled. Even if the program production and transmitting side is ready for digital broadcasting, it would not be effectively used if the viewer does not have digital receivers. Absence of viewer and lack of digital receiver have negative impacts on digital migration. It delays analogue switch off schedule, which becomes burdens for DBS to continue simultaneous broadcasting causing pressure on budget cut of program production. Absence of viewer hinders the promotion of digital broadcasting and its effective utilization and if it were the case, data broadcasting also would not be utilized effectively and program production in HD would not be encouraged where no one can benefit. Other government ministries and agencies that have source information would not take difficulties to start new services in data broadcasting or private companies would not put their advertisements on data broadcasting, which also effects capacity of program production. If important assumptions were fulfilled, it is highly likely that DBS would achieve overall goal with recommendations shown in this chapter.

Table 4.1-1 Overall goal and objectively verifiable indicator

Overall	No	Indicators	Status
Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available	1	Terrestrial digital broadcasting service area covers 65 % or more of Botswana (The target in NDP 10)	Likely to be achieved
	2	3 or more number of programs that linked the data broadcasting contents are produced per year.	Likely to be achieved
	3	20 or more number of High Definition (HD) programs are produced per year	Likely to be achieved

(1) Indicator 1

The digital broadcasting network is already available in Botswana from 45 transmitting stations. Although the coverage simulation and radio wave field measurement must be conducted to understand the precise coverage, it is likely to meet this figure given that the current analogue broadcasting provides 85% coverage according to DBS.

DBS set 80% of current analogue coverage by the digital as ASO criteria. Due to the different propagation characteristics between UHF and VHF, and transmitting power between digital and analogue, there is a possibility that in the area where the current analogue broadcasting can be received, the viewer

cannot receive digital broadcasting. Therefore it is necessary to conduct the survey to understand the precise coverage and provide measures to those who are living in poor reception areas.

(2) Indicator 2

BTV has already been producing data broadcasting contents that are linked to programs. At the beginning of data broadcasting service, BTV made four programs of Flava dome (Music show), Silent shout (Talk show), Talk back (Talk show) and Molemo wa kgang (Talk show) program linked data broadcasting and continue it. In addition to that, BTV is preparing an additional three years project to expand the program coverage such as program linked with live broadcasting programs such as football games, and e-government data broadcasting contents do disseminate information and improve the access to the government service by the public. Given that DBS place data broadcasting as the centre of the new service that comes with digital migration, it is likely that the figure of three could be cleared.

(3) Indicator 3

According to the available statistics, BTV produces 18 and 17 in-house programs in 2010 and 2011 respectively and it was 18 programs that are produced and broadcasted during the year of the Project. The Project supported the preparation of the plan of HD system procurement. The upgrades of studio and editing system work completes by March 2018. After the system is upgraded, the production is all done in HD format. Given the current number if in house production, it is likely that the20 programs of the figure will be cleared.

4.2 Plan of Operation and Implementation Structure of the Botswana side to achieve Overall Goal

In order to achieve overall goal and digital migration, it is important to implement plans produced in the project activities. The implementation of plans is dealt with in the normal structure of DBS operation. DBS engineering department is responsible for confirming the coverage and take measures against poor reception areas. BTV data broadcasting unit continues to work to improve the services and capacity of the unit. BTV engineering is responsible for the procurement of HD system facility. BTV program section can take the leadership to produce programs in HD.

(1) Understand the digital coverage

Although the digital coverage in overall goal is likely to be achieved, it is important to understand the exact coverage by the simulation and field radio wave measurement. Due to the different characteristics of VHF and UHF and the transmitting powers in analogue and digital, locations of digital transmitting stations, there is a possibility that those area covered by analogues broadcasting services may not be covered by the digital. The result of the coverage is only be found by the coverage simulation and the field radio wave measurement. It is important to accurately measure the coverage and take measures against those areas not covered by the digital broadcasting.

Table 4.2-1 Activity for indicator 1

Activities / Sub-Activities	2016		2017				2018				2019			
	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ
1 Understand the digital coverage														
1.1 Concudt coverage simulation														
1.2 Conduct filed radio wave measurement														
1.3 Confirm the coverage														
1.4 Take measures in poor reception area														

(2) Improvement in the capacity of data broadcasting unit

DBS has a plan to implement a three-year project to strengthen the capacity of data broadcasting unit. The main focuses of the project is to start data broadcasting contents that are linked with a live broadcasting. So far the unit can produce program linked contents on the recorded programs. However a live broadcasting program needs different skills to timely obtain information and update it. In addition to that, in order to expand the range of services, it is important to build a relation with the agencies and organizations that have the source of information.

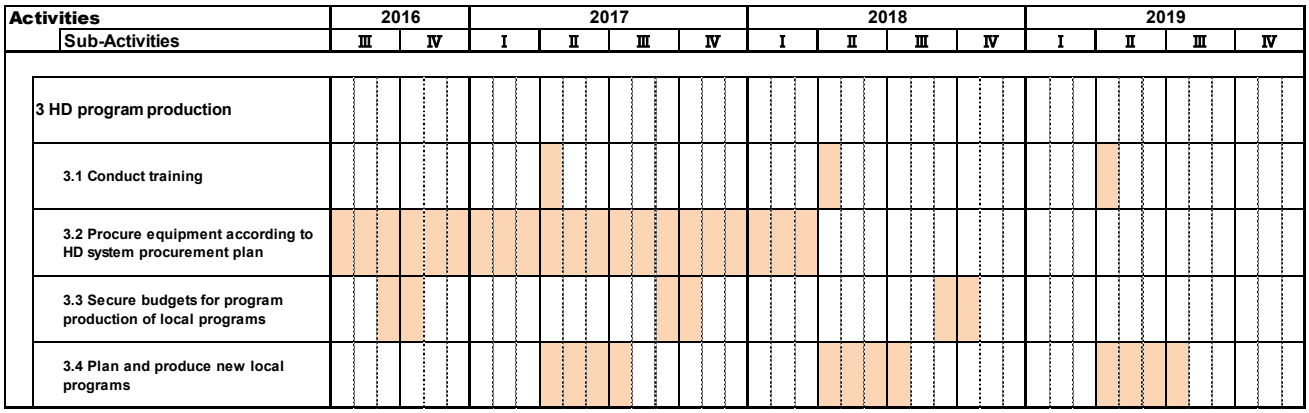
Table 4.2-2 Activity for indicator 2

Activities / Sub-Activities	2016		2017				2018				2019			
	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ
2 Capacity development of Data broadcasting unit														
2.1 Produce data broadcasting contents that are linked with a live broadcasting														
2.2 Buiild a relations with information source agancies and organizations														
2.3 Expand the range of services														
2.4 Employ new members in the unit														

(3) HD program production

Implement the HD system procurement plan and increase the number of programs locally produced. The broadcasting regulation in Botswana request public and commercial broadcasting stations to broadcast a certain ratio of local programs while the state broadcasting station, BTV is out of the scope of the regulation. However there are demands from the general public to broadcast locally produced programs in BTV. It is important to periodically conduct the customer survey and take the opinions of the viewers to reflect it on the programing schedule and increase the number of local programs.

Table 4.2-3 Activity for indicator 3



4.3 Recommendations for the Botswana side

Although achievement of overall goal is highly likely from the current status and the fact that digital migration continues to remain as an important agenda for DBS as well as in the national development plan, the following recommendations are made in order to more effectively proceed and make the achievement more certain.

Table 4.3-1 Recommendation for overall goal

No	Major issues	Recommendation
1	Promotion of digital receivers	• Type approval should be appropriately performed in order to provide assurance and incentives to the consumers to purchase the digital receivers that are certified by BOCRA. The stackers and markings would be recommended • It would be recommended that the policy be formulated for the preparation of digital receivers. Due to the market size of Botswana, it is unlikely that the digital receiver is brought to Botswana if it is left to the market. The political leadership is required to formulate the policy that gives incentives to manufactures or importers to bring the product to Botswana. • Penetration of digital receiver takes time. The measures should be taken as early as possible to promote digital receivers. Distribution of digital receivers, provision of subsidies or instalments to lower income households can be an incentive to take up digital receivers. • Public relations activities to be enhanced once the receivers are available to facilitate the uptake by the viewers.
2	Analyse the digital service coverage	• It is important to measure the accurate digital broadcasting service coverage to understand the gap between analogue and digital service coverage. By this, measures can be planned to provide support to the viewers living in the poor reception areas. • It is recommended that DBS procure coverage simulation software and field radio wave measurement equipment and develop human resource capacity of transmitting engineers to deal with the equipment also to analyse the result of the coverage simulation and plan and implement measures to fill the gap.
3	Toward ASO	• It is recommended that DBS take a step to measure ASO criteria set by the ASO

No	Major issues	Recommendation
		plan. • Call centre should be established and continues to provide services to the viewer until ASO by answering particular questions raised by the viewers. Website also should be opened to engage with a large number of viewers to provide necessary information for digital migration. • The viewing habit should be analysed because ASO depends also on how much viewers rely on terrestrial broadcasting for watching television. If the ratio is low and the contents are carried by other platform, it would be possible to terminate analogue broadcasting. • A trial area in a small village should be set to learn the lesson and make use of it to other areas to prevent confusion from happening and for the smooth analogue switch off.
4	Improve the capacity of data broadcasting unit	• The current capacity of data broadcasting unit is only enough to continue the current service. However BTV put data broadcasting at the centre of digital migration and intentions to expand its service contents from program linked to a live broadcasting programs to e-government. This requires additional staff members and new skills. It is recommended that BTV provide training opportunities to the staff members and recruit the new staff members to improve its capacity
5	Increase the number of locally produced programs	• According to the viewers survey, BTV is a most popular station in Botswana, and one of its reasons is that BTV broadcast local contents. The broadcasting regulation also requires the broadcasting stations to broadcast a certain level of local program and it is a condition for licensing, though BTV, a state broadcasting, station is not regulated by the regulation. It is recommended that BTV continue to produce local contents and promote government policies and local culture, talents in order to fulfil its missions. • By understanding the need of the viewer, it is important to examine the programing schedule and it is recommended that BTV is given a right to flexible change the programing schedule according to the voices of the viewers without too much government interference. • HD Program Production Manual should be introduced and used by as many staff as possible in order to improve the HDTV production skills and techniques of all the BTV employees and quality of the programs
6	Secure budget	• All of the above recommendations need budget preparation. It is recommended that DBS plans first and secure necessary budget in every financial year to implement the plan.

4.4 Monitoring Plan from the end of the Project to Ex-post Evaluation

It is recommended that monitoring and evaluation be conducted periodically toward the achievement of overall goal. The main point of the monitoring and evaluation for Ex-post evaluation is whether the outcomes that the project aimed are continued to be effective and develop after a certain period since the completion of

the Project.

Quantitative indicators are recommended to set to measure the progress. For the digital broadcasting service coverage, it is recommended to set the number of area that completed the coverage simulation and field radio wave measurement since it is difficult to conduct the whole country in one time particularly for field radio wave measurement. The whole country can be divided into several parts and the indicator can be developed how many and much the coverage simulation and field radio wave measurement have been conducted. The aggregated total is used for the digital coverage of the whole country. For program production of data broadcasting and HD contents, the number of programs produced could be used as an indicator to monitor the progress.

(1) Implementing structure of the monitoring

The same structure is used to monitor the progress toward overall goal. Deputy permanent secretary in charge of broadcasting and information can chair the monitoring meeting that is held every 6 months. Each activity to achieve its indicator is addressed by technology and licensing WG, HD program production WG and data broadcasting WG. Each leader of WG is responsible for implementation and report.

(2) The target figure

The target figures in each year should be introduced toward the overall goal of the Project.

For the indicator 1, the percentage of area where field radio wave measurement is conducted is used for the figure. For indicator 2 and 3, the number of new programs produced is counted as an indicator. If program linked data broadcasting contents are produced for one content, the indicator will be fulfilled in three years. With regard to HD program production, BTV consistently produces programs in house for approximately 16 to 18 according to the record. Once HD studio system is installed, the production can gradually shift in HD format. The proposed indicator for overall goal is shown in Table 4.4-1.

Table 4.4-1 Proposed indicator for overall goal

	For indicator 1	Indicator 2	Indicator 3
Year	Percentage of area where field radio wave measurement is conducted.	Number of newly produced program linked data broadcasting contents	Number of programs produced in HD format
2017	40 %	1	5
2018	80 %	1	10
2019	100 %	1	20

It is highly recommended that DBS implement those by preparing implementation plans for each activity. Without concrete plan, it is difficult to find problems and adjust the progress if there is any deviation or delay from the plan. Monitoring is used for finding problems.

ANNEX 1: Result of the Project

ANNEX 2: List of Projects (Report, Manual, Handbooks, etc) produced by the Project

ANNEX 3: PDM (All version of PDM)

ANNEX 4: R/D, M/M, Minutes of JCC

ANNEX 5: Monitoring Sheet

Separate Volume: Copy of Products Produced by the Project

Volume 1	**HD Program Production Manual**
Volume 2	**Data Broadcasting Training Material**
Volume 3	**Market Survey Report for Digital Migration (including programing schedule)**
Volume 4	**ISDB-T Standards of Botswana and Technical Specifications for Receivers**
Volume 5	**Public Relations Plan for Digital Migration**
Volume 6	**Test Centre Operation Manual**
Volume 7	**Call Centre Operation Manual**
Volume 8	**Procurement Plan of HD Studio Systems**

Annex -1
Result of the Project

List of Dispatched Experts

Nr	Work Assignment	Name	Company
1	Team Leader / Broadcasting Policy & Strategy	Mr. Naoaki NAMBU	YEC
2	Deputy Team Leader / Institution / Training 1	Mr. Katsuya TERABAYASHI	YEC
3	ASO Plan / Technical Standards 1	Mr. Yoshiki MARUYAMA	YEC (OS)
4	Technical Standards 2	Mr. Akira SAITO	YEC
5	Public Relations Plan / Coordinator/Training 2	Ms. Keiko UCHIUMI	YEC
6	HD Programme Production	Ms. Chiaki MATSUMOTO	YEC (OS)
7	Data Broadcasting Content Production	Mr. Susumu SATO	YEC (OS: Tomo-Digi)
8	Data Broadcasting Coding	Mr. Toshikazu KOJIMA	YEC (OS: Tomo-Digi)
9	Data Broadcasting Design	Mr. Fumitaka WATANABE	YEC (OS: Tomo-Digi)
10	Data Broadcasting Programing	Mr. Yuichiro HOSHI	YEC (OS: Tomo-Digi)
11	Production Engineer 1	Mr Junjiro SAITO	YEC(OS: NTV)
12	Production Engineer 2	Mr. Osamu SEINO	YEC(OS: NTV)
13	HD Procurement Plan	Mr. Kazuhiko HARIKAE	YEC
14	Test Centre Operation	Mr. Satoshi HAMANAKA	YEC(OS: J-DS)

<Note>

YEC: Yachiyo Engineering Co., Ltd.

NTV: Nippon Television Network Corporation

J-DS: Japan Digital Broadcasting Engineering System Co., Ltd.

List of Counterparts

No	Name	Position	Remark
Project Director			
1	Kebonye Kgabele Moepeng	Permanent Secretary	
Project Manager			
1	Mogomotsi Kaboeamodimo	Deputy Permanent Secretary	
Technology and Licensing WG			
1	Calvin Goiletswe	PBE-TX (DTT)	Deputy Project Manager Leader of TL WG
2	Kabo Dikolobe	CBE-BTV	
3	Didibeng Modisenyane	PBE-TX	Sub leader of TL WG
4	Bathopi Luke	Director - BOCRA	Sub leader of TL WG
5	Itumeleng Batsalelwang	DTT Expert - BOCRA	
6	Thapelo Maruping	Deputy Director - BOCRA	
7	Samuel Mpaesele	Manager - BOCRA	
8	Constance Kolaatamo	PBE-TX	
9	Galani Mothobi	PBE-BTV	
10	Maibi Gaotlolwe	PBE - TX	
11	Matshwenyego Kwada	MTC- TPS	
Public Relations WG			
1	Lorato Ntuara	Copy Right	Leader of PR WG
2	Last Rakgasa	Head of Radio Programmes	
3	Itumeleng Mmusi	Graphic Designer (BTV)	
4	Tshireletso Stoffel	Radio Botswana	
5	Omphile Ntakhwane	Daily News	
6	Ndulamo Ntopo	Public Relations	
HD Program Production WG			
1	Solly Nageng	Head of programmers	Leader of HD WG
2	Linet Habana	Ass. Commissioning Editor	
3	Gaamangwe Mathame	Programme Producer	
4	Gail Mochanang	Programme Producer	
5	Ponatshego Ponatshego	Graphic Designer	
6	Ernest Segokotlo	Engineer	
7	Ontlametse Gaothuse	Videographer	
8	Dintle Gaolebale	Studio Director (Operations)	
9	Kefilwe Mokgaotsane	Reporter News and Current affairs	
10	Audrey Bonang	Content Acquisition	
Programing WG			
1	Joel Thuto	Head of Channel	Leader of PG WG
2	Edson Malebane	Channel Controller	Leader of PG WG until Mar, 2015
3	Maipelo Montwedi	TX Producer (Programming)	
4	Lorraine Moleki	TX Producer (Programming)	
5	Morena Keipeile	Engineer	
6	Nkobi Mosipi	Marketing	

No	Name	Position	Remark
7	Phemelo Tsopito	Sports	
8	Kagiso Mapine	Executive Producer	
9	Onthatile Boti	News and Current Affairs	
Data Broadcasting WG			
1	Salome Senome	Executive producer	Leader of DT WG
2	Gaone Karele	Graphic Designer	
3	Gosaitse Koobonye	Marketing	
4	Kefilwe Leero	Programme Producer	
5	Gaotsenwe Ngwako	Sports	
6	Kedirileng Makgasa	Engineer	
7	Itumeleng Siviya	News and Current affairs	
8	Tabona Luza	Engineer	
9	Torotea Mmopi	Program Producer	
10	Beauty Sendi-Mpho	Editor	
11	Bame Mogomotsi	Acquisition	
12	Kaone Mosenti	Director	
13	Maipelo Montwedi	Programing	

List of Equipment

No	Item	Qt	Model	Recipient
1	Laptop	3	SONY (SVF 152C29W)	DBS
2	Copy Machine	1	RICHO (MP2001L)	
3	Printer	1	SUMSUNG (Xpress C410W)	
4	Projector	1	EPSON (V260X)	
5	P2 Card	5	PANASONIC (AJ-P2E064FNG)	
6	Outdoor antenna	40	EllES	
7*	IP Router 1 set	1	Cisco (1921), D-Link (DAP1360) Level one (FSW-0811)	
8*	DS TV recorder	1	DPS5001MC	
Test Centre Equipment				
9	Spectrum analyser	1	ANRITSU (MS2712E) Option MS2712E-0009 BW DEMOND Option 31 GPS receiver Option 30 ISDB-T video measurements	BOCRA
	Periodic Antenna	1	ANRITSU (2000-1747-R)	
	Magnetic Antenna	1	ANRITSU (2000-1528-R)	
	Adapter (DC to 11 GHz)	1	ANRITSU (510-102-R)	
	Adapter (DC to 18 GHz)	1	ANRITSU (1091-27-R)	
	Portable Rack	1	VISION3952228	
	Laptop	1	Lenovo G80-50	
	ISDB-T Modulator	1	DEK TEK (DTU 215)	
	Monitor	1	SANSUI SLED-50FHD	
	STB	2	EWD888	
	Matching pad (DC to 3000 MHz)	1	ANRITSU (12N50-75B)	
	Amplifier	1	EllIES	
	Rack	1	VISION3952228	
	Adopter (75 -50)	1		
	Adopter (50-50)	1		
	Attenuator -40dB	1		
	Antenna	1	DIAMOND ANTENNA	
	Antenna accessory	1	DIAMOND ANTENNA	
	Antenna accessory	1	BNCJ-NJ convertor	

* Those items were procured for operation and research purpose of the Project.

List of Items provided by other than the Project

No	Item	Qt	Model	Recipient
1	Integrated digital television	1	Sharp (LC-32LE360D3)	BOCRA
2	Set top box	1	EWD (2000ND-BML)	
3	Mobile device	1	Sharp (AQUOS Phone SD-10D)	
4	Mobile device	1	EWD	
5	DPMR	3	Buffalo (One-seg tuner DH-MONE/IP)	

Telephone: 3653056/3021

Fax: 3653347

Reference: BS 1/2/9 I (144)

DEPARTMENT OF BROADCASTING SERVICES

PRIVATE BAG 0060

GABORONE

02nd August 2016

Digital Migration in Television (DiMT)
P/Bag 0060
Gaborone

Dear Sir,

Acknowledgement of receipt of DiMT Project equipment

We acknowledge receipt of the equipment handed over to our department as per list below.

i) List of Items provided by the Project

No	Item	Qt	Model	Recipient
1	Laptop	3	SONY (SVF 152C29W)	DBS
2	Copy Machine	1	RICHO (MP2001L)	
3	Printer	1	SUMSUNG (Xpress C410W)	
4	Projector	1	EPSON (V260X)	
5	P2 Card	5	PANASONIC (AJ-P2E064FNG)	
6	Outdoor antenna with cable	40	EIIES	
7*	IP Router 1 set	1	Cisco (1921), D-Link (DAP1360) Level one (FSW-0811)	
8*	DS TV recorder	1	DPS5001MC	
Test Centre Equipment: 1 Set				BOCRA
9	Spectrum analyser	1	ANRITSU (MS2712E) Option MS2712E-0009 BW DEMOND Option 31 GPS receiver Option 30 ISDB-T video measurements	
	Periodic Antenna	1	ANRITSU (2000-1747-R)	
	Magnetic Antenna	1	ANRITSU (2000-1528-R)	
	Adapter (DC to 11 GHz)	1	ANRITSU (510-102-R)	
	Adapter (DC to 18 GHz)	1	ANRITSU (1091-27-R)	
	Portable Rack	1	VISION3952228	
	Laptop	1	Lenovo G80-50	
	ISDB-T Modulator	1	DEK TEK (DTU 215)	
	Monitor	1	SANSUI SLED-50FHD	
	STB	2	EWD888	
	Matching pad (DC to 3000 MHz)	1	ANRITSU (12N50-75B)	

	Amplifier	1	EIIIES	
	Rack	1	VISION3952228	
	Adopter (75 -50)	1		
	Adopter (50-50)	1		
	Attenuator -40dB	1	Maspro	
	Antenna	1	DIAMOND ANTENNA	
	Antenna accessory	1	DIAMOND ANTENNA	
	Antenna accessory	1	BNCJ-NJ convertor	

* Those items were procured for operation and research purpose of the Project.

The list below is the items provided by other than the Project and handed over.

ii) List of Items provided by other than the Project

No	Item	Qt	Model	Recipient
1	Integrated digital television	1	Sharp (LC-32LE360D3)	BOCRA
2	Set top box	1	EWD (2000ND-BML)	
3	Mobile device	1	Sharp (AQUOS Phone SD-10D)	
4	Mobile device	1	EWD	
5	DPMR	3	Buffalo (One-seg tuner DH-MONE/IP)	

We would once again thank your team for the support that you have provided for the implementation of this project.

Thank you.

Yours faithfully

Mogomotsi Kaboeamodimo
Deputy Permanent Secretary, Information and Broadcasting

Annex -2

List of Products produced by the Project

List of Products produced by the Project

No		Document	Responsible WG	Remarks
Deliverables				
1	D	HD program production manual	HD	Manual focused on the HD program production. Mainly for the production of news, documentary
2		Training material for data broadcasting program	DT	Basic training material for in-house training to understand data broadcasting.
3		Market survey report for digital migration, including programing schedule)	PG	Result of market survey including data broadcasting and draft programing schedule for digital broadcasting
4		Data broadcasting contents produced during the project period	DT	Data broadcasting contents that are produced and broadcasted during the project period
5		Botswana ISDB-T Standards and Technical specifications for receivers	TL	ISDB-T standard document tailored for Botswana context. Technical specifications for digital receivers for type approval including STB, IDTV, and DRPM
6		Public relations plan	PR	Include the budget plan and public relation activities
7		Operation manual for test centre	TL	Include the usage of equipment and procedures to receive and check the functions of receivers
8		Operation manual for call centre	PR	Include frequently asked questions and model answers, how to set up digital receivers and antennas
9		HD studio systems procurement plan	TL	Include equipment plan, budgetary plan, procurement schedule
Other Outputs				
10	O	ASO Plan	TL	ASO criteria was set as 80% of analogue service area by digital and 65% of receiver penetration
11		Training plan for data broadcasting	DT	Training plan for in-house training, also middle term plan to fill the positions and provide training to them
12		Monitoring Sheet	JT	Version 1, 2, 3, 4
13		Completion Report		This document

Note: D: Official Deliverable, O: Other Output Documents, TL: Technology and Licensing WG, PR: Public Relations WG, HD: HD Program Production WG, PG: Programing WG, DT, Data Broadcasting WG
JT: Joint Work

Annex -3
PDM (All versions of PDM)

PDM Version 0

Project Name：Implementation of the Digital Migration Project
Period of Implementation: July 2014 ～June 2016 **Target Group: Government Staff concerned with Implementation of Digital Migration**
Target Area: Whole Country of Botswana **Date: 12 Mar. 2014**
Implementing Agency: Department of Broadcasting Services, Ministry of State President (DBS) **Ver. 0-7**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal			
Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available.	1. Terrestrial digital broadcasting service area covers 65% or more of Botswana (the target in NDP10). 2. ○ or more number of programs that linked with the data broadcasting contents are produced per year. 3. ○ or more number of High Definition (HD) programs are produced per year.	1. Radio Wave Measurement 2. Broadcasting Program Schedule 3. Broadcasting Program Schedule	
Project Purpose			
Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready.	1. ○% or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV). 2. Facilities and human resources planned as necessary for producing and broadcasting HD programs based on ISDB-T data broadcasting are developed.	1. Customer Sample Survey 2. Project Progress Report	・Developments of DTTB network and related equipment are executed as planned. ・ISDB-T receivers are penetrated to households as planned.
Outputs			
1. Various plans necessary for migration to digital broadcasting are developed. 2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.	1-1. Roadmap towards Analogue Switch Off (ASO) is developed. 1-2 National Standards of Receivers are developed. 1-3 Terrestrial Digital Broadcasting Station Licensing Criteria are developed. 1-4 Public Relations Plan is developed. 2-1. Sections that handle data broadcasting are established in BTV. 2-2. HD Program Production Manual is developed. 2-3, A training system for producing data broadcasting program is established. 2-4. Program-linked and non-linked data are broadcasted.	1-1 ASO Roadmap 1-2. National Receiver Standards 1-3. Broadcasting Station Licensing Criteria 1-4. Public Relations Plan 2-1. BTV Organization Chart 2-2. HD Program Production Manual 2-3. Training plan for data broadcasting program 2-4. Broadcasting Program Schedule	・Various approval process by the concerned organizations are not delayed. ・Staff received trainings does not resign the BTV.

Activities	Inputs		
1. Relative to various plans for digital migration 1-1 To establish Technology and Licensing Working Group, Public Relations Working Group 1-2 To review a roadmap towards ASO 1-3 To review technical standards related to ISDB-T 1-4 To develop regulations for terrestrial broadcasting station licensing criteria 1-5 To review Public Relations Plan for Digital Migration	<u>Japanese Side</u> 1. JICA Experts (1) Chief Advisor/Policy & Strategy (2) Institution/Training Plan (3) ASO Plan/Technical Standards (4) Public Relations Plan (5) HD Program Production (6) Data Broadcasting Contents Production (7) Data Broadcasting Programming	<u>Botswana Side</u> 1. C/P Personnel (1) Project Manager (2) Deputy Project Manager (3) Leader of Technology and Licensing Working Group (WG) (4) Leader of Public Relations WG (5) Leader of Program Production WG (6) Leader of Programming WG (7) Leader of Data Broadcasting WG	・C/P personnel continue to work on the Project. ・Staff received trainings does not resign the BTV.

2. Relative to DBS's capacity of producing programs 2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcasting Working Group 2-2 To develop HD program production capability 2-3 To establish a section that produce data broadcasting program 2-4 To develop a training system for producing data broadcasting program 2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey 2-6 To plan and produce program-linked and non-linked data broadcasting	2. Equipment ・Data Broadcasting Contents Management System: 1 set 3. Training in Japan ・HD Studio Operations (Camera, Lighting, Audio, Video Engineer) ・Digital Terrestrial Television Broadcasting (DTTB) Training (including Data Broadcasting)	2. Members of Working Groups 3. Project Office for Experts (in both BOCRA and DBS) 4. Project Vehicles: 2 cars 5. Existing BTV's facilities and equipment that can be utilized for Terrestrial Digital Broadcasting 6. All equipment that should be procured during the Implementation Period of the Technical Cooperation Project for migration to ISDB-T	**Preconditions** ・Relevant ministries and agencies are ready to cooperate for migration to terrestrial digital broadcasting.

PDM Version 1

Project Name: Implementation of the Digital Migration Project
Period of Implementation: September 2014 to August 2016 **Target Group: Staff of DBS, BOCRA and other concerned with Implementation of the Digital Migration**
Target Area: The Entire Country of Botswana **Date: 24th Sep. 2014**
Implementing Agency: Department of Broadcasting Services (DBS), Ministry of State President **Version. 1**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available.	1. Terrestrial digital broadcasting service area covers 65% or more of Botswana (the target in NDP10). 2. O or more number of programs that linked with the data broadcasting contents are produced per year. 3. O or more number of High Definition (HD) programs are produced per year.	1. Radio Wave Measurement 2. Broadcasting Program Schedule 3. Broadcasting Program Schedule	
Project Purpose Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready.	1. O% or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV). 2. Facilities and human resources planned as necessary for producing and broadcasting HD programs based on ISDB-T data broadcasting are developed.	1. Customer Sample Survey 2. Project Progress Report	・Developments of DTTB network and related equipment are executed as planned. ・ISDB-T receivers are penetrated to households as planned.
Outputs 1. Various plans necessary for migration to digital broadcasting are developed. 2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.	1-1. Analogue Switch Off (ASO) Plan is developed. 1-2. Botswana ISDB-T Standards is developed. 1-3. Specifications of receivers is prepared. 1-4. Terrestrial Digital Broadcasting Station Licensing Criteria are developed. 1-5. Draft Public Relations Plan is developed. 2-1. Sections that handle data broadcasting are established in BTV. 2-2. HD Program Production Manual is developed. 2-3. A training system for producing data broadcasting program is established. 2-4. Program-linked and non-linked data are broadcasted.	1-1 ASO Plan 1-2. Botswana ISDB-T Standards 1-3. Specifications of receivers 1-4. Terrestrial broadcasting station licensing criteria 1-5. Draft Public Relations Plan 2-1. BTV Organization Chart 2-2. HD Program Production Manual 2-3. Training plan for data broadcasting program 2-4. Broadcasting Program Schedule	・Various approval process by the concerned organizations are not delayed. ・Staff received trainings does not resign DBS.

Activities	Inputs		
	Japanese Side	Botswana Side	
1. Relative to various plans for digital migration 1-1 To establish Technology and Licensing Working Group, Public Relations Working Group 1-2 To prepare ASO plan 1-3 To review Botswana ISDB-T Standards 1-4 To review specifications of receivers 1-5 To prepare terrestrial broadcasting station licensing criteria 1-6 To develop Draft Public Relations Plan for Digital Migration	1. JICA Experts (1) Team Leader/Policy & Strategy (2) Institution/Training Plan 1 (3) ASO Plan/Technical Standards 1 (4) Technical Standards 2 (5) Public Relations Plan/Training Plan 2 (6) HD Program Production (7) Data Broadcasting Contents Production (8) Data Broadcasting Coding (9) Data Broadcasting Design (10) Data Broadcasting Programming	1. C/P Personnel (1) Project Manager (2) Deputy Project Manager (3) Leader of Technology and Licensing Working Group (WG) (4) Leader of Public Relations WG (5) Leader of Program Production WG (6) Leader of Programming WG (7) Leader of Data Broadcasting WG	・C/P personnel continue to work on the Project. ・Staff received trainings does not resign DBS.
2. Relative to DBS's capacity of producing programs 2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcasting Working Group 2-2 To develop HD program production capability 2-3 To establish a section that produce data broadcasting program 2-4 To develop a training system for producing data broadcasting program 2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey 2-6 To plan and produce program-linked and non-linked data broadcasting	2. Equipment ・*Data Broadcasting Contents Management System: 1 set 3. Training in Japan ・HD Studio Operations (Camera, Lighting, Audio, Video Engineer) ・Digital Terrestrial Television Broadcasting (DTTB) Training (including Data Broadcasting)	2. Members of Working Groups 3. Project Office for Experts (in both BOCRA and DBS) 4. Project Vehicles: 2 cars 5. Existing BTV's facilities and equipment that can be utilized for Terrestrial Digital Broadcasting 6. All equipment that should be procured during the Implementation Period of the Technical Cooperation Project for migration to ISDB-T	**Preconditions** ・Digital migration plan is not excluded from the national development plan.

PDM Version 2

Project Name: Implementation of the Digital Migration Project
Period of Implementation: September 2014 to August 2016 Target Group: Staff of DBS, BOCRA and other concerned with Implementation of the Digital Migration
Target Area: The Entire Country of Botswana Date: 20th Mar. 2015
Implementing Agency: Department of Broadcasting Services (DBS), Ministry of State President Version. 2

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available.	1. Terrestrial digital broadcasting service area covers 65% or more of Botswana (the target in NDP10). 2. 3 or more number of programs that linked with the data broadcasting contents are produced per year. 3. 20 or more number of High Definition (HD) programs are produced per year.	1. Radio Wave Measurement 2. Broadcasting Program Schedule 3. Broadcasting Program Schedule	
Project Purpose Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready.	1. 34% or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV). 2. Facilities and human resources planned as necessary for producing and broadcasting HD programs based on ISDB-T data broadcasting are developed.	1. Customer Sample Survey 2. Project Progress Report	・Developments of DTTB network and related equipment are executed as planned. ・Developments of HD studio systems are executed as planned. ・ISDB-T receivers are penetrated to households as planned.
Outputs 1. Various plans necessary for migration to digital broadcasting are developed. 2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.	1-1. Analogue Switch Off (ASO) Plan is developed. 1-2. Botswana ISDB-T Standards is developed. 1-3. Specifications of receivers is prepared. 1-4. Terrestrial broadcasting station licensing criteria are developed. 1-5. Draft Public Relations Plan is developed. 2-1. Sections that handle data broadcasting are established in BTV. 2-2. HD Program Production Manual is developed. 2-3. A training system for producing data broadcasting program is established. 2-4. Program-linked and non-linked data are broadcasted.	1-1 ASO Plan 1-2. Botswana ISDB-T Standards 1-3. Specifications of receivers 1-4. Terrestrial broadcasting station licensing criteria 1-5. Draft Public Relations Plan 2-1. BTV Organization Chart 2-2. HD Program Production Manual 2-3. Training plan for data broadcasting program 2-4. Broadcasting Program Schedule	・Various approval process by the concerned organizations are not delayed. ・Staff received trainings does not resign DBS.

Activities	Inputs		
	Japanese Side	Botswana Side	
1. Relative to various plans for digital migration 1-1 To establish Technology and Licensing Working Group, Public Relations Working Group 1-2 To prepare ASO plan 1-3 To review Botswana ISDB-T Standards 1-4 To review specifications of receivers 1-5 To review terrestrial broadcasting station licensing criteria 1-6 To develop Draft Public Relations Plan for Digital Migration 1-7 To conduct public relations activities in accordance with the Draft Public Relations Plan	1. JICA Experts (1) Team Leader/Policy & Strategy (2) Institution/Training Plan 1 (3) ASO Plan/Technical Standards 1 (4) Technical Standards 2 (5) Public Relations Plan/Training Plan 2 (6) HD Program Production (7) Data Broadcasting Contents Production (8) Data Broadcasting Coding (9) Data Broadcasting Design (10) Data Broadcasting Programming (11) Production Engineering	1. C/P Personnel (1) Project Manager (2) Deputy Project Manager (3) Leader of Technology and Licensing Working Group (WG) (4) Leader of Public Relations WG (5) Leader of Program Production WG (6) Leader of Programming WG (7) Leader of Data Broadcasting WG	・C/P personnel continue to work on the Project. ・Staff received trainings does not resign DBS.
2. Relative to DBS's capacity of producing programs 2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcasting Working Group 2-2 To develop HD program production capability 2-3 To establish a section that produce data broadcasting program 2-4 To develop a training system for producing data broadcasting program 2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey 2-6 To plan and produce program-linked and non-linked data broadcasting	~~2. Equipment~~ ~~・*Data Broadcasting Contents Management System: 1 set~~ 2. Training in Japan ・HD Studio Operations (Camera, Lighting, Audio, Video Engineer) ・Digital Terrestrial Television Broadcasting (DTTB) Training (including Data Broadcasting)	2. Members of Working Groups 3. Project Office for Experts (in both BOCRA and DBS) 4. Project Vehicles: 2 cars 5. Existing BTV's facilities and equipment that can be utilized for Terrestrial Digital Broadcasting 6. All equipment that should be procured during the Implementation Period of the Technical Cooperation Project for migration to ISDB-T	**Preconditions** ・Digital migration plan is not excluded from the national development plan.

~~*Procurement of CMS will be determined late~~

PDM Version 3

Project Name: Implementation of the Digital Migration Project
Period of Implementation: September 2014 to August 2016 Target Group: Staff of DBS, BOCRA and other concerned with Implementation of the Digital Migration
Target Area: The Entire Country of Botswana Date: 10 September 2015
Implementing Agency: Department of Broadcasting Services (DBS), Ministry of State President Version. 3

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available.	1. Terrestrial digital broadcasting service area covers 65% or more of Botswana (the target in NDP10). 2. 3 or more number of programs that linked with the data broadcasting contents are produced per year. 3. 20 or more number of High Definition (HD) programs are produced per year.	1. Radio Wave Measurement 2. Broadcasting Program Schedule 3. Broadcasting Program Schedule	
Project Purpose Environment for the terrestrial digital broadcasting that takes advantage of the features of ISDB-T is ready.	1. 34% or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV). 2. Facilities and human resources planned as necessary for producing and broadcasting HD programs based on ISDB-T data broadcasting are developed.	1. Customer Sample Survey 2. Project Monthly Report	・Developments of DTTB network and related equipment are executed as planned. ・Developments of HD studio systems are executed as planned. ・ISDB-T receivers are penetrated to households as planned.
Outputs 1. Various plans and systems necessary for migration to digital broadcasting are developed. 2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.	1-1. Analogue Switch Off (ASO) Plan is developed. 1-2. Botswana ISDB-T Standards is developed. 1-3. Specifications of receivers is prepared. 1-4. Terrestrial broadcasting station licensing criteria are developed. 1-5. Draft Public Relations Plan is developed. 1-6. Operation manual for the test centre is prepared. 1-7. Operation manual for the call centre is prepared. 2-1. Sections that handle data broadcasting are established in BTV. 2-2. HD Program Production Manual is developed. 2-3. A training system for producing data broadcasting program is established. 2-4. Program-linked and non-linked data are broadcasted. 2-5. Procurement plan of HD studio systems is developed.	1-1 ASO Plan 1-2. Botswana ISDB-T Standards 1-3. Specifications of receivers 1-4. Terrestrial broadcasting station licensing criteria 1-5. Draft Public Relations Plan 1-6. Operation manual for test centre 1-7. Operation manual for call centre 2-1. BTV Organization Chart 2-2. HD Program Production Manual 2-3. Training plan for data broadcasting program 2-4. Broadcasting Program Schedule 2-5. Procurement Plan of HD Studio Systems	・Various approval process by the concerned organizations are not delayed. ・Staff received trainings does not resign DBS.

Activities	Inputs		
1. Relative to various plans for digital migration 1-1 To establish Technology and Licensing Working Group, Public Relations Working Group 1-2 To prepare ASO plan 1-3 To review Botswana ISDB-T Standards 1-4 To review specifications of receivers 1-5 To review terrestrial broadcasting station licensing criteria 1-6 To develop Draft Public Relations Plan for Digital Migration 1-7 To conduct public relations activities in accordance with the Draft Public Relations Plan 1-8 To establish a test centre for compliance with set specifications and receivers penetration assurance 1-9 To develop viewers support through a call centre operation	<u>Japanese Side</u> 1. JICA Experts (1) Team Leader/Policy & Strategy (2) Institution/Training Plan 1 (3) ASO Plan/Technical Standards 1 (4) Technical Standards 2 (5) Public Relations Plan/Training Plan 2 (6) HD Program Production (7) Data Broadcasting Contents Production (8) Data Broadcasting Coding (9) Data Broadcasting Design (10) Data Broadcasting Programming (11) Production Engineering (12) HD Procurement Plan 2. Training in Japan ・HD Studio Operations (Camera, Lighting, Audio, Video Engineer) ・Digital Terrestrial Television Broadcasting (DTTB) Training (including Data Broadcasting) 3. Equipment Test Centre Equipment: 1 set	<u>Botswana Side</u> 1. C/P Personnel (1) Project Manager (2) Deputy Project Manager (3) Leader of Technology and Licensing Working Group (WG) (4) Leader of Public Relations WG (5) Leader of Program Production WG (6) Leader of Programming WG (7) Leader of Data Broadcasting WG 2. Members of Working Groups 3. Project Office for Experts (in both BOCRA and DBS) 4. Project Vehicles: 2 cars 5. Existing BTV's facilities and equipment that can be utilized for Terrestrial Digital Broadcasting 6. All equipment that should be procured during the Implementation Period of the Technical Cooperation Project for migration to ISDB-T	・C/P personnel continue to work on the Project. ・Staff received trainings does not resign DBS.
2. Relative to DBS's capacity of producing programs 2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcasting Working Group 2-2 To develop HD program production capability 2-3 To establish a section that produce data broadcasting program 2-4 To develop a training system for producing data broadcasting program 2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey 2-6 To plan and produce program-linked and non-linked data broadcasting 2-7 To develop procurement plan of HD studio systems			**Preconditions** ・Digital migration plan is not excluded from the national development plan.

PDM Version 4

Project Name: Implementation of the Digital Migration Project
Period of Implementation: September 2014 to August 2016
Target Group: Staff of DBS, BOCRA and other concerned with Implementation of the Digital Migration
Target Area: The Entire Country of Botswana
Date: 22 April 2016
Implementing Agency: Department of Broadcasting Services (DBS), Ministry of State President
Version. 4

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available.	1. Terrestrial digital broadcasting service area covers 65% or more of Botswana (the target in NDP10). 2. 3 or more number of programs that linked with the data broadcasting contents are produced per year. 3. 20 or more number of High Definition (HD) programs are produced per year.	1. Radio Wave Measurement 2. Broadcasting Program Schedule 3. Broadcasting Program Schedule	
Project Purpose Environment for the terrestrial digital broadcasting that takes advantage of the features of ISDB-T is ready.	1. 34% or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV). 2. Facilities and human resources planned as necessary for producing and broadcasting HD programs based on ISDB-T data broadcasting are developed.	1. Customer Sample Survey 2. Project Monthly Report	・Developments of DTTB network and related equipment are executed as planned. ・Developments of HD studio systems are executed as planned. ・ISDB-T receivers are penetrated to households as planned.
Outputs 1. Various plans and systems necessary for migration to digital broadcasting are developed. 2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.	1-1. Analogue Switch Off (ASO) Plan is developed. 1-2. Botswana ISDB-T Standards is developed. 1-3. Specifications of receivers is prepared. 1-4. Terrestrial broadcasting station licensing criteria are developed. 1-5. Draft Public Relations Plan is developed. 1-6. Operation manual for the test centre is prepared. 1-7. Operation manual for the call centre is prepared. 2-1. Sections that handle data broadcasting are established in BTV. 2-2. HD Program Production Manual is developed. 2-3. A training system for producing data broadcasting program is established. 2-4. Program-linked and non-linked data are broadcasted. 2-5. Procurement plan of HD studio systems is developed.	1-1 ASO Plan 1-2. Botswana ISDB-T Standards 1-3. Specifications of receivers 1-4. Terrestrial broadcasting station licensing criteria 1-5. Draft Public Relations Plan 1-6. Operation manual for test centre 1-7. Operation manual for call centre 2-1. BTV Organization Chart 2-2. HD Program Production Manual 2-3. Training plan for data broadcasting program 2-4. Broadcasting Program Schedule 2-5. Procurement Plan of HD Studio Systems	・Various approval process by the concerned organizations are not delayed. ・Staff received trainings does not resign DBS.

Activities	Inputs		
1. Relative to various plans for digital migration 1-1 To establish Technology and Licensing Working Group, Public Relations Working Group 1-2 To prepare ASO plan 1-3 To review Botswana ISDB-T Standards 1-4 To review specifications of receivers 1-5 To review terrestrial broadcasting station licensing criteria 1-6 To develop Draft Public Relations Plan for Digital Migration 1-7 To conduct public relations activities in accordance with the Draft Public Relations Plan 1-8 To establish a test centre for compliance with set specifications and receivers penetration assurance 1-9 To develop viewers support through a call centre operation	<u>Japanese Side</u> 1. JICA Experts (1) Team Leader/Policy & Strategy (2) Institution/Training Plan 1 (3) ASO Plan/Technical Standards 1 (4) Technical Standards 2 (5) Public Relations Plan/Training Plan 2 (6) HD Program Production (7) Data Broadcasting Contents Production (8) Data Broadcasting Coding (9) Data Broadcasting Design (10) Data Broadcasting Programming (11) Production Engineering (12) HD Procurement Plan (13) Test Centre Operation 2. Training in Japan ・HD Studio Operations (Camera, Lighting, Audio, Video Engineer) ・Digital Terrestrial Television Broadcasting (DTTB) Training (including Data Broadcasting) 3. Equipment Test Centre Equipment: 1 set	<u>Botswana Side</u> 1. C/P Personnel (1) Project Manager (2) Deputy Project Manager (3) Leader of Technology and Licensing Working Group (WG) (4) Leader of Public Relations WG (5) Leader of Program Production WG (6) Leader of Programming WG (7) Leader of Data Broadcasting WG 2. Members of Working Groups 3. Project Office for Experts (in both BOCRA and DBS) 4. Project Vehicles: 2 cars 5. Existing BTV's facilities and equipment that can be utilized for Terrestrial Digital Broadcasting 6. All equipment that should be procured during the Implementation Period of the Technical Cooperation Project for migration to ISDB-T	・C/P personnel continue to work on the Project. ・Staff received trainings does not resign DBS.
2. Relative to DBS's capacity of producing programs 2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcasting Working Group 2-2 To develop HD program production capability 2-3 To establish a section that produce data broadcasting program 2-4 To develop a training system for producing data broadcasting program 2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey 2-6 To plan and produce program-linked and non-linked data broadcasting 2-7 To develop procurement plan of HD studio systems			**Preconditions** ・Digital migration plan is not excluded from the national development plan.

Annex -4
R/D, M/M, Minutes of JCC

RECORD OF DISCUSSION

RECORD OF DISCUSSIONS

ON

IMPLEMENTATION OF THE DIGITAL MIGRATION PROJECT

IN

REPUBLIC OF BOTSWANA

AGREED UPON BETWEEN

MINISTRY OF STATE PRESIDENT

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Gaborone, 5 May 2014

Mr. Akihiko HOSHINO
Resident Representative
Botswana Office
Japan International Cooperation Agency

Mr. Mogomotsi Kaboeamodimo
Deputy Permanent Secretary –
Information and Broadcasting
Ministry of State President

Based on the minutes of meetings on the Detailed Planning Survey on the Implementation of the Digital Migration Project (hereinafter referred to as "the Project") signed on February 19, 2014 between Department of the Broadcasting Services (hereinafter referred to as "DBS"), Ministry of State President and the Japan International Cooperation Agency (hereinafter referred to as "JICA"), JICA held a series of discussions with DBS and relevant organizations to develop a detailed plan of the Project.

Both parties agreed the details of the Project and main points discussed as described in the Appendix 1 and the Appendix 2, respectively, and to request their respective governments to proceed with the necessary procedures for implementation of the Project.

Both parties also agreed that DBS, the counterpart to JICA, will be responsible for the implementation of the Project in cooperation with JICA, coordinate with other relevant organizations and ensure that the self-reliant operation of the Project is sustained during and after the implementation period in order to contribute toward social and economic development of Botswana.

The Project will be implemented within the framework of the Note Verbales exchanged on September 18, 2013 between the Government of Japan (hereinafter referred to as "GOJ") and Government of Botswana (hereinafter referred to "GOB").

Appendix 1: Project Description
Appendix 2: Minutes of Meetings on Technical Cooperation on Implementation of the Digital Migration Project signed on February 19, 2014

Appendix 1

PROJECT DESCRIPTION

Both parties confirmed that there is no change in the Project Description agreed on in the minutes of meetings on the concerning Preparatory Survey on the Project signed on February 19, 2014 (Appendix 2).

I. BACKGROUND

In February 2013, GOB decided to adopt Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) as a standard for digital television because ISDB-T has advantages of broadcasting for cars and mobile phones. In Africa, Botswana is the first country which decided to adopt ISDB-T. Botswana gives importance to urge digitalization because International Telecommunication Union (ITU) announced to South African Development Community (SADC) to completely migrate analog broadcasting to digital by 2015.

However, there is not enough equipment such as transmitters or studio equipment for terrestrial digital broadcasting in Botswana. In addition, Botswana lacks of knowledge and techniques for formulating channel planning, making show applied features of digital broadcasting and procedure, use and maintenance of studio and broadcasting equipment. Because of the situations, Botswana requested technical cooperation for smooth migration from analog to digital broadcasting.

Although the Republic of South Africa adopted Digital Video Broadcasting Terrestrial 2 (DVB-T2) and some other countries in SADC also have decided to adopt DVB-T2, Botswana decided to adopt ISDB-T. It means that Botswana believes Japanese experience of completion of digitalization is helpful for digitalization in Botswana. Japan also believes that and hopes that ISDB-T will be adopted to other African countries by showing successful example on this project.

This project falls under the program of "Strengthening infrastructure facilities and distribution system" in the context of the Japanese assistance policy for Botswana. In addition, according to Japan's ODA policy, it is important to create the environment where Japanese companies can benefit from the business in developing countries. It is considered that the adoption of the ISDB- T in Botswana will increase business opportunities of Japanese companies.

II. OUTLINE OF THE PROJECT

Details of the Project are described in the Logical Framework (Project Design Matrix: PDM) (Annex I) and the tentative Plan of Operation (Annex II).

1. Title of the Project
   Implementation of the Digital Migration Project

2. Overall Goal
   Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available.

3. Project Purpose
   Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready.

4. Outputs
   1. Various plans necessary for migration to digital broadcasting are developed.
   2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.

5. Activities
   1. Relative to various plans for digital migration
      1-1 To establish Technology and Licensing Working Group and Public Relations Working Group
      1-2 To review a roadmap towards Analogue Switch Off (ASO)
      1-3 To review technical standards related to ISDB-T
      1-4 To develop regulations for terrestrial broadcasting station licensing criteria
      1-5 To review Public Relations Plan for Digital Migration
   2. Relative to DBS's capacity of producing programs
      2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcast Working Group
      2-2 To develop HD program production capability
      2-3 To establish a section that produce data broadcast program
      2-4 To develop a training system for producing data broadcast program
      2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey
      2-6 To plan and produce program linked and non-linked data broadcast

6. Input
   (1) Input by JICA
      (a) Dispatch of Experts
         - Chief Advisor/Policy & Strategy
         - Institution/Training Plan
         - ASO Plan/Technical Standards
         - Public Relations Plan
         - HD Program Production
         - Data Broadcasting Contents Production
         - Data Broadcasting Programming

(b) Training
Provision of training in Botswana and in Japan

(c) Machinery and Equipment
Provision of machinery and equipment (Data Broadcasting Contents Management System (1 set))
In case of importation, the machinery, equipment and other materials under this clause will become the property of the GOB upon being delivered C.I.F. (cost, insurance and freight) to the Botswana authorities concerned at the ports and/or airports of disembarkation.

(2) Input by DBS
DBS will take necessary measures to provide at its own expense:

(a) Services of DBS's counterpart personnel and administrative personnel as referred to in II-7;
(b) Suitable office space with furniture and necessary equipment;
(c) Supply or replacement of machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the equipment provided by JICA;
(d) Means of transport and travel allowances for the JICA experts for official travel within Botswana;
(e) Information as well as support in obtaining medical service;
(f) Credentials or identification cards;
(g) Available data (including maps and photographs) and information related to the Project;
(h) Running expenses necessary for the implementation of the Project;
(i) Expenses necessary for transportation within Botswana of the equipment referred to in II-6 (1) as well as for the installation, operation and maintenance thereof; and
(j) Necessary facilities to the JICA experts for the remittance as well as utilization of the funds introduced into Botswana from Japan in connection with the implementation of the Project

7. Implementation Structure
The Project organization chart is given in the Annex III. The roles and assignments of relevant organizations are as follows:

(1) GOB side

(a) Permanent Secretary to the Ministry of State President as the Project Director will bear an overall responsibility for the Project.
(b) Project Manager
A representative of DBS will be responsible for the matters related to administration and implementation of the Project.
(c) Deputy Project Manager
A representative of Ministry of Transport and Communications will be responsible for the matters related to regulating the broadcasting services within the Project.

(2) JICA Experts
The JICA experts will give necessary technical guidance, advice and

recommendations to DBS on any matters pertaining to the implementation of the Project.

(3) Joint Coordinating Committee
Joint Coordinating Committee (hereinafter referred to as "JCC") will be established in order to facilitate inter-organizational coordination. JCC will be held at least four times during the Project duration (See ANNEX II). JCC will approve an annual work plan, review overall progress, conduct evaluation of the Project, and exchange opinions on major issues that arise during the implementation of the Project.

8. Project Site(s) and Beneficiaries
Throughout the country
Citizens in Botswana

9. Duration
Two (2) years from the Project commencement. (Assignment of first Japanese expert in Botswana)

10. Report
DBS and JICA experts will jointly prepare Project Completion Report at the time of project completion.

11. Environmental and Social Considerations

(1) DBS agreed to abide by 'JICA Guidelines for Environmental and Social Considerations' in order to ensure that appropriate considerations will be made for the environmental and social impacts of the Project.

III. UNDERTAKINGS OF DBS

1. DBS will take necessary measures to:

(1) ensure that the technologies and knowledge acquired by the Botswana nationals as a result of Japanese technical cooperation contributes to the economic and social development of Botswana, and that the knowledge and experience acquired by the personnel of Botswana from technical training as well as the equipment provided by JICA will be utilized effectively in the implementation of the Project; and

(2) grant privileges, exemptions and benefits to the JICA experts referred to in II-6 (1) above and their families, which are no less favorable than those granted to experts and members of the missions and their families of third countries or international organizations performing similar missions in Botswana.

2. DBS will take necessary measures to:

(1) provide security-related information as well as measures to ensure the safety of the JICA experts;
(2) permit the JICA experts to enter, leave and sojourn in Botswana for the duration of their assignments therein and exempt them from foreign registration requirements and consular fees;
(3) exempt the JICA experts from taxes and any other charges on the equipment, machinery and other material necessary for the implementation of the Project;
(4) exempt the JICA experts from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to them and/or remitted to them from abroad for their services in connection with the implementation of the Project; and
(5) meet taxes and any other charges on the equipment, machinery and other material, referred to in II-7 above, necessary for the implementation of the Project.

3. DBS will bear claims, if any arises, against the JICA experts resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Project, except when such claims arise from gross negligence or willful misconduct on the part of the JICA experts.

IV. MONITORING AND EVALUATION

JICA and the DBS will jointly and regularly monitor the progress of the Project through the Monitoring Sheets based on the Project Design Matrix (PDM) and Plan of Operation (PO). The Monitoring Sheets shall be reviewed every six (6) months.
Also, Project Completion Report shall be drawn up one (1) month before the termination of the Project.

JICA will conduct the following evaluation and surveys to mainly verify sustainability and impact of the Project and draw lessons. The DBS is required to provide necessary support for them.

1. Ex-post evaluation: three (3) years after the project completion, in principle
2. Follow-up surveys: upon necessity basis

V. PROMOTION OF PUBLIC SUPPORT

For the purpose of promoting support for the Project, DBS will take appropriate measures to make the Project widely known to the people of Botswana.

VI. MUTUAL CONSULTATION

JICA and DBS will consult each other whenever any major issues arise in the course of Project implementation.

VII. AMENDMENTS

The record of discussions may be amended by the minutes of meetings between JICA and DBS.
The minutes of meetings will be signed by authorized persons of each side who may be different from the signers of the record of discussions.

Annex I Logical Framework (Project Design Matrix: PDM)
Annex II Tentative Plan of Operation
Annex III Project Organization Chart

Project Design Matrix

ANNEX I

Version 0-6

Dated 19,Feb,2014

Project Title: Implementation of the Digital Migration Project

Implementing Agency: Department of Broadcasting Services, Ministry of State President (DBS)

Target Group: Government Staff concerned with Implementation of Digital Migration

Period of Project: July 2014 - June 2016

Project Site: Whole Country of Botswana

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available.	1. Terrestrial digital broadcasting service area covers 65% or more of Botswana (the target in NDP10). 2. O or more number of programs that linked with the data broadcasting contents are produced per year. 3. O or more number of High Definition (HD) programs are produced per year.	1. Radio Wave Measurement 2. Broadcasting Program Schedule 3. Broadcasting Program Schedule			
Project Purpose Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready.	1. O% or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV). 2. Facilities and human resources planned as necessary for producing and broadcasting HD programs based on ISDB-T data broadcasting are developed.	1. Customer Sample Survey 2. Project Progress Report	・DTTB network is developed and related equipment are procured that assumed in the plan. ・ISDB-T receivers are penetrated to households.		
Outputs 1. Various plans necessary for migration to digital broadcasting are developed. 2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.	1-1. Roadmap towards Analogue Switch Off (ASO) is developed. 1-2 National Standards of Receivers are developed. 1-3 Terrestrial Digital Broadcasting Station Licensing Criteria are developed. 1-4 Public Relations Plan is developed. 2-1. Sections that handle data broadcasting are established in BTV. 2-2. HD Program Production Manual is developed. 2-3. A training system for producing data broadcasting program is established. 2-4. Program-linked and non-linked data are broadcasted.	1-1 ASO Roadmap 1-2. Receiver National Standards 1-3. Broadcasting Station Licensing Criteria 1-4. Public Relations Plan 2-1. BTV Organization Chart 2-2. HD Program Production Manual 2-3. Training plan for data broadcasting program 2-3. Broadcasting Program Schedule	・Various approval process by the concerned organizations are not delayed. ・Staff received trainings does not resign the BTV.		
Activities	**Inputs**				
	The Japanese Side	**The Botswana Side**			
1. Relative to various plans for digital migration 1-1 To establish Technology and Licensing Working Group, Public Relations Working Group 1-2 To review a roadmap towards ASO 1-3 To review technical standards related to ISDB-T 1-4 To develop regulations for terrestrial broadcasting station licensing criteria 1-5 To review Public Relations Plan for Digital Migration 2. Relative to DBS's capacity of producing programs 2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcasting Working Group 2-2 To develop HD program production capability 2-3 To establish a section that produce data broadcasting program 2-4 To develop a training system for producing data broadcasting program 2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey 2-6 To plan and produce program-linked and non-linked data broadcasting	1. JICA Experts (1) Chief Advisor/Policy & Strategy (2) Institution/Training Plan (3) ASO Plan/Technical Standards (4) Public Relations Plan (5) HD Program Production (6) Data Broadcasting Contents Production (7) Data Broadcasting Programming 2. Equipment ・Data Broadcasting Contents Management System: 1 set 3. Training in Japan ・HD Studio Operations (Camera, Lighting, Audio, Video Engineer) ・Digital Terrestrial Television Broadcasting (DTTB) Training (including Data Broadcasting)	Botswana Side 1. C/P Personnel (1) Project Manager (2) Deputy Project Manager (3) Leader of Technology and Licensing Working Group (WG) (4) Leader of Public Relations WG (5) Leader of Program Production WG (6) Leader of Programming WG (7) Leader of Data Broadcasting WG 2. Members of Working Groups 3. Project Office for Experts (in both BOCRA and DBS) 4. Project Vehicles: 2 cars 5. Existing BTV's facilities and equipment that can be utilized for Terrestrial Digital Broadcasting 6. Necessary equipment that would be procured during the Implementation Period of the Technical Cooperation Project for migration	・C/P personnel continue to work on the Project. ・Staff received trainings does not resign the BTV. **Pre-Conditions** ・Relevant ministries and agencies are ready to cooperate for migration to terrestrial digital broadcasting <Issues and countermesures>		

Tentative Plan of Operation

Version 0 Annex II

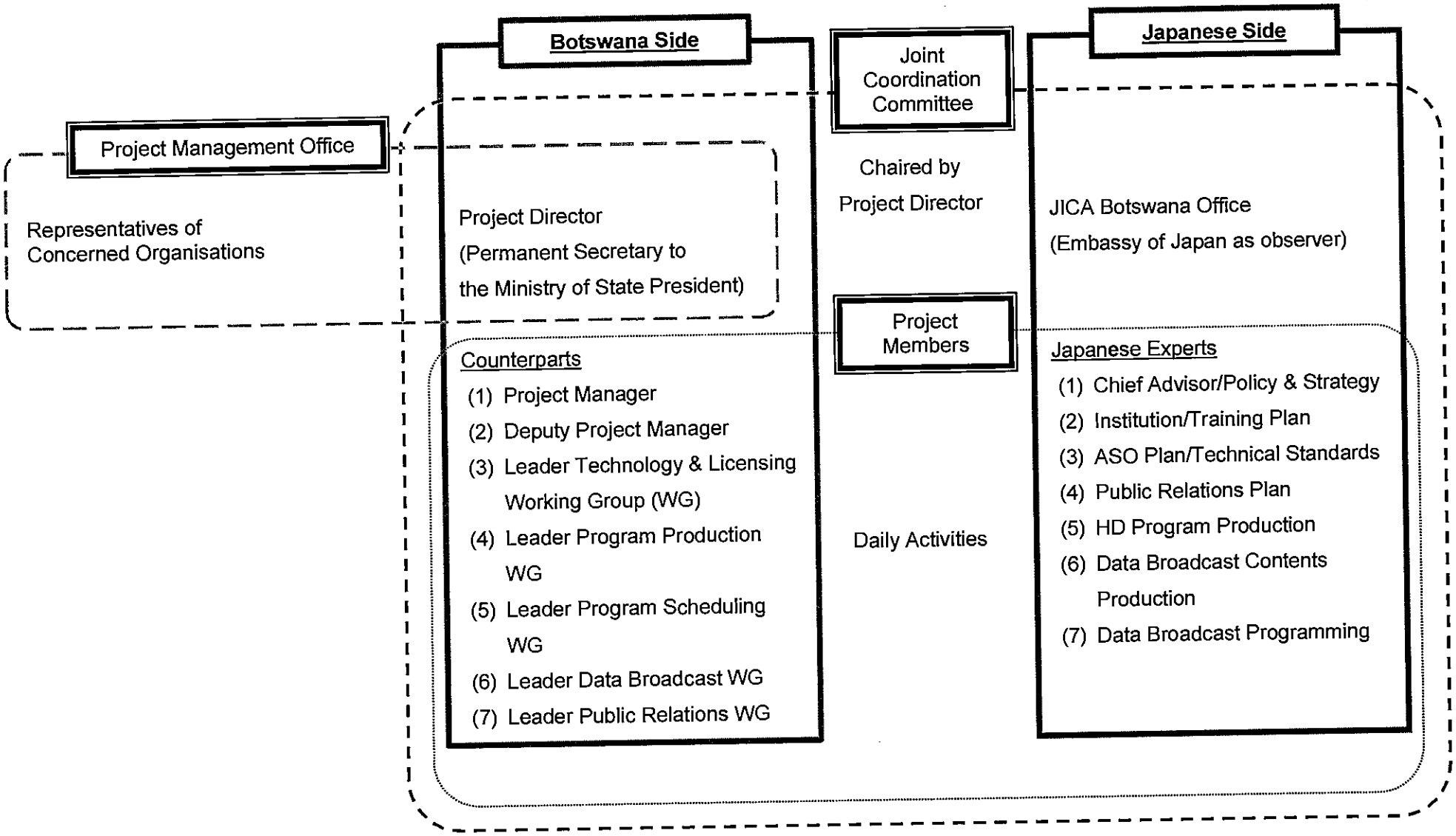
Dated 19,Feb,2014

Project Title:

Inputs	Year	1st Year				2nd Year				3rd Year				Remarks	Monitoring: Issue	Monitoring: Solution
		I	II	III	IV	I	II	III	IV	I	II	III	IV			
Expert																
Chief Advisor / Policy & Strategy	Plan															
	Actual															
Institution / Training Plan	Plan															
	Actual															
ASO Plan / Technical Standards	Plan															
	Actual															
Public Relations Plan	Plan															
	Actual															
HD Program Production	Plan															
	Actual															
Data Broadcast Contents Production	Plan															
	Actual															
Data Broadcast Programming	Plan															
	Actual															
Equipment																
Data Broadcasting Contents Management System: 1 set	Plan															
	Actual															
Training in Japan																
HD Studio Operations (Camera, Lightning, Audio, Video, Video Eng.)	Plan															
	Actual															
Digital Terrestrial Television Broadcasting Training (including data broadcasting)	Plan															
	Actual															

Activities / Sub-Activities	Year	1st Year				2nd Year				3rd Year				Responsible Organization: Japan	Responsible Organization: Botswana	Achievements	Issue & Countermeasures
		I	II	III	IV	I	II	III	IV	I	II	III	IV				
Output 1: Various plans necessary for migration to digital broadcasting are developed.																	
1.1 To establish Technology and Licensing Working Group, Public Relations Working	Plan													JICA	DBS		
	Actual																
1.2 To review a roadmap towards ASO	Plan													JICA	DBS		
	Actual																
1.3 To review technical standards related to ISDB-T	Plan													JCIA	BOCRA		
	Actual																
1.4 To develop regulations for terrestrial broadcasting station licensing criteria	Plan													JICA	BOCRA		
	Actual																
1.5 To review Public Relations Plan for Digital Migration	Plan													JICA	DBS		
	Actual																
Output 2: DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.																	
2.1 To establish Program Production Working Group, Programming Working Group and Data Broadcasting Working Group	Plan													JICA	DBS		
	Actual																
2.2 To develop HD program production capability	Plan													JICA	DBS		
	Actual																
2.3 To establish a section that produce data broadcasting program	Plan													JICA	DBS		
	Actual																
2.4 To develop a training system for producing data broadcasting program	Plan													JICA	DBS		
	Actual																
2.5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey	Plan													JICA	DBS		
	Actual																
2.6 To plan and produce program-linked and non-linked data broadcasting	Plan													JICA	DBS		
	Actual																

Monitoring Plan	Year	1st Year				2nd Year				3rd Year				Remarks	Issue	Solution
		I	II	III	IV	I	II	III	IV	I	II	III	IV			
Monitoring																
Joint Coordination Committee	Plan															
	Actual															
Set-up the Detailed Plan of Operation	Plan															
	Actual															
Submission of Monitoring Sheet	Plan															
	Actual															
Reports/Documents																
Project Completion Report	Plan															
	Actual															



Organization Chart of the Project

MINUTES OF MEETINGS
BETWEEN
JAPANESE DETAILED PLANNING SURVEY TEAM
AND
DEPARTMENT OF BROADCASTING SERVICES,
MINISTRY OF STATE PRESIDENT, REPUBLIC OF BOTSWANA
ON
JAPANESE TECHNICAL COOPERATION
ON
IMPLEMENTATION OF THE DIGITAL MIGRATION PROJECT

In response to the request from the Republic of Botswana (hereinafter referred to as 'Botswana'), the Detail Planning Survey Team (hereinafter referred to as 'the Team') organized by Japan International Cooperation Agency (hereinafter referred to as 'JICA') and headed by Shigeki MIYAKE, visited Botswana from February 11 to February 20, 2014 for the purpose of working out the details of the technical cooperation concerning the "Implementation of the Digital Migration Project".

During its stay in Botswana, the Team exchanged views and had a series of discussions with the Botswana authorities concerned with respect to necessary measures to be taken by JICA and the Government of Botswana represented by Department of Broadcasting Services (hereinafter referred to as "DBS") for the successful implementation of the above mentioned project.

As a result of the discussions, both sides agreed to convey to their respective government the matters referred to in the documents attached hereto.

Gaborone, February 19, 2014

三宅繁輝

Mr. Shigeki Miyake
Leader
Detail Planning Survey Team
Japan International Cooperation Agency

Mr. Mogomotsi Kabocamodimo
Deputy Permanent Secretary - Information and Broadcasting
Ministry of State President

ATTACHED DOCUMENT

I. PROJECT TITLE

Both sides agreed that the project title is 'Implementation of the Digital Migration Project' (hereinafter referred to as 'the Project').

II. PROJECT SITE

Project head office: Department of Broadcasting Services, Gaborone.

Project Site: Throughout the country

III. SUMMARY OF THE PROJECT'S FRAMEWORK

Both sides jointly discussed and agreed the basic design of the Project. The Project Design Matrix (hereinafter referred to as 'PDM') version 0 is shown in ANNEX I.

1. RESPONSIBLE MINISTRY

Ministry of State President (MSP)

2. IMPLEMENTING AGENCY

Department of Broadcasting Services (DBS)

3. COOPERATING MINISTRY AND AGENCY

Ministry of Transport and Communications (MTC) and Botswana Communications Regulatory Authority (BOCRA)

4. DURATION OF THE PROJECT

Two (2) years from the Project commencement. (Assignment of first Japanese expert in Botswana)

5. SCOPE OF THE TECHNICAL COOPERATION

5.1 Overall goal

Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available.

5.2 Project Purpose

Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready.

5.3 Outputs

1. Various plans necessary for migration to digital broadcasting are developed.
2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.

5.4 Project Activities

1. Relative to various plans for digital migration

1-1 To establish Technology and Licensing Working Group and Public Relations Working Group

1-2 To review a roadmap towards Analogue Switch Off (ASO)

1-3 To review technical standards related to ISDB-T

1-4 To develop regulations for terrestrial broadcasting station licensing criteria

1-5 To review Public Relations Plan for Digital Migration

2. Relative to DBS's capacity of producing programs

2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcast Working Group

2-2 To develop HD program production capability

2-3 To establish a section that produce data broadcast program

2-4 To develop a training system for producing data broadcast program

2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey

2-6 To plan and produce program-linked and non-linked data broadcast

IV. PLAN OF OPERATIONS

Both sides had jointly prepared and agreed Tentative Plan of Operations (PO) as shown in ANNEX II. A revised PO will be presented in the Inception Report for approval by the JCC, and the activities of the Project are subject to change when necessity arises in the course of implementation.

V. MEASURES TO BE TAKEN BY JICA

The following matters were confirmed in the discussion between the Botswana and JICA sides:

1. Dispatch of JICA experts

JICA will dispatch experts from Japan and/or other countries with its own expenses for the following purposes:

1) JICA will dispatch appropriate numbers of Short-Term Experts during the project period, to ensure the smooth implementation of the Project. The number of these experts will be decided each year by JICA according to the limitation of its budget and availability of personnel. Followings are the fields of the experts:

- Chief Advisor/Policy & Strategy
- Institution/Training Plan
- ASO Plan/Technical Standards
- Public Relations Plan
- HD Program Production
- Data Broadcasting Contents Production

- Data Broadcasting Programming

2. Provision of Machinery and Equipment

JICA will provide the necessary machinery and equipment for the implementation of the Project effectively and efficiently. The proposed equipment is Data Broadcasting Contents Management System (1 set). The specification of the equipment shall be decided by JICA considering its effect and budget for the Project.

3. Counterparts Training in Botswana and in Japan.

The Counterparts Training will be conducted within the Project budget for acquiring the knowledge and skills in concerned fields.

VI. MEASURES TO BE TAKEN BY BOTSWANA SIDE

The following matters were confirmed in the discussion between the Botswana and JICA sides:

1. Necessary Expenses

In accordance with the laws and regulations which are in force in Botswana, the Botswana side takes following measures at its own expenses.

1) Salaries, local traveling costs and daily subsistence allowance (DSA) for the Botswana counterpart personnel;
2) Expenses for the maintenance of office facilities;
3) Running costs of project offices, i.e. electricity, water, etc.; and
4) Others to be discussed by both sides, when necessary.

2. Assignment of Counterparts

The Botswana side agreed to assign necessary counterparts during the duration of the Project period and the counterparts will collaborate with Japanese experts to make the Project fruitful, effective and viable. The titles of Counterpart personnel are provided and shown in ANNEX III

3. Office Space and Furniture

Both sides confirmed that the office space and furniture for Japanese experts shall be provided by the Botswana side prior to the commencement of the Project.

VII. ADMINISTRATION OF THE PROJECT

1. Joint Coordinating Committee

For the effective and successful implementation of the Project, the Joint Coordinating Committee (JCC) will be established and be held at least four times during the Project duration (See ANNEX II) to fulfil the following functions:

1) To approve the annual work plan of the Project based on the Plan of Operation (PO)

within the framework of the Record of Discussions,

2) To oversee the overall progress of the annual work plan and to evaluate and approve the result of the Project, and
3) To review and exchange opinions of major issues arisen from the Project.

2. JCC MEMBERS

Followings are main JCC members from Botswana side:

Permanent Secretary to the Ministry of State President as the Project Director will bear an overall responsibility for the Project.

A representative of DBS as the Project Manager will be responsible for the matters related to administration and implementation of the Project.

A representative of MTC as the Deputy Project Manager will be responsible for the matters related to regulating the broadcasting services within the Project.

The representatives of DBS and MTC and other members of JCC will be appointed before the first JCC meeting scheduled in the 2nd month.

VIII. EVALUATION

JICA and DBS will conduct jointly the following evaluations and reviews.

1. Terminal evaluation at six (6) months prior to the end of the duration of the Project.

JICA will conduct the following evaluations and surveys to draw lessons from the Project to verify mainly the sustainability and the impact. DBS will be requested to provide necessary support (e.g. data relating to the Project, interview of C/P) for the survey.

1. Ex-post evaluation carried out generally at three (3) years after the completion of the Project; and
2. Follow-up surveys whenever necessary.

IX. RECORD OF DISCUSSIONS

The Record of Discussions will be signed between JICA Botswana Office and DBS prior to the commencement of the Project to determine the framework of the Project. The Draft of the Record of Discussions will include in the ANNEX IV of this Minutes of Meetings.

X. OTHERS

1. Project Management Office (PMO)

Botswana side intends to establish a Project Management Office (PMO) for smooth implementation of the Digital Migration Project. The PMO will consist of governmental stakeholders of digital migration. The PMO is expected to be established by the end of February 2014 subject for approval of the Parliament.

2. Progress of Work by Botswana Side

Botswana side stated that the following works were in progress and would be completed

by the Botswana side, therefore, be excluded from the Project components.

1) Drafting a roadmap towards ASO
2) Drafting technical standards related to ISDB-T
3) Development of frequency plan/channel plan
4) Development of broadcasting network development plan
5) Drafting Public Relations Plan for Digital Migration
6) Procurement of HD studio equipment for Studios 1 and 3

3. Emergency Warning Broadcasting System (EWBS)

Botswana side stated that the new equipment/systems for ISDB-T should be compatible with or upgradable to the EWBS components, and requested JICA to provide necessary advices as a part of activities related to the digital broadcasting. Japanese side accepted the request in principle. The JICA experts listed in V. 1. 1), more particularly Chief Advisor/ Policy & Strategy and ASO Plan/Technical Standards, can provide the necessary advices within their assignment periods. However, the both sides agreed that EWBS will normally be operational after relevant laws and regulations related to the national disaster management by utilizing EWBS on ISDB-T, and would be effective when the mobile receivers equipped with EWBS function, of which sales would start besides Set Top Box (STB) for the digital migration, became popular. Therefore, priority for the Project should be placed on HD program production skills and data broadcasting. The Project will improve the capacity of Botswana side to effectively and promptly issue the emergency information to the public. Depend on the level of improvement on these activities, spread of EWBS compatible mobile receivers and enactment of relevant laws and regulations, JICA will consider additional inputs of the experts for technical assistance on EWBS operations, if necessary.

4. Technical Specifications of Equipment and Systems to be Procured

Both sides agreed that the JICA experts listed in V. 1. 1), ASO Plan/Technical Standards, will provide necessary advices on technical specifications of equipment and systems to be procured by Botswana side to meet with recommended ASO Plan/Technical Standards.

5. Baseline Survey and Confirmation of Target of Objectively Verifiable Indicators

JICA explained needs of a baseline survey and confirmation of target of the objectively verifiable indicators and important assumption in the PDM as follows:

1) Baseline Survey: A customer sample survey for obtaining a baseline of the customer awareness of the terrestrial data broad casting of BTV shall be conducted within 3 months from the start of the Project.
2) Target values of the objectively verifiable indicators 2 and 3 for the Overall Goal and the objectively verifiable indicator 1 for the Project Purpose in the PDM shall be set within 6 months from the start of the Project, and approved in the JCC.
3) Facilities and human resources necessary for producing and broadcasting programs

based on ISDB-T data broadcasting, i.e. the target of the objectively verifiable indicator 2 for the Project Purpose, shall be defined within 6 months from the start of the Project, and approved in the JCC.

4) Street prices of ISDB-T receivers, i.e. an important assumption for achievement of Overall Goal, shall be assumed in the ASO plan within 6 months from the start of the Project, and approved in the JCC.

ANNEX

ANNEX I

Project Name : Implementation of the Digital Migration Project
Period of Implementation: July 2014 ~June 2016
Target Area: Whole Country of Botswana
Implementing Agency: Department of Broadcasting Services, Ministry of State President (DBS)
Target Group: Government Staff concerned with implementation of Digital Migration
Date: 19 Feb. 2014
Ver. 0-6

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal Terrestrial digital broadcasting that takes advantage of the features of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) is effectively available.	1. Terrestrial digital broadcasting service area covers 65% or more of Botswana (the target in NDP10). 2. ○ or more number of programs that linked with the data broadcasting contents are produced per year. 3. ○ or more number of High Definition (HD) programs are produced per year.	1. Radio Wave Measurement 2. Broadcasting Program Schedule 3. Broadcasting Program Schedule	
Project Purpose Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready.	1. ○% or more customers recognize the terrestrial data broadcasting of Botswana Television (BTV). 2. Facilities and human resources planned as necessary for producing and broadcasting HD programs based on ISDB-T data broadcasting are developed.	1. Customer Sample Survey 2. Project Progress Report	・ISDB-T receivers are sold at prices about that assumed in the plan.
Outputs 1. Various plans necessary for migration to digital broadcasting are developed. 2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.	1-1. Roadmap towards Analogue Switch Off (ASO) is developed. 1-2 National Standards of Receivers are developed. 1-3 Terrestrial Digital Broadcasting Station Licensing Criteria are developed. 1-4 Public Relations Plan is developed. 2-1. Sections that handle data broadcasting are established in BTV. 2-2. HD Program Production Manual is developed. 2-3, A training system for producing data broadcasting program is established. 2-4. Program-linked and non-linked data are broadcasted.	1-1 ASO Roadmap 1-2. Receiver National Standards 1-3. Broadcasting Station Licensing Criteria 1-4. Public Relations Plan 2-1. BTV Organization Chart 2-2. HD Program Production Manual 2-2. Training plan for data broadcasting program 2-3. Broadcasting Program Schedule	・Various approval process by the concerned organizations are not delayed. ・Staff received trainings does not resign the BTV.
Activities 1. Relative to various plans for digital migration 1-1 To establish Technology and Licensing Working Group, Public Relations Working Group 1-2 To review a roadmap towards ASO 1-3 To review technical standards related to ISDB-T 1-4 To develop regulations for terrestrial broadcasting station licensing criteria 1-5 To review Public Relations Plan for Digital Migration	**Inputs** Japanese Side 1. JICA Experts (1) Chief Advisor/Policy & Strategy (2) Institution/Training Plan (3) ASO Plan/Technical Standards (4) Public Relations Plan (5) HD Program Production (6) Data Broadcasting Contents Production (7) Data Broadcasting Programming	Botswana Side 1. C/P Personnel (1) Project Manager (2) Deputy Project Manager (3) Leader of Technology and Licensing Working Group (WG) (4) Leader of Public Relations WG (5) Leader of Program Production WG (6) Leader of Programming WG (7) Leader of Data Broadcasting WG	・C/P personnel continue to work on the Project. ・Staff received trainings does not resign the BTV.

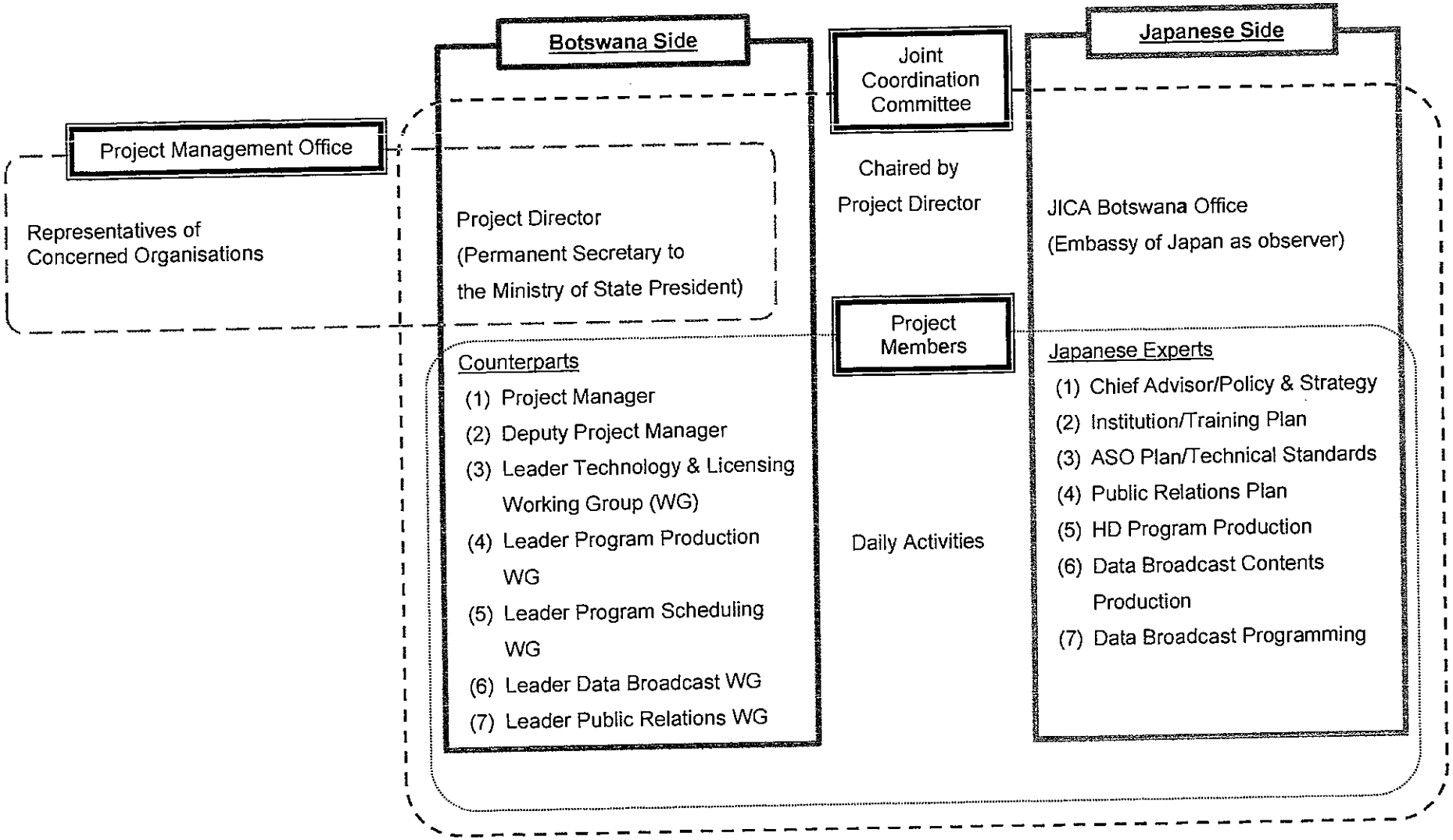
2. Relative to DBS's capacity of producing programs 2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcasting Working Group 2-2 To develop HD program production capability 2-3 To establish a section that produce data broadcasting program 2-4 To develop a training system for producing data broadcasting program 2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey 2-6 To plan and produce program-linked and non-linked data broadcasting	2. Equipment ・Data Broadcasting Contents Management System: 1 set 3. Training in Japan ・HD Studio Operations (Camera, Lighting, Audio, Video Engineer) ・Digital Terrestrial Television Broadcasting (DTTB) Training (including Data Broadcasting)	2. Members of Working Groups 3. Project Office for Experts (in both BOCRA and DBS) 4. Project Vehicles: 2 cars 5. Existing BTV's facilities and equipment that can be utilized for Terrestrial Digital Broadcasting 6. All equipment that should be procured during the Implementation Period of the Technical Cooperation Project for migration to ISDB-T	Preconditions ・Relevant ministries and agencies are ready to cooperate for migration to terrestrial digital broadcasting.

Tentative Plan of Operation: Implemantation of Digital Migration Project

Activities	FY	2013	2014											2015											2016					
	Year		2014											2015											2016					
	Month		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
1. Relative to various plans for digital migration																														
1	1-1 To establish Technology and Licensing Working Group, Public Relations Working Group																														
	1-2 To review a roadmap towards ASO																														
	1-3 To review technology standards related to ISDB-T																														
	1-4 To develop regulations for terrestrial broadcasting station licensing criteria																														
	1-5 To review Public Relations Plan for Digital Migration																														
2. Relative to DBS's capacity of producing programs																														
2	2-1 To establish Program Production Working Group (WG), Programming WG and Data Broadcast WG																														
	2-2 To develop HD program production capability																														
	2-3 To establish a section that produce data broadcast program																														
	2-4 To develop a training system for producing data broadcast program																														
	2-5 To develop programming plan of digital broadcasting, including data broadcast, based on the market needs survey																														
	2-6 To plan and produce program-linked and non-linked data broadcast																														
(1)	Joint Coordination Committee								△						△					△						△					
(2)	Monitoring/Evaluation Mission								◎						◎					◎						◎					
	Report								IC/R											PG/R											F/R

IC/R: Inception Report, PG/R: Progress Report, F/R: Final Report

JICA Experts and Training in Japan	FY	2013	2014											2015											2016					
	Year		2014											2015											2016					
	Month		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
JICA Experts	(1) Chief Advisor/Policy & Strategy																														
	(2) Institution/Training Plan																														
	(3) ASO Plan/Technical Standards																														
	(4) Public Relations Plan																														
	(5) HD Program Production																														
	(6) Data Broadcast Contents Production																														
	(7) Data Broadcast Programming																														
Training in Japan	HD Studio Operations (Camera, Lighting, Audio, Video Eng.)																														
	Digital Terrestrial Television Broadcasting Training (including data broadcasting)								TBD																						



Organization Chart of the Project

ANNEX IV

【Draft】
RECORD OF DISCUSSIONS

ON

IMPLEMENTATION OF THE DIGITAL MIGRATION PROJECT

IN

REPUBLIC OF BOTSWANA

AGREED UPON BETWEEN

DEPARTMENT OF BROADCASTING SERVICES

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Gaborone, [date]

Botswana Office Japan International Cooperation Agency	Mr. Mogomotsi Kaboeamodimo Deputy Permanent Secretary – Information and Broadcasting Ministry of State President

Based on the minutes of meetings on the Detailed Planning Survey on the Implementation of the Digital Migration Project (hereinafter referred to as "the Project") signed on February 19, 2014 between Department of the Broadcasting Services (hereinafter referred to as "DBS"), Ministry of State President and the Japan International Cooperation Agency (hereinafter referred to as "JICA"), JICA held a series of discussions with DBS and relevant organizations to develop a detailed plan of the Project.

Both parties agreed the details of the Project and main points discussed as described in the Appendix 1 and the Appendix 2, respectively, and to request their respective governments to proceed with the necessary procedures for implementation of the Project.

Both parties also agreed that DBS, the counterpart to JICA, will be responsible for the implementation of the Project in cooperation with JICA, coordinate with other relevant organizations and ensure that the self-reliant operation of the Project is sustained during and after the implementation period in order to contribute toward social and economic development of Botswana.

The Project will be implemented within the framework of the Agreement on Technical Cooperation signed on [date] (hereinafter referred to as "the Agreement") and the Note Verbales to be exchanged / exchanged on [date] between the Government of Japan (hereinafter referred to as "GOJ") and Government of Botswana (hereinafter referred to "GOB").

Appendix 1: Project Description
Appendix 2: Minutes of Meetings on Technical Cooperation on Implementation of the Digital Migration Project signed on February 19, 2014

Appendix 1

PROJECT DESCRIPTION

Both parties confirmed that there is no change in the Project Description agreed on in the minutes of meetings on the concerning Preparatory Survey on the Project signed on February 19, 2014 (Appendix 2).

I. BACKGROUND

In February 2012, Botswana decided to adopt Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) as a standard for digital television because ISDB-T has advantages of broadcasting for cars and mobile phones. In Africa, Botswana is the first country which decided to adopt ISDB-T. Botswana gives importance to urge digitalization because International Telecommunication Union (ITU) announced to South African Development Community (SADC) to completely migrate analog broadcasting to digital by 2015.

However, there is not enough equipment such as transmitters for terrestrial digital broadcasting in Botswana. In addition, Botswana lacks of knowledge and techniques for formulating channel planning, making show applied features of digital broadcasting and procedure, using and maintenance of studio and broadcasting equipment. Because of the situations, Botswana requested technical cooperation for smooth migration from analog to digital broadcasting.

Although countries in SADC are recommended to adopt Digital Video Broadcasting–Terrestrial 2 (DVB-T2), Botswana decided to adopt ISDB-T. It means that Botswana believes Japanese experience of completion of digitalization is helpful for digitalization in Botswana. Japan also believes that and hopes that ISDB-T will be adopted to other African countries after this project.

This project falls under the program of "Strengthening infrastructure facilities and distribution system" in the context of the Japanese assistance policy for Botswana. In addition, according to Japan's ODA policy, it is important to create the environment where Japanese companies can benefit from the business in developing countries. It is considered that the adoption of the ISDB- T in Botswana will increase business opportunities of Japanese companies.

II. OUTLINE OF THE PROJECT

Details of the Project are described in the Logical Framework (Project Design Matrix: PDM) (Annex I: As for Draft of R/D, See ANNEX I of M/M) and the tentative Plan of Operation (Annex II: As for Draft of R/D, See ANNEX II of M/M).

1. Title of the Project
   Implementation of the Digital Migration Project

2. Overall Goal
   Terrestrial digital broadcasting that takes advantage of the features of ISDB-T is effectively available.

3. Project Purpose
   Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready.

4. Outputs
   1. Various plans necessary for migration to digital broadcasting are developed.
   2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.

5. Activities
   1. Relative to various plans for digital migration
      1-1 To establish Technology and Licensing Working Group and Public Relations Working Group
      1-2 To review a roadmap towards Analogue Switch Off (ASO)
      1-3 To review technical standards related to ISDB-T
      1-4 To develop regulations for terrestrial broadcasting station licensing criteria
      1-5 To review Public Relations Plan for Digital Migration
   2. Relative to DBS's capacity of producing programs
      2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcast Working Group
      2-2 To develop HD program production capability
      2-3 To establish a section that produce data broadcast program
      2-4 To develop a training system for producing data broadcast program
      2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey
      2-6 To plan and produce program linked and non-linked data broadcast

6. Input
   (1) Input by JICA
      (a) Dispatch of Experts
         - Chief Advisor/Policy & Strategy
         - Institution/Training Plan
         - ASO Plan/Technical Standards
         - Public Relations Plan
         - HD Program Production
         - Data Broadcasting Contents Production
         - Data Broadcasting Programming
      (b) Training
         Provision of training in Botswana and in Japan

(c) Machinery and Equipment
Provision of machinery and equipment (Annex IV)
In case of importation, the machinery, equipment and other materials under II-6 (1) (c) above will become the property of the GOB upon being delivered C.I.F. (cost, insurance and freight) to the Botswana authorities concerned at the ports and/or airports of disembarkation.

(2) Input by DBS
DBS will take necessary measures to provide at its own expense:
(a) Services of DBS's counterpart personnel and administrative personnel as referred to in II-7;
(b) Suitable office space with furniture and necessary equipment;
(c) Supply or replacement of machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the equipment provided by JICA;
(d) Means of transport and travel allowances for the JICA experts for official travel within Botswana;
(e) Information as well as support in obtaining medical service;
(f) Credentials or identification cards;
(g) Available data (including maps and photographs) and information related to the Project;
(h) Running expenses necessary for the implementation of the Project;
(i) Expenses necessary for transportation within Botswana of the equipment referred to in II-6 (1) as well as for the installation, operation and maintenance thereof; and
(j) Necessary facilities to the JICA experts for the remittance as well as utilization of the funds introduced into Botswana from Japan in connection with the implementation of the Project

7. Implementation Structure
The Project organization chart is given in the Annex III. The roles and assignments of relevant organizations are as follows:

(1) GOB side
(a) Permanent Secretary to the Ministry of State President as the Project Director will bear an overall responsibility for the Project.
(b) Project Manager
A representative of DBS will be responsible for the matters related to administration and implementation of the Project.
(c) Deputy Project Manager
A representative of Ministry of Transport and Communications will be responsible for the matters related to regulating the broadcasting services within the Project.

(2) JICA Experts
The JICA experts will give necessary technical guidance, advice and recommendations to DBS on any matters pertaining to the implementation of the Project.

(3) Joint Coordinating Committee
Joint Coordinating Committee (hereinafter referred to as "JCC") will be established in order to facilitate inter-organizational coordination. JCC will be held at least four times during the Project duration (See ANNEX II). JCC will approve an annual work plan, review overall progress, conduct monitoring and evaluation of the Project, and exchange opinions on major issues that arise during the implementation of the Project.

8. Project Site(s) and Beneficiaries
Throughout the country
Citizens in Botswana

9. Duration
Two (2) years from the Project commencement. (Assignment of first Japanese expert in Botswana)

10. Reports to JCC
DBS and JICA experts will jointly prepare the following reports in English.
(1) Inception Report
(2) Progress Report on annual basis until the project completion.
(3) Project Completion Report at the time of project completion.

11. Environmental and Social Considerations

(1) DBS agreed to abide by 'JICA Guidelines for Environmental and Social Considerations' in order to ensure that appropriate considerations will be made for the environmental and social impacts of the Project.

III. UNDERTAKINGS OF DBS

1.DBS will take necessary measures to:

(1) ensure that the technologies and knowledge acquired by the Botswana nationals as a result of Japanese technical cooperation contributes to the economic and social development of Botswana, and that the knowledge and experience acquired by the personnel of Botswana from technical training as well as the equipment provided by JICA will be utilized effectively in the implementation of the Project; and

(2) grant privileges, exemptions and benefits to the JICA experts referred to in II-6 (1) above and their families, which are no less favorable than those granted to experts and members of the missions and their families of third countries or international organizations performing similar missions in Botswana.

2.DBS will take necessary measures to:

(1) provide security-related information as well as measures to ensure the

safety of the JICA experts;

(2) permit the JICA experts to enter, leave and sojourn in Botswana for the duration of their assignments therein and exempt them from foreign registration requirements and consular fees.

(3) exempt the JICA experts from taxes and any other charges on the equipment, machinery and other material necessary for the implementation of the Project;

(4) exempt the JICA experts from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to them and/or remitted to them from abroad for their services in connection with the implementation of the Project; and

(5) meet taxes and any other charges on the equipment, machinery and other material, referred to in II-7 above, necessary for the implementation of the Project.

3. DBS will bear claims, if any arises, against the JICA experts resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Project, except when such claims arise from gross negligence or willful misconduct on the part of the JICA experts.

IV. EVALUATION

JICA and the DBS will jointly conduct the following evaluations and reviews.

1. Terminal evaluation during the last six (6) months of the cooperation term

JICA will conduct the following evaluations and surveys to mainly verify sustainability and impact of the Project and draw lessons. The DBS is required to provide necessary support for them.

1. Ex-post evaluation three (3) years after the project completion, in principle
2. Follow-up surveys on necessity basis

V. PROMOTION OF PUBLIC SUPPORT

For the purpose of promoting support for the Project, DBS will take appropriate measures to make the Project widely known to the people of Botswana.

VI. MUTUAL CONSULTATION

JICA and DBS will consult each other whenever any major issues arise in the course of Project implementation.

VII. AMENDMENTS

The record of discussions may be amended by the minutes of meetings between JICA and DBS.

The minutes of meetings will be signed by authorized persons of each side who may be different from the signers of the record of discussions.

Annex I	(As for Draft of R/D, See ANNEX I of M/M): Logical Framework (Project Design Matrix: PDM)
Annex II	(As for Draft of R/D, See ANNEX II of M/M): Tentative Plan of Operation
Annex III	(As for Draft of R/D, See ANNEX III of M/M): Project Organization Chart
Annex IV	(As for Draft of R/D, See V. 2. of ATTACHED DOCUMENT of M/M): List of Equipment

MINUTS OF MEETINGS

MINUTES OF MEETINGS
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
MINISTRY OF STATE PRESIDENT
FOR AMENDMENT OF THE RECORD OF DISCUSSIONS
ON
IMPLEMENTATION OF THE DIGITAL MIGRATION PROJECT

The Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of State President hereby agree that the Record of Discussions on Implementation of the digital migration project signed on May 5th 2014 will be amended as follows;

1. Project Purpose and Outputs

Before	Amended Version
II. OUTLINE OF THE PROJECT 3. Project Purpose Environment, which allows DBS to implement self-sustainably the terrestrial digital broadcasting that takes advantage of the features of ISDB-T, is ready. 4. Outputs 1. Various plans necessary for migration to digital broadcasting are developed. 2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.	II. OUTLINE OF THE PROJECT 3. Project Purpose Environment for the terrestrial digital broadcasting that takes advantage of the features of ISDB-T is ready. 4. Outputs 1. Various plans and systems necessary for migration to digital broadcasting are developed. 2. DBS's capacity of producing programs including High Definition (HD) and data broadcasting is improved.
Reason: The activities regarding output 1 which are handled mainly by BOCRA are not only for DBS but also all other broadcasting stations in Botswana. There are some possibilities of misleading in current mentions. Also, the activities under output 1 are producing plans and development of the systems or mechanisms, too.	

2. Activities and Input

Before[1]	Amended Version
II. OUTLINE OF THE PROJECT	II. OUTLINE OF THE PROJECT

[1] Several PDM modifications were approved in 1st JCC on September 24th, 2014 and 2nd JCC on March 20th, 2015. These modifications have been already reflected.

5. Activities 1. Relative to various plans for digital migration 1-1 To establish Technology and Licensing Working Group, Public Relations Working Group 1-2 To prepare ASO plan 1-3 To review Botswana ISDB-T Standards 1-4 To review specifications of receivers 1-5 To review terrestrial broadcasting station licensing criteria 1-6 To develop Draft Public Relations Plan for Digital Migration 1-7 To conduct public relations activities in accordance with the Draft Public Relations Plan	5. Activities 1. Relative to various plans for digital migration 1-1 To establish Technology and Licensing Working Group, Public Relations Working Group 1-2 To prepare ASO plan 1-3 To review Botswana ISDB-T Standards 1-4 To review specifications of receivers 1-5 To review terrestrial broadcasting station licensing criteria 1-6 To develop Draft Public Relations Plan for Digital Migration 1-7 To conduct public relations activities in accordance with the Draft Public Relations Plan 1-8 To establish a test centre for compliance with set specifications and receivers penetration assurance 1-9 To develop viewers support through a call centre operation
2. Relative to DBS's capacity of producing programs 2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcasting Working Group 2-2 To develop HD program production capability 2-3 To establish a section that produce data broadcasting program 2-4 To develop a training system for producing data broadcasting program 2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey 2-6 To plan and produce program-linked and non-linked data broadcasting	2. Relative to DBS's capacity of producing programs 2-1 To establish Program Production Working Group, Programming Working Group and Data Broadcasting Working Group 2-2 To develop HD program production capability 2-3 To establish a section that produce data broadcasting program 2-4 To develop a training system for producing data broadcasting program 2-5 To develop programming plan of digital broadcasting, including data broadcasting, based on the market needs survey 2-6 To plan and produce program-linked and non-linked data broadcasting 2-7 To develop procurement plan of HD

6. Input (1) Input by JICA (a) Dispatch of Experts - Chief Advisor/Policy & Strategy - Institution/Training Plan - ASO Plan/Technical Standards - Public Relations Plan - HD Program Production - Data Broadcasting Contents Production - Data Broadcasting Coding - Data Broadcasting Design - Data Broadcasting Programming - Production Engineering (b) Training Provision of training in Botswana and in Japan	<u>studio systems</u> 6. Input (1) Input by JICA (a) Dispatch of Experts - Chief Advisor/Policy & Strategy - Institution/Training Plan - ASO Plan/Technical Standards - Public Relations Plan - HD Program Production - Data Broadcasting Contents Production - Data Broadcasting Coding - Data Broadcasting Design - Data Broadcasting Programming - Production Engineering <u>- HD Procurement Plan</u> (b) Training Provision of training in Botswana and in Japan <u>(c) Machinery and Equipment</u> <u>Provision of machinery and equipment (Test Centre Equipment (1 set))</u>

Reason:

(1) Establishment of Test Centre

There is no industry group in Botswana either to conduct self-regulation to penetrate appropriate receivers or to encourage such as manufacturers or import traders for the proper digital receivers. Even if BOCRA is preparing affordable minimum specifications of the receivers for type-approvals, it would be expected that the digital receivers would not work properly to display contents of broadcasters or have functions of feature of ISDB-T such as data broadcasting contents. However, the Test centre will reduce the risks that viewers might purchase devices which are improper or contribute more beneficial enjoying on ISDB-T through publication reports by the test centre in order to promote appropriate receivers penetrations. Thus, the project purpose will be achievable through the Objectively Verifiable Indicators like more than 34 % recognition in customers (viewers) on the data broadcasting.

(2) Operation of Call Centre

DBS has decided to establish a call centre to support viewers to purchase and install digital receivers in certain period by analogue switch off which is tentatively scheduled December, 2016. However, there is lack of knowledge to handle the supports, also, the schedule of the digital switch over (commencement of digital broadcasting services) is behind in the original plan, it would be concerned to achieve the project purpose. Thus, the call centre will be important to accelerate receivers'

penetration and improvement of the recognition on the ISDB-T features.

(3) HD procurement Plan

DBS is installing 45 digital transmitters systems for creating digital broadcasting coverage in nationwide and is supposed to complete by the end of September, 2015. Though, the digital broadcasting services fully ready such as providing HD quality pictures with data broadcasting contents, DBS remains upgrading the equipment of master control and TV studios to HD qualities. Upgrading the equipment is not only to procure the equipment but also to make clear the procedure to convert HD systems with actual operation in both conventional and digital broadcasting. Therefore, it would be accelerated if there is a comprehensive HD procurement plan including the procedure of upgrading to HD and specifications with consideration of interfaces between the transmission and data broadcasting operation facilities in order to achieve the overall goal for ensuring sustainability.

This amendment will become effective as of September 14th, 2015.

Annex 1 : Record of Discussions (signed on May 5th, 2014)

Annex 2 : Memorandum of the First JCC Meeting (signed on September 24th, 2014)

Annex 3 : Memorandum of the Second JCC Meeting (signed on March 20th, 2015)

Annex 4 : PDM (Revised)

Gaborone, September 14th, 2015

Mr. Akihiko HOSHINO
Resident Representative
Botswana Office
Japan International Cooperation Agency

Mr. Mogomotsi Kaboeamodimo
Deputy Permanent Secretary –
Information and Broadcasting
Ministry of State President