FINAL REPORT

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Project Title: Scientific Data Standards and Exchange: Capacity Development

A final report prepared by:

The International Plant Genetic Resources Institute (IPGRI)

Submitted to:

ICT-KM

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Executive Summary

The objective of this project was (1) to train CGIAR staff in the latest technologies and standards in use by the international scientific community for managing scientific information and (2) to develop a strategy for implementing appropriate information architecture within the CGIAR for maximizing access to these distributed information sources.

All these objectives were met successfully within the project timeframe.

(1) Training Workshop: More than 40 CGIAR scientists were trained during a 5 days workshop in Rome. The trainees survey carried out at the end of the workshop indicated clearly that the training was extremely relevant to the participants and raised sufficient awareness within the CGIAR on the technology as well as immediate ways to deploy it at a large scale. More importantly, the web service package selected at the meeting as the most appropriate for the CGIAR (BIOCASE) has already been deployed at more than 5 CGIAR Centres (IRRI, CIP, CIAT, IPGRI, and ILRI). In the other Centres holding genebanks, this process will be finalized by end October 2005.

(2) Strategy: All CGIAR Centres participating at the workshop finalized their individual strategy for adoption and deployment of web services. The consolidated strategies are provided in this report.

In addition, the Project objectives were extended to cover the practical deployment of web services at various CGIAR and other relevant locations. GBIF/BIOCASE was selected as a model web services and the following locations have been successfully configured:

i. CIAT – Centro Internacional de Agricultura Tropical (Cali, Colombia)
ii. CIMMYT – Centro Interncional de Mejoramiento de Maiz y Trigo (Mexico)(*)
iii. CIP – Centro Internacioanl de la Papa (Lima, Peru)
iv. ICARDA – International Crops Research Institute for the Semi-Arid Tropics (Aleppo, Syria) (*)
v. ICRISAT – International Crops Research Institute for the Semi-Arid Tropics (Patancheru, India) (*)
vi. IITA – International Institute for Tropical Agriculture (Ibadan, Nigeria) (*)
vii. ILRI - International Livestock Research Institute (Addis, Ethiopia))
viii. IPGRI – International Plant Genetic Resources Institute (Rome + Montpellier)
ix. IRRI- International Rice Research Institute (Los Banos, Philippines)
x. USDA/GRIN – United States Department of Agriculture (Washington, USA)
xi. World Agroforestry Centre (ICRAF, Nairobi, Kenya) (*)

(*) In process, final installation and tests expected to be achieved by end November 2005

List of Acronyms and Abbreviation:

ICT-KM: Information and Communication Technology and Knowledge Management

CGIAR: Consultative Group on International Agricultural Research

GBIF: Global Biodiversity Information Facility

BioCase: Biological Collection Access Service in Europe

BioMOBY: An open source research project based on web services

GCP: Generation Challenge Program

Project Coordinator (leading scientist) and project scientists:

Gaiji Samy, SINGER Project Leader
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Collaborating Institutions and Staff:

IPGRI
Raj Sood, IPGRI-Rome
Milko Skofic, IPGRI-Rome
Tom Hazekamp, Consultant, IPGRI-Rome
Dag Terje Endresen, Consultant, IPGRI-Rome

GBIF - Global Biodiversity Information Facility
Hannu Saarenmaa, GBIF-Copenhagen
Donald Hobern, GBIF-Copenhagen
Giorgos Ksouris, GBIF-Copenhagen

BGBM - Botanic Garden & Botanical Museum Berlin-Dahlem
Markus Doring, BGBM/BIOCASE
Javier de La Torrre, BGBM/BIOCASE

BioMOBY
Mark Wilkinson, BioMOBY-Canada
Benjamin Good, BioMOBY-Canada

Introduction and background:

Information is essential for the ability to manage and use biodiversity. The Future Harvest Centres hold a great deal of information on biological diversity, which is of great importance to agriculture, forestry and fisheries. In particular, through the World Wide Web and CD-ROMs, such valuable information is made available as Global Public Goods to support the efforts of farmers, scientists, conservationists and development workers in fighting poverty, hunger and environmental degradation.

In recent years there has been an explosion in the number and type of databases generated by the CGIAR in various fields (i.e. forestry, livestock, fishery, crops, integrated natural resource management (INRM), social sciences, and water). However, CGIAR partners are facing increased difficulties to access these resources in a consolidated manner.

Today, the fundamental advances in information technology, especially those surrounding the uses of the Web, have provided the key concepts necessary for collecting, assembling, archiving, distributing and accessing biodiversity information in revolutionary ways. The actual limitations are not inherent in the information, but rather in its organization and the isolation of one resource from another.

Today's challenge is the development of an information architecture to address these and other obstructions for the effective use of biodiversity resources on the Web. This reflects the growing motivation of CGIAR scientists to build a collection of CGIAR biodiversity resource discovery and integration tools: **the information tide is rising, but the ability to harness it is in its infancy.**

Prior to the implementation of complex information systems capturing dispersed information sources across scientific communities, CGIAR scientists and collaborators require an agreement on minimum data standards and Web information technologies. The adoption of a simple set of data standards coupled with the latest technology in Internet information technology (such as Web services) will be the main building blocks toward the implementation of a comprehensive CGIAR information infrastructure.

The objective of this project is to train key CGIAR staff in the latest technologies and standards in use by the international scientific community for managing scientific information and to develop a strategy for implementing appropriate information architecture within the CGIAR for maximizing access to these distributed information sources.

The expected outcomes of this project are:

- CGIAR staff are trained in the latest technologies and standards in use by the international scientific community for managing scientific information
- A CGIAR strategy for information networking of scientific databases developed through a set of specific strategies for each Centre.
- Relevant information activities of the Generation Challenge Programme and the CGIAR System-wide Genetic Resource Programme (SGRP) are further developed to demonstrate the applicability of the web service technology.

Major research findings:

Different data standards and database systems are being used to manage scientific information. This is the case within CGIAR and the scientific community around the world. Therefore, linking heterogeneous databases together and making the information stored in such databases available to the scientist in a standard format remains a big challenge.

GBIF, BioMoby, and BioCase are the examples of few initiatives that are trying to solve this major problem through the development of various data standards and data exchange protocols. The methodologies and standards already developed by these initiatives are followed and used by the international scientific community for managing and exchanging the information stored in various databases around the world.

The selection of methodologies used by GBIF[1], BioMoby[2], and BioCase[3] for this project was done purely on the basis of contribution made by each initiative in the area of managing and disseminating scientific information. The scientific databases of more then 38 countries are linked with the GBIF portal, which provides information related to millions of samples conserved around the world. The main objective of GBIF is to facilitate digitization and global dissemination of primary biodiversity data so that researchers can benefit from the use of the information. The protocols and the standards used by GBIF are very relevant to our work. The data exchange protocols used by GBIF can be adopted as is by the CGIAR to meet similar objectives.

BioMoby is a system through which a user is able to interact with multiple sources of biological data, regardless of the underlying format or schema. This system also allows for the dynamic identification of new relationships between data from different sources. The management of biological data needs flexibility and independence from standard formats and schemas. The dynamic nature of BioMoby meets this requirement very well. This project is well known in the scientific community and has linkages with prominent research institutes and organizations. The Generation Challenge Program (GCP) has adopted BioMoby to exchange scientific information among GCP partners and beyond. Since most of our CGIAR partners are member of the GCP, and will implement BioMoby at their locations sooner or later, it was necessary to learn and understand the methodologies used by BioMoby. Their participation in this workshop therefore, was critical.

BioCase is a research project funded by the European Commission. BioCase is a web-based information service that provides unified access to the biological collections in Europe. It leaves full control of the information with the collection holders. More then 35 institutions from 30 different European countries are using BioCase. Most of these partners are also involved in developing national nodes to gather and relay data on the national collections using BioCase data provider.

The GBIF and BioCase use similar methodologies, such as information exchange based on defined set of data standards. BioMoby, on the other hand, allows more flexibility to the users by allowing them to make their data available using web

[1] http://www.gbif.org/
[2] http://biomoby.org/
[3] http://www.biocase.org/

services. It does not restrict itself to any particular data standard. The methodologies used by these initiatives are similar and they complement each other. The CGIAR can benefit from the work already done by these initiatives.

All the major outcomes of this activity have been successfully achieved through this workshop. The key CGIAR staff has been trained in the latest technologies (web services) and standards that are in use by the international scientific community for managing and sharing the scientific information.

The Appendix entitled “Strategy” describes very well the overall objectives partners want to achieve with respect to information networking of scientific databases. The same document also describes the steps partners intend to take to meet their respective objectives. The “Strategy” document describes the situation on the ground and will feed well in the formulation of strategy for information networking of scientific databases and defining the implementation work plan for each partner.

The Generation Challenge Programme (GCP) has adopted BioMoby to meet their data exchange requirements. The System-wide Information Network for Genetic Resources (SINGER) has adopted BioCase to exchange information at the accession level. Through this meeting both BioCase and BioMoby were tested in combination, their forces joined to meet the overall objectives of managing and exchanging scientific information. **That both BioCase and BioMoby protocols can work together and, in fact, complement each other, is one of the major finding of this workshop.**

Implication of research findings:

The adoption of BioCase or BioMoby protocols will help research institutes to manage and exchange information effectively within and outside the CGIAR. The scientific community outside the CGIAR will be able to access information residing in the various databases within the CGIAR and directly benefit by using the available information. The use of international data standards to manage scientific information will standardize the data within CGIAR; and will facilitate the data sharing among CGIAR and non CGIAR partners. The adoption of standards does not necessarily mean that the partners will have to store all their information based on such standards. It simply means that partners will map their existing data against the international standards for exchanging and sharing information.

Further, the implementation of these protocols will help the research institutes in establishing regional and crop networks. In this scenario, the research institute can act as a regional or country node which non-CGIAR partners can use to link their data. These networks can then be linked with the central portal or the gateway which users will use to access the information.

Once all the databases are linked together using these protocols, it will provide huge benefits to the scientists, farmers, policy makers and educational institutes. Scientists will be able to retrieve information from different sources. This will help scientists to enhance their research agenda. Farmers can access accession level information through one web portal. The availability of such an enormous amount of information will help policy makers to take appropriate decisions at both the crop and the country level.

Training:

During the training workshop, participants were trained on three major data exchange protocols. The details of these protocols and the trainers are indicated in the table below:

Data Exchange Protocols	Trainer Name and Affiliations
DIGIR(Distributed Generic Information Retrieval)	Hannu Saarenmaa (GBIF) Giorgos Ksouris (GBIF) Donald Hobern(GBIF)
BioCase (Biological Collection Access Service in Europe)	Javier De La Torre (BGBM) Markus Doring (BGBM)
BioMoby (An Open Source research project which aims to generate an architecture for the discovery and distribution of biological data through web services)	Benjamin Good (BioMoby) Mark Wilkinson (BioMoby)

The participants were divided in three groups. The training sessions for all the three protocols took place simultaneously on the third and the fourth day of this workshop. Two training sessions were allocated for each protocol. It gave participants an opportunity to attend at least two sessions covering two different protocols. In some cases, where centres had more then one delegate attending the workshop, delegates could attend training on all three protocols. The trainers kicked off the sessions by making small presentations highlighting the contents and the format of the training. Each participant was provided with a computer and had an opportunity to work with the technology. The trainers followed the following training format:

1. Introduction to the protocol.
2. Installation and configuration of the data provider software.
3. Establishing database connection.
4. Understanding the data standards and schemas. Mapping the database against the standards/schemas.
5. Testing the data mapping and the local installation.
6. Establishing the linkages with the web portal to view the actual data and the results.
7. Questions and answers.

The following CGIAR and non-CGIAR staff were trained during this workshop:

Center/Partner	Name of the Participant
USDA-GRIN	Quinn P. Sinnott
FAO	Stefano Diulgheroff
CIAT	Fernando Rojas Doryan Erik Colunge Cabrera
CIFOR	Yuliardi Yuzar
CIP	Miguel Blancas Simon Reinhard Luis Avila
CIMMYT	Juan Carlos Alarcon
ICARDA	Jan Konopka Khaled El-Shamaa
ICRAF	Peter Muraya Ahmed Said Salim Mbarak

ICRISAT	Pradyut J. Modi Hari Deo Upadhyaya
IITA	Jude Atalobhor Michael Lawson
ILRI	Ephrem Getahun Hailu Aynalem Tesfahun
IPGRI	Kheder Durah Frederick Atieno Tito Franco Sonia Dias Rajesh Sood Milko Skofic
IRRI	Paul O'Nolan Alexander Cosico
IWMI	Suparuek Puttakhot Pierre Marchand
WARDA	Rama S. Venkatraman Aline Lisette-Vidal
World Fish Center	Marco Noordeloos

Please see the Annex: "Evaluation Forms- Results" to assess the success of the training.

Impact on beneficiaries:

Organizing such an event is always a challenge. Both CGIAR and non-CGIAR participants benefited from this workshop. This workshop provided CGIAR partners an opportunity to see how things are moving in the international community and for the non-CGIAR partners; it provided a window of opportunity to involve CGIAR partners in their work.

This workshop gave participants first hand experience on GBIF, BioMoby and BioCase protocols and they were clearly able to see the benefits of using these protocols to meet their needs, specifically in the area of information sharing and exchange. During this workshop participants worked in real time with the data exchange standards used by the international scientific community. It gave them an opportunity to closely analyze the functionalities of the each protocol.

For the first time participants were exposed to protocols using web services technology developed by the prominent non-CGIAR partners: GBIF, BioMoby and BioCase.

This workshop had tremendous impact on both CGIAR and non-CGIAR partners. These are summarized below:

1. Non-CGIAR partners were able to come to the same platform despite their involvement in the development of different methodologies and standards, to join hands to tackle the common issues that relate to the scientific community around the world.
2. BioCase and BioMoby came to an agreement to build a middleware that will allow access to the information coming from either protocol. BioCase and BioMoby will be able to talk to each other using the middleware, hence facilitating the information exchange between partners using one or the other protocol.

3. This workshop provided CGIAR partners an opportunity to learn how data is exchanged using web services and the role of data standards in the entire process.
4. This workshop provided partners an opportunity to discuss their issues with CGIAR and non-CGIAR colleagues, to find common solutions related to scientific information management and exchange. This workshop made it possible for CGIAR colleagues to work more closely on the common issues. Partners agreed to share knowledge and expertise to help each other in the area of information sharing and management.
5. The CGIAR partners learned to install, configure, map and link data using GBIF, BioCase and BioMoby protocols.
6. GBIF, BioMoby and BioCase protocols are open source initiatives and are available free of cost. Implementing these ready-to-use protocols will save CGIAR enormous amount of money and effort.

Our special thanks to participants from GBIF, BioMoby and BioCase for taking the time to attend this workshop and sharing their knowledge with the CGIAR partners. Further more, they provided excellent training to the participants in the area of web services and data exchange protocols they developed. They have been providing this support even after the workshop to our CGIAR partners.

Lessons learned:

During the needs assessment phase of this project partners were requested to submit the information related to their scientific information systems and data standards. Some partners did not give enough feedback during this phase. In order to fill this gap each partner was given a ten minute slot to describe the situation on the ground at their respective center. This exercise helped in understanding the needs at the center level and in addressing the common issues during the workshop and the training sessions. We also gave them one month after the meeting for revisions and further consultation within their centre.

Recommendations:

1. Even though the work on deploying BioCase at each center has started, some centers still need assistance in putting the right infrastructure in place so that they can install BioCase and BioMoby to map their information sources and make their data available to others. Therefore, there is a need to continuously provide support to the efforts that have already started to achieve this target.
2. Lot of work is needed to define the exact role of the middleware that will enable BioMoby and BioCase protocols to talk to each other. This work will require proper evaluation of both protocols to define the exact functionality of the middleware. Since BioMoby has been adopted by the GCP and the BioCase is being installed to exchange the accession level information through SINGER, it is essential to provide support to the development of middleware so that both protocols can talk to each other.

Appendices:

Appendices I: Meeting Agenda

Training Workshop on interoperability

A joint ICT-KM, Generation CP and SGRP training workshop
IPGRI, Rome, 13-17 June 2005

Challenge:

Information is essential for the ability to manage and use biodiversity. The Future Harvest Centres hold a great deal of information on biological diversity, which is of great importance to agriculture, forestry and fisheries. In recent years there has been an explosion in the number and type of databases generated by the Future Harvest Centres in various fields (i.e. forestry, livestock, fishery, crops, integrated natural resource management, social sciences, and water). However, the CGIAR partners are facing increased difficulties to access these resources in a consolidated and coherent manner.

Today's challenge is the development of an information architecture to address these and other obstructions for the effective use of biodiversity resources on the Web. This reflects the growing motivation of CGIAR scientists to build a collection of CGIAR biodiversity resource discovery and integration tools in close collaboration with their partners: **the information tide is rising, but the ability to harness it is in its infancy.**

Meeting Purpose

To train key CGIAR staff in the latest technologies and standards in use by the international scientific community for managing scientific information and to develop a strategy for implementing an appropriate information architecture for maximizing access to these CGIAR-distributed information sources.

Acknowledgments:

This training workshop is a shared initiative of the CGIAR ICT-KM[4], the Generation Challenge Programme[5] and the CGIAR System-wide Genetic Resources Programme[6].

More specifically, the objectives of the workshop are:

- To understand the Web services technologies and how they can be used in different environments;
- To assess the most important technologies in use within the scientific community at an international level. To achieve this, it is proposed to focus on the following implementations:
    - The Global Biodiversity Information Facility (GBIF)[7]
    - The Biological Collection Access Service for Europe (BIOCASE)[8]

[4] *(http://ictkm.cgiar.org)*
[5] *(http://www.generationcp.org)*
[6] *(http://sgrp.cgiar.org)*
[7] *(http://www.gbif.org)*
[8] *(http://www.biocase.org) BIOCASE is a GBIF partner.*

    - BIOMOBY, integrating distributed heterogeneous bioinformatics web services[9];
- To assess the short and medium term needs of the Future harvest Centres in the area of interoperability;
- To train CGIAR experts in selected technologies in use by the international scientific community;
- To contribute to the development of a CGIAR strategy for the effective sharing of scientific data using Web services;
- To recommend areas of development to GBIF, BIOCASE and BIOMOBY in order to meet the demand of the scientific community.

Invited Organizations and Institutions

(for a detailed list of participants, please see Annex I)

- Future Harvest Centres: CIAT, CIFOR, CIMMYT, CIP, ICARDA, IITA, ICRAF, ICRISAT, ILRI, IPGRI, IRRI, IWMI, WARDA and WorldFish
- International Organizations/Institutions: GBIF, BIOMOBY, FAO
- National and Regional Organizations/Institutions: BIOCASE/Botanic Garden and Botanical Museum Berlin, Nordic Genebank (NGB), United States Department of Agriculture (USDA-GRIN)

AGENDA

June 13, 2005 Day 1

8:30AM	Arrival of participants	
8:45AM	Welcome and keynote address by IPGRI Director General	Emile Frison
9:00AM	Context/Introduction of the Training Workshop	Samy Gaiji
9:20AM	Introduction of participants	
9:40AM	Approval of Agenda and meeting logistics	
10:00AM	Coffee/Tea Break	

Session 1: Technology overview

10:30AM	"A brief overview of interoperability and Web services"	Dag Terje Endresen
11:00AM	"What's GBIF?"	Hannu Saarenmaa
11:30AM	"What's BIOCASE?"	Javier de la Torre
12:00AM	Lunch	
1:00PM	"What's BIOMOBY?"	Benjamin Good
1:30PM	Plenary discussion	

Session 2: Needs Assessment

[9] *(http://www.biomoby.org)*

(10-15 min presentation, 5-10 min discussion)

2:00PM Overview of needs and priorities (CIAT)
2:20PM Overview of needs and priorities (CIFOR)
2:40PM Overview of needs and priorities (CIMMYT)
3:00PM Overview of needs and priorities (CIP)
3:20PM Overview of needs and priorities (ICARDA)

3:40PM Coffee/Tea Break

4:00PM Overview of needs and priorities (IITA)
4:20PM Overview of needs and priorities (ICRAF)
4:40PM Overview of needs and priorities (ICRISAT)

June 14, 2005 Day 2

Session 2: Needs Assessment (cont'd)

8:30AM Overview of needs and priorities (ILRI)
8:50AM Overview of needs and priorities (IPGRI)
9:10AM Overview of needs and priorities (IRRI)
9:30AM Overview of needs and priorities (IWMI)
9:50AM Overview of needs and priorities (WARDA)

10:10AM Coffee/Tea Break

10:30AM Overview of needs and priorities (WorldFish)
11:50AM Overview of needs and priorities (USDA-GRIN)
11:10AM Overview of needs and priorities (EURISCO/NGB)
11:30AM Overview of needs and priorities (FAO)

12:00AM Lunch

1:00PM Plenary discussion

Session 3: Training content and planning

1:30PM Presentation of DIGIR Training Session
2:30PM Presentation of BIOCASE Training Session

3:30PM Coffee/Tea Break

4:00PM Presentation of Generation CP/BIOMOBY Training Session
5:00PM Training sessions planning

June 15, 2005 Day 3

Session 4: Training sessions

Group A: DIGIR training session 9:00-12:00 / 1:00-5:00
(Sakura meeting room)
Group B: BIOCASE training session 9:00-12:00 / 1:00-5:00
(Ground floor training room)
Group C: GCP/BIOMOBY training session 9:00-12:00 / 1:00-5:00
(1st floor meeting room)

Coffee/Tea Break at 10:00AM and 3:30PM, Lunch at 12:00AM

June 16, 2005 Day 4

Session 4: Training sessions (cont'd)

Group D: DIGIR training session 9:00-12:00 / 1:00-5:00
(Sakura meeting room)
Group E: BIOCASE training session 9:00-12:00 / 1:00-5:00
(Ground floor training room)
Group F: GCP/BIOMOBY training session 9:00-12:00 / 1:00-5:00
(1st floor meeting room)
Coffee/Tea Break at 10:00AM and 3:30PM, Lunch at 12:00AM

June 17, 2005 Day 5

Session 5: Strategy and future developments/implementations

8:30-12:00 Working Group I: "Technology"
(GBIF, BIOCASE, BIOMOBY)
(1st floor meeting room)
Working Group II: "Implementation"
(Sakura meeting room)

Coffee/Tea Break at 10:00AM

12:00 Lunch

(Sakura meeting room)
1:00PM Working Group I report

1:30PM Working Group II report

2:00PM Plenary discussion

3:30PM Coffee/Tea Break

4:00PM Wrap-up and Recommendations for the CGIAR Strategy on interoperability

5:00PM Closure and departure of participants

LIST OF PARTICIPANTS

1.	Hannu SAARENMAA	(GBIF)
2.	Donald HOBERN (GBIF) – 16-17/06	(GBIF)
3.	Giorgos KSOURIS	(GBIF)
4.	Javier DE LA TORRE	(BGBM)
5.	Markus DÖRING– 15, 16 & 17 June only	(BGBM)
6.	Mark WILKINSON– 16-17/06	(BIOMOBY)
7.	Benjamin GOOD – 13-15/06	(BIOMOBY)
8.	Mathieu ROUARD	(GCP/IPGRI)
9.	Milko SKOFIC	(GCP/SGRP)
10.	Dag Terje ENDRESEN	(NGB)
11.	Quinn P. SINNOTT	(USDA-GRIN)

12.	Stefano DIULGHEROFF	(FAO)
13.	Fernando ROJAS	(CIAT)
14.	Doryan Erik COLUNGE CABRERA	(CIAT)
15.	Yuliardi YUZAR	(CIFOR)
16.	Luis AVILA	(CIP)
17.	Miguel BLANCAS	(CIP)
18.	Simon REINHARD	(CIP)
19.	Juan Carlos ALARCON	(CIMMYT)
20.	Jan KONOPKA	(ICARDA)
21.	Khaled EL-SHAMAA	(ICARDA)
22.	Peter MURAYA	(ICRAF)
23.	Ahmed Said Salim MBARAK	(ICRAF)
24.	Pradyut J. MODI	(ICRISAT)
25.	Hari Deo UPADHYAYA	(ICRISAT)
26.	Jude ATALOBHOR	(IITA)
27.	Michael LAWSON	(IITA)
28.	Ephrem Getahun HAILU	(ILRI)
29.	Aynalem TESFAHUN	(ILRI)
30.	Kheder DURAH	(IPGRI)
31.	Frederick ATIENO	(IPGRI)
32.	Tito FRANCO	(IPGRI)
33.	Paul O'NOLAN	(IRRI)
34.	Alexander COSICO	(IRRI)
35.	Suparuek PUTTAKHOT	(IWMI)
36.	Pierre MARCHAND	(IWMI)
37.	Aline LISETTE-VIDAL	(WARDA)
38.	Rama S. VENKATRAMAN	(WARDA)
39.	Marco NOORDELOOS	(WORLDFISH)
40.	Samy GAIJI	(Secretariat/SGRP)
41.	Rajesh SOOD	(Secretariat/SGRP)
42.	Audrey CHAUNAC	(Secretariat/SGRP)
43.	Adriana ALERCIA	(IPGRI)
44.	Imke THORMANN	(IPGRI)
45.	Tom HAZEKAMP	(IPGRI/Consultant)
46.	Sónia DIAS	(IPGRI)

Appendice II: List of participants

Centre/Institution/ Organization	First Name	Last Name	Mailing Address	Phone	Fax	EMail
GBIF Global Biodiversity Information Facility	Hannu	SAARENMAA	GBIF Secretariat Universitetsparken 15 DK-2100 COPENHAGEN	+45 35 32 14 79	+45 35 32 14 80	hsaarenmaa@gbif.org
GBIF Global Biodiversity Information Facility	Donald	HOBERN	GBIF Secretariat Universitetsparken 15 DK-2100 COPENHAGEN	+45 35 32 14 83	+45 35 32 14 80	dhobern@gbif.org
GBIF Global Biodiversity Information Facility	Giorgos	KSOURIS	GBIF Secretariat Universitetsparken 15 DK-2100 COPENHAGEN	+45 35 32 14 85	+45 35 32 14 80	ksouris@gbif.org
BGBM Botanic Garden & Botanical Museum Berlin-Dahlem	Markus	DORING	Königin-Luise-Str.6-8 14191 Berlin GERMANY	+49(30) 838-50284	+49(30) 841 72 954	m.doering@bgbm.org
BGBM Botanic Garden & Botanical Museum Berlin-Dahlem	Javier	de la TORRE	Königin-Luise-Str.6-8 14191 Berlin GERMANY	+49(30) 838-50284	+49(30) 841 72 954	j.torre@bgbm.org
BIOMOBY	Mark	WILKINSON	Medical Genetics St. Paul's Hospital, 1081 Burrard St. , Rm. 166 Vancouver, B.C. V6Z 1Y6 CANADA	+(1 604) 682-2344 (62129)	+(1 604) 806-9274	mwilkinson@mrl.ubc.ca markw@illuminae.com
BIOMOBY	Benjamin	GOOD		+(1 604) 6822344x62912		bgood@mrl.ubc.ca bmg@sfu.ca

GCP/IPGRI	Mathieu	ROUARD	c/o INIBAP Parc Scientifique Agropolis II, 34397 Montpellier Cedex 5 FRANCE	+(33) 467611302	+(33) 467610334	m.rouard@cgiar.org
GCP/SGRP	Milko	SKOFIC	c/o IPGRI Via dei Tre Denari, 472/a 00057 Maccarese (Fiumicino), ITALY	+(39) 066118286	+39 0661979661	m.skofic@cgiar.org
NGB Nordic Gene Bank	Dag Terje	ENDRESEN	P.O. Box 41 S-230 53 Alnarp SWEDEN	+46-40-53 66 54	+46-40 -53 66 50	dagterje@ngb.se
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Appendices III: Evaluation results

ICT-KM Training Workshop on Interoperability
IPGRI, Maccarese, Italy – 13 to 17 June 2005

TRAINING COURSE EVALUATION

	Criterion	Score	Replies
1.	How well did the course meet its objectives	☐ 5	10
		☐ 4	19
		☐ 3	6
		☐ 2	
		☐ 1	
2.	Balance between different topics	☐ 5	7
	Comment: I would like to have had more info (rate: 4)	☐ 4	18
		☐ 3	9
		☐ 2	
		☐ 1	
		No reply	1
3.	Balance between theory/lectures and practical work	☐ 5	7
		☐ 4	14
		☐ 3	10
	Comment: a bit more theory for me (rate: 4)	☐ 2	4
		☐ 1	
4.	Amount of new information provided	☐ 5 (a lot of new information)	14
		☐ 4	16
		☐ 3	4
		☐ 2	
		☐ 1 (little new information)	
		No reply	1
5.	Overall length of course/time allocated to each part of the course	☐ 5	5
		☐ 4	17
		☐ 3	10
		☐ 2	1
		☐ 1	
		No reply	2
6.	Suitability of teaching methods used for the subject (e.g. lectures, demonstrations, practical exercises, field work, discussions, etc.)	☐ 5	6
		☐ 4	16
		☐ 3	8
		☐ 2	3
		☐ 1	

		No reply	2
7.	Quantity and quality of equipment available to participant	☐ 5	18
		☐ 4	11
		☐ 3	5
		☐ 2	
		☐ 1	
		No reply	1
8.	Quality of presentations by instructors	☐ 5	10
		☐ 4	14
		☐ 3	8
		☐ 2	2
		☐ 1	
		No reply	1
9.	Number of participants	☐ 5 (Satisfactory)	30
		☐ 4 (Too many)	5
		☐ 3 (Too few)	
10.	Instructor/trainee interactions	☐ 5	11
		☐ 4	15
	Comment: Biocase presentations good but instructors enthusiastic Interruptions a bit distracting at times (rate: 4)	☐ 3	5
		☐ 2	1
		☐ 1	
		No reply	3
11.	Interactions with other participants	☐ 5	14
		☐ 4	14
		☐ 3	5
		☐ 2	
		☐ 1	
		No reply	2
12.	Relevance of course content to your work	☐ 5	21
		☐ 4	12
		☐ 3	1
	Comment: very relevant to my work (rate: 4)	☐ 2	
		☐ 1	
		No reply	1
13.	Degree of interest generated by the course	☐ 5	15
		☐ 4	12
		☐ 3	5
		☐ 2	
		☐ 1	
		No reply	3
14.	Overall effectiveness of the course	☐ 5	11
		☐ 4	15
		☐ 3	6
		☐ 2	
		☐ 1	
		No reply	3

15.	Quality and quantity of information received prior to training course	☐	5	6
		☐	4	11
		☐	3	12
		☐	2	3
		☐	1	
		No reply		3
16.	Course organization - travel, arrival, accommodation, financial arrangements, etc.	☐	5	26
		☐	4	6
		☐	3	
		☐	2	
		☐	1	
		No reply		3

17. List the strengths of the course:

- Samy personally did an outstanding job as a convenor, facilitator, and visionary.
- Thanks people!
- It was just great. Hope to apply lessons learnt.
- Application of web services in the research. Interchanges the experiences between the centers.
- Lots of new information. Good trainers. Important technologies exposed.
- Good mix of theory and practicals.
- The presenters invited are experts in their fields and are involved in actual development of the software.
- Instructors and course leaders and ? were very well prepared. Instructors were the 'REAL' people who developed the procedures not some low-level person.
- New technologies; Interactions with Centers; Computing support.
- Good hands-on training on DIGIR, Biocase. Trainers always willing to assist.
- Exposure to new methods on sharing data. Practical session on DIGIR.
- Relevance; Agenda (well developed); Technical skills of participants and trainers.
- Technical; High tech; Well supported; Key people.
- Organization; Course outline; Course material; Team spirit between centers; Technology options provided.
- Practical; Very relevant with the needs; Informative.
- Technology; Awareness; Participatory; Capacity building.
- New technologies; Standardization.
- I've answered this questionnaire as someone who was only here for the last two days and who was entirely in the I.T. discussions. Many thanks for the opportunity to attend. Donald Hobern.
- Practical sessions; Excellent coordination of the courses; Excellent participation.

18. List the activities that you enjoyed least/found least useful:

- BioMOBY lecture.
- Everything.
- Continue with the development the webservices and its integration with BioMOBY, DIGIR and Biocase.
- Debates between the trainers discussing their issues during the training sessions.
- Some training sessions (BioMOBY) was not "practical".
- Presentation on need assessment by organization.
- All were useful.
- Hands on; Going out together; Nice people and support.

- However useful, BioMOBY is abstract to me.

19. Suggest ways of improving the organization of programme of future training courses, e.g. new activities to include:

- None.
- More focus on hands on training and less talk.
- A little bit longer practicals would be very useful.
- Was perfect.
- The course itself was very well organized. The only possible addition I heard was to have had a daytime sightseeing trip in the middle of the week for a break.
- Tutorials.
- I look forward to participating to the next training workshop. I hope that I can apply the knowledge that I have learnt here.
- It was a perfect workshop and you cannot change what is perfect.
- More detailed course outline; better prepared and course material.
- None.
- Reorganize sessions' schedule. PM sessions were disproportionate: one 2h30 and the other 1h.
- Arrangements for group visits to places of interest in town.
- Excellent.

Appendices IV: Strategies for Interoperability

	IPGRI
Objectives	- Sharing knowledge and information on genetic resources more effectively * - Enable institutions/people to share information more effectively
Outputs	- SINGER, EURISCO work via web services ** - Standards for information sharing and exchange developed ** - Implementing new technologies for sharing information at regional and national levels *
Steps	- Development of standards with key communities - Assessment of available technologies options with partners - Decide on the technology options - Develop a tool kit for implementation and training - Enabling/Facilitating infrastructure establishment - Deployment of technology option at all level in a collaborative manner - Promotion of benefits of information sharing

	USDA-GRIN
Objectives	- Share USDA national plant germplasm system data more effectively - Be able to access other collections (CGIAR, National, Regional) more effectively *
Outputs	- More fully integrated international data standards into the USDA database **** - Increase awareness of availability of other collections ***
Steps	- Review latest MCPD standards and incorporate into USDA database - Install one or more of the services presented at the workshop (BioCASE, DiGIR, BioMOBY) for GRIN ASAP (1 week?) - Enhance communication with the members here at the meeting to keep informed of the new resources (should Samy create interoperability bulletin board)

	FAO
Objectives	- Serve global PGRFA community with a more coherent and interpreted information + knowledge offer *** - Widen GPA+SOW information accessibility +sharing+utilization - Contribute to the establishment of the global information system under the IT-PGRFA
Outputs	- Development of a schema for interoperability of GPA metadata with the other existing metadat6a processes ** - Implementation of web services by CG community + by national systems * - Completion of GPA monitoring + country report preparation for SOW in majority of developing countries - Automated data harvesting from developed countries for GPA related information ***
Steps	- Development of a proposal for data schema for GPA to be submitted to TADWG meeting in September 2005 - Global survey on existing information resources (Systems+services etc) - Development of a prototype portal proposal for the global information system of the IT on PGRFA - Strenghtening partnership activities between FAO + CG

	- Facilitate/Promote interactions among stakeholders from different sectors - Build capacity/raise awareness in developing countries on information management + sharing by taking advantage of on going processes (SOW, Global Trust etc…)

	IRRI
Objectives	- Use web services to share research data publicly by making them searchable by portals * - Use web services to share computational resources (HPC, stat software)
Outputs	- Identify suitable data identity standards for describing data (e.g. DarwinCore) ** - Adopt Generation CP platform via BioMOBY protocol - Use DiGIR for sharing genebank accession data **** - Look for opportunities to apply in other areas (e.g. Library data) ****
Steps	- Complete inventory - Classify data - Prioritize for sharing (+protection) - Clarify hosting model centralized, shared or distributed - Find relevant data standard for sharing data or develop schema - Choose wrappers + portals

	IITA
Objective	- Provide and share databases with the use of Web services
Outputs	- Promote IITA research databases together in a coherent manner *** - Establish rules and standards in Centres data management **
Steps	- Awareness workshop among scientists bringing about the formation of working group - Consult and collaborate with Centres already implementing Web services to actualize inter-operability

	ICRISAT
Objectives	- Efficient sharing of data using appropriate technology and best practices - Generating knowledge through robust analysis using appropriate methods and tools
Outputs	- Appropriate technology for data sharing and tools for analysis ** - Information on germplasm of ICRISAT mandate crops - Enhanced use of germplasm of ICRISAT mandate crops by crop improvement scientists *
Steps	- Creating awareness among various players within institute (GR, breeding, NRM etc…) and partners - Enhancing quality and accuracy of data - Identify and acquiring required support (hardware, software, manpower) - Bringing data to the common standards for sharing with the partners and global community - Making data available to global community through Web services - Identifying data analysis tools for generating knowledge - Sharing knowledge through training programmes, workshops, CD/DVDs etc…

	ICARDA
Objective	- Contribute (share) research databases to a global biodiversity information system *
Outputs	- Upgrade existing data system for sharing using web services (PGR databases/SINGER; Crop based systems/ICIS) - Contribute to the development of standards by CGIAR to join global information platform ****** - Implement Web services technology in the Centres * - Assist partners particularly NARS to build/use web services technologies to share their research data ****
Steps	- Upgrade IT infrastructure (i) at Centres; (ii) in NARS (assist in upgrade efforts, mainly on knowledge side); - Increase awareness and provide necessary tools/training to the scientists in the Centres and research partners to organize, analyze and share research data - Use available web services wrappers - Develop portals for (i) crops of global mandate; (ii) themes (like drought) - Contribute to the development of CGIAR portals

	CIP
Objective	- Update data sharing technologies and services
Outputs	- Implement BioMOBY web services - Add more web services for access to HPC, GIS, statistics, bioinformatics a other research tools and services - Expose Genetic resources data through web services * - Commodity modules in DIVA-GIS (->BioCASE ->BioMOBY)
Steps	- What: all published research assets (GR, variety catalogs, tools [statistics, HPC…], GIS etc…) - Staff: RIU (statisticians, GIS, bioinformatics etc…) - Funds: GPG/World Bank; Generation CP, HPC etc… - Collaborations: CG, Future Harvest, ARI, NARS, standards, topics, crops, disciplines etc…) - Awareness raising (training documentation, publications etc…)

	IWMI
Objectives	- Start sharing - Show benefit from data shared by others - Take advantage of existing efforts - High tech capacity building - -> Foster non gene implementations
Outputs	- IWMI spatial products available as web service ** - Capacity to implement the technology with NARS ** - Investigate how web services can support knowledge brokering *** - Harvest data better (CG + all the rest) FAO… - Better understanding of gene/non-gene relations - Developing non-gene schema (GBIF, BioCASE) *** - Expand BioMOBY ontology to non-gene datasets ****
Steps	- Capacity building - Easy kills/prototype - Community of practice -> contribute/benefit - Volunteer as facilitator for non-gene schemas - Focus on collaboration with other Centres on this

	ILRI
Objective	- Share scientific data to various stakeholders to enhance ILRI's impact in reducing poverty
Outputs	- Promote the culture of information sharing within the research community in and outside the institute ****
	- Build internal capacity in using web services technology ***
	- Share up-to-date information that confirms to an agreed standard within the scientific community ***
Steps	- Establish a network for discussions, organize conferences and distribute fliers to increase awareness to the benefits of sharing (e.g. success stories of GBIF, SINGER etc…)
	- Organize and conduct training on inter-operability
	- Be proactive in making sure that accurate and up to date information is shared.
	- Participate in refining standards for information sharing

	CIMMYT
Objective	- Share data with other Centres efficiently
Outputs	- Develop an automatic system replication of CIMMYT data (e.g. genebank data) *
	- Increase data standardization ***
Steps	- Migrate IWIS DB to ICIS structure
	- Training in Java
	- Visit CG Centres with expertise in web services
	- Get agreement with other CG Centres in order to use or develop common tools

	WARDA
Objectives	- Make available all databases through web services *
	- Participate with BioCASE and BioMOBY
Outputs	- Up-to-date information/knowledge for WARDA research community
	- Data sharing with NARS partners improved *******
	- Visibility of WARDA among stakeholders and donor communities
Steps	- Obtain management support to implement this project
	- Train the scientific staff
	- Inventory of available information assets/knowledge databases (e.g. genebanks information system, West Africa inland valley information system, Rice information system)
	- Rearrange/Reorganize the datasets to comply with the CG portal standard
	- Train the NARS partners
	- Hands on training for data managers

	World Fish Center
Objective	- Become more valuable source of aquatic species data for the global community
Outputs	- Strategic discussion with INGA and other genetic researchers
	- Develop relevant/realistic plan to share Reefbase data (benthos & fish obs) **
	- Strategic discussion among FishBase – ReefBase – TrawlBase (+lessons learnt) **
Steps	- Start metadata inventory at WFC (according to the established formats provided)

	- Explore specific application/collaboration of “CBIS” (DiGIR applied to ocean data) to ReefBase (& FishBase & TrawlBase) - COBIS linked to GBIF!! - Evaluate potential use of other Centres data & technologies to WFC mission => presentation/summary of sources to key WFC staff - Brief INGA & other genetic scientists at WFC on data sources & services and their importance and applications - Initiate collaborative discussions & sharing for data/maps/others with IWMI

ICRAF	
Objective	- To further share the genetic resources databases using the web services technologies
Outputs	- Scientific information will be easily available to wider community - Standards implemented in information presentation * - Quality information on germplasm easily accessible
Steps	- (same as CIFOR)

CIFOR	
Objectives	- Introduce/Share to management/users/scientists - Share CIFOR available scientific information ASAP
Outputs	- Scientific information are managed better (storage, publishing, workflows, sharing mechanisms with other organizations) - Scientific information are easily accessible, better disseminated, give higher benefit & impact to stakeholders *
Steps	- Develop metadata standards for scientific information that fits all Centres using global accepted standards (e.g. DarwinCore, DublinCore). - Acquire the required infrastructure/Technology - Develop a public mechanism/procedures for sharing scientific information to a Portal using Web services (e.g. DiGIR, BioCASE) - Awareness and capacity building within the organization - Promotion of the system to stakeholders / public - Awareness & capacity building (e.g. training workshops, seminars) - Promotion (e.g. posters, newsletter, include URL in publications, web sites etc…)

CIAT	
Objective	- Diffusion of the Web services technology advantage to the scientific team in CIAT and select and develop the services (data and application) to be publish as a web service.
Outputs	- Raise awareness with the scientific team about the web services technologies * - Share our genebank information (Cassava, Bean, Forages) * - Develop software application together with Centres to be exposed as web services ****
Steps	- Hold a workshop and internal seminars about the web services technology (e.g. BioCASE, BioMOBY, GBIF) - Expose the ESTs cassava database using GBIF and expose the ACEDB-Bean and Cassava databases using BioMOBY (short term) - Develop applications (web services) for the easy use of the bioinformatics tools in conjunction with another Centres and share the experience with IT teams - URG service of search and request of germplasm as a web service

	- Diversity cassava molecular network (MOLLAS) as a web service