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DECLARATION BY THE SCIENTIFIC REPRESENTATIVE OF THE PROJECT COORDINATOR


I, as scientific representative of the coordinator of this project and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

- » The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;
- » The project (tick as appropriate)⁽¹⁾:
 - has fully achieved its objectives and technical goals for the period;
 - has achieved most of its objectives and technical goals for the period with relatively minor deviations.
 - has failed to achieve critical objectives and/or is not at all on schedule.
- » The public website, if applicable
 - is up to date
 - is not up to date
- » To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 3.4) and if applicable with the certificate on financial statement.
- » All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 3.2.3 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of scientific representative of the Coordinator:

Prof. Dr. Erko Stackebrandt

Date: 02 / 06 / 2014



For most of the projects, the signature of this declaration could be done directly via the IT reporting tool through an adapted IT mechanism and in that case, no signed paper form needs to be sent

1 If either of these boxes below is ticked, the report should reflect these and any remedial actions taken.

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PUBLISHABLE SUMMARY



PUBLISHABLE SUMMARY

Overview of the progress during the reporting period (November 2012 - April 2014)

SUMMARY DESCRIPTION – GOALS AND OBJECTIVES

During the first half of the Preparatory Phase (2012 - 2015) the EU-funded pan-European Microbial Resource Research Infrastructure (MIRRI) project comprised 16 Partners and 20 Collaborating Parties. The objectives of MIRRI during the Preparatory Phase were to develop strategies to integrate existing quality controlled public microbial resource centres and public microbial culture collections into a pan-European microbial resource research infrastructure under a legal status, replacing the fragmented landscape of holdings, data and services by a coordinated offer to the academic and bio-industrial user to foster research and the bio-economy. MIRRI not only aims to provide a comprehensive source of information about existing microbial collections, but also to improve quality standards, broaden their coordinated holdings and services, respond to user-driven needs and to create an operational concept for a sustainable infrastructure. MIRRI will make a difference by taking joint cost effective approaches to coordinate services and products targeted to help provide solutions to research problems. Emphasis is being laid in the generation of an IT-infrastructure capable of linking the existing resource-derived molecular phenotypic data of individual MIRRI partners with data from the scientific literature and public data repositories to create a user-friendly interoperable data-resource system. At the end of the Preparatory Phase it is the goal to provide a legal framework, a concept for its operation and to find solutions for its sustained funding and financial solutions for broadening key aspects of MIRRI. Furthermore, criteria will be defined to allow new partners to join MIRRI and to enlarge the MIRRI offer through creating national networks. All to ensure that microbiology is underpinned by high quality resources to improve the quality of science and to protect the enormous investment in the generation of data by ensuring the biological materials on which it is based is retained for future study.

The European Commission (EC) has granted 3,137,774.00 € funding (2012 - 2015) to the Preparatory Phase of MIRRI (www.mirri.eu) to conceptualise and secure funding for the construction of the European Research Infrastructure for microbial resources.

THE MIRRI OFFER

Microbial organisms and the component parts thereof, such as Archaea, Bacteria, yeast, filamentous fungi, phages, plasmids and DNA, as well as data associated and analytical tools are the central key material for the advancement of research in basic and applied studies in academia and the bioindustry. Microorganisms have been used for more than 150 years for deciphering the agents of human infections and they serve as natural resources for the production of antibiotics and other secondary metabolites of therapeutic value; they play fundamental roles in the cycling of gases, and they are key players in improving food, agriculture and waste management; they are appreciated tools in studying the evolution of early life on planet Earth, of phylogeny, ecology, physiology; they are key research tools for determining changes in the genome, transcriptome, proteome, or metabolome for unravelling genetic and environmental factors determining the mechanisms of their beneficial and detrimental actions. Consequently, microbial resources are considered as essential raw material for the advancement of biotechnology, human health and research and development in life sciences and researchers have relied upon the availability of reference material from microbial culture collections for more than 120 years. Europe has been the cradle of public collections and their presence in the respective national research environment is an indispensable element for the advancement of science. At the European level, however, the landscape is fragmented, lacking coherence and coordination. This is the situation the Microbial Resource Research Infrastructure (MIRRI) will resolve; it will integrate the main microbial resource centres and their supporting services and data into a novel pan-European coordinated microbial Research Infrastructure resulting in the establishment of a higher level quality controlled entity consisting of national public collections to better serve the user needs.

DESCRIPTION OF THE WORK PERFORMED SINCE THE BEGINNING OF THE PROJECT AND THE MAIN RESULTS ACHIEVED SO FAR

MIRRI is well advanced as it approaches the compilation of its half term report of the Preparatory Phase having achieved most key goals as set for this stage in the Description of Work. The Preparatory Phase work builds on achievements of previous and ongoing national, European and global mBRC initiatives and research projects, such as those funded under FP5, FP6 and FP7, and the Global Biological Resource Centre Network project, work which is directly related to the needs of MIRRI. Individual work packages have outlined strategies to be implemented in the next phase. MIRRI has prepared the first iteration of its Business and Financial plan and has contacted national stakeholders to signal their commitment to fund the Implementation/Operational Phase by signing a Memorandum of Understanding as a Member State.

MIRRI will work towards the implementation of a legal status under the ERIC regulation. No decision has been made yet on a seat of the headquarters (Central Coordinating Unit, CCU) but for the MIRRI structure a hub-node structure is envisaged. The CCU will provide a common access portal to resources including appropriate facilities, support and expertise available in Member States. The national node structure will be comprised of national research collections linked to the national scientific community (e.g., universities, research institutions, bioindustry). Membership criteria for broadening the infrastructure have been outlined. They will allow a tiered structure for full members and collaborating parties; those addressing the latter are already in place, MIRRI having already added several new members to the infrastructure.

The financial plan needs to address two separate issues, the first regarding support of a lean CCU, containing elements for the daily running of business between user, the MIRRI portal and its partners, and vice versa. At this stage of the project the requirements for this are well advanced. The second is less well defined at the moment as it addresses national support for nodes and their networks; the assessment of the impact of the individual strategies with respect to expansion of holdings, services, education, training, data curation and other intrinsic operations on existing collection policies and activities are just underway; additionally, each Member State has different needs, they range from having single national collections to many disparate centres which are advanced to different levels of operation, all of which impacts heavily on each country's specific development and support needs.

Thorough analyses of the responses from the academic and industrial user toward improved needs demanded of public microbial collections have confirmed the requirement to broaden holdings, expertise, data interoperability and services and mechanisms to optimize the MIRRI offer. These considerations are addressed individually in the different work packages as follows:

- » An analysis of holdings, expertise and services has resulted in the definition of individual partner strengths. MIRRI collections can be grouped in three categories, the first one based on covering a broad range of physiological and ecological biodiversity, a second one focussing on medical microorganisms while a third one concentrates on holdings for application, e.g. agriculture, food and waste management. The filling of the identified gaps to better serve user needs will follow existing strengths and expertise.
- » Heads of MIRRI partner collections have addressed the issue of better coordination at the European level by outlining their medium-term acquisition policy and agreeing to adjust their holding focus according to the expertise in other centres.
- » Analysis of the stakeholder community at the national level identified a broad range of groups according to their interest and decision making power in MIRRI. The benefits reaching out from or to MIRRI partners will define communication channels and stimulate proactive and targeted contact from partners to the individual stakeholders.

- » The quality of management, resources and data has been identified as key to the development of MIRRI partners and a basis for building trust between MIRRI and its users. The OECD Best Practice Guidelines in combination with appropriate QM measures, already implemented in some MIRRI partner collections, need to be broadened and made a requirement for new members.
- » Monitoring elements to demonstrate the impact of MIRRI on BRCs and of MIRRI on society have been identified and need to be placed into appropriate implementation programmes.
- » Synergies with other ESFRI projects have been strongly enhanced through the discussion of joint grant proposals in the H2020 INFRADEV calls. Discussions are ongoing within the BMS group (here mainly with EMBRC, ISBE, ELIXIR, EU-OPENSREEN) and with the ENV group (here mainly with partners for the ENVRI-1 project plus some BMS group partners).
- » Cooperation with regional networks in the USA, Asia, Africa and South America are ongoing and build upon contacts made in previous EU projects between some of the MIRRI partners.
- » The need for training young taxonomists and microbial resource managers has been assessed and surveys on modern e-learning methods compiled. Training and outreach is a common theme of H2020 partners.
- » The necessity to develop standardized formats for data entries during acquisition of microbial resources has been in the focus of the work package on Data Resource Management. In order to allow the user to gain a maximum of hitherto scattered information, the combination of the provision of high quality physical resources with their associated data of unprecedented richness and interoperability is one of the main MIRRI challenges for which a strategy is presently outlined.
- » MIRRI has been instrumental in influencing the microbial component of the discussion at the level of the European Commission on the implementation of the Nagoya protocol on IPR and Access and Benefit Sharing (ABS) in compliance with the Convention on Biological Diversity (CBD). Following the discussion of the previous EMbaRC project a Code of Conduct on Biosecurity for BRCs has been published.

A graphic summary of the main MIRRI offer is attached as ANNEX WP1-1.

EXPECTED FINAL RESULTS AND THEIR POTENTIAL IMPACT AND USE

Progress is ongoing in all work packages and strategies for an improved offer to the user community are well advanced. In order to engender trust with its stakeholders and user communities, MIRRI will:

- » establish governance mechanisms and an effective Business Plan that incorporate the key stakeholders in decision making processes to deliver and ensure sustainability. It will aim to secure longer term support for subsequent phases, examining suitable business strategy and revenue lines to reach technical, legal and financial maturity. It will provide the tools, concepts and design to enter the implementation and operational phases.
- » operate on the basis of a not-for-profit entity, established under the European Community legal framework for a European Research Infrastructure Consortium (ERIC) or a similar mechanism.
- » be built around an open access infrastructure for handling of and access to expertise, resources and associated data.

- » be a distributed infrastructure facilitating access to a broader range of high quality microorganisms with added value through associated data to help realise their intrinsic value. The products and services will be delivered through the individual participants but a MIRRI web portal will bring these offers together and show where products and services can be found. Any individual mBRC can be a contact point but their offer will be enhanced by the cross infrastructure resources.
- » provide open access for data and materials generated with public funding establishing clear rights on access and use but where it adds value it may develop tools for which it charges. mBRCs will continue to charge for supply of strains. Some services will be market driven and where commercialized approaches will be in line with the legal mechanisms establishing MIRRI.
- » work with its partners.
 - » to improve their Business Plans and expand their private funding.
 - » to develop joint standards for presenting data and providing services that effectively link phenotypic and genomic data for users. This will add significant value to the ESFRI network and the biological resources held.
- » develop a common accession policy to protect the public investment by funders in developing these resources. It will facilitate acquisition of strains to increase capacity and thereby underpin European life sciences.
- » be open to all European collections that meet the membership requirements and will help all others meet those criteria.
- » liaise with Member States to ensure the user community are part of the Governance structure to inform its work and output. The infrastructure's expertise will be focussed and enhanced and mechanisms to facilitate its use and to bring in external expertise developed.
- » organize virtual platforms of expertise across the infrastructure to share access and costs.
- » keep duplications of holdings to a minimum, consistent with the security and diversity of microbial resources. Thus, as part of the MIRRI Preparatory Phase there will be planning for rationalisation and consolidation of the offerings of current and future MIRRI member collections. As a result centres of excellence will be established with national funding,
- » collaborate with other ESFRI consortia, e.g., BBMRI, ERINHA, EMBRC, ELIXIR EU-OPENSOURCE and INSTRUMENT, ISBE in areas of common interests to avoid duplication and unproductive competition. These will be augmented where it makes sense by international linkages. Collaboration with other European initiatives and regional infrastructures will be explored and intensified, respectively.

The heart of the MIRRI offer will be around the management of 1) an inclusive network where collections are able to improve their level of quality; 2) data interoperability and sharing where appropriate expertise in curation and analysis of different types of datasets will bring cost efficiencies and new tools; access to published datasets will be useful for systems biology and access to expertise in a wide range of computational modelling approaches will enable the integration of diverse datasets into quantitative and predictive models; 3) holdings and services expansion in a coordinated way but accepting national needs and mandates in the medium-term but streamlining a fully coordinated accession policy in the long run.

The societal impact will be to improve the economy and create employment through the biotechnological discoveries in healthcare, food security and livelihoods that MIRRI will underpin. The address of the project public website is www.mirri.org.

PROJECT OBJECTIVES FOR THE PERIOD



PROJECT OBJECTIVES FOR THE PERIOD

AIMS AND OBJECTIVES

The decades-long collaboration among many of the MIRRI partners has already built a platform of trust and had fostered common interests in the long-term sustainability of mBRCs. A new element and one of the main roles of the project management is to convince the partners that MIRRI is more than the sum of the individual mBRC holdings and services by reaching an agreement to work towards a distributed infrastructure of European dimension. The MIRRI strategies to be outlined at the end of the Preparatory Phase must find solutions by which each national node and the associated national network identifies its unique place within the MIRRI infrastructure with a minimum of unnecessary redundancy but a maximum offer to the MIRRI users; resulting in the medium-term that certain elements of national interest will be aligned to common strategies as defined by the executive bodies of MIRRI's future Central Coordinating Unit.

The overall goal of MIRRI is to define the most appropriate Pan-European Distributed Research Infrastructure for supporting academia and bio-industry research that require a broad range of state of the art authenticated reference material, associated data and advanced services to allow high quality research, development and application. The novelty of this infrastructure is based on the commitment of its members to coordinate and expand holdings according to collection strength and user needs, to provide a high-quality standard among partner collections, to broaden services and data offer, and to provide a common hub platform for legal and technical advice to partners and the user community. MIRRI aims to design an open access facility with the legal status of a European Research Infrastructure Consortium (ERIC), initially made up of 5 to 6 national node centres characterized by specific tasks and local synergies by affiliating to them a national network with specific research holdings and expertise in isolation, characterization and R&D.

The MIRRI Central Coordinating Unit (CCU) with its executive secretariat and associated governing boards will be designed:

- » To provide an infrastructure, with open access to academic, research, industry and civil services, for the provision of resources and associated data for the advancement of research in microbiology in the -omics area and exploitation of an unparalleled wealth of raw material for biotechnological application
- » To create a common technical platform for advanced screening of resource-associated data originating from MIRRI partner collections and from the literature, allowing an in-depth interoperable search for new combinations of genomic, ecologic, geographic and phenotypic traits selected by the research community
- » To develop the most comprehensive European repository of microbial resources, data, protocols for standard operating procedures and best practice management, and legal advice in biosafety and biosecurity issues, intellectual property and resource traceability
- » To maximize the impact of microbial resources on European science and technology by raising the range and standard of authenticated samples and associated data for advanced experiments in basic and applied research

The objectives of the MIRRI Preparatory Phase project are:

- 1 Management of the MIRRI project and design of the governance and legal structure
- 2 Analysis of user and stakeholder needs and expectations for developing appropriate communication channels
- 3 Development of criteria for MIRRI partner membership and user access

- 4 Gap analysis of MIRRI partner holdings, services, instrumentation and tools
- 5 Realization of schemes of future dissemination activities: training courses, university curriculum for Master and PhD students
- 6 Exploration of evaluation criteria to measure the impact of MIRRI on society and of the user clientele on MIRRI
- 7 Outlining a strategy for data standards for strain acquisition and interoperability of datasets from various sources to maximise user attraction to MIRRI
- 8 Defining the position of MIRRI partners in the legal framework of resource property rights and ownership

The Overall Project Management has ensured timely achievement of project results through technical and administrative management. The main objectives have been administrative and financial coordination of the project, including monitoring of the status of Milestones and timely arrival of the proposed deliverables.

At present the MIRRI management bodies are:

- » Coordinator
- » Manager
- » Steering Committee (SC)
- » Advisory Board

The following tasks of the Management have been done:

- » Supervision of the task as outlined in the “Description of Work”
- » Administration of the project
- » Handling and Distribution of funds
- » Delivery of the second edition of the Business Plan and Financial Plan (with SC, WP 3 and WP4)
- » First outline of the governance structure as indicated in the Business Case
- » Comparison of legal structures possibly implemented by MIRRI and decision to work towards an ERIC
- » Linking with other ESFRI partners (BMS group, ENV group) in the preparation of H2020 calls
- » Publishing MIRRI-relevant topics

1. ANALYSIS OF USER AND STAKEHOLDER NEEDS AND EXPECTATIONS FOR DEVELOPING APPROPRIATE COMMUNICATION CHANNELS

Analysis of the user needs has been developed by means of four individual online Survey questionnaires to scientists from academia and the bio-industry and to European microbial resource centres.

The following targets have been considered:

- » established users of the MIRRI partner collections providing thousands of researchers who are well aware of the range and quality of holdings and services
- » bio-industry contacts that either have already been users of MIRRI partner resources and its services

- » national collections of the ECCO (European Consortium of Culture Collections) group that are not involved in MIRRI but would benefit from MIRRI upon future membership

A distributed infrastructure such as MIRRI must witness a change in the acquisition policy of its partner collections from a national and individual collection research point of view to a coordinated strategy in which user satisfaction is key to the sustainability of MIRRI. Besides the need to change resource management of individual MIRRI partner collections other crucial and determining elements are

- » an analysis of the stakeholder landscape at the national and European level, the recognition of how individual stakeholders influence and benefit from being involved in MIRRI and how to open communication channels with those who may have a decisive influence.
- » the understanding of user needs, their expectation towards quality, range of offer and costs of resources. A MIRRI portal should guide the user to the most appropriate partner collection matching their expectations in terms of material, data, advice, and services. Elements of an overarching strategy are part of several work packages and the individual results must flow into a coherent product at the end of the preparatory phase which will be a fundamental building block of the MIRRI offer.

MIRRI has been given appropriate exposure through publications and through presentations at national and international conferences and links to social media. Leaflets and posters have also been delivered. The principle dissemination tool is the MIRRI web site, developed with the aims to increase awareness of the MIRRI Project and its objectives among the wider public and attract potential stakeholders interested in providing resources or benefitting from the MIRRI offer.

2. DEVELOPMENT OF CRITERIA FOR MIRRI PARTNER MEMBERSHIP AND USER ACCESS

The establishment of the criteria for MIRRI membership will be worked out on the basis of the information retrieved from the surveys on the status, management, sustainability, quality standards, etc. of public microbial collections in Europe, the OECD best practices guidelines for Biological Resource Centres and the input from other WPs covering aspects such as

- » requirements imposed by the proposed legal structure
- » proposed requirements regarding quality management, data interoperability, or risk assessment
- » regulations concerning ABS/Nagoya protocol

Several work packages are responsible for outlining this objective criteria, transversal meetings between WPs are required to adjust the criteria for MIRRI membership in the second half of the project period.

3. GAP ANALYSIS OF MIRRI PARTNER HOLDINGS, SERVICES, INSTRUMENTATION AND TOOLS

In parallel with user surveys on needs, collections themselves must evaluate their holdings in terms of depth (strain level) and breadth (phylum level) of holdings, categories of their potential use (medical research/diagnostic; food; environment; agriculture; application/exploitation) and determination of degree of overlap at the strain level. As pointed out under 2. above evaluation is crucial for the development of MIRRI into a coordinated and distributed infrastructure:

- » Inventory of MIRRI Partner and Collaborating Party collections
- » Determine individual strengths that are worth pursuing
- » Obtained thoughts of MIRRI partner heads for future strategic development

- » Assessment of published microbial strains not deposited in public collections
- » Assessment of strains deposited in research collections
- » Definition of criteria under which strains are worth depositing in public collections
- » Compilation of experts in taxonomy to be considered members of user-expert discussion groups or service platforms
- » Evaluation of available instrumentation and services

With gaps and strengths identified mechanisms have been explored to expand individual collections to users' benefit. Numbers of strains deposited in non-public collections but worth depositing will influence the financial plan of MIRRI partners in the long-term (see Business and Financial Plan).

4. REALIZATION OF SCHEMES OF FUTURE DISSEMINATION ACTIVITIES: TRAINING COURSES, UNIVERSITY CURRICULUM FOR MASTER AND PHD STUDENTS

The notion of declining expertise in taxonomy is a phenomenon of countries worldwide as this biological discipline has largely been replaced in academia by teaching molecular biology. On the other hand, interest in environmental studies and ecological connections and networks require a proper education in microbial systematics, strain management and preservation and in translating genetic information into function. MIRRI addresses these needs by evaluating the recent situation in order to develop specific training courses for users, including MIRRI staff and by building links to Universities to be involved in specific curricula. The rationale is founded in the available high taxonomic and technical expertise present in MIRRI partner collections which are equipped with state-of-the-art instrumentation. Activities have involved surveys on

- » education and training, current tools, and contents produced and used within MIRRI
- » education and training needs of MIRRI customers
- » compilation of data, material and examples of good practice on new and potential technologies and tools for Education and Training
- » contacts with Lifetrain/EMTRAIN projects
- » contact lists of European institutions in charge of microbiology training offers

Only a few MIRRI staff members have teaching responsibilities within university curricula but many MIRRI partners offer training courses for students. These two activities need to be bundled in coherent curricula packages to link the existing MIRRI expertise more closely to the higher education system at national and international levels. Closer connections with academic institutions will be made in the second half of the MIRRI project.

5. EXPLORATION OF EVALUATION CRITERIA TO MEASURE THE IMPACT OF MIRRI ON SOCIETY AND OF THE USER CLIENTELE ON MIRRI

The long history of public microbial resource centres serving research and development and the advancement of the bio-economy undoubtedly indicate the wide range of areas where they have an unquestionable high impact, which, however, is difficult to estimate. Impact of scientific research most frequently relies on proxies such as number of publications and number of patents. Within the current task, efforts were directed toward the evaluation of benchmarks and to list relevant measurable indicators of MIRRI's impact:

- » Overview of current trends in global and regional evolution of publications and patents in several fields associated with microbial resources

- » Compilation and optimization of a list of relevant measurable indicators of MIRRI's impact resulting in the "Monitoring and Evaluation of MIRRI impact (M&E)" working document compared and completed following the FENRIAM (Foresight-enriched Research Infrastructure Impact Assessment Methodology) guidelines and impact indicators list

In some cases the impact can be measured directly because of job creation or spin off SMEs or tracing the MIRRI source to the delivered product, e.g. publication, lectures, services, resource acquisition, training courses, social media, or web-site visits. Resources originating from individual public collections carry a defined collection acronym/strain number combination and can be easily traced through trade numbers and through the scientific literature. In the second half of the project the indicators linked to resources and parts thereof will be better defined to enable the measurement of impact MIRRI. Increase of resource provision may point towards the positive effect of MIRRI but may also be related to a general growing interest in and use of microbiological resources in R&D. It is therefore imperative that indicators are used that reflect the sole impact of MIRRI such as utilization of the MIRRI specific data offer, use of MIRRI's business models, use of MIRRI's codes of conduct and access to MIRRI's platforms, tools and broader coverage of resources through MIRRI's portal and central coordinating unit.

6. OUTLINING A STRATEGY FOR DATA STANDARDS FOR STRAIN ACQUISITION AND INTEROPERABILITY OF DATASETS FROM VARIOUS SOURCES TO MAXIMISE USER ATTRACTION TO MIRRI

Resource-associated data provision has been identified as one of the main goals and vision of MIRRI as it is the combination of authenticated microbial strains with a rich offer of information that will distinguish MIRRI from other regional and international resource providers, giving MIRRI a user advantage. MIRRI will provide strategies for consistent acquisition of data accompanying resources deposited in MIRRI collections and for data evaluation and validation

- » Development minimum standards will include
 - » common data requirements on accession forms
 - » mechanisms for handling restricted data
 - » use of appropriate ontologies (controlled vocabularies)
 - » data formats and content to meet defined standards
 - » quality management to ensure optimum delivery of information services to users
- » Automatic comparison of the data, data curation by curators and provision of validated data by the central clearing house
- » Data integration and systems interoperability on the information level
- » User access to data

MIRRI will provide an integrated, high-quality, manually annotated, non-redundant micro-biological resource database which provides all relevant information data and associated contextual data (metadata) about a particular biological resource.

7. DEFINING THE POSITION OF MIRRI PARTNERS IN THE LEGAL FRAMEWORK OF RESOURCE PROPERTY RIGHTS AND OWNERSHIP

Public resource centres are deeply involved in a whole array of legal issues and MIRRI as the European flagship of the microbial domain must facilitate its members to comply with regulations concerning intellectual property rights, access and benefit sharing (ABS), and use of material transfer agreements (MTA) according to the Convention on Biological Diversity (CBD) and the Nagoya Protocol (NP) and to rules and regulations

with respect to biosafety and biosecurity. The activities included

- » Comparison of the NP and draft EU ABS regulations and intense communication with the European Commission, members of the European parliament, and national focal points to influence decision making processes on key issues regarding microbial resources
- » Presentation of a guidance document on these issues and presentation of ABS and Best Practice issues at international conferences
- » A draft for minimal requirements for transfer agreements was formulated
- » Survey on gap analysis concerning biosecurity regulations in MIRRI partner collections

MIRRI will play an important role as ‘European Trusted Collections’, as advisors of stakeholders in the above mentioned issues at the national and European level and it will have an educational role in informing researchers about the mandatory adherence to the articles of the CBD and NP

**WORK PROGRESS AND ACHIEVEMENTS
DURING THE PERIOD**



WORK PROGRESS AND ACHIEVEMENTS DURING THE PERIOD

WORKPACKAGE 2 - DESIGN OF THE MICROBIAL RESOURCE RESEARCH DISTRIBUTED INFRASTRUCTURE

I. SUMMARY OF PROGRESS TOWARDS OBJECTIVES AND DETAILS FOR EACH TASK

A considerable number of well-established, mature mBRCs/Culture Collections (CCs) exist in Europe which differ in many aspects such as size, focus, quality assurance, ICT development, etc. but have in common their status as service collections that accept, maintain and provide microbial raw material. They also offer scientific services and contract research related to microbiology. However, at present this important resource potential is offered in a fragmented, uncoordinated and disharmonized way. The integration of all or part of this resource, knowledge, services and research in a sustainable multipurpose platform will be a major step forward with respect to their visibility, transparency, access and use, and will provide significant added value for all stakeholders involved be they academic or industrial end-users, policy makers or funding bodies.

This work package designs the scope and coverage of MIRRI with regard to the provision of microbial raw material and related services to the user community. The goal is to facilitate the exploration of the full potential of microbial diversity to address major challenges such as climate change, agriculture, healthcare, chemical industry production and energy.

Feedback from stakeholders to help design MIRRI's improved offer was collected by means of different surveys and meetings.

1. SURVEYS

During this first term of the preparatory phase (M1-M18), WP2 developed four different questionnaires to collect information from the main stakeholders of MIRRI, being the microbial **resource holders/providers** and the **microbial resource users**:

- » the "**ECCO-CC questionnaire**": Survey of the Public mBRCs/CCs that are members of the European Culture Collections' Organization (ECCO)
- » the "**non-ECCO-CC questionnaire**": Survey of the non-public CCs within laboratories of European research institutes, public health centres, universities, national reference laboratories and hospitals
- » the "**User questionnaire**": Survey of the current and potential users of microbial resources and services
- » the "**Innovative services questionnaire**": Survey of the interest of current and potential users of microbial resources and services for the innovative aspects of MIRRI
- » The questionnaires were compiled with input from all WPs, and the results of the surveys will contribute to tasks within and outside WP2

The online Survey Monkey tool (SM) was used for survey upload, design, hosting, data collection and processing.

Two surveys were launched in April 2013 (a. ECCO-CC and c. User questionnaires), one in September 2013 (b. non-ECCO-CC questionnaire), and one in January 2014 (d. Innovative Services questionnaire).

Annex WP2-1 gives an overview of the target groups, distribution channels, expected outputs and timing for the four WP2-surveys.

Annex WP2-2 shows an overview of the feedback received and partially analysed for all questionnaires at the time the present report was drafted.

» **ECCO-CC (a) and USER (c) surveys** to profile European public mBRCs/CCs (ECCO members) and their Users

The first two surveys were conducted in parallel, with the main goal of comparing the offer and demand in microbial resources, services, data, quality, etc. to define the future function and content of MIRRI.

The ECCO-CCs survey with a high response rate (80 %) provided an inventory of the holdings of 60 out of 75 public mBRCs/CCs that are member of the European Culture Collections' Organization (ECCO). Hence, the ECCO-CC survey results represent the European public mBRC/CC community well and suggest a high level of interest in and cooperation with the MIRRI initiative. The profiles of 60 ECCO-CCs of various sizes and scope are available, enabling inventory of maximal resources and services (WP2.1) and comparison of important BRC guidelines with current mBRCs/CCs practices, in view of developing future MIRRI membership criteria (WP2.2).

For the **User survey** nearly 1200 replies were received, of which about 25% provided contact details allowing further direct communication. Participation of the non-profit sector was significantly higher than the profit sector (resp. 76% and 24%). A short inquiry to MIRRI CCs with the aim to know the number of orders, sent material and customers during 2010-2012 showed that 69% of the material was sent to non-profit organizations and 31% to profit organizations. These data suggest that the participation of both sectors in the USER survey reflects the representation of both sectors in many of the mBRCs/CCs customer bases. To enhance the participation of the profit sector, at the 2nd MIRRI general meeting it was decided to re-open the User questionnaire in parallel with a fourth questionnaire "Innovative Services questionnaire", specifically targeting the bio-industry in Europe (see below). Respondents were provided a link at the end of the Innovative Services questionnaire allowing them to also participate in the previous User survey, to gather more profiles of current and potential users from bio-industry.

The intermediate findings from the ECCO-CC and User survey analyses are presented in the "Results and Conclusions" section for the relevant WP2 tasks. The second period of the User survey is ongoing and has not been analysed yet, thus the findings presented are for the initial period only.

» **Non-ECCO-CC (b) survey** to map the microbial resources preserved in European laboratory collections.

The survey detected 158 non-public CCs maintained in laboratories from different types of institutes distributed over Europe. There are vast numbers of laboratory collections (e.g. research, reference, or hospital collections), some of which might harbor important taxa and expertise not well covered by public mBRCs/CCs. Therefore they represent important stakeholders as (potential) providers of complementary microbial resources/expertise for MIRRI.

An extensive list of contact persons maintaining laboratory collections was compiled in collaboration with all MIRRI participants, and a questionnaire was designed by WP2 with input from other WPs (WP6 in particular). Several questions, e.g. on available resources, quality and data, were similar or identical to the ECCO-CC questionnaire for comparative purposes.

Except for Italian and Spanish laboratories, which were approached personally by the local MIRRI partner, and which provided a higher level of feedback, the response rate in most countries was low. For this reason, the survey was re-opened and a MIRRI partner personally contacted the laboratories that did not respond in the first period within their country. With this approach, several additional responses were obtained (total of 158 instead of 85) with a slightly better distribution among European countries (19 countries instead of 15) than in the first survey period (Table 2.1).

Analysis of the non-ECCO survey (2nd period) is ongoing, but the first significant results are discussed below within the relevant WP2 tasks.

- » **Innovative Services (d)** survey to assess the interest of users in innovative MIRRI aspects
 A fourth WP2-questionnaire was designed with the aim to evaluate the degree of interest of current and potential users, especially from bio-industry, in putative innovative functions and services of MIRRI. For this purpose, all MIRRI partners were encouraged to brainstorm in order to describe the added value of MIRRI and to identify what improved or innovative services MIRRI could provide beyond what is currently offered by public mBRCs/CCs individually.
 MIRRI collections were again asked to distribute this new survey to their customers. Furthermore, one coordinator per country (MIRRI Partner or Collaborating Party) was nominated as responsible to compile a list of contacts in the bio-industry (companies retrieved from public directories, associations, etc.) and to distribute the questionnaire to these (potential) users in their country. In addition, the Enterprise Europe Network (EEN) has been involved to approach the BioChemTech sector and other bioindustries in Europe. The questionnaire was also distributed via the social media and the MIRRI website. These approaches were successful in improving the involvement of the profit stakeholder, as the share of respondents from the profit sector increased from 1/4 in the User survey to 1/3 in this new survey. Moreover, 1/3 of respondents (both for profit and non-profit users) indicated not to be current customers of mBRCs/CCs, suggesting many potential mBRC/CC users were reached. Data collection and analysis of the Innovative Services survey is ongoing, but first results are discussed within tasks WP2.1 and WP2.4.

2. MEETINGS

- » MIRRI/ECCO meeting, 11-12/12-14 June 2013, Athens, Greece
 WP2 session organized during the MIRRI meeting and a MIRRI session during the ECCO meeting. In the WP2 session preliminary results from the ECCO CCs and User surveys were presented and further actions were planned.
 In the MIRRI session during the ECCO meeting several aspects of the project were presented to the audience (more than 100 participants mainly from European CCs but also from other CCs worldwide).
- » FEMS meeting & “FEMS questionnaire”, 21-25 July 2013, Leipzig, Germany
 A survey initiated by WP5 (outreach) was organized with input from other WPs to explore communication, expected impact and services and expertise needed from MIRRI.
 In all, 59 participants of the FEMS conference answered this questionnaire. Most of them came from Germany and most of them belong to the academic sector. The main outcomes from this action were increased awareness about MIRRI and a list of 23 specialists that would be willing to participate as scientific experts in MIRRI.
- » Carnot meetings, 9-10 October 2013, Lyon, France
 The CRBIP collection participated in the CARNOT meetings and had interviews with 6 different companies that use microbial resources. The companies were able to express their needs directly, these included detected gaps, recommendations etc. Although the scope was very limited, the face-to-face dialogues enriched the knowledge about user demands and their perception of culture collections.
- » Second MIRRI General Meeting, 19-22 November 2013, Amsterdam, The Netherlands
 A breakout session was held to discuss WP2 results and to get input from other MIRRI members on function of the research infrastructure and the resources and services to be included. The most relevant agreements were to design a new survey aimed to show innovative services that MIRRI could offer and to re-open the User questionnaire in order to enlarge the input from stakeholders, especially the bio-industry. Another breakout session was held specifically for WP2.2 to discuss membership types and membership criteria.

» TASK WP2.1 DEFINE THE FUNCTION OF THE RESEARCH INFRASTRUCTURE AND THE RESOURCES AND SERVICES TO BE INCLUDED

Significant progress has been achieved for this task by means of the surveys and meetings. We have gathered an inventory of *ex-situ* microbial resources, expertise and services in Europe; explored gaps in resources and services; assessed the level of interest of the user community for MIRRI; and received the commitment of some of the resource/service providers to cooperate in MIRRI.

INVENTORY OF *EX-SITU* MICROBIAL RESOURCES IN EUROPE (MAXIMAL COVERAGE BY RESOURCE HOLDERS) AND THEIR AVAILABILITY

A first inventory on microbial holdings based on the information requested (numbers of available items per type of microbial/genetic resource) is summarized in Table 2.1. A finer inventory (strain/species/genus) is foreseen in the second half of the preparatory phase in collaboration with WP6.1.

In the case of non-public CCs holdings are underestimated, as several respondents only indicated the type of resources in their collection and not the number of items. With respect to **uniqueness**, 42% of respondents indicated that their collection contains species/genera not well-represented in public mBRCs/CCs, and specify these “unique” holdings; i.e. phytoplasmata (5 CCs), consortia (4), viroids (2), and microalgae viruses (1). These collections are very valuable as they might harbor unique resources that are currently not available to the research community.

TABLE 2.1. TOTAL NUMBER OF HOLDINGS PER RESOURCE TYPE IN mBRC/CCs PARTICIPATING IN THE ECCO OR IN THE NON-ECCO CCs SURVEYS

RESOURCE TYPE	TOTAL NUMBER OF ITEMS	NUMBER OF ITEMS IN ECCO-CCs	NUMBER OF ECCO-CCs INVOLVED	NUMBER OF ITEMS IN NON-PUBLIC-CCs	NUMBER OF NON-PUBLIC-CCs INVOLVED
Filamentous fungi	269.023	212.389	28	56.634	57
Bacteria	413.302	180.328	33	232.974	95
Genomic DNA	83.204	58.796	33	24.408	40
Yeasts	41.002	22.050	13	18.952	15
Micro-algae	13.426	8.741	9	4.685	11
Protozoa	19.760	6.483	5	13.277	5
Plasmids	4.109	3.286	7	823	10
Cyanobacteria	4.629	2.744	9	1.885	11
Phages	1.414	1.249	8	165	6
Cell lines human	1.232	793	4	439	3
Archaea	7.107	772	7	6.335	8
Viruses plants	2.936	741	2	2.195	9
Viruses human	1.047	734	3	313	6
Cell lines plants	674	674	1		
Cell lines animal	369	312	4	57	5
Hybridomas animal	139	89	2	50	1
Viruses animal	76	35	1	41	2
Total	863.449	500.216		363.233	

Regarding the **availability** of the non-public CCs' holdings, only 40% of the laboratories supply samples of their resources to third parties upon request. Others share resources in specific cases (36%) such as in collaborative research, or not at all (24%) (Figure 2.1).

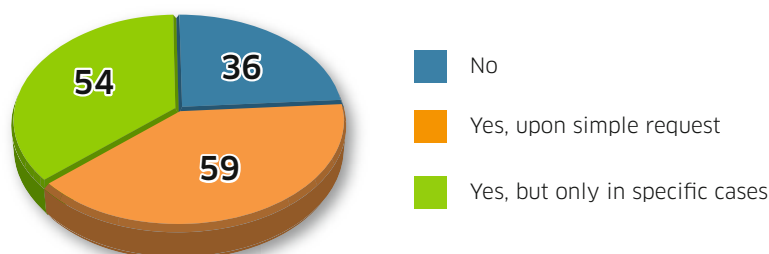


FIGURE 2.1. RESOURCES OF ECCO COLLECTIONS SHARED WITH THIRD PARTIES

Nevertheless, about 75% of the laboratories are interested in letting established public mBRCs/CCs maintain their most important strains/items, even 31 of the 36 respondents that currently do not share resources with third parties. Overall, 82% of laboratories participating in the survey were willing to associate with national or international networks, such as the future MIRRI, to make material from their collection available to third parties. In the next term of the preparatory phase, strategies will be proposed for integrating unique holdings in the MIRRI infrastructure to complement those already available to the user community, in compliance with criteria developed for MIRRI membership.

INVENTORY OF EXPERTISE AND SERVICES RELATED TO MICROBIAL RESOURCES IN EUROPE

a. Specialization

Annexes WP2-3 and WP2-4 list the specializations on particular taxa or habitats as indicated by the individual ECCO-CCs and by the non-public CCs. In addition, the non-public CCs were asked to specify their “holdings not well-represented in public mBRCs/CCs” (see task 6.1 in WP6 report). The lists are partly overlapping and will be analysed further in collaboration with WP6.1, in which gaps at the genus and species level in publically available resources/taxa will be identified.

Based on the collected data, clusters of expertise can be identified and will be further explored to discover if they can provide consultancy services to the user community.

b. Expertise & Services

Annex WP2-5a and b show an overview of the different microbial analyses in which ECCO-CCs (a) and non-public CCs (b) have expertise, and which analyses they currently offer as a service. Overall, there is a large variety in expertise and service capacity among ECCO and non-ECCO CCs and some lack of coverage in ECCO-CCs can be reinforced by the expertise of non-public CCs (e.g. pathogenicity tests, serotyping, whole genome sequence data analysis, polar lipid determination and sequence analysis of non-characterized plasmids). In addition, some of the non-public CCs declared to have additional expertise such as phytoplasma identification, analysis of symbiotic properties, phage typing, and fungal virus detection, which could broaden the offer of the MIRRI Infrastructure.

The results allow mapping of the service capacity in detail, providing the basis for an integrated MIRRI directory, and for establishing MIRRI expert clusters/platforms.

EXPLORING GAPS IN MICROBIAL RESOURCES AND SERVICES

In the ongoing Innovative Services survey, 65% of users indicated that the services currently offered by mBRCs/CCs are sufficient for their work.

Gaps in available microbial resources/taxa were hard to establish through the surveys. In general, users anticipate an increased use of resources such as Archaea, viruses, Cyanobacteria, and micro-algae. Although these increases are small, the numbers indicate a minor “shift” towards these less commonly available resource types. With regard to missing taxa, none came forward from the first User survey although

participants were given ample opportunity. In the recent Innovative services survey a second attempt was made. Respondents were again asked to list microorganism groups important for their work but at present not offered by public mBRCs. The compiled lists will be analysed in collaboration with WP2.4 and WP6.1, and a list of priority groups will be prepared (D6.1).

Overall, the microbial analyses offered by mBRCs seem to fulfil user needs, except for whole genome sequence data analysis, which is the fifth most frequently outsourced analysis by users (Annex WP2-6) and currently offered by only 3 public ECCO-CC. This service could be broadened with the expertise of research laboratories as 18 non-public CCs declared to provide this analysis. In addition, several respondents specified new services that would be valuable for them, e.g. supply/preservation of microbial communities, virus propagation, training in the use of bioinformatic software, on-line microbiology courses, and a phytoplasma database. It is noted that other “new” services proposed by respondents are already offered by public mBRCs/CCs, such as plasmid typing, provision of microbial DNA, lipid analysis and species identification, indicating a lack of awareness of the availability of such services.

Other needs respondents mentioned concerned the swift access to mBRC/CC material and services, like the development of a culture deposit system accessible at any time of the year or the possibility for rapid information search and ordering by direct contact (e-mail) and the possibility to order customized services.

Further analysis of the data provided by users in the surveys and at face-to-face meetings will guide MIRRI to map user needs and to prioritize on specific services.

LEVEL OF INTEREST OF THE USER COMMUNITY

Preliminary results of the Innovative services survey show a high interest of the current and potential user community in MIRRI. Table 4.2 shows its most relevant results. As about 1/3rd of the respondents declared not to use resources and services from public mBRCs they are considered potential new users. From all respondents more than 1/4th would be available to collaborate with MIRRI as experts and about 2/3rd would like to be further informed about MIRRI initiatives, which clearly demonstrate the interest of the user community in the development of the Infrastructure.

TABLE 2.2. PERCENTAGE OF USERS WHO WOULD BE AVAILABLE AS EXPERTS AND WHO WOULD LIKE TO BE FURTHER INFORMED ABOUT MIRRI.

SECTOR	% POTENTIAL USERS	% AVAILABLE AS EXPERTS	% THAT WANT TO BE FURTHER INFORMED
Profit	36	26	65
Non-profit	32	29	64

Overall, the participants to the survey showed high interest in most of the suggested new or improved services, endorsing the proposed MIRRI function and content.

COMMITMENT OF RESOURCE/SERVICE PROVIDERS TO COOPERATE IN MIRRI

a. ECCO-Culture Collections

So far, the willingness and ability of the public mBRCs/CCs (ECCO members) to participate in MIRRI, has not been formally discussed. However, the high response rate (60 out of 75 members) of this core stakeholder group to the survey suggested a high interest. This will have to be further explored in the next months, pending more information coming from different WPs, such as (i) requirements imposed by the proposed legal structure (ii) proposed requirements regarding quality management, data interoperability, etc. (iii) regulations concerning ABS/Nagoya protocol.

b. Non-public Culture Collections (CCs) (non-ECCO CCs)

Although in some countries the response to the survey was low, the laboratories that did participate in the survey were highly motivated to associate with MIRRI to make biological material from their collection available to the scientific community (82%). Contact details of the person(s) responsible for these collections are available for future targeted communication regarding MIRRI.

» **TASK WP2.2 DEFINE MEMBERSHIP CRITERIA FOR MIRRI IN THE CONSTRUCTION PHASE**

Membership criteria for MIRRI should reflect at least the requirements already established for Biological Resource Centres (OECD) and for Research Infrastructures (ESFRI). First, the situation of the public microbial collections in Europe on the status, management, sustainability, quality standards, etc. has been mapped through the ECCO-CC survey. The information retrieved so far has been compiled, providing an overview of the ECCO-CCs at present, and compared with the OECD best practices guidelines for Biological Resource Centres to build up a “criteria scheme” to continue outlining the MIRRI membership criteria in the construction phase.

The answers provided by the 60 European public microbial collections in the ECCO-CCs survey were compared with the OECD best practices guidelines for Biological Resource Centres (<http://www.oecd.org/science/biotech/38777417.pdf>) to enable assessment of their compliance to a set of preliminary criteria related to the operation of a BRC. From this analysis, the most important criteria considered so far are:

- » Sustainability of the collection
- » Accreditation/certification
- » Checks for viability, purity, identification and authentication are performed before and/or after preservation
- » Resources are preserved by two different methods
- » Maintenance of a duplicate collection in a separate building
- » Risk assessment is performed on all material
- » Secured access to the collection stocks
- » Standardization of the database structure and data formatting
- » Having an online catalogue including most to all publically available resources from the collection
- » Material Accession Agreements refer to the Prior Informed Consent of the country of origin
- » Information on depositor, geographical origin, and growth conditions are mandatory fields for each new deposit
- » Reference to the country of origin of the biological material with respect to fair and equitable Benefit Sharing in case the recipient uses provided material for commercial purposes
- » CC keeps record of distributed biological material and the respective recipients

By adding information on the ECCO-CCs' resources to the scheme, the effect of imposing different levels or combinations of above criteria on the potential content of MIRRI (i.e. number and type of resources included if the ECCO-CCs comply with the selected set of criteria) can be analysed with this cross-table. It is clear that a balance has to be agreed between requirements imposed and the envisaged critical mass without jeopardizing quality. In Deliverable 2.1, several cases will be presented and discussed.

Next to the criteria extracted mainly from the OECD guidelines for BRCs, additional and mandatory criteria for mBRCs/CCs membership will result from the legal structure selected for MIRRI, and the EU regulations concerning ABS/Nagoya protocol, issues treated by WP3 and WP9, respectively.

To expand the scope of resources beyond what is available from public ECCO-CCs, resources maintained in laboratory collections could be made available through MIRRI. In case of association of such non-public CCs to MIRRI, the criteria pertaining to the resources and to the resource providers should be the same as for the public mBRCs/CCs. The survey conducted among European laboratories deliberately did not go into detail with respect to the OECD guidelines for BRCs. Once the non-public CCs that will be assets for MIRRI are identified (WP6), their compliance with selected criteria has to be examined.

During the 2nd MIRRI general meeting (Amsterdam, 19-22 November 2013) a specific breakout session devoted to membership types and membership criteria was held.

In summary, following guidelines were put forward:

- » different types of MIRRI membership could be considered, each representing a different stakeholders group (e.g. resource providers, scientific experts, users, etc.), for each of which membership criteria should be developed. This will be further analysed in collaboration with WP2.4 (Define the stakeholder community and their needs) and WP5 (Stakeholder analyses)
- » for resource providers, membership should also emphasize and reinforce identified pillars such as complementarity and high quality of microbial resources, standardization of mBRC operations, good communication within and outside the Infrastructure, data quality and interoperability, technological innovation and improved mBRC services

Membership types and membership criteria will be discussed together with other WPs at the “Workshop to agree minimal-maximal function of MIRRI, the type of partnership and the resources and services to be included” which is planned by WP2 in M30 (Deliverable 2.2) to provide a final compilation report in M33 (Deliverable 2.3).

» TASK WP2.3 DESIGN THE OPERATIONAL STRUCTURE FOR MIRRI IN THE CONSTRUCTION PHASE

According to the action plan agreed after the 2nd General Meeting of the project, information was gathered from WP1.1, WP2.1, WP3.1, WP3.2, and WP3.3 about the consortium structure.

The vision of the MIRRI infrastructure itself including its Governance structure is around a distributed model with a hub and spokes design consisting of a Central Coordinating Unit with a central coordinating hub. The activities of this unit will be defined and governed by a decision making Governing Board consisting of the Member States having signed the ERIC, a Steering Committee (Figure 2.2) and guided by an Advisory Board. The roles of the Chair, Director, Boards, etc. of the implemented RI are yet to be defined but models are already available from other ESFRI consortia that ensure good governance and control. These will be explored and lessons will be learned from these.

The Central Coordinating Unit will be responsible for:

- » Managing the technical aspects of mBRCs
- » Coordinating the infrastructure with other international initiatives
- » Providing an intergovernmental forum on mBRC issues
- » Project development and management
- » Technical issues for membership

- » Outreach and publicity
- » Organisation and delivery of capacity building programmes
- » Central financing issues

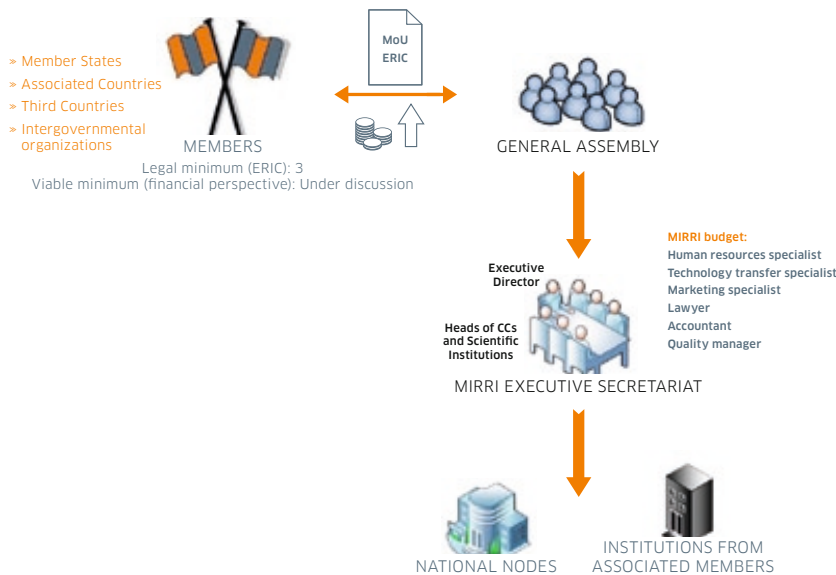


FIGURE 2.2. MIRRI GOVERNING BOARD

The activities of MIRRI will be carried out through clusters of experts from both within and outside the RI (Figure 2.3). The clusters, led by an appropriate expert from either the MIRRI consortium or outside will carry out short or long term large or small projects on behalf of MIRRI.

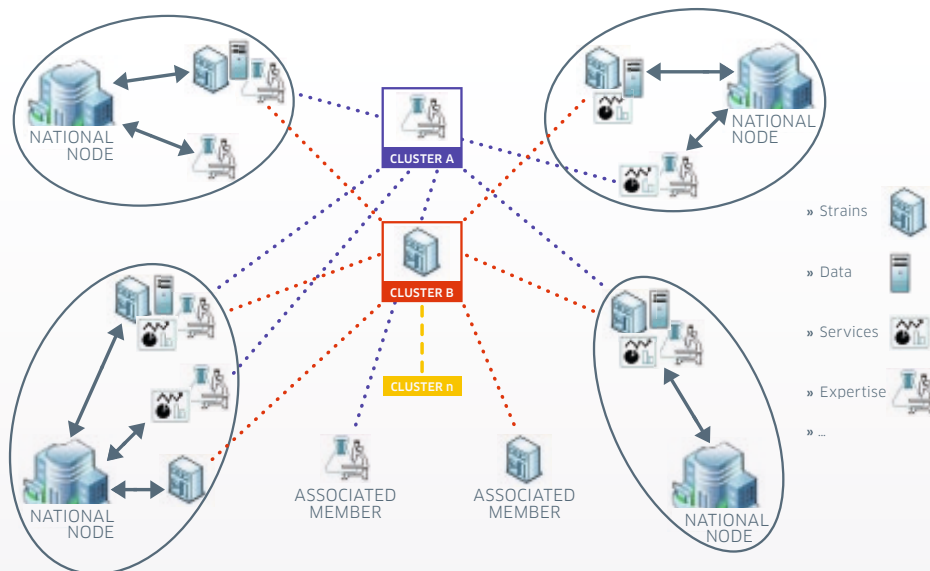


FIGURE 2.3. MIRRI NATIONAL NETWORKS AND CLUSTERS OF EXPERTISE

There will be national nodes to coordinate country activities and partners beyond Europe will ensure global participation and applicability of outputs (Figure 2.4). Within countries, specific arrangements might be made for national coordination - but that is for each country to decide.

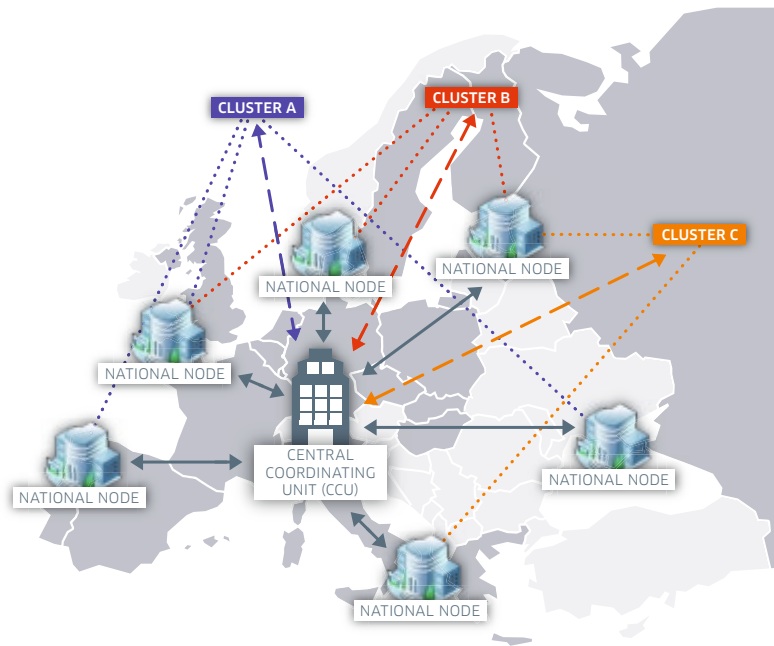


FIGURE 2.4. MIRRI CENTRAL COORDINATING UNIT STRUCTURE

The MIRRI organizational chart relating to governance will be strongly linked to the outputs of work package 3 ‘Define governance structure, legal status and operational practice’.

GOVERNANCE

The Board decides on membership issues. Individual mBRCs wanting to join submit an application to the Board with a recommendation from the national node. Applications will be assessed by the Technical Committee. The main obligations on Member States are to provide direction in delivery of appropriate outputs and to provide funding aimed at developing capacity and quality at the national level. The MS gets participation in setting priorities through the Board as well as the inside track on knowledge access. The Governing Board would be responsible for approving the budget and the Executive Director will be responsible for allocating the funds. Financial rules will be designed in the preparatory phase.

Interim measures will need to be put in place prior to the establishment of a Board. To date, it is envisaged that interested Member States will sign a MoU or ‘Letter of Intent’ and subsequently be invited to join an European Research Infrastructure Consortium (ERIC) which would extend to the coordinating unit and Governing Board function, the national nodes would keep their own legal status within states. Member States joining the ERIC would be entitled to vote in the General Assembly and have a position on the Governing Board.

These measures might involve the establishment of an Interim Board during the construction phase and the setting of a threshold of Member States and mBRCs “signing up” before MIRRI is formally established. The formal signing up needs to be clarified but at least would involve adherence to an ERIC or equivalent. The participation in MIRRI-ERIC and the governance of MIRRI-ERIC will be defined in the statutes of MIRRI-ERIC. The interaction between MIRRI-ERIC and the Partners will be defined in a Partner Charter that has to be agreed between national nodes and Partners.

Interested Member States might be invited to send one technical and one administrative delegate each to the Interim Board. Membership of the Interim Board would require a gatekeeper - MoU or ‘Letter of Intent’ signature.

It is envisaged that a scientific Advisory Board would be established by the Interim Board – which subsequently could be validated by the full board. The duties of the scientific board are yet to be fully determined but would include support on strategy, work programme design and operational issues; they would review proposals for further development of the infrastructure and proposals for new members. The terms of reference and membership of this group has yet to be defined.

The scientific advisory board would ensure user benefits are delivered from the improved quality management of mBRCs delivering a consistent level of service and better access to authentic and reproducible materials in a transparent and traceable way.

MANAGEMENT

The Board would appoint an Executive Director (interim measures will need to be adopted between design and MIRRI implementation and Board establishment) who would be independent of any mBRC. The funding for such interim measures would be covered by host country and potentially a funded project from the European Commission.

A “Heads of mBRC” group (this group would initially be all the Heads of the Founder members but when more than 20 mBRCs are involved the MIRRI partners could elect a core group) could be established to work with the Executive Director (who has the mandate to direct them within the scope of the membership criteria); there would not be a formal reporting line.

The Central Coordinating Unit (executive body) will execute the directives of the Governing Board (Member States) it will deliver the work plan and the mBRC members (contractors) react accordingly. General Assembly consists of mBRC representatives (heads of mBRC group) with user group representation to advise the work programme. The Advisory Board will advise at both General Assembly and Board level. The composition of the coordinating unit will include the Executive Director, IT, Science officer and communications/customer relations officer. Any mBRC is an entry point to the infrastructure and can do business and bring the expertise and resources in the whole infrastructure to the question as appropriate.

The management and governance must cover the three different phases of the MIRRI project, namely: the current preparatory phase (which develops the full Business Plan for the project); implementation (the phase in which increasing levels of commitment will be required from partners); including operation (during which phase the infrastructure will be up and running and operating fully).

Clearly, each phase informs the next, so there is considerably more certainty now about management and governance in the preparatory phase than in the implementation phase. Nevertheless, a number of key elements of future phases can be outlined at this point.

» TASK WP2.4 DEFINE THE STAKEHOLDER COMMUNITY AND THEIR NEEDS

It was agreed by MIRRI partners that WP2 will limit itself to the microbial resource providers and users, as the two most important MIRRI stakeholders. The relationship with other stakeholders like policy makers, governmental bodies, funding bodies, etc. will be explored in other tasks, i.e. WP4.3 and WP5.4.

Different groups within each type of stakeholder (providers and users) have been identified because of their different needs and/or expectations i.e. for providers, public (ECCO members) and non-public (laboratory collections, non-ECCO) CC have been differentiated. In the case of users, profit and non-profit organizations have been considered. Information about their profile and needs has been gathered by means of the different surveys (see WP2.1) and it will be used to establish priorities in the construction phase.

a. Resource providers

In relation to preservation of the biological material, 63% of the ECCO-CCs declared their wish to implement additional methods to improve the maintenance of the collection and expressed the need for equipment, human resources and infrastructure (in this order of priority). About half of the respondents to the non-ECCO survey (46%) believe that the future of their collections is in danger. Most of these (92%) pointed out the lack of funding as the main reason for being at risk. Moreover, 34% also mentioned issues related to human resources as retirement of the responsible person, lack of dedicated personnel, etc.

Regarding training, different necessities were identified for both groups of stakeholders (public and non-public CCs). As reported in Table 2.3, most resource providers consider job specific training important, specifically in issues such as quality management, characterization and preservation of the biological resources, legal matters and international regulations.

TABLE 2.3. PERCENTAGE OF ECCO CCS AND NON-ECCO CCS THAT EXPRESSED NEEDS IN TRAINING ISSUES

	ECCO CC	NON-ECCO CC
No training needed	9%	16%
Quality Management	58%	53%
IT	39%	19%
Characterization of the biological resources	60%	42%
Preservation of the biological resources	46%	58%
Legal matters and international regulations	Unknown	52%
Other	5%	5%

b. Users

At present, most of the users of public mBRCs/CCs belong to the non-profit sector which is supported by the higher number of resources provided to the non- than to the profit sector (see ECCO-CC and USER surveys section).

Hence, the User survey, sent out to the current customers of the ECCO-CCs, allowed to map mainly the non-profit sector and their needs (see also WP2.1). This urged the need for a strategy to further engage the profit sector and especially the bio-industry in Europe. For this, all MIRRI partners were requested to compile a list of bio-industries or biotech associations per country, and contacts with the Enterprise Europe Network (EEN) were established.

The Innovative Service questionnaire was distributed through these new links. As previously shown, we engaged additional potential users and the participation of the profit sector was higher than in the User survey sent previously (about 1/3rd instead of 1/4th).

Next, we are planning to analyse the results of the user surveys per sector, with the aim to identify their specific needs and develop a targeted approach to attract them.

» TASK WP2.5 EXPLORE PARTNER LINKAGES AND ROUTES TO HARMONIZATION, CONSIDERING EXISTING STRUCTURES

Based on the information retrieved through the surveys a list of the existing national, regional and international networks of microbial resource providers has been compiled.

In summary, in 13 countries, national networks exist to which the local ECCO-CCs adhere. These range from general microbial societies to formalized consortia of public mBRCs/CCs. Internationally, ECCO-CCs are linked to the WFCC and to several (previous and current) mBRC/CC initiatives or projects financed by the European Commission.

With respect to the non-public CCs, about 1/3 of the respondents collaborate with a public mBRC/CC in their country or are part of an (inter)national network, e.g. national networks of reference centres or working collections, ESFRI and other projects (Biobanques, Q-collect, EVA, BBMRI, ERINHA), thematic microbial societies, and collaborative projects with other laboratories. Moreover, 82% are willing to associate with national or international networks, such as the future MIRRI, to make material from their collection available to third parties.

Establishing national nodes as a mandatory intermediary between interested microbial resource holders/providers and the envisaged legal Infrastructure is a priority. In some countries such nationally coordinated consortia already exist, in other countries initiatives are ongoing, e.g. CECT has started to build up a Spanish network of microbial resource holders.

II. SIGNIFICANT RESULTS

To cope with the WP2 main objective “Design the Microbial Resource Research distributed Infrastructure” actions performed during the first 18 months have focused on consulting the resource providers and users about their needs and expectations regarding MIRRI. Through four questionnaires *ad hoc* designed, feedback from these different stakeholders has been compiled, analysed and evaluated. Information retrieved will help in the definition of the research infrastructure and include:

- » an inventory of *ex-situ* microbial resources in Europe
- » an inventory of expertise and services related to microbial resources in Europe
- » an evaluation of detected gaps in resources and services
- » an assessment of the level of interest of the user community for MIRRI and
- » an assessment of the interest of resource/service providers to cooperate in MIRRI as well

Based on the information gathered by these surveys at this point, bacteria, yeasts and filamentous fungi, and their genomic DNA are the main scope of the current public mBRCs/CCs in Europe as well as the highest demanded resources and will be the core of MIRRI. It was concluded from the user survey that gaps in the microbial resources and services offered by public CCs are hard to identify. Nonetheless, several non-public collections were identified that preserve organisms that are rare or difficult to preserve and also having the expertise associated with these specialized organisms. These collections are very valuable as they might harbour resources and expertise that are currently not available to the research community.

The questionnaires directed to the (potential) users have fulfilled a double function by gathering their feedback and, at the same time, spreading the MIRRI outreach. In case of the User survey, the currently offered mBRC/CC resources and services were highlighted, raising awareness of the user community of the broad coverage and diversity available in European mBRCs/CCs. In addition, the Innovative Services questionnaire was designed in a specific way, informing the participants of the shortcomings and fragmentation of the current situation in Europe regarding accessibility of microbial resources, services and associated data, and presenting the improvement that MIRRI could offer in these respects.

Main WP2 outputs are available in the Member area on the MIRRI webpage to facilitate access to these information sources by other WP members.

The scope and coverage of the provision of resources and services to the user community by MIRRI is foreseen in the second half of the preparatory phase by refining the inventory of holdings to be included in MIRRI, exploring complementarity in clusters of expertise, in collaboration with WP6.1. Combining expertise and capacity of all types of providers will open the possibility of constructing valuable transnational thematic expert platforms easily accessible through the MIRRI portal.

The establishment of the criteria for MIRRI membership will be worked out on the basis of the information retrieved from the surveys on the status, management, sustainability, quality standards, etc. of public microbial collections in Europe, the OECD best practices guidelines for Biological Resource Centres and the input from other WPs covering aspects the outcome of which could influence membership criteria (tasks 3.2 and 3.3, tasks 9.1 and 9.2. For this reason, transversal meetings between WPs are required to adjust the criteria for MIRRI membership on the basis of the “criteria schema” derived from task WP2.2).

A first outline of the operational structure for MIRRI in the construction phase has been described. Up to now models considering preliminary versions of the Business Plan and information provided by the Steering Committee in meetings (Heads of CCs meeting Feb 17. 2014, Hannover) have been used to make the first diagrams and promote discussion.

Regarding partner linkages, a first effort to map existing networks and structures among microbial resource holders/providers was done. Input from WP5 working on the synergies and overlaps with other ESFRI projects, and from WP3 working on the governance of the Infrastructure established in an ERIC legal framework is needed to propose routes of harmonization and cooperation models among resource holders.

III. REASONS FOR DEVIATIONS FROM ANNEX I OF THE DOW AND IMPACT ON RESOURCES

Task WP2.3 is slightly delayed due to the lack of feedback from other WPs but progress is expected in the coming months during this year. There are no deviations in other tasks.

IV. EXPLAIN THE REASONS FOR FAILING TO ACHIEVE CRITICAL OBJECTIVES AND/OR NOT BEING ON SCHEDULE AND EXPLAIN THE IMPACT ON OTHER TASKS AS WELL AS ON AVAILABLE RESOURCES AND PLANNING

All objectives have been achieved.

V. STATEMENT ON THE USE OF RESOURCES

All resources have been used prudently and according to the DoW.

VI. PROPOSE CORRECTIVE ACTIONS

No corrective actions necessary.

WORKPACKAGE 3 – DEFINE GOVERNMENT STRUCTURE, LEGAL STATUS AND OPERATIONAL PRACTICE

I. SUMMARY OF PROGRESS TOWARDS OBJECTIVES AND DETAILS FOR EACH TASK

A distributed infrastructure requires four specific organizational and coordination elements to maximise return in investment.

- » The secretariat design can be developed on the basis of the recommendations and requirements of the European Research Infrastructure Consortium (ERIC) model and the specific needs of a distributed infrastructure such as MIRRI, defined in the European Commission practical guidelines for ERIC as an “organised network of resources”.
- » The legal status for the MIRRI implementation and operational phases, the latter one is for the permanent structure, will be different from the structure of the present MIRRI Preparatory Phase and is based on the model of ERIC. Besides being adapted to a distributed infrastructure the ERIC model is recommended by the European Commission that also provides for technical and legal advices in the preparation of the status and the setting up of the consortium.
- » The quality management (QM) system has two integrated layers.
 - » a QM system to consolidate and optimize the operations and productivity of the consortium to meet the needs of the - internal and external- user in terms of certified and/or accredited products and services.
 - » an Adapted Quality Approach to support research programme management. This approach is expected to be resolutely innovative, adapted to new research contexts.
- » These three elements will be complemented by an assessment mechanism to measure quantitatively and qualitatively the impact of MIRRI on the collections, and the response of the consortium to the external (market) demand.

» TASK WP3.1 ESTABLISH SECRETARIAT AND GOVERNANCE STRUCTURE

The value of a distributed infrastructure goes beyond a mere network of institutions. It renders possible the pooling of the offers of every institution that is part of the infrastructure to meet particular demands of the R&I community, demands that cannot otherwise be met by an isolated institution. These collated offers – including in terms of human expertise – are similar to the “clusters” concept discussed during sessions of the first annual meeting in Amsterdam. The difference is that clusters are more static while pooled offers are more flexible, temporary, actively adapted to the market’s demand. Both systems, permanent clusters and *ad hoc* collations, can be organised in MIRRI.

The term ‘executive secretariat’ used in Annex I (DoW) will be named here ‘Central Coordinating Unit’ (CCU). This unit will embrace a dedicated central main office to manage and coordinate the infrastructure in its implementation and operational phases.

The central coordinating unit will be responsible for:

- » Managing the technical aspects of mBRCs
- » Coordinating the infrastructure with other international initiatives
- » Providing an intergovernmental forum on mBRC issues

- » Project development and management
- » Technical issues for membership
- » Outreach and publicity
- » Organisation and delivery of capacity building programmes
- » Central financing issues

The CCU and its governance structure can be developed on the basis of the recommendations and requirements of the European Research Infrastructure Consortium (ERIC) model and the specific needs of a distributed infrastructure such as MIRRI, defined in the European Commission practical guidelines for ERIC as an “organised network of resources”. The envisaged distributed model will be a hub and spokes design consisting of the CCU as a hub unit with national nodes bringing together the mBRCs that meet the MIRRI requirements (see Figure 2.4). The national nodes will coordinate country activities and partners beyond Europe will ensure global participation and applicability of outputs.

The hub will have functional clusters around it. The clusters will carry out short or long term large or small projects on behalf of MIRRI. Members of clusters (mBRC expert groups) will be formed and tasked by the CCU on behalf of the Governing Board to provide solutions to operational problems, provide expert services or working on an infrastructure task or project. These clusters will be led by an appropriate expert from either the MIRRI consortium or outside.

Before a formal legal entity is agreed upon the governance structure might involve the establishment of an Interim Board and the setting of a threshold number of Member States and mBRCs “signing up” before MIRRI is formally established. The formal signing up needs to be clarified but at least would involve adherence to an ERIC or equivalent. The participation in MIRRI-ERIC and the governance of MIRRI-ERIC will be defined in the statutes of MIRRI-ERIC. The interaction between MIRRI-ERIC and the Partners will be defined in a Partner Charter that has to be agreed between National Nodes and Partners (Figure 3.1).

The activities of this unit will be defined and governed by a decision making Governing Board consisting of the Member States having signed the MIRRI-ERIC (named ‘executive body’ under Task 3.2), a Steering Committee and guided by an Advisory Board. It is envisaged that a scientific advisory board would be established by the interim board - which subsequently could be validated by the full board. The duties of the scientific board are yet to be fully determined but would include support on strategy, work programme design and operational issues; they would review proposals for further development of the infrastructure and proposals for new members. The terms of reference and membership of this group have yet to be defined (WP 2.2).

The scientific advisory board would ensure user benefits are delivered from the improved quality management of mBRCs delivering a consistent level of service and better access to authentic and reproducible materials in a transparent and traceable way.

The Board decides on membership issues. Individual mBRCs wanting to join submit an application to the Board with a recommendation from the national node. Applications will be assessed by the Technical Committee. The main obligations on Member States are to provide direction in delivery of appropriate outputs and to provide funding aimed at developing capacity and quality at the national level. The Member States gets participation in setting priorities through the Board as well as the inside track on knowledge access. The Governing Board would be responsible for approving the budget and the Executive Director will be responsible for allocating the funds. Financial rules will be designed in the preparatory phase.

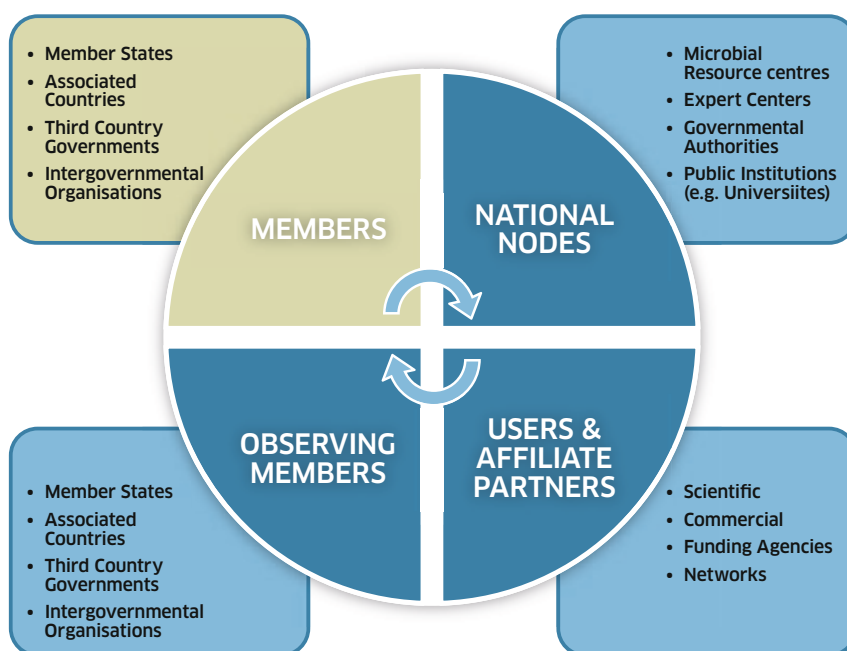


FIGURE 3.1. MIRRI GOVERNANCE

The roles of the Chair, Director, Boards, etc. of the implemented RI are yet to be defined but models are already available from other ESFRI consortia that ensure good governance and control. These will be explored and lessons will be learned from these.

The Board would appoint an Executive Director (interim measures will need to be adopted between design and MIRRI implementation and Board establishment) who would be independent of any mBRC. The funding for such interim measures would be covered by host country and potentially a funded project from the European Commission.

A “Heads of mBRC” group (this group would initially be all the Heads of the Founder members but when more than 20 mBRCs are involved the MIRRI partners could elect a core group) could be established to work with the Executive Director (who has the mandate to direct them within the scope of the membership criteria); there would not be a formal reporting line.

The CCU as executive body will execute the directives of the Governing Board (Member States), it will deliver the work plan and the mBRC members (contractors) react accordingly. The General Assembly consists of mBRC representatives (heads of mBRC group) with user group representation to advise the work programme. The Advisory Board will advise at both General Assembly and Board level. The composition of the coordinating unit will include the Executive Director, IT, Science officer and communications/ customer relations officer. Any mBRC is an entry point to the infrastructure and can do business and bring the expertise and resources in the whole infrastructure to the question as appropriate.

» **TASK WP3.2 ANALYSIS OF A LEGAL STATUS FOR MIRRI - INFORMATION RELATED TO THE ERIC LEGAL FRAMEWORK**

NECESSARY FEATURES OF THE LEGAL FRAMEWORK ADAPTED TO THE NEEDS OF MIRRI

Pan-European Research infrastructures require a specific legal shell to accommodate at the same time European rules and diverse national regulations. The legal status must provide a guarantee concerning the liability, the financial control and the human resources management. It must also support the governance structure.

MODELS

In Europe, several legal models are used for setting up contractual bounds between entities willing to set up an international structure with scientific goals.

Roughly eight models can be identified⁽¹⁾ and compared. They can be grouped under three legal frameworks:

- » National law based models (Unlimited and limited liability companies or foundation)
- » Community law based legal forms, (Art 171 Joint Undertaking; Art 169 EEIG; ERIC)
- » International law based intergovernmental organisations (International organisations, Open-ended international coordination body)

A comparative summary of the comparison is presented in Annex WP3-1.

THE EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

Although two kinds of Community law legal forms already existed, the ERIC legal framework was created in 2009 because studies had shown the necessity to develop a model more adapted to the needs of the ESFRI programme, complementary to and compatible with the European Research Area (ERA) functioning, including the financial structure mixing 'Member States' main contribution with European Commission's complementary support⁽²⁾.

ERIC status is a mechanism facilitating multi-state funding, a scheme similar to the ERA financial construction. The European Commission has devoted an entire section of their website to the ERIC legal status where many answers can be found. The present report is an executive summary of the contents of this internet source completed with complementary analysis.

ERIC is a Community law based legal form specially developed to support the ESFRI construction. It is recommended by DG research and Innovation of the European commission.

It has several major advantages:

- » Providing not only the legal framework but also a well-marked path to build this structure
- » Offering support to the design and drafting of the status, via the EC ESFRI ERIC office
- » Allow additional members to join at any time provided prior consent from the assembly of members
- » Every Member State can organize its national structure, provided it is optimally coordinated with the pan-European structure
- » Governing and management structures required are minimal:
 - » the assembly of members having full decision-making powers and
 - » the executive body and legal representative of the ERIC will be appointed by the assembly of members. This executive body is headed by either a director or a board of directors

1 Report of the Workshop on the legal forms of research infrastructures of pan-European interests, 23 March 2006, Brussels, organised by the European Strategy Forum on Research Infrastructures (ESFRI) in collaboration with the European Commission, Directorate General for Research.

2 Community legal framework for a European Research Infrastructure Consortium ERIC Council Regulation (EC) No 723/2009 of 25 June 2009.

In addition to these advantages, other considerations must be taken into account:

- » MIRRI will have to collaborate with other pan-European research infrastructures. Also, similar governing and management structures and the same legal status facilitate collaborations which are strongly recommended by the European Commission
- » Lessons learned by those RIs that have already completed their preparatory phase are useful background for the MIRRI set up. In particular the distributed form of BBMRI may offer MIRRI a basis

An ERIC is open to EU Member States, associated countries, third countries, and intergovernmental organisations participations. These entities sign the agreement creating the ERIC and designate public or private entity(ies) to represent them in the general assembly.

Practically, at the end of the preparatory phase, every founding member sends a letter of request to the European Commission to setting up the MIRRI ERIC. The future member also designates its representing entity in the general assembly.

To reach this stage each partner need to seek during the preparatory phase the approval of their respective relevant national authority for the participation to the consortium.

This bottom up phase may evolve differently and at different pace from countries to countries. It is not necessary that all participants to the preparatory phase get the approval of their state to join the consortium at the time of foundation of the consortium. Joining the consortium can be done at any time after its creation.

A minimum of three states must submit a request of consortium set up to the European Commission.

From a legal perspective it is required to have a minimum of three members to create an ERIC. From a financial perspective, to make the consortium operational and viable, a critical number of members – preferably more than ten – should be attained because the functioning of the executive secretariat is financed by the ERIC members' contributions and the total budget is divided among the members. The respective contribution of the members will decrease with the increase of members.

ADVOCATING MIRRI AT THE NATIONAL LEVEL

The set-up of a European Infrastructure such as the MIRRI distributed infrastructure requires parallel action of every MIRRI participants' representative towards their respective national relevant authorities.

- » First to convince the national authorities about the importance of culture collection, and the importance of having a Pan-European infrastructure consolidating these biological resources centres, in other words to convince the authorities to put BRC dedicated to micro-organisms in the national priorities, that is on the national scientific roadmap.
- » Secondly to convince the national authorities to join the efforts of other countries in the setting up of the distributed infrastructure.

Procedures to obtain a formal commitment of a State to become member of a MIRRI or to host it vary from country to country.

Information on the national procedures can be obtained at the national points of contact listed in Annex WP3-2. MIRRI participants are advised to approach these national authorities (see WP4 and Business Case).

Before the launch of the MIRRI preparatory phase, concerted actions of several culture collections in Europe have put MIRRI on the European Roadmap. These collections, now participants of the MIRRI preparatory phase, had presented hard facts and effective needs for the biotech R&I to the ESFRI council.

» **TASK WP3.3 ESTABLISH A COMMON UNDERSTANDING ON QUALITY MANAGEMENT SYSTEM (QMS), APPROPRIATE STANDARDS, BEST PRACTICE MODELS**

BACKGROUND

It is expected that (with regards to the QMS) BRCs (Biological Resource Centres) and collections agree on an appropriate set of standards, harmonized procedures, an independent auditing process, peer review procedures, continuous interchange and adjustment and a synchronization of their development.

To date the origin of the harmonized QMS has focused on the biological material of a BRC and the BRCs range of services. The other most relevant factors determining the quality management of a BRC have concerned data sets, standard operating procedures and regulatory standards (Figure 3.2).

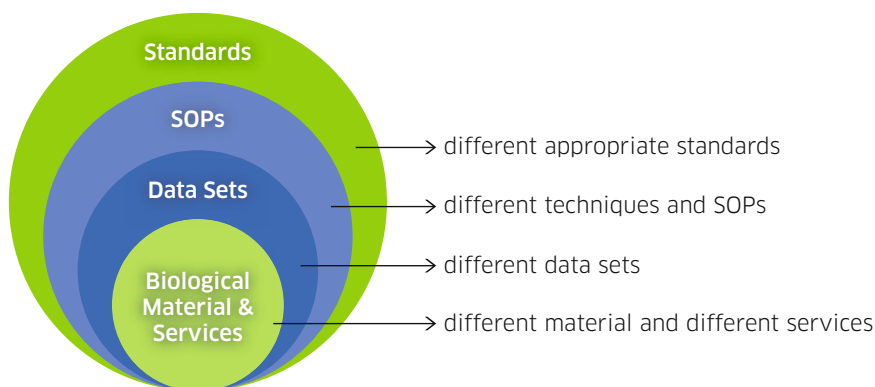


FIGURE 3.2. CONCEPT OF THE TASK SETTING

The conflict in finding an appropriate and harmonized QMS on this basis is inherent to the system because it ignores the influence of parameters like collecting biodiversity, offering of various services, different funding strategies, different organizational structures, and different infrastructures within the organizations or different national regulations amongst the MIRRI Member States. In addition the various and changing user demands as well as the need for establishing specialized BRCs are not covered by the QMS strategy so far. A common QMS with shared procedures at the detailed level is not achievable ignoring all these differences and thus not beneficial.

In addition to these internal aspects of the BRC community, external drivers have a strong impact on the definition of the future system of managing quality in BRCs. Besides globalization, rapid changes and progress in science, product development, technology, logistics, lifestyle, customer needs and demands together with increased regulatory requirements will lead to even greater needs for system-level thinking and practice in quality management rather than the fragmentary micro-management activities in this sector in the past. This managerial shift in quality management applies even more to organizations being part of the biotechnology sector. Biotechnology is an extremely agile, high-risk, fast-moving business environment dependent on talented scientists, structural knowledge application, visionary managers and clear-sighted investors, and that requires quite a different breed of supporting infrastructures. These infrastructures must be able to follow the demanding biotech community with its economical as well as political mandate and associated regulatory requirements. The research-infrastructure of MIRRI will provide a central access point for biotechnology to facilitate deposit of and access to the whole breadth of microbial diversity and related information as well as opportunities for knowledge-transfer and training. Thus quality management concepts and tools for MIRRI members must in fact be more dynamic than many had realized and this also means that quality managers in BRCs have to adopt new approaches and techniques if they aim to sustain a universal influence on the competitiveness and success of the respective BRC.

The main target of future BRCs and MIRRI members is to be in balance with its individual mandate and the economic and scientific environment, but as well as with the requirements of the MIRRI infrastructure. Thus the main goal can only be a system fostering and stabilizing this balance.

1. Developing a QMS concept - Quality Manual

The challenge in developing a QMS concept for BRCs is, to create a managerial strategy beyond standards as a consolidating system. If MIRRI wants to be successful in establishing a common understanding on a Quality Management System, the efforts in this task must be dedicated to a forward-looking and modern strategic approach. This means that administering data sets, harmonizing SOPs and determining appropriate standards can no longer dominate the quality management discussions. Although these topics are still important, they adhere only to the visible elements of a BRC and seek the right set of standards to grade a BRCs operations. In the first months of the project MIRRI has made use of the unique chance to reinvent the quality management definition for BRCs through a new approach. Within this approach the definition of quality management is no longer tied to the biological material, but to the organization's policy and the governance of different compliance needs – regardless if IT-systems, social responsibility, laboratory processes or network membership criteria are reflected. Thus the handling of biological material is no longer the initial point of the QMS but of course still a crucial one. The initial point is network driven by offering managerial solutions empowering a BRC to be a valuable partner in the MIRRI infrastructure. This essential shift incorporates the fact that BRCs are facing a growing regulatory environment, a higher complexity in their operations, seemingly limitless requirements by user communities and an increased focus on accountability. Hence a broad range of governance, risk, quality and compliance initiatives across the organization of a BRC seems to be necessary to cope with global development. The new strategy counteracts the traditional management approach with a variety of mostly uncoordinated as well as independently planned and managed initiatives. Such thinking potentially increases the overall risk for the organization. In addition, parallel compliance, quality and risk initiatives lead to duplication of efforts and cause costs to spiral out of control. The new managerial strategy will master the situation accommodating the fact that governance, quality, risk, and compliance can be steered by similar processes. Through centrally managed control, definition, enforcement and monitoring a BRC has the ability to coordinate and integrate all these initiatives, that to date are managed independently and not mutual harmonized. Thus tackling the almost unscalable aforementioned challenges is within reach, if each BRC and MIRRI together commit to the new definition and integrated approach of Quality Management and give way to a more eclectic “Policy Compliance Management System” (Figure 3.3).

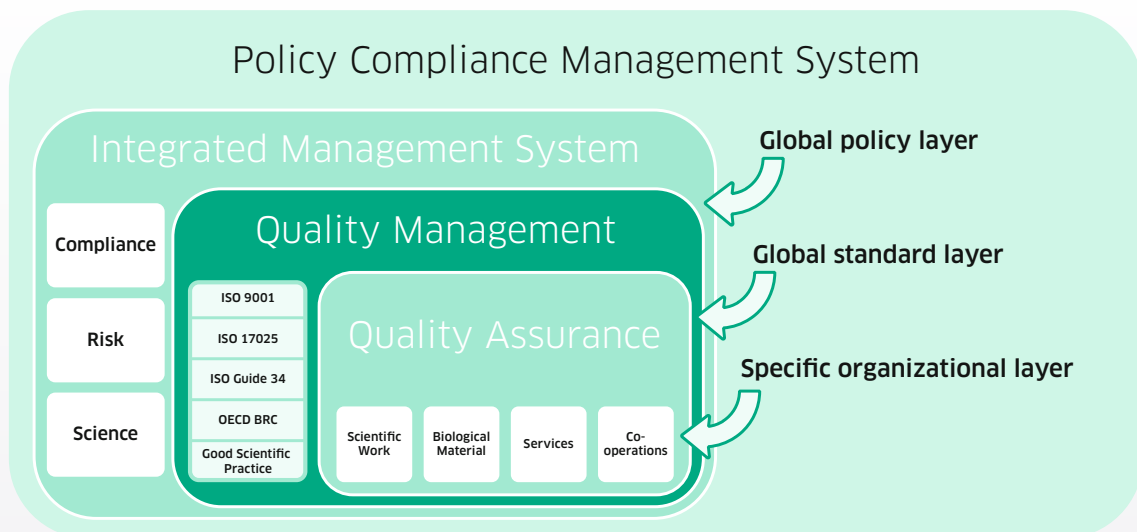


FIGURE 3.3. LAYERED SYSTEM STRUCTURE POLICY COMPLIANCE MANAGEMENT SYSTEM

The layered system structure shows the *built-in*, rather than *controlled*, quality approach with a dedicated Quality Management mapping the compliance policy as the overarching priority in any effort for performance excellence.

2. Drafting a QMS agenda

The following agenda captures the main steps to establish a common understanding on an appropriate Quality Management System (QMS) as an integrative part of the overarching Policy Compliance Management System, to develop and differentiate appropriate standards and to develop best practice models based on the transition of BRCs already made in their organizations (Figure 3.4).

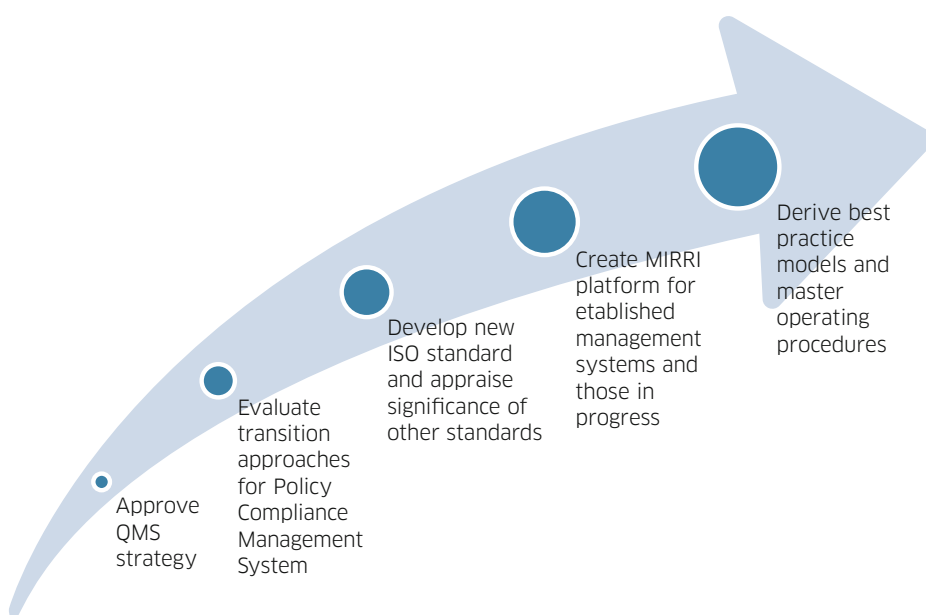


FIGURE 3.4. QMS AGENDA

3. Workshop: Actual situation towards progressive harmonization of QMS among MIRRI BRCs

A workshop was held in Amsterdam in November 2013. In this satellite meeting the new strategy was presented and discussed pan-sectoral, the plenum was open for all interested participants in the respective work packages and tasks. Any input, demand and idea from the different fields of activity within MIRRI are important to create a harmonized management system empowering BRCs to be a most valuable partner for industrial as well as scientific interest groups. In a follow-up workshop in November 2014 the linkage to the development of the new ISO-standard will be evaluated and the QMS agenda will be finalized.

4. Appropriate standards

In the past decade many efforts had been undertaken to establish appropriate standards supporting Biotechnology – most of them are dedicated to applications and materials. Thus the actual system of international standards, mainly created by ISO (International Organization for Standardization) and OECD (Organisation for Economic Co-operation and Development), is focussing the complementary aspects of management, technical skills, product conformity and process stability. The OECD Best Practice Guidelines for BRCs extend this system to the aspect of regulatory affairs. Each standard is specialised to enhance the compliance of an organisation to a single aspect (e. g. ISO 17025 -> technical skills). The view on the major overlap of suitable standards like ISO 9001, ISO 17025, ISO Guide 34, the French standard NF S96-900 and OECD Best Practice Guidelines for BRCs shows that the OECD Best Practice Guidelines for BRCs covers a broad spectrum of the requirements delivered by other standards. The integrated view to the different aspects demonstrates that the highest degree of coverage to support a biological resource centre in reaching a high compliance level in each aspect is given only by the OECD Best Practice Guidelines for BRCs.

But due to the deep linkage between BRCs and Biotechnology a strong, internationally acknowledged and far-reaching ISO standard is required to support the harmonization of core requirements and confidence building between the partners. ISO is the world's largest developer of voluntary, but highly recognized international standards giving state-of-the-art specifications for products, services and good practice and helping to make industry more efficient and effective. Developed through global consensus, ISO standards help to break down barriers to international trade. ISO is a network of 164 national standards bodies that make up the ISO membership and represent ISO in their country.

Since 2013 ISO/TC 276 "Biotechnology" will coordinate the establishment of a new ISO standard in liaison with other technical committees to avoid conflicts and/or duplication. The founding meeting of international Technical Committee ISO/TC 276 took place in December 2013 in Berlin/Germany. The creation of the Technical Committee was preceded by a period of intensive preparation and different approaches to create appropriate standards or guidelines. The German DIN (Deutsches Institut für Normung) took the initiative and formally submitted a proposal for the creation of ISO/TC Biotechnology. In February 2013 this was approved, and DIN was entrusted with the secretariat.

The focus of ISO/TC 276 is to find standardization needs and gaps in the field of biotechnology. The scope of ISO/TC 276 is "Standardization in the field of biotechnology processes that includes the following topics: 1) terms and definitions; 2) biobanks and bioresources; 3) analytical methods; 4) bioprocessing; 5) data processing including annotation, analysis, validation, comparability and integration; 6) metrology.

Within the next three years ISO/TC 276 Biotechnology will work closely with related committees in order to identify standardization needs and gaps, and collaborate with other organizations to avoid duplication and overlapping standardization activities. Some MIRRI partners took an active role in the definition of the new standard, from France and Germany. A representative of INRA is leading Task Group 2 "biobanks and bioresources" and a representative of DSMZ is co-chairing the secretariat at DIN and the German "mirror" of ISO/TC 276. The new standard is expected to be launched in 2016.

5. Best practices; harmonization of procedures

The impact on the compliance spectrum is manifold and can mainly be identified as internal and external determinants.

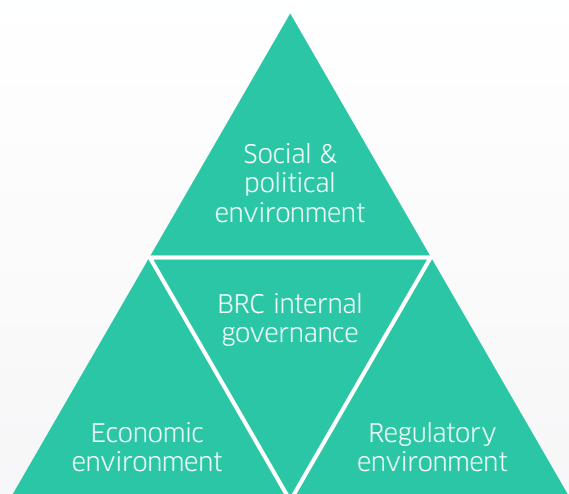


FIGURE 3.5. SOURCE OF COMPLIANCE DETERMINANTS

The role of MIRRI will be to mirror the different compliance determinants, their impact and the transition of the associated BRCs in the different layers of the management system (Figure 3.5.). MIRRI in addition has the ability to keep down costs for the BRCs by establishing a central core platform of experts, procedures and

knowledge being accessible for their members. The development of a knowledge and best practice base will lead to master instructions helping to deal with the different requirements. All information given by MIRRI is validated by the source BRC and thus applied management approaches.



FIGURE 3.6. APPROACH FOR A MIRRI MANAGEMENT SYSTEM PLATFORM

Subsequently to the generated knowledge, best practices will mainly support emergent BRCs and create a benchmark system for already highly developed BRCs. The process of harmonizing procedures will mainly support the demand for comparable quality in producing high quality biological material and performing reliable services. Thus MIRRI serves as a provider hub to comparable and valuable on-site infrastructures mapping a shared system of compliance and quality (Figure 3.6).

» TASK WP3.4 DEMONSTRATE THE IMPACT OF MIRRI ON BRCS

Biological Resource Centres (BRCs) are fundamental in harnessing and preserving the world's biodiversity and genetic resources fuelling research and development and the advancement of the bioeconomy. While BRCs and their resources have a wide range of areas where they have an unquestionable high impact, true value and growth are hard to estimate, and one has to rely on the use of a number of proxies.

Generally speaking, impact of scientific research most frequently relies on proxies such as number of publications and number of patents.

Within the current task, we have split our efforts into two different fronts:

- » Obtaining an overview of current trends in global and regional evolution of publications and patents in several fields associated with microbial resources.
- » Compilation and optimization of a list of relevant measurable indicators of MIRRI's impact.

a. Overview of current trends in global and regional evolution of publications and patents in several fields associated with microbial resources.

As a first phase we did some preliminary data collection (from Pubmed, Genbank, World Intellectual Property Organization, and International Journal of Systematic and Evolutionary Microbiology). Comparative analysis revealed trends in number of publications, sequences, new species and genera, and patents associated with microbiology/biotechnology (as is shown and discussed in **Annex WP5-2**). These results have been presented and discussed with fellow members of MIRRI (most importantly during the 2nd SC-WP Meetings at ECCO XXXII, in Athens).

b. Compilation and optimization of a list of relevant measurable indicators of MIRRI's impact.

The second phase consisted in setting up a sound final shortlist of measurable indicators of impact. Analysis of MIRRI's DoW, resulted in the “**Monitoring and Evaluation of MIRRI impact (M&E)**” working document, which was subjected to several rounds of discussion and brainstorming within MIRRI (namely at the discussion panel at the 2nd MIRRI annual meeting), and compared and completed following the **FENRIAM** (Foresight-enriched Research Infrastructure Impact Assessment Methodology) guidelines and impact indicators list. By merging both documents, we produced a full list of measurable indicators (**Annex WP5-3a**), which was later reduced and adjusted to fit the scope of MIRRI, BRCs, and microbial resources, resulting in an extended short-list (**Annex WP5-3b**).

This extended short-list was circulated to the entire MIRRI consortium, to measure perceived relevance of each proposed measurable indicator, and to collect information on data availability from each BRC within MIRRI. The goal of this approach was to produce a final short-list (containing only the highest relevance indicators), and identifying possible future issues with data availability and data collection. Current results of this survey can be seen in **Annex WP5-4**

c. Discussion and pre-validation of our current plan and methodology.

We procured informal contacts with members of other ESFRI projects, and with the Economic Studies Department at University of Minho, for discussion and pre-validation of our current plan and methodology.

II. SIGNIFICANT RESULTS

The overall structure of the MIRRI organization, suggestions for its legal structure, interoperability between its members, ideas for the implementation of a quality management and best practice structure as well as suggestions for demonstrating the impact of MIRRI on Biological Resource Centres have been outlined. In each of the Workpackages 6 -9 results have been achieved that have not been tackled in previous decades of collaboration among the main MIRRI collections. MIRRI partners agreed to be guided by an assembly of members with full decision making-power and which elects a legal representative and an executive body, headed by a director or a board of directors. The first outline of a governance structure will be modified along the path MIRRI takes to reach the ERIC status. A new quality of cooperation among MIRRI partners has been achieved in a meeting of mBRC directors leading to an open discussion about national mandates and collection priorities even to statements on collections parts not further pursued in the future.

Quality management on the first glance has never been more required than right now. But with priorities changing constantly and resources under continuous scrutiny, compliance in an overarching sense has become the key to standardization and quality awareness in biological resource centers. The degree to which we respect the effectiveness of quality management in a biological resource center may have evolved from direct quality control. However, since many years integrative quality management beyond the exclusive view on material related quality is established in the minds of responsible quality managers as well as in the standardization efforts by international organizations like ISO or OECD. Moreover today paradigm shifts is required in defining quality management and differentiate its role and its methodological potential within an organization acting in global responsibilities towards legislation, standardization and customer demands. The diverse role biological resource centers have overtaken in the last years so serve as infrastructures or a part of these for scientific, economic, social and governmental communities deeply requires a a managerial strategy for quality management beyond standards. MIRRI set up to the plate and launches a model structure being able to solve the paradigm shift in a sustainable and beneficial approach.

III. REASONS FOR DEVIATIONS FROM ANNEX I OF THE DOW AND IMPACT ON RESOURCES

There are no deviations from Annex I.

IV. EXPLAIN THE REASONS FOR FAILING TO ACHIEVE CRITICAL OBJECTIVES AND/OR NOT BEING ON SCHEDULE AND EXPLAIN THE IMPACT ON OTHER TASKS AS WELL AS ON AVAILABLE RESOURCES AND PLANNING

All objectives have been achieved.

V. STATEMENT ON THE USE OF RESOURCES

All resources have been used prudently and according to the DoW.

VI. PROPOSE CORRECTIVE ACTIONS

No corrective actions necessary.

WORKPACKAGE 4 – FINANCIAL PLAN

» TASK WP4.1 DEVELOP A FINANCIAL PLAN

The work package develops a financial plan for the operation of the future Microbial Resource Research Infrastructure which explores all possible sources of funding for the long-term functioning of the infrastructure and for the envisioned improved access to resources and services. The work package will present mechanisms for funding the operation of the infrastructure and the consequential further development of the individual national components of this distributed infrastructure. It will engage funders in the process and seek commitments of support. This WP will also develop a Business Plan for the RI which includes an operational plan, the financial plan (D4.1) and a marketing plan. To achieve this it must estimate the cost of building the RI based upon the governance structure, gap analysis of coverage, new services needed; Evaluate the different sources of funding available for the construction phase; Estimate the potential running costs of MIRRI; Design a financial plan for the funding of the RI utilising output from the other work packages of this proposal; Develop structures for the management of the RI finances; Approach the funders and seek commitment of funds; so that at the end of preparatory phase MIRRI is ready to implement and begin its implementation phase.

I. SUMMARY OF PROGRESS TOWARDS OBJECTIVES AND DETAILS FOR EACH TASK

The MIRRI model is based on the following founding principles:

- i. MIRRI will operate on the basis of a non-profit entity, established under the European Community legal framework for a European Research Infrastructure Consortium (ERIC) or a similar mechanism.
- ii. The heart of the MIRRI consortium should be around an open access infrastructure for handling of and access to data and information.
- iii. In parallel with its fundamentally open approach, downstream services may be commercialised – using complementary approaches developed in line with the legal mechanisms establishing MIRRI.
- iv. The infrastructure will be organised in such a way as to distribute expertise as well as costs. Duplications of holdings will be kept to a minimum, consistent with the security and diversity of microbial resources. Thus, as part of the MIRRI preparatory phase there will be planning for rationalisation and consolidation of the offerings of current and future MIRRI member collections.
- v. Clear links with other ESFRI consortia, e.g., BBMRI, ERINHA, EMBRC, ELIXIR EU-OPENSOURCE and INST-RUCT, need to be developed to identify common interests and to avoid duplication and unproductive competition. These will be augmented where it makes sense by international linkages. Collaboration with other European initiatives will also be explored such as ECDC, QBOL and EVA.
- vi. In order to ensure a manageable start for the implementation of MIRRI, minimal requirements for partner collections will have to be formulated. It is the aim of MIRRI to expand and become an inclusive network where collections are able to improve their level of quality.
- vii. MIRRI will work with partners, to develop joint standards for presenting data and providing services that effectively link phenotypic and genomic data for users. This will add significant value to the ESFRI network and the biological resources held.

The preparatory project phase establishes the stakeholder governance mechanisms, operations and structure and consequently an effective Business Plan to deliver and ensure sustainability. The Business Plan lays down the mechanisms to secure longer term support for subsequent phases, examining suitable business strategy and revenue lines to reach technical, legal and financial maturity. By project end it must provide the tools, concepts and design to enter the implementation and operational phases. It was on this basis that the costs of establishment and the means for funding these costs were estimated. The initial costs estimated at proposal stage envisaged all European Member States joining with the full membership of the European Culture Collections' Organisation (ECCO) participating, some 66 microbial resource centres. Consequently costs were estimated in the region of €200 million. Based on the revised thinking and work package team considerations this estimate has been revised down to around 58 million (see Table 4.1), anticipating 10 countries to join in the first 5 years of construction and around 20 microbial resource centres. However, final estimates cannot be made until the infrastructure design, activities and outputs are specified more clearly. Work has begun to construct the legal entity in WP3, Governance structure and size and function of the central coordinating unit is well underway. The final plan is not due until month 30 but the short business case developed with its associated information has sufficient information to allow Member States to understand the MIRRI offer, its impact and the costs for achieving this.

TABLE 4.1. SUMMARY OF EXPECTED EXPENDITURES

EXPECTED EXPENDITURES (€M)		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTALS
Central Hub	Staff costs	0.7	0.6	0.6	0.6	0.6	3.1
	Database	1	1.2	1.5	2	2	7.7
	Governance	1.2	1.2	1.2	1.2	1.2	6
	Development	0.25	0.4	0.4	0.5	0.6	2.15
National Nodes (& mBRCs)	Establishment	2.2	1	1	1	1	6.2
	Operation	4	5	6	6	7	28
Projects & Education		1	1	1	1	1	5
TOTALS (EUR MILLION)		10.35	10.4	11.7	12.3	13.4	58.15

There is a mixed model envisaged for the source of the funds (Table 4.2).

TABLE 4.2. FUNDING MIRRI

FUNDING SOURCE	FUNDING LEVEL (%)				
	Year 1	Year 2	Year 3	Year 4	Year 5 **
Member States *	75	63	58	54	50
Third Party Grants	12.5	25	35	35	35
Coordinating hub host country	12.5	10	2	2	2
Bioindustry	0	1	3	5	8
mBRC membership fees	0	1	2	4	5

* Member State funding predominantly will be invested in the development of National nodes and their mBRCs

** Funding will be more or stable in years 6-10

RESULTS

- » A better estimate of costs of the infrastructure
- » An understanding of funding sources (see M4 Milestone report Task 4.3 below)
- » Initial discussions with national authorities and funders providing feedback on what they expect see in the Business Plan
- » A better understanding on the common costs of running a BRC resulting in a publication expressing the work and aims of MIRRI to make the offer better and the functioning sustainable
- » Smith, D., Mc Cluskey, K. & Stackebrandt, E. (2014). Culture Collection funding models and BRC Business Plans, SpringerPlus 3, 81. <http://www.springerplus.com/content/3/1/81>
- » A business case to take to potential funders

» TASK WP4.2 ORGANISE FINANCIAL MANAGEMENT

SUMMARY OF PROGRESS TOWARDS OBJECTIVES AND DETAILS FOR EACH TASK

This task is specifically aimed at the examination of mechanisms for financial management for the research infrastructure and to design a financial model that will enable the distributed centres to function as a coordinated infrastructure. This is intrinsic to the development of the Business Plan which Task 4.1 development of the financial plan is coordinating. The work to identify suitable financing sources has been reported briefly under Task 4.1 above. The short business case compiled as a consequence offers the opportunity for partners to explore different funding models with their national authorities and funders (including public, charity, public-private partnership or industry) and those that are currently used to finance the building and maintenance of research infrastructures (RI) in Europe. Outreach to other European Strategy Forum for Research Infrastructure (ESFRI) Biological and Medical Sciences infrastructures has begun through the coordinator or through work packages 5 and 6 activities. Thus information on how other RIs are going about this is informing the MIRRI process. Milestone M4 *List of potential funders and strategy for engagement and National plans for engagement of funders* examined the different funding sources and table 2 (above) demonstrates the extent to which these sources will contribute to funding MIRRI. The different investment models are yet to be fully analysed and explored. MIRRI has been fortunate to have been provided with Business Plans from some of the other RIs including BBMRI and EU-OPENSREEN and these have helped in the construction of MIRRI's plans. There are not a large number of suitable alternative user cost models available and therefore MIRRI is continuing to explore this aspect. Initially feedback on the current business case is needed from potential funders to direct future discussions on this. Only then can MIRRI explore controlling mechanisms to monitor performance and cost; and subsequently examine and adapt to reflect the needs and requirements of the individual partners and allow for meaningful benchmarking. Subcontracting involving experts on international controlling structures is planned.

The CRBIP Financial Manager gave some recommendations about the MIRRI Business Plan:

- » It is important to give value to Biological Resource Centres within the industrial sector, revealing service lists, compensation for the service in numbers or in quality.
- » We need to propose services and facilities that the BRCs (such as CRBIP) could offer through MIRRI, in order to capture the interest of people of the industry in the market.
- » It is also important to sensitize the scientific community showing the role of MIRRI in contributing to research.

- » They recommended us to present MIRRI to industrial and biotechnology companies and, thus, prepare a specific presentation including precisions about the Business Plan with:
 - » Scientific Interest
 - » History and role of collections
 - » Potential wealth of collections in France
 - » What kind of recovery can be done with the collections
 - » Collections are tools for research and industry
- » Show European strategy to explain the funding

This translated into ensuring that there was not only the MIRRI regional approach but it was important that a specific national approach was needed. This has also been highlighted in other partner approaches to their national funders for example in Germany.

RESULTS

Financial management elements are yet to be fully addressed but work to date has helped construct the business case.

» TASK WP4.3 ENGAGE FUNDING BODIES

SUMMARY OF PROGRESS TOWARDS OBJECTIVES AND DETAILS FOR EACH TASK

Following on from Tasks 4.1 and 4.2 the work package activities are profoundly linked and all elements are focused on producing a sound business case to present to potential funders. The milestone MS4 *List of potential funders and strategy for engagement and National plans for engagement of funders* provided an overview how MIRRI needed to go about the task of getting sustainable funding. Partners began their work to identify local Government and funder contacts during the submission phase of the project and it became very clear that although the departments and organisations remained the same the contacts didn't. First contacts were inevitably with the national European Strategy Forum on Research Infrastructures (ESFRI) representatives but these were not always the relevant one for each microbial resource Centre (mBRC) in each country. A second group of contacts were the National representatives of the Research Infrastructure Committee. Partners were provided with these lists of representatives and added to their own experiences made initial contacts. This process took longer than anticipated and the first iteration of this milestone report was made and circulated in November 2013. To date not all partners have supplied their contacts details for this report. The engagement process could only begin once the MIRRI Memorandum of Understanding and the print version of the Business Plan was made available for the partners to make informed contact based on those identified.

To engage the funder it was essential that the MIRRI offer was further developed and articulated. This offer to science and bioindustry explains the impact of MIRRI, how it can change operations of BRCs, underpin and improve the microbiological sciences, impact on bioeconomy, input to integrated solutions to the grand challenges and to generate knowledge from data.

THE DATA OFFER (INTEROPERABILITY TO FACILITATE DATA MINING)

MIRRI will connect its data to other relevant data sets to facilitate the generation of knowledge. The high quality structured strain data in its member collection when interrogated at several levels will be able to identify potential chemical entities and properties to deliver solutions and indicate where to find them. Utilising taxonomic hierarchy to extend individual strain data to relatives, or chemistry through host and substrates can lead to a broader range of organisms that have the potential property sought. Additionally, when discoveries are made environments can be identified where more microbial diversity with the property

can be found. MIRRI will seek data holding partners and through initiatives of ELIXIR and BioMedBridges will ensure interoperability of its community data to facilitate accelerated discovery and innovation.

LEGAL CERTAINTY ON USE

MIRRI follows the globally accepted principles of establishment of Biological Resource Centres that not only retain resources and information of high quality but make them available in a legally compliant operational framework. MIRRI will work with resource providers, policy makers and users to provide legal clarity of rights in use and transparency to engender trust. Additionally, MIRRI partners have established codes of practice, specifically in biosecurity to reduce potential mal intended use. MIRRI will work to provide resources in a safe and compliant way.

BUSINESS MODELS FOR OPERATIONS

MIRRI recognises the need of biotechnology industry to keep ahead of its competitors in business and thus the need for confidentiality in sourcing organisms and exchanging information. MIRRI will make available coordinated platforms of resources, tools, data and expertise through controlled and confidential business models. Each individual microbial resource centre will be a point of contact for industry to do business with MIRRI. Thus a company's most appropriate provider will not only bring its range of products and services but will have behind it the wealth of 400000 plus microorganisms and the expertise across the member collections.

BROADER ACCESS TO MATERIALS

Having set up its data offer to identify new sources of lead compounds, provided legal certainty of use and appropriate business models MIRRI can reach out to regional and global efforts facilitating access to global resources. Engendered trust, compliant delivery and opportunity to track the use of overseas genetic resources can facilitate access to materials from countries of mega diversity for global science and discovery.

SECURITY OF STRAINS FOR FUTURE USE AND PROTECTION OF PUBLIC FUNDING INVESTMENT

It is clear that scientists do not currently source research strains and deposit their biological materials in public service microbial resource centers. MIRRI wants to change this and will work with journal editors, research funders and scientists to offer incentive for change. It is absolutely essential that if science, particularly microbiology, is to impact on global challenges and the bioeconomy that microbial resource centers need to work together with all stakeholders to achieve this. High quality resources with improved knowledge from data provided by these centers will make a difference.

IMPROVED QUALITY AND DATA IN SCIENCE

There is a distinct need to improve the quality of scientific research, to remove fragmentation in resource and service availability and focus on the fundamental needs and challenges. These are the key drivers for European Strategy Forum for Research Infrastructures and MIRRI will provide the underpinning resources and expertise to do this in microbiology.

BETTER RESOURCES AND SERVICES TO MEET STAKEHOLDER NEEDS

MIRRI will work with its partners to establish improved management of microbial resources to provide coordinated access to high quality resources. Working with stakeholders to achieve common strategies in acquisition, characterisation and delivery the MIRRI microbial resource centre infrastructure will deliver high quality and protect public investment in the collection and generation of information on microbiological material.

The strategy for engagement of National funders was outlined in the milestone report and extended in the most recent version of the MIRRI business case where the above MIRRI offer is provided and expanded upon. Partners were requested to start discussions with the most appropriate Government contacts using the MIRRI Memorandum of Understanding (MoU) and Business Case and report back. This feedback was coordinated by work package 5. Partners were to select the appropriate representatives from the lists of ESFRI delegates and country Research Infrastructure Committee representatives. Alternatively, partners that had already established direct contact with the relevant Government department used this contact as the starting point for engagement. Key contacts have been identified by partners. The anticipated outcomes and impact was that National representative signature to the MoU would be secured and represent the first step towards the establishment of a European Research Infrastructure Consortium (ERIC).

It is still early in the preparation phase of MIRRI and there are many lessons still to learn and the detailed requirements for MIRRI still to be defined. There is still work to do but MIRRI is on the right path to secure funding for its implementation and operational phases.

RESULTS

The MIRRI French partners CRBIP have been particularly successful in working with their ESFRI representatives.

The MIRRI MoU are likely to be signed by Belgian, French, German and Polish national representatives

» TASK WP4.4 DEVELOP A BUSINESS PLAN

SUMMARY OF PROGRESS TOWARDS OBJECTIVES AND DETAILS FOR EACH TASK

The output of this task is built on the previous work package tasks and the collation of information from all work packages. WP2 designs the infrastructure, WP3 the governance structure, legal status and operational practice WP6 services and products WP7 capacity building, WP 8 data management and information system, WP9 legal framework. These are key elements in the Business Plan which are under development and that must also take into account other outputs provided by WP5 the outreach and linkages, WP7 training and education. The foundation for the MIRRI Business Plan had to be made early so that potential funders could engage helping design the infrastructure so it delivered their needs. It meant that financial estimations were founded on information available before discussions were complete. An operational plan, the financial plan (D4.1) and a marketing plan are to be developed during the life span of the project. The delivery of final content for the Business Plan is dependent on output from almost all work packages and in most instances this will be delivered late in the project. To date the task undertaken was to structure the Business Plan content and to include some of the findings and output as far as possible. The resultant compilation was submitted as Deliverable D4.3 Draft short Business Plan in June 2014. Since then outputs from the surveys of Work package 2, the annual project meeting presentations in Amsterdam November 2013 and a Heads of Collections meeting held in February 2014 have further informed development. Although, the final version will be delivered towards the end of the project and relies on cross work package activity such as the structure of the partnership and choice of legal status, an initial draft was needed quite early as a basis to engage funders/States.

RESULTS

- » Deliverable D4.3 Draft short Business Plan in June 2014
- » Printed version for use in the strategy to engage funding bodies (Task 4.3)

II. SIGNIFICANT RESULTS

Deliverable D4.3 'Draft short Business Plan' was submitted to the European Commission June 2013. Although three months delayed due to project start delays it provided stimulation for development of business models, the legal structure and operations.

A print version of the business case to take to national authorities and funders to seek commitment (with the MIRRI Memorandum of Understanding) to the further development of MIRRI will have been prepared until the end of April 2014.

III. REASONS FOR DEVIATIONS FROM ANNEX I AND IMPACT ON RESOURCES

The only deviation from the DoW was the delay in Task WP4.1: the delivery of the short Business Plan to the European Commission, due month 6 – April 2013 was delivered June 14, 2014, month 8. This was due to the delayed start to the project by some partners and the limited usable feedback from user surveys. This has not impeded funder engagement which has been undertaken by partners and results coordinated by work package 5.

IV. EXPLAIN THE REASONS FOR FAILING TO ACHIEVE CRITICAL OBJECTIVES AND/OR NOT BEING ON SCHEDULE AND EXPLAIN THE IMPACT ON OTHER TASKS AS WELL AS ON AVAILABLE RESOURCES AND PLANNING

All objectives have been achieved.

V. STATEMENT ON THE USE OF RESOURCES

All resource use is on track.

VI. PROPOSE CORRECTIVE ACTIONS

No corrective actions needed.

WORKPACKAGE 5 – COMMUNICATION, DISSEMINATION AND OUTREACH

I. SUMMARY OF PROGRESS TOWARDS OBJECTIVES AND DETAILS FOR EACH TASK

The overall objective of Work Package 5 (WP5) is to foster outreach to all MIRRI stakeholders, identified by a stakeholder analysis, and to establish a stimulating mutual communication. This dialogue needs to be specifically tailored since MIRRI has a wide range of stakeholders, each one with specific communication preferences. To develop and to implement such a customised communication and outreach strategy is the main goals of WP5 during the Preparatory Phase. A further objective of WP5 is the demonstration of MIRRI's impact on society.

Not all stakeholders are familiar with MIRRI and its objectives; therefore the first step is to raise awareness. This was done starting the public relation (PR) offense at the very beginning of the project. PR material (e.g. leaflets and information posters) was designed and is available for all MIRRI participants to be spread to the stakeholder communities. MIRRI's online presence was established by a) the MIRRI project website (www.mirri.org; see deliverable D5.1) and b) creating social media accounts on Facebook, Twitter, LinkedIn and Google+. A much more effective way of promoting MIRRI is the representation at relevant national and international conferences and congresses. Within the first 18 months MIRRI was presented at several of such events by oral presentation, exhibition booth or poster presentation. Additionally, several articles on MIRRI and specific MIRRI-relevant topics have been published (see details below).

Based on the thorough stakeholder analysis a tailored communication strategy for each stakeholder is under development. Now, as the MIRRI offer has been refined after 18 months, the concept can be implemented and the customised messages can be delivered to the relevant stakeholders. The communication strategy will be adapted, based on feedback from the stakeholders, as necessary.

» TASK WP5.1 IDENTIFY OPPORTUNITIES TO IMPROVE COMMUNICATION BETWEEN PROVIDERS AND USERS OF MICROBIOLOGICAL MATERIAL AND DESIGN APPROPRIATE MECHANISMS

The task will identify opportunities and define strategies for efficient and effective communication inside and outside the community of microbial biological material holders. Stakeholder meetings co-organised with annual general meetings will be one opportunity for two-way communication. User feedback can be effectively collated and taken into consideration in relevant work packages. Well defined channels for communication will be described and explored to provide benefits to service and material providers, scientific researchers, business leaders and policy makers within the microbial domain. The WP will keep users who will rely on MIRRI as an RI up to date with new developments but also actively seek to attract new user communities. The MIRRI website will offer a tool in the communication process and will be kept up-to-date. Key information will be distributed through it.

ACTIONS UNDERTAKEN AND RESULTS ACHIEVED

In detail, the actions fulfilled include:

- » Analysis of user surveys prepared by WP2 in order to identify possible gaps in communication.
- » The WP2 survey, which was addressed to users of microbial material, revealed that communication between users and providers is often suboptimal regarding certain issues. For example, it was obvious that users miss information on strain metadata and that they are unaware of the full range of services offered by culture collections. A second survey, addressed to culture collections within the European Culture Collections' Organization (ECCO) showed that the culture collections also need to improve

proactive communication with the user community, e.g. by providing newsletter, linking their databases etc.

- » Development of a strategy to improve communication between providers and users.
- » Based on the results of the analyses mentioned, a first draft of a strategy to improve communication between providers and users of microbial material was developed.
- » Preparation and submission of deliverable D5.4 “A strategy and implementation plan to identify opportunities to improve communication between providers and users of microbial material”.

» TASK WP5.2 ORGANISE AN EXPERT GROUP TO DEFINE THE POLICY AND PRIORITIES OF MIRRI IN TERMS OF SUPPORT TO R&D

WP2 will define MIRRI's organisational framework, structure and function for implementation in the construction phase. Task WP5.2 will support this work by exploring the composition, function, longevity and output of an R&D expert group. Such a model could be adopted for a number of activities and functions of MIRRI in its operational phase. This group will be an intermediary between enterprise, industry and science, dedicated to topics such as research & innovation and development & cooperation. The different R&D user groups are seen *inter alia* in sectors like: Agriculture and Rural Development, Climate and Environment, Education and Culture, Energy, Maritime Affairs and Fisheries, Health Care, Nutrition and Consumers and Waste Technology. After an evaluation phase for the appropriate composition of the expert groups, the working principle will be defined to allow diversified input from all user groups and stakeholders.

ACTIONS UNDERTAKEN AND RESULTS ACHIEVED

At this moment (M18), the action plan has been refined and up-dated several times. Among various MIRRI meetings (Kick-Off Meeting, Braunschweig, November 2012; 1st Steering Committee + WP leaders Meeting, Ghent, February 2013; 2nd Steering Committee + WP leaders Meeting, Athens, June 2013; 2nd MIRRI General Meeting, Amsterdam, November 2013) the last of these events has been of special importance for the achievement of the objective of the task.

In detail, the actions fulfilled include:

- » Explore composition of expert group by suggesting names and affiliations. This was done by requesting input from contributing partners who provided lists of suggested experts (names, expertise, affiliation, contact data and additional info). These lists were complemented with data collected from systematic searches using Scopus and Web of Knowledge and from the list of members of the European Academy of Microbiology (<http://europeanacademyofmicrobiology.org/>) and those of the EU Bioeconomy Panel (<http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=2859>).
- » Evaluation of the resulting list to identify gaps/overlaps revealed a good balance between sectors mentioned in the DoW, fields, gender issues, etc.
- » Consultation for additional input regarding potential experts. A matrix was prepared and distributed to collect input from all MIRRI participants. In this matrix the above mentioned sectors and fields of expertise were introduced as a foldable menu, together with areas of activity (Academic & Education, Agronomy, Bioremediation, Chemical, Environmental, Food & Feed, Pharma & Medical, and Veterinary). The matrix and the accompanying text were agreed by WP5 contributors.
- » Distribution of evaluation of general input, including amendments. After all these steps the resulting list contains 60 individuals from 17 countries giving coverage to all sectors, fields and areas of activities, and balanced in terms of gender (see Annex WP5-1). Most (32) of the individuals are alien to

MIRRI which is needed to reach a diversified input from the stakeholders. The presence of individuals from partners and collaborating parties of MIRRI gives cohesion to the group and represents the interests of the research infrastructure. About a one-half reduction is needed for economic reasons and this can be done without compromising the diversity achieved focusing on overrepresented tags.

» TASK WP5.3 DEMONSTRATION OF THE IMPACT OF MIRRI ON SOCIETY

The investment in MIRRI will gradually generate assets that can be drawn on in the future to create benefits. These benefits could be knowledge, new products, processes or services and training for economic, environmental or social purposes. While it is accepted that investment in research itself and in infrastructures for research is essential for national and regional economic development, it is also accepted that the achievement of economic returns and the measurability of those returns is dependent upon a range of contingent factors. Thus assessing the impact of the infrastructure is important to demonstrate that user needs are met and to show the added value of having MIRRI as part of society. The design and implementation of appropriate mechanisms will enable judgment on the investments made. Using evidence of past network projects e.g. CABRI or EMbaRC output evaluation criteria will be developed, be it scientific (research, publications), technical (access to resources and data) or social (job creation, applicable products). Interaction with other RIs will be essential. Scenarios will be developed, as well as estimates and case studies to demonstrate what would have happened without networking.

ACTIONS UNDERTAKEN AND RESULTS ACHIEVED

Biological Resource Centres (BRCs) are fundamental in harnessing and preserving the world's biodiversity and genetic resources fuelling research and development and the advancement of the bioeconomy. While BRCs and their resources have a wide range of areas where they have an unquestionable high impact, true value and growth are very hard to estimate, and one has to rely on the use of a number of proxies.

Within the current task, we have split our efforts into two different fronts:

- » Obtaining an overview of current trends in global and regional evolution of publications and patents in several fields associated with microbial resources
- » Compilation and optimization of a list of relevant measurable indicators of MIRRI's impact

a. Overview of current trends in global and regional evolution of publications and patents in several fields associated with microbial resources.

In a first phase a preliminary data collection was performed from Pubmed, Genbank, World Intellectual Property Organization, and the International Journal of Systematic and Evolutionary Microbiology. Comparative analysis revealed trends in number of publications, sequences, new species and genera, and patents associated with microbiology/biotechnology (as is shown and discussed in Annex WP5-2). These results have been presented and discussed with MIRRI members (most importantly during the 2nd SC-WP Meetings at ECCO XXXII, in Athens).

b. Compilation and optimization of a list of relevant measurable indicators of MIRRI's impact.

The second phase consisted in setting up a sound final shortlist of measurable indicators of impact, resulting in the “**Monitoring and Evaluation of MIRRI impact (M&E)**” working document, which was subjected to several rounds of discussion and brainstorming within MIRRI (namely at the discussion panel at the 2nd MIRRI annual meeting), and compared and completed following the **FENRIAM** (Foresight-enriched Research Infrastructure Impact Assessment Methodology) guidelines and impact indicators list. By merging both documents, we produced a full list of measurable indicators (Annex WP5-3a), which was later reduced and adjusted to fit the scope of MIRRI, BRCs, and microbial resources, resulting in an extended short-list (Annex WP5-3b).

This extended short-list was circulated to the entire MIRRI consortium, to measure perceived relevance of each proposed measurable indicator, and to collect information on data availability from each BRC within MIRRI. The goal of this approach was to produce a final short-list (containing only the highest relevance indicators), and identifying possible future issues with data availability and data collection. Current results of this survey can be seen in Annex WP5-4.

c. Discussion and pre-validation of our current plan and methodology.

We procured informal contacts with members of other ESFRI projects, and with the Economic Studies Department at University of Minho, for discussion and pre-validation of our current plan and methodology.

» TASK WP5.4 ESTABLISH MECHANISMS FOR CONNECTION WITH GOVERNING BODIES AND POLICY MAKERS AT NATIONAL & EUROPEAN LEVELS

During the preparatory phase each MIRRI participant is required to organise dialogue with their national governing body utilising common approaches and report to the consortium on policy matters. Similarly dialogues need to be sought on EU level. BRC activities impact on political, economic and social issues would be conveyed highlighting the diverse working levels, in which BRCs act with their expertise. Important topics such as biosecurity (see WP9), employment (the development of infrastructures and improved delivery of materials and information in the bioeconomy will generate employment opportunities), poverty eradication (development and cooperation of BRCs can impact directly on local development providing mechanisms to utilise biodiversity for the direct benefit of the local population) and biotechnological applications and products are served by BRCs and their rich knowledge base, material collections and data bases.

ACTIONS UNDERTAKEN AND RESULTS ACHIEVED

The MIRRI participants need to contact their Governments/Policy Makers/Funders for a number of reasons, described under different work packages of the project:

Task WP2.4 – Define the stakeholder community and their needs

The stakeholders include providers and users of resources in the different sectors related with microbial resources as well as government and regulatory bodies and policy makers.

Task WP3.2 – Analyse the most appropriate legal status for MIRRI and define its internal policy

The internal policy and the governance structure will be designed together with representatives of State Governments and other relevant stakeholders.

Task WP4.3 – Engage funding bodies

This is the most critical part of establishing MIRRI and therefore it is essential that funding bodies including Ministries are brought into the discussions early.

Task WP9.1 – Define a MIRRI policy on IPR and ABS in compliance with the CBD

Investigate together with CBD and national government representatives the possibilities for a pan-European or global multilateral ABS mechanism for the operation of microbial BRC's, building on the concepts in the Nagoya Protocol concerning global multilateral benefit-sharing mechanisms (art. 10), and the use of codes of conduct, guidelines and best practices (art. 20). Assess practical problems and deficiencies on matters of IP and ABS in relation to deposits and report on the need and requirements.

In a first step MIRRI partners have identified the key contacts for the different aspects to be dealt with (see annexWP5-5). Some of the partners have already had a first contact with their authorities for one or several of these aspects. Feedback on these contacts is sent to the task 5.4 leader and exchanged during the MIRRI meetings. Responds from the governmental site included the following recommendations:

- » Some countries recommended establishing a network of culture collections in order to become part of the MIRRI infrastructure, and structuring activities have been initiated
- » Industrial and biotechnological companies must be involved to discuss with them how MIRRI can respond to their needs. MIRRI must offer services and facilities that capture the interest of the private sector. MIRRI should develop innovative services linked to the biological resources
- » The scientific community must be sensitized, and must realize the role of MIRRI in contributing to cumulative research

A template was distributed to MIRRI partners and collaborating parties to standardize this exchange of information with a view to compile the "Report on linkages to governing bodies and policy makers at national & European levels and common work programmes with other infrastructures both in and outside Europe" (deliverable D5.7), due month 36.

» TASK WP5.5 IDENTIFY SYNERGIES AND SHARE COMMON TASKS AND STRATEGIES WITH OTHER ESFRI RIS

As a part of a highly productive research environment, MIRRI needs to identify collaboration with other ESFRI RIS to set up state-of-the-art services. A concerted effort is needed to configure the required infrastructure as cost effectively as possible. Avoiding duplication across Europe's RI could be gained through the bridging of complementary research facilities by MIRRI. Meetings and discussions with other RIS help to define unique approaches and boundaries of the individual RIS, areas of common interest, overlapping fields, or gaps not covered. This will lead to identification of synergies and multidisciplinary activities and will particularly enrich the BMS RI group. But moreover, the links to other RIS should be kept open to reinforce MIRRI's potential for innovation by allowing interdisciplinary translation of knowledge into various research activities for future applications.

SIGNIFICANT RESULTS ACHIEVED

Communication with other ESFRI RIS has been established to identify synergies and shared strategies. Outreach was focussed on RIS from the Health & Food group since potential synergies with other projects are mainly expected in the fields of biological and environmental science. By attending several workshops, areas of common interests have been identified and potential collaborations are explored by MIRRI and other projects like EU-OPENSREEN, EMBRC or ELIXIR as well as projects from the ESFRI Environmental Sciences group. To identify shared strategies in more detail a matrix for potential collaboration has been developed. Based on the results from this matrix collaboration in common areas of interests with other ESFRI projects will be facilitated.

For some issues most of the ESFRI RIS have shared strategies, e.g. in developing a legal form such as an ERIC. Since many projects have already established their legal form it will be useful for MIRRI to get feedback on how to handle this issue most effectively.

Coordinators from ESFRI Health & Food projects have started to develop cluster projects, to be submitted to certain Horizon2020 calls. MIRRI has identified several potential combined service offers with e.g. EU-OPENSREEN; potential concrete collaborations with other ESFRI projects are being evaluated at the moment.

During the Second BioMedBridges General Meeting in March 2014 it was decided that MIRRI is accepted as associated partner within the consortium. This fact will additionally foster communication and collaboration with other ESFRI Health & Food projects on common issues like data management, access policy or training.

ACTIONS ACHIEVED WITHIN THE TASK

The WP leader, who is also leader of task 5.5, commenced in February 2013 which delayed the starting of proactive work within this task. Nevertheless, due to already existing links (i.e. personal contacts) to other ESFRI Health & Food projects and huge activity within the Health & Food group in 2013 there are no deviations from the Description of Work or delays to the original output and deliverable schedule.

To facilitate communication with persons from other relevant projects a contact database has been developed. Contact data as well as the field of activity within a project from relevant persons of ESFRI and nonESFRI projects have been collated. This document is available in the Members Area on the MIRRI website, i.e. it is accessible to all MIRRI participants and will be used for outreach. Personal contacts have been made to participants of other projects on several workshops (mainly attended by the MIRRI partners DSMZ, CABI and CRBIP). Coordinators of the ESFRI RIs meet regularly and discuss areas of common interests and potential collaborations.

Some synergies with other ESFRI RIs are obvious, e.g. development of a legal form such as an ERIC or defining the Central Coordinating Unit, but other areas of common interest are not so evident. To get an overview on this, a collaboration matrix has been developed by task 5.5 and the MIRRI WP leaders. Each WP provides some simple keywords, explaining what they work on. Based on these results identification of synergies will be facilitated and future collaboration can be coordinated.

The coordinators of the ESFRI Health & Food projects started to elicit combined service offers of their projects which can be integrated into so-called cluster projects which match certain Horizon2020 calls (e.g. INFRADEV-4). First results show that MIRRI's closest connection in the field of offered services is with EU-OPENSREEN, EMBRC, ELIXIR and ISBE (see Table WP5.1.). An overview of potential interactions between projects within the Health & Food group (as identified after the last coordinators' meeting) is shown in Figure WP5.1. Possible collaborations with projects from the ESFRI Environmental Group are under investigation.

TABLE WP5.1. EXAMPLES FOR POTENTIAL COMBINED SERVICE OFFERS WITH OTHER ESFRI PROJECTS

RI	RI	COMBINED SERVICE OFFER	USER TAKE HOME
MIRRI	EUOPENSREEN	microbial resources, assay development, screening	potent "tool" compound for microbiology
		preparation of extracts from as yet unexplored microbiological sources and bio-profiling	novel biologically active and bio-profiled substances
		screening terrestrial environments, genome screening for potential genes involved in secondary metabolites	producer strains for enzymes or compounds
MIRRI	EMBRC	curated interoperable databases	validated data
		coordinated isolation programmes	new microbiological resources for further exploitation
MIRRI	ELIXIR	curated interoperable databases	validated data
MIRRI	ISBE	high-throughput analysis of new terrestrial strains, organisms and biological material	analysed data of biological material
MIRRI	BBMRI	provision of resources, expertise in IP	new resources
MIRRI	EATRIS	microbial resources, assay development, screening	novel substances for vaccine development
MIRRI	EuroBioImaging	low-throughput imaging of natural products	bio-profiling of novel substances

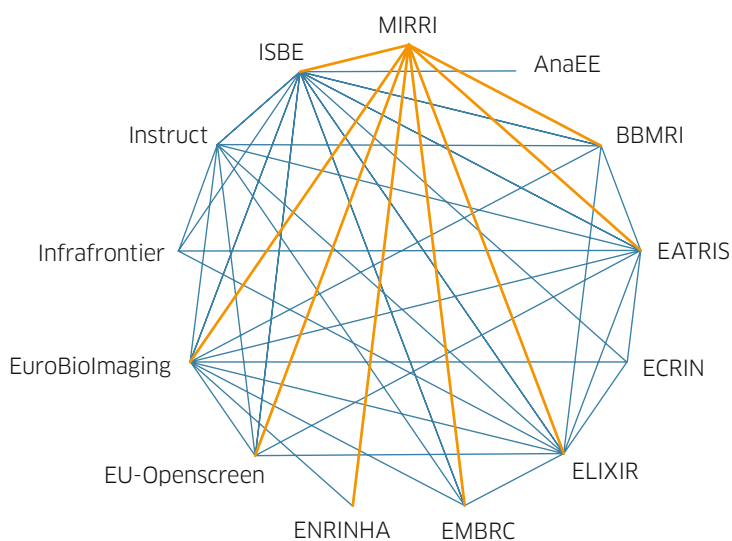


FIGURE WP5.1. POTENTIAL INTERACTIONS BETWEEN THE PROJECTS WITHIN THE ESFRI HEALTH & FOOD GROUP; DISCUSSIONS NOT FINISHED YET

» TASK WP5.6 EVALUATE NON-EUROPEAN PARTICIPATION AND DEVELOP PROGRAMMES OF COOPERATION WITH NON-EUROPEAN PARTNERS

Cooperation beyond the European boundary is key in developing the critical mass of expertise and capacities, which are required to address today's and future challenges such as food and water, climate, health and poverty; all of which have a global perspective and thus can only be sensibly addressed at a global level. MIRRI will build bridges between providers and users of microbiological material from outside the EU. The envisioned outreach beyond European borders will facilitate access to huge, mainly undiscovered, microbial resources with immense potential in science and industry in a mutual beneficial way with legal clarity on use. This task will build upon the existing links built by the Global Biological Resource Centre Network (GBRCN-Demonstration Project) with partners e.g. in Brazil, China, Japan, Kenya, Taiwan and other links to e.g. USA and Australia.

ACTIONS ACHIEVED WITHIN THE TASK

a. The United States Culture Collection Network (USCCN)

The task leader is on the steering group of the US Culture Collection Network (www.usccn.org), a project funded by the NSF as a Research Coordinated Network. MIRRI was represented in the meeting on the development of a shared informatics system for culture collections. MIRRI is developing its information system strategy which is intended to add value to strain data and link it to other relevant data sets to facilitate research and accelerate discovery. The opportunity to look at the potential for a more comprehensive global system is being explored. The meeting of the two groups enabled transfer of knowledge and the introduction to different systems. A second meeting focussed on regulatory compliance and the outputs from MIRRI work package 9 on biosecurity and the Convention on Biological Diversity access and benefit sharing requirements being implemented through the Nagoya Protocol were shared. Mechanisms for compliance were shared with a view to have, as far as possible, common approaches implemented in microbial resource centre best practice. Collaboration in the USA could lead to the development of a North American node of the global network - GBRCN.

b. Activities in Africa with the Kenyan Biological Resource Centre Network

Interactions with Africa began with partnership in the GBRCN demonstration project and progress is being made to establish a Kenyan Biological Resource Centre Network and National legislation in Kenya. A workshop funded by Leeds University, Leeds African College and the Worldwide Universities Network (WUN) was held at Leeds University, May 13th-17th, 2013. The workshop *Framework for the economic development of microbial resources in sub-Saharan agriculture* was an opportunity to connect MIRRI to African conservation and utilisation activities in microbiology. The workshop examined objectives, obstacles and solutions to the development of microbial resources in Africa and brought together a number of key players in the field from Australia, UK and Africa. The workshop was attended by 13 participants from 4 countries: Australia, Brazil, Kenya and the UK.

Subsequently, a proposal was successfully submitted to the CABI Development Fund to organise a workshop in Africa, with Brazilian counterparts who can work with African colleagues, to facilitate the establishment of microbial resource centres of value to the continent. The workshop *Hands across the Atlantic* will focus on the development and use of local microbial diversity to derive biopesticide products, addressing the major identified hurdles in the chain from isolating the microbe to a product on the market. The prospect of using the resources developed to support the bio-based economy in Africa will also be explored. Solutions for the envisaged problems will be sought through discussion and design of protocols at a workshop to be held in Kenya. The workshop will be hosted by the Kenyan Agriculture Research Institute (KARI) Nairobi in the period 14th-18th July 2014. It will bring Brazilian counterparts to work with African colleagues to share their experiences in developing a Brazilian Network of BRCs to bring local microbial diversity to research and development. Capacity building models developed will be suitable for implementation globally.

c. Regional activities via the World Federation for Culture Collections (WFCC)

MIRRI was represented at the World Federation for Culture Collections (WFCC) 13th International Culture Collection Conference ICC13 in Beijing. The WFCC have operated as a scientific society with a focus on microbial resource preservation and supply for over 4 decades. MIRRI is working closely with the WFCC to ensure operational models, policies and strategies are appropriate for implementation across the world. The WFCC facilitates international collaboration and exchange particularly through its international conference. Common issues were discussed with Ken Suzuki, President of the Japan Society for Culture Collections, founding Director of the National Institute of Technology and Evaluation (NITE) Biological Resource Centre (NBRC). The NBRC leads an effort to coordinate activities, policies and strategies in Asia, the Asian Biological Resource Centre Network (ABRC).

A MIRRI presentation at the ICC13 Session 14 Regional activities facilitated global outreach for MIRRI. The links to North America (above) South America (below) and Asia needs only the link to Australasia to establish the global network. Here again the WFCC forum facilitated links via AMRIM - Australian Collections of Microorganisms Information network to complete a regional approach.

CABI is an international organisation owned by 47 countries and thus has a global network of member countries. Through CABI's member countries and contacts made via the WFCC MIRRI's outreach is strengthened. For example work with the NITE BRC, CABI is helping Brunei (a member country of CABI) establish a BRC that can sustainably exploit its microbial diversity to contribute to solving some of the world's grand challenges.

d. PROCISUR - the Cooperative Program for the Development of Agricultural Technology in the Southern Cone

Andres Frances of the Institute of Agricultural Research (INIA), Chile at a meeting with colleagues from Argentina, Brazil, Bolivia, Paraguay and Uruguay in Uruguay who represent the agricultural national research institutes (like INIA in Chile) under the PROCISUR organization (<http://www.procisur.org.uy/>) of the south cone of the American sub-continent agreed to work toward establishing a South American node as part of the global network.

A follow up workshop was organized in Chile in November 2013 to help organise a South American regional microbial resource collection network and node of MIRRI. MIRRI input to the workshop was discussed with Andres Frances, Chile and colleagues from Argentina, Brazil, Bolivia, Paraguay and Uruguay identified common goals with MIRRI. MIRRI will provide the group with its Business Plan and a joint programme of work will be established.

II. SIGNIFICANT RESULTS

- » One of the first steps in establishing a MIRRI brand is to create a recognition value. Therefore, a corporate design was introduced: templates for PowerPoint presentations as well as templates for posters were prepared to ensure uniform external communication. These templates as well as further guidelines on MIRRI-related publications are available in the Members Area of the MIRRI website (see below).
- » PR material like the MIRRI leaflet has been designed in the very beginning of the project and is available for all participants.
- » As highlighted in the DoW, the MIRRI website (www.mirri.org; see deliverable D5.1) is one of the key tools for external as well as internal communication. The content of the website is updated on a regular basis. Recorded statistics from the website indicate a vivid interest as e.g. in February and March 2014 more than 1,500 page visits were recorded. Retention time, navigation and downloads of visitors are monitored and will be used to improve the website.

The Members Area on the MIRRI website is merely for internal use, only accessible via password. All MIRRI participants were provided with a username and a corresponding password. The Members Area offers:

- » download of important documents (e.g. DoW), templates (e.g. PowerPoint, activity report), PR material (e.g. leaflet, info poster) or reports and deliverables
- » a working area for each WP where WP-relevant documents can be uploaded (by the WP leader) and downloaded by MIRRI members
- » a special section for the Steering Committee to which only its members have access to and where documents can be exchanged

Today's communication tools include social media. Engagement of people (as of 31.03.2014) is shown in Annex WP5-6. MIRRI is active on:

- » Facebook (page "MIRRI – Microbial Resource Research Infrastructure"; www.facebook.com/mirri.esfri)
- » Twitter (@MIRRI_live; www.twitter.com/MIRRI_live)
- » LinkedIn (group "MIRRI – Microbial Resource Research Infrastructure"; <http://www.linkedin.com/groups/MIRRI-Microbial-Resource-Research-Infrastructure-4893351>). The WP5 leader is also member in 46 LinkedIn groups on behalf of MIRRI
- » Google+ (page "MIRRI – Microbial Resource Research Infrastructure"; www.plus.google.com/102423811576132435008/posts)
- » A YouTube channel has been reserved (MicrobialResourceRI), but has not been used yet

Social media allow a facilitated spread of information; MIRRI uses this communication channel to provide project updates, information on upcoming MIRRI-related events as well as press releases concerning microbiology-related news on a regular basis.

- » Feedback from respondents of the surveys performed by WP2 revealed that many of them would like to be informed about MIRRI activities. Since their preferred way of receiving information is via email, an electronic newsletter (e-newsletter) is currently designed. In the beginning this newsletter will be sent to persons known to be interested in MIRRI, but it also will be possible to subscribe to the e-newsletter on the MIRRI website. It is envisaged that the e-newsletter will inform about project news, upcoming events, participating collections and other noteworthy facts.
- » The most efficient way of outreach is direct communication. Representing MIRRI at important events is an appropriate method to reach a broad user community. MIRRI exhibited on several national as well as international conventions. Another, and lower-cost outreach, is to give oral presentations about MIRRI. Several MIRRI participants did so and some key lectures were delivered at conferences such as ECCO XXXII (2013), FEMS congress (2013) or ICC13 (2013). In addition, MIRRI members presented MIRRI posters at national and international events. There have also been publications of peer-reviewed and non-peer-reviewed articles on MIRRI in national and international scientific journals, magazines and newsletters (see Annexes WP5-7, WP5-8).
- » A detailed overview on these kinds of outreach activity will be provided to the European Commission.
- » Some stakeholders of MIRRI were known from the beginning of the project and work of several WP requests direct interaction. Therefore, with starting work in the different WPs a primary outreach has been initiated to e.g. users of microbial resources (via WP 2 and WP5), bio-industry (via WP2 and WP5), governmental bodies (via WP4 and WP5) and other research infrastructures (via WP 5, WP7 and WP8). In the meantime MIRRI has refined its offer, what it does different and what added value it provides. This information can now be used to implement a coordinated and targeted outreach and communication strategy. The basis for this is the MIRRI stakeholder analysis. Within this analysis the different stakeholder groups of MIRRI (on the national as well as on the international level) and their potential interest in the project have been identified and suitable communication methods are under development.
- » Outreach and networking of MIRRI has been successfully initiated: within the first 18 months of project duration there have been several requests to join MIRRI and three new Collaborating Parties were accepted by the Commission.

Links to regional and national activities have been established to explore collaborative opportunities and for the future linkage to form a Global Biological Resource Centre Network (GBRCN) as envisaged by the Organisation for Economic Cooperation and Development (OECD). Links have been established with:

- » The United States Culture Collection Network (USCCN, www.usccn.org) where the task leader is on the Steering Committee. Participation in three USCCN meetings as initiated joint considerations in information systems and regulatory compliance
- » Establishing microbial resource centre capacity building in Africa with the Kenyan Biological Resource Centre Network and establishing links between them and activities in Brazil
- » Regional activities to establish a global network via the World Federation for Culture Collections (WFCC); Participation in a regional activity session at the International Congress for Culture Collections thirteenth meeting (ICCC13) in Beijing, China
- » Establishing coordinated microbial resource activities in South America in collaboration with PROCISUR - the Cooperative Program for the Development of Agricultural Technology in the Southern Cone; participation in two workshops in Chile

PROBLEMS ENCOUNTERED AND SOLUTIONS RECOMMENDED

Outreach is costly – effective communication tools like face-to-face meetings require adequate travel funds. The same is true for exhibition at meetings or publications. Due to a very limited amount of money for PR activities and travelling, presentation of MIRRI at the national and international level has to be planned wisely. To get an overview on relevant events where MIRRI should appear a list of these has been prepared. The Steering Committee evaluates this list on a regular basis, prioritises important events and suggest people who should attend. To lessen the burden the MIRRI budget alternative sources for travel funds are sought, e.g. the partners' institutes.

A professional market study, as proposed by observers of others ESFRI projects, should be considered. Funding for such a study is not foreseen in the current phase.

Significant ties with task WP3.4 allows us to consider joint actions and common outcomes.

III. REASONS FOR DEVIATIONS FROM ANNEX I AND IMPACT ON RESOURCES

No deviation from Annex 1 (DoW).

IV. EXPLAIN THE REASONS FOR FAILING TO ACHIEVE CRITICAL OBJECTIVES AND/OR NOT BEING ON SCHEDULE AND EXPLAIN THE IMPACT ON OTHER TASKS AS WELL AS ON AVAILABLE RESOURCES AND PLANNING

Task WP5.4: In the DoW Task 2.4, “Stakeholders” are described to include providers of resources, users of resources, government, regulatory bodies, and policy makers. The MIRRI steering committee has agreed that WP2 will take care of the Providers of the resources and of the users of the resources, and will coordinate the necessary actions needed. Coordination of the communication with the other stakeholders for defining their needs with regard to mBRCs, has been allocated to WP5.

No deviations from other objectives and tasks.

V. V. STATEMENT ON THE USE OF RESOURCES

All resources were used as planned.

VI. VI. PROPOSE CORRECTIVE ACTIONS

No corrective actions needed.

WORKPACKAGE 6 – DEVELOPMENT OF SERVICES, OUTPUTS AND FOSTER INTERDISCIPLINARY WORK PROGRAMS

I. SUMMARY OF PROGRESS TOWARDS OBJECTIVES AND DETAILS FOR EACH TASK

OBJECTIVES

It is the goal of Work Package 6 to identify intrinsic features of national mBRCs with respect to holdings, expertise and services. These objectives should be considered in the greater context of how to improve the management of MIRRI to better serve the stakeholder demands in academia and bio-industries. A new overarching structure for a decentralized European mBRCs network with a hub-spoke structure will provide a more centralized plan to provide the authenticated biological raw material upon which high quality research and biotechnological innovation is based. The aspects of improved management refer to the central coordinating unit (CCU) as well as to the individual mBRCs who have to implement the policies outlined by the CCU according to improve services within the frame of the infrastructure and to the specific demands of national nodes and their networks. The general aim is to improve mBRC-user relationships to foster research and support the knowledge-based bio-economy. In order to encourage and stimulate a modification of the present situation and to create incentives for its implementation the present situation needs to be evaluated.

» TASK WP6.1 DEFINE STRATEGIES ON HOW GAPS IN MBRC HOLDINGS CAN BE ADDRESSED

1. CURRENT STATUS OF MBRC HOLDINGS, WITH EMPHASIS ON MIRRI PARTNER MBRCs

Within mBRCs the numbers and kind of taxa of individual holdings and the expertise of curators are determined to some extent by the history of the collections and by their funding system. This history explains the taxonomically defined holdings and strength in methods used for authentication and characterization and in offering identification services, training courses and advice. It is, however, the funding system that determines by and large the present situation, including expansion limits and possibilities in holdings, personnel and infrastructure. In order to develop a strategy to coordinate a common accession policy, WP6.1 firstly needs to compare key numbers concerning holdings and existing gaps. As the situation of mBRCs and associated collections differs upon the kind of microorganisms maintained, the following will distinguish between prokaryotic (Archaea, Bacteria, Cyanobacteria) and eukaryotic microorganisms (yeast, fungi, microalgae).

1.1. PROKARYOTES

ACQUISITION TREND OF BACTERIAL RESOURCES OVER THE PAST YEARS

Existing data on MIRRI partner holdings originate from a survey performed in 2011 during the EMbaRC project (www.embarc.eu).

Most collections acquired in the period between 2000 and 2011 significantly more non-type strains than type strains, though the number of non-type strains is fluctuating strongly over the last years. Most major public service collections accession both type strains and non-type strains, but the decision to focus on one or the other type of material as well as on their numbers depends upon the mBRCs' policy, expertise and funding. Data for some major MIRRI bacterial collections are shown in Table WP6.1.

TABLE WP6.1. ACCESSION OF TYPE STRAINS AND NON-TYPE STRAINS BETWEEN 2000-2011 BY SOME MIRRI PARTNER MBRCs DATA COLLECTED FOR THE EMBARC PROJECT (2009-2012).

ACCESSIONS 2000-2011	TYPE STRAINS	NON-TYPE STRAINS	TOTAL	RATIO (%) TYPE: NON-TYPE STRAINS	NUMBER OF GENERA
DSMZ	6,240	5,575	11,815	52.8	1,348
CECT	636	606	1,242	51.2	242
BCCM-LMG	2,490	4,194	6,684	37.2	513
CRBIP	2,746	5,282	8,028	34.2	792
CCUG	2,192	15,425	17,617	12.4	6

With some exceptions the annual acquisition of prokaryotic type and non-type strains over the past 11 years is rather stable. Worldwide major mBRCs acquired about 100,000 prokaryotic strains over the past 10 years. Most collections accessioned low numbers, annually less than 500 strains.

STRENGTH OF MIRRI PARTNER MBRCs

Five major MIRRI partner collections DSMZ, CRBIP, BCCM/LMG, CCUG and CECT cover a very broad range of prokaryotic biodiversity at all taxonomic levels (96% of all described phyla, 85% of all described genera and 86% of all described species). In terms of higher taxonomic groups the emphasis of all mBRCs is on Actinobacteria, Firmicutes, Proteobacteria and Bacteroidetes. As organisms belonging to these phyla are most easily cultivated from the majority of environmental samples, these taxa harbor the highest numbers of species. Strains of other phyla are present in only one or a few of the four mBRCs. Data on higher level holdings are depicted in Annex WP6-1.

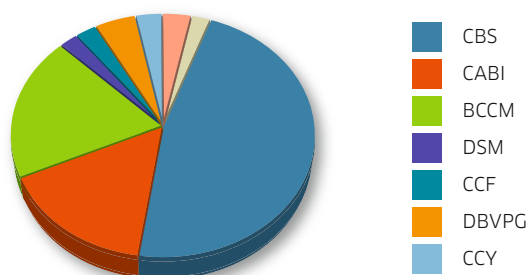
The following strengths and emphasis on holdings can be deduced:

- » The DSMZ focuses on type strains, trying to offer a broad coverage of biodiversity. Unique features which are not covered by other mBRCs are Archaea, rare taxa, Firmicutes, Actinobacteria, Myxobacteria, phototrophic and chemolithotrophic proteobacteria, as well as anaerobes.
- » The CRBIP also covers a broad range of diversity but concentrates on certain pathogenic organisms (*Leptospira*, *Listeria*, *Actinomyces*, *Corynebacterium*, *Neisseria*, *Moraxella*, and enterobacterial taxa), as well as on *Bacillaceae*, and cyanobacteria.
- » The CCUG concentrates on pathogenic bacteria with a high number of isolates per species.
- » The BCCM/LMG focuses on lactic acid bacteria, plant pathogens, acetic acid bacteria, nitrogen fixing taxa and the pathogenic campylobacteria.
- » The CECT as the most recent established collection has the fewest number of genera covered but presently concentrates on *Aeromonas*, and halophilic organisms.
- » Individual mBRCs focus on holdings of pathogens and reference material for humans, animals, plants (health, quarantine), strains relevant to biotechnology (food, agriculture, bioindustry) or strains covering diversity in terms of habitat, metabolism and ecology (academia, bioindustry).
- » The concentration of diversity within a narrow geographical region is unparalleled in the world. Although the uptake of novel organisms has increased the numbers of strains in each mBRC in the last five years, new deposits will not have changed the above picture much since 2011.

Within the MIRRI preparatory phase an up-to-date comparison including more European mBRCs with bacterial holdings is envisaged to define strengths of individual mBRCs and to identify overlaps and gaps in available prokaryotic taxa. The prokaryotic hierarchic scheme has been updated at the end of 2013 with newly described species since 2009. In addition, new data was gathered in a WP2-MIRRI from 60 mBRCs/CCs that are member of the European Culture Collections' Organization (ECCO) survey on the total number (strains/items) and types of holdings (not on genus level, bacteria, yeasts, fungi, Microalgae, Cyanobacteria, etc.). In total 24 collections were identified holding between 1,000 and 30,000 bacteria (data available in the WP6 member area of the MIRRI website). Further mapping on taxonomic level of these holdings will allow a more complete gap analysis. A similar analysis as for the EMbaRC data, but using the updated prokaryotic hierarchic scheme and data from a larger number of mBRCs, is planned in the next period of the MIRRI preparatory phase.

1.2. YEAST AND FUNGI

In terms of strains and species of fungi and yeast, the Centraalbureau voor Schimmelcultures (CBS, Fungal Biodiversity Centre, Utrecht, The Netherlands) is not only the leading mBRC in Europe, but the world-wide leading resource centre in quantity and phylogenetic depth for these resources. Other collections, such as CABI (UK), and the Belgian Coordinated Culture Collections (BCCM/MUCL and BCCM/IHEM) hold less than 50% of the CBS numbers, while in comparison the other collections of yeast and/or fungi are even much smaller (Figure 6.1). Other, smaller collections focus more on specific taxa with less coverage at the generic level but concentrating on holdings of strains from national origin.



* The number for the BCCM combines the data from the BCCM/IHEM and the BCCM/MUCL collections (for data and country see Table WP6.2).

FIGURE 6.1. SCHEMATIC DISPLAY OF HOLDINGS OF YEASTS AND FUNGI (COMBINED) IN SOME OF THE MAJOR MIRRI PARTNER* AND COLLABORATING PARTY COLLECTIONS

As determined in 2003 for holdings evaluated in 1994 the overlap of strains in the CBS, BCCM-MUCL, MUM and CABI were less than about 8% (<http://www.ebrcn.org/>). New data on genus level of European fungi and yeast mBRCs/CCs does not exist.

TABLE WP6.2. HOLDINGS WITH EMPHASIS ON FUNGI AND YEAST IN MIRRI MBRCs AND COLLABORATING PARTY COLLECTIONS

RI	COUNTRY	FUNGAL STRAINS	EMPHASIS	YEAST STRAINS
ACA-DC	Greece	81	Food technology	none
ATHUM	Greece	600	Fungi, macromycetes, airborne microflora	none
BCCM/IHEM	Belgium	16.000	Yeasts, fungi of biomedical and veterinary importance; <i>Cryptococcus</i>	3453
BCCM/MUCL	Belgium	13500	diverse	2200

RI	COUNTRY	FUNGAL STRAINS	EMPHASIS	YEAST STRAINS
CABI	UK	28000	Mainly from commonwealth members	261
CBS	The Netherlands	63000	environmental and agricultural systems worldwide	9000
DSMZ	Germany	2700	application	300
CECT	Spain	1130	diverse	2484
CCF	Czech Republic	2800	Filamentous fungi, opportunistic pathogens, food, environment <i>Geosmithia</i>	none
CCY	Slovakia	none	Yeasts and yeast-like fungi, biotechnology, clinical environment	3800
DBVPG	Italy	none	Yeasts and yeast-like fungi, biodiversity, biotechnology	5900
MUM	Portugal	396	Biodiversity	270
NCAIM	Hungary	310	agriculture	1540
PYCC	Portugal	none	Yeasts, Mediterranean habitats, dimorphological fungi	3000
VTT	Finland	none	Biotechnology, brewing, paper industry, food	1400

2. IMPROVE THE DEPOSITION OF MICROBIAL RESOURCES FOR MUTUAL BENEFIT OF SCIENCE AND USERS

2.1. BACKGROUND

The number of strains worth depositing in public culture collections cannot be estimated as the criteria for deposition depend somewhat on their interest in clinical, basic and applied research. Though the deposition of type strains is mandatory, gaps exist for those type strains, which were either never deposited, lost by collections, or for which the description was based on dead or preserved material. As compared to the about 9.000 described type strains, only about 160 type strains are lost to science (Yarza *et al.*, 2013).

The situation is different with reference strains of yeast and fungi and of non-type strains of any microbial material. Only a minute fraction of microbial strains and of genetic elements like plasmids, bacteriophages as well as purified DNA are deposited in public mBRCs. This gap in available microbial diversity is most obvious by the unavailability of strains used in the scientific literature and in research laboratories as the results of isolation projects.

The missing cooperation of authors to share resources stands in contrast to the publication policy of the majority of journals which expressively states in the Instruction to Authors that biological resources included in scientific articles need to be available to the user (though not necessarily deposited in public collections). Despite the obligation to share resources, several obstacles exist that prevent putting this obligation of authors into action. Once published, most resources are either no longer maintained or are not publicly available in the long run.

The only known example for obligate deposition includes the deposition of prokaryotic type strains as laid down in the Code of Nomenclature of Prokaryotes. This single example shows that a strategy could be successful if all stakeholders involved are guided by the necessity to change the present practice. A strategy needs to include discussion on present strength and weakness (bottlenecks of policy implementation) of practice, possible incentives and correcting actions, resulting in a consensus strategy involving all partners and actions for the common good.

2.2. OBJECTIVES

Public collections can only offer a fraction of the resources that have been isolated in academic research projects or by the bioindustry. As deposition of microbial diversity is impossible and not advisable, it is nevertheless necessary to assess their number and taxonomic affiliation in order to decide about the necessity to safeguard these resources for future use and to protect the investment of their isolation and scientific studies. The objectives of WP6.1 regarding improvement of deposits are:

- » Determine the number of orphan cultures not deposited in public culture collections.
- » Determine the willingness of authors to deposit into public collections strains that are included in the scientific literature.
- » Estimating the number of strains and the fraction of strains worth depositing in research collections, using DFG (German Research Council)-funded projects between 2000 and 2010 as an example.
- » Develop a strategy for improved and facilitated deposition of microbial resources by involving editors of journals, authors/scientists, funding bodies and mBRCs.

2.3. SURVEY RESULTS

The following is a summary of surveys that cast some light on the huge discrepancies of strains worth depositing in principle and strains deposited in practice. These data are necessary to develop a strategy for stakeholders to react towards safeguarding valuable raw material for academia and the bio-industry.

ENDANGERED COLLECTIONS IN EUROPE

In 2013 MIRRI-WP2 organized a survey to map laboratory collections maintained in research institutes, universities, hospitals or reference centres in Europe. With 158 participants distributed in 19 countries, over 1.000.000 microbial holdings were described and localized. Annex WP6-2 and Annex WP6-3 list summaries for bacteria and yeast/fungi, respectively, maintained in national research collections (not taking into account reference centres for clinical isolates) that respondents considered specializations of their collection or holdings that are not well represented in public mBRCs.

Several collections specialized in other kinds of microbial material that are available from only limited public mBRCs, such as Microalgae, Protozoa, consortia, phytoplasmata and plant viruses, were identified as well (Annex WP6-4).

In total, 45% of respondents indicated that the future of their collection was endangered, mainly due to a lack of funding or staff for maintenance of the collection, or the imminent retirement of the responsible scientist. Only 37% of the surveyed collections currently share their resources with third parties upon simple request. The vast majority of these collections thus remains inaccessible for the broad scientific community, and is potentially at risk to be lost. Nonetheless, in the survey 80% of those collections considering themselves at risk were interested to let public mBRCs foster their key strains to avoid loss.

NUMBER OF STRAINS AND THEIR DEPOSITIONS

Surveys on authors' willingness to deposit strains in public collections have been performed between 2010 and 2012 and the results and conclusions were published (Stackebrandt 2010, 2011, 2012, Stackebrandt *et al.*, 2014). Though these data were not generated within the frame of the MIRRI project they provided a basis for the further evaluations, determine the MIRRI strategy for closing holding gaps and can be used as a benchmark for future MIRRI impact studies on strain acquisition.

SURVEY ON STRAINS MAINTAINED IN GERMAN RESEARCH LABORATORIES

In order to assess the holdings in research laboratories, a single national survey was performed on researchers having received a grant on microbiological projects by the German Research Council (DFG) between 2001 and 2010. Of 167 addressees contacted, 30 researchers (18%) indicated the presence of collections with a total of about 60.000 microbial strains. Of these, 11.000 matched the following key strain' criteria as published by Stackebrandt *et al.* (2014).

As DFG funded projects are only one of several nationally funded projects it is impossible to presently estimate how many funded collections, how many microbial strains and how many strains worth depositing are maintained at the national level, not to speak at a regional or at the global level. It will nevertheless not be an overstatement assuming an order of magnitude of up to fifty thousand strains worth depositing originating from MIRRI partner countries.

Nevertheless, this number would at least double as high as the estimated total number of resources accessioned by public culture collections world-wide (data for fungi and yeast are missing but probably similarly high), clearly indicating the needs for sharing the work load world-wide and major investment in personal, maintenance, and storage capacities.

» TASK WP6.2 FACILITATE ACCESS TO EXPERTISE IN MICROBIOLOGY

A list of taxonomic experts in Europe has been generated, based on the initial list from a manuscript of Tamames and Rosselló-Móra (2012). The initial list of about 500 putative target names had been crosschecked with the public repositories (as Scopus and other databases) in order to complete their affiliations, electronic addresses and correct (if it was the case) the names.

The original bacteriologist list has been enlarged with cyanobacteriologists, protistologists and mycologists. The initial list had been circulated at least four times among the identified experts. Up to now, the over 1000 exchanged emails have improved the lists by curating names, affiliations or expertise.

The lists have been constructed as an excel file, thus initially easy to search. To be implemented in a web site, the list should be restructured to be dynamic. The fungi expert list is still on the way to be constructed.

» TASK WP6.3 ASSESS AND DEFINE SERVICES REQUIRED FROM MIRRI

A SUMMARY OF PROGRESS

In WP2.1 & 2.4 all major services offered by public mBRCs/CCs in Europe (WP2 ECCO-CC survey) and those mostly ordered/needed by the user community (User survey) were explored in search of potential gaps or required improvements. It became clear that queries concerning required services should best be focused in order to address users/stakeholders more directly. MIRRI partners decided to focus on bio-industry users of BRCs, as the segment of stake-holders to inventory its present and future needs for services. A more focused approach could help to develop and optimize the potential of MIRRI to underpin bio-industry and, hence, European bio-economy. Therefore, it was proposed to contact various bio-industry companies via the Enterprise Europe Network (EEN, <http://een.ec.europa.eu/>) for presenting MIRRI to the representatives in

the field, and to explain the purposes and benefits of MIRRI for their activities. It was decided that the best way to contact bio-industry is at the occasion of the various symposia and meetings that are organized by and for the bio-industrial companies/researchers. These bio-industry events were listed and WP6, WP5 and WP2 are exploring the most appropriate opportunity to organize the D6.7 workshop with the bio-industry stakeholders during (or back to back) one of these meetings. Completion of deliverable D6.7 is envisaged by end of 2014 (M26). A strategy would centre on

- » identification of user needs for service identification of representatives for the user community and the involvement of the user community in the decision making on the service output of MIRRI
- » service development
 - » Exploring mutual interactions between the service providers and interactions with the different user communities
- » Identify priority actions for the MIRRI service output
 - » Enhancement of existing and development of new services
 - » Design implementation mechanisms for the construction phase

» TASK WP6.4 FOSTER INTERDISCIPLINARY WORK PROGRAMS

A SUMMARY OF PROGRESS

The work of this task overlaps with delivery from Work Package 5 outreach, communication and dissemination. As part of the outreach strategy of WP5, interactions with other ESFRI Research Infrastructures have been mapped and a broader paper on interactions was prepared. The delivery of these interactions is covered by the MIRRI outreach strategy currently being developed.

The coordinator participated in several BMS RI and ENV group meetings discussing possible joint applications to H2020 calls (especially the INFRADEV 4 call). A list with these potential combined services and a division of labour between participating projects has been circulated among participants. A decision on joint project(s) will be made on April 28th. See also Activity Report from WP5.

Informal discussions with Guy Cochrane (Head of the European Nucleotide Archive (ENA) at EMBL-EBI) on possible collaborations between WP 8 and ENA as part of ELIXIR were positive. ENA would support data exchange, standardization and data integration as well as archiving as part of their ELIXIR mandate. On the working level this cooperation could be rapidly established and supported. Nevertheless, a formal agreement needs to be established between the coordinators of MIRRI and ELIXIR, including the assignment of manpower on both sides e.g. for the implementation phase of MIRRI.

MIRRI has become an associate partner in the BioMedBridges this will be open MIRRI's work to a wider audience including partners from related projects and initiatives and industry representatives. Specifically, this is crucial to the development of MIRRI's data offer addressed in MIRRI work package 8 (see also the WP8 report). BioMedBridges <http://www.biomedbridges.eu/> will form a cluster of the emerging biomedical sciences research infrastructures (BMS RIs) and construct the data and service bridges needed to connect them.

- » The BMS RIs are on the roadmap of the European Strategy Forum on Research Infrastructures (ESFRI)
- » The missions of the BMS RIs stretch from structural biology of specific biomolecules to clinical trials involving thousands of human patients
- » Most serve a specific part of the vast biological and medical research community, estimated to be at least two million scientists in Europe across more than 1000 institutions from more than 36 ESFRI Member States and Associated Countries

- » Each of them brings together its own large community of users to build a coordinated infrastructure. This process has already had a major impact on coordination of national infrastructures within each Member State
- » Essentially all BMS RIs are distributed infrastructures, with nodes in many European Member States

Erko Stackebrandt (Coordinator) has attended previous meetings and David Smith (CABI and MIRRI Steering Committee) attended the kick off meeting of the project at Hinxton Hall in 2012. Smith attended the BioMed-Bridges 2nd Annual Meeting, Florence, Italy in March 2014 to create the links to ensure MIRRI's information system and its strategy to link out to other relevant data sets to generate knowledge from data collaborates effectively with this initiative to be effective.

Discussions have begun on a joint acquisition policy between EMBRC and MIRRI as both infrastructures cover microorganisms (EMBRC specifically from marine environments), that require a joint agreed approach to making a wider choice available for users.

The Q-collect project (EU FP7-Grant agreement no. 612712 [KBBE.2013.1.2-06]) has had its Kick-off meeting on the 2nd of December in Leiden (The Netherlands). This projects aims to reveal the inventory of collection holdings on plant pest related (focusing on quarantine) organisms. It is known that these holdings are mostly related to working collections and less to public collections or BRC's. Part of the EU project concerns microbial pests and pest organisms. Paul De Vos (WP leader in MIRRI) is involved in this part. Within the frame of Q-collect, a survey has been launched in order to obtain information on microbial (and other) plant pest related holdings of these working collections but also of public collections. The questionnaire is based on the MIRRI questionnaire of WP2 for microorganisms.

TOWARDS A STRATEGY

Plans for a "workshop with other initiatives and users" as stated in the DoW need to be developed before the end of 2014 in order to organise it in the time line of the preparatory phase of MIRRI.

Certainly for information that is coming out of Q-collect for the microbial aspects a strategy will be developed in order to realise a more concentrated availability under quality normalisation of reference cultures that are used for diagnosis for phyto-sanitary purposes. Initiatives like Q-Bacco net in which three EU bacteria collections (NCPFB, CFBP and BCCM/LMG) collaborate in close relation with EPPO (European Plant Protecting Organisation) to facilitate access to high quality reference organisms for some quarantine pests has to be seen in this perspective.

II. SIGNIFICANT RESULTS

European public service collections cover the phylogenetic diversity very well at the genus and type strain level, the deposition of which is regulated for Prokaryotes (though not for eukaryotic microorganisms). The accessioning of Bacterial non-type strains is also not regulated and collections accept strains according to research strength without any harmonization among collections. The degree of duplication among type strains is favoured as these strains are reference strains for research. In an earlier analysis on duplication of non-type strains between the collections (EBRCN project, 2004-2008) it was concluded, that the situation was not alarming. This situation did not change over the last seven years but a recent evaluation on the genus level of holdings of any kind among major collections is missing. It was established in 2008 that the reasons for most duplication of type and reference strains are perfectly sound, up to a point that it is even required by international regulatory bodies (Rules for Valid Publication). At the level of non-type strains the degree of overlap has not yet been evaluated. The compilation of catalogue entries in the WDCM database and improving interoperability should be retrievable via the StrainInfo team. Contacts were made and the software manager of StrainInfo will investigate the possibilities on the short term. This topic will be followed within tasks of WP8.

Specific important results were:

- » Collection strengths have been identified for MIRRI collections as well as for Collaborating Parties and several non-public research collections (respectively ECCO and non- ECCO members) in Europe
- » Updated hierarchic scheme of Prokaryotes is available and was shared with WP8 to convert it into a dynamic structure
- » Lists of endangered collections and potential depositors of research strains are available from surveys.
- » Publication on 'key' criteria for strains to be deposited has been accepted (Stackebrandt *et al.* 2014)
- » In February 2014 a meeting was organized in Hanover with the heads of MIRRI collections to discuss coordination issues (collection mandate, overlaps and gaps in holdings, willingness to free capacities)
- » The list of bacteriologist experts was finished in March 2014, but the cyanobacteria, protist and fungi expert databases still need some curation. Up to now we can recognize about 300 bacteriology, 50 cyanobacteria and 80 protists taxonomy experts
- » The gap analysis for mBRC services should be available in a more finalized way in order to allow developing strategies for operational performance of newly introduced services according to users' needs
- » Links to other ESFRI Research Infrastructures via two indirect routes: (1) through Biological and Medical Sciences (BMS) Research Infrastructure (RI) coordinators group and (2) through the BioMed-Bridges project
- » Direct links to ELIXIR on specific issues via WP8 leader, EU-OPENSOURCE via the coordinator and EMBRC - European Marine Biological Resource Centre on a common accession policy
- » Direct links to European projects and regional or global initiatives including Q-collect

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III. REASONS FOR DEVIATIONS FROM ANNEX I AND IMPACT ON RESOURCES

Task WP6.3: The workshop (D6.7) foreseen in M15 (January 2014) is too soon and should be postponed. We first need a list of innovative services that MIRRI can offer to discuss with various users and stakeholders. When the new strategies to include users/stakeholders are successful, WP6 can start to design the MIRRI service output.

IV. EXPLAIN THE REASONS FOR FAILING TO ACHIEVE CRITICAL OBJECTIVES AND/OR NOT BEING ON SCHEDULE AND EXPLAIN THE IMPACT ON OTHER TASKS AS WELL AS ON AVAILABLE RESOURCES AND PLANNING

No failure indicated.

V. STATEMENT ON THE USE OF RESOURCES

Task WP6.1: All resources allocated to WP 6.1 have been spent prudently on salaries and participation in conferences presenting results of WP.

VI. PROPOSE CORRECTIVE ACTIONS

No corrective actions needed.

WORKPACKAGE 7 - CAPACITY BUILDING, EDUCATION AND TRAINING

» TASK WP7.1 DESIGN INNOVATIVE LEARNING PROGRAMMES AND TOOLS, E.G. E-LEARNING AND VIRTUAL LABORATORIES

E-learning or electronically supported learning and teaching, information and communication systems serve as specific media to implement the learning process and can be harnessed in microbial resources management. The available tools and the potential for developing new tools will be assessed. Moving students or teachers between countries is expensive but costs can be reduced by harnessing computer and network-enabled transfer of skills and knowledge. E-learning applications and processes include Web-based learning, computer-based learning, virtual education opportunities and digital collaboration. Content is delivered via the Internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM. It can be self-paced or instructor-led and includes media in the form of text image, animation, streaming video and audio. Demonstrating laboratory based techniques can be delivered through virtual laboratories. Based on the outputs of the EMbaRC training and outreach programme and training activities globally such tools will be assessed and a strategy developed for their uptake, development and use. Guidance to make available the tools and related publish materials in open access will be taken from Open AIRE (Open Access Infrastructure for Research in Europe)

Communication difficulties have been mitigated by the compilation of a list of contacts of Heads of Education and Training activities from each MIRRI partner and collaborating party. This list is a valuable resource for present and future activities, assuring that we reach the proper people, and increasing the quality and speed of our interactions.

In order to assess the current panorama of education and training offer within MIRRI, a survey, via questionnaire, was elaborated (Annex WP7.1). The questionnaire was developed and contained 11 multiple-choice questions, and a final, open-ended section for details and comments. After internal discussion, and validation the final questionnaire was sent to all members and collaborators within MIRRI (in August 2013). The goal of this survey was to obtain a snapshot of training, current tools, and contents being used and produced within the consortium.

The survey was sent to a total of 33 institutions (all of MIRRI partners and collaborating parties) and a total of 28 replies was collected (4 institutions were not applicable, as they are not BRCs, and one did not reply). The majority of culture collections are both recipients and providers of training courses (ca. 80%). Received training usually comes from a combination of external and internal sources (61%), although exclusively internal (26%) or external sources (13%) are the preferred option for some.

While some collections do not currently offer training as part of their services (21%)- usually associated with a combination of lack of personnel and/or financial resources- in most cases there is a clear desire to introduce them in the near future. The type of training provided by MIRRI members and associates is always a combination of theoretical and practical components, and still relies almost exclusively on face-to-face interaction (only one collection makes use of blended learning). Likewise, and despite the current trends in increased use and production of contents in new formats, training within members and associates of MIRRI still have an overwhelming dominance of classic contents (only 1/3 of our collections makes use of video, interactive or other types of new contents, and only about ¼ produce them; Figure 7.1.).

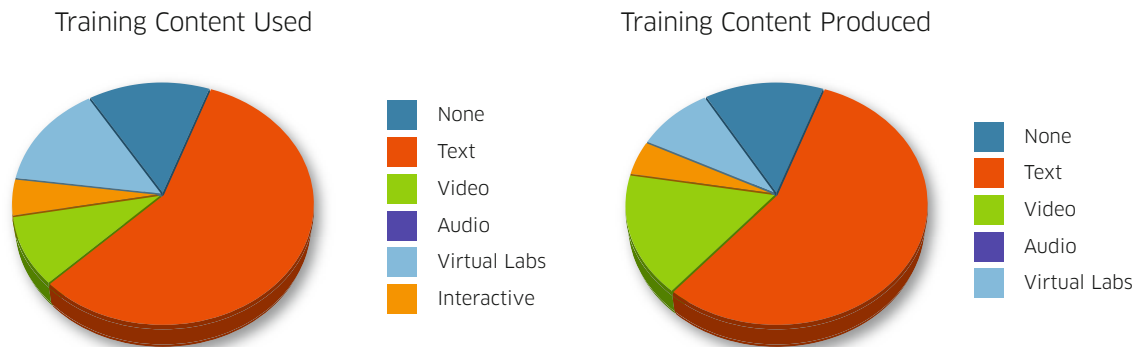


FIGURE 7.1. OVERVIEW OF TYPE OF LEARNING/TRAINING CONTENT USED (LEFT) AND PRODUCED (RIGHT) BY MEMBERS OF THE MIRRI CONSORTIUM.

WP2 conducted a questionnaire-based survey targeting current and potential users of microbial resources and services. The surveys aimed to identify trends in current and future demand and needs for our services, as well as identify possible gaps. Replies from a total of 1146 individual users were collected and further examined (see WP2.4 for details), and specific results on training and education were further processed and analysed by WP7.

This revealed a wide gap between training that our users outsourced from third parties (18% of replies) and from culture collections (7% of replies). This gap will likely decrease in the next five years, due both to the increase in our users demand for training provided by culture collections, and stagnation and decrease in demand from third party providers (Figure 7.2.). This expected spike in demand from culture collections is particularly pronounced in replies from the profit sector (Figure 7.2. and Figure 7.3.).

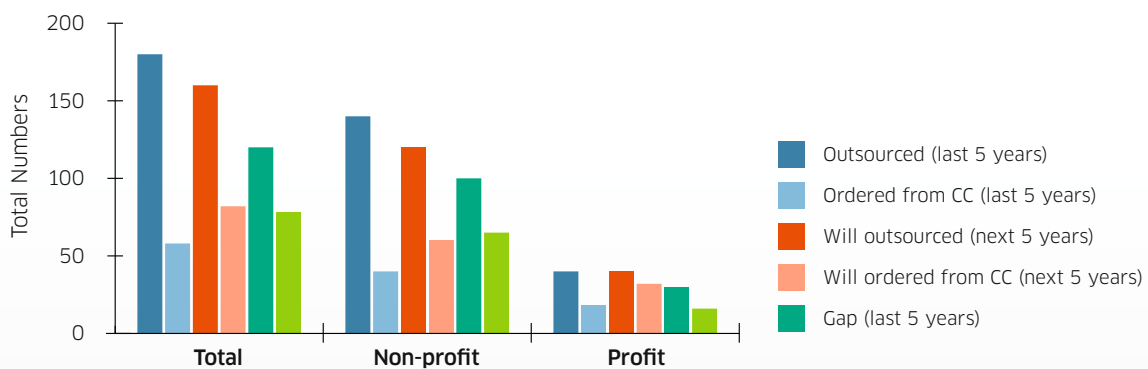


FIGURE 7.2. OVERVIEW OF PAST AND FUTURE TRAINING DEMAND BY CUSTOMERS OF MEMBERS OF THE MIRRI CONSORTIUM

When analysing the reasons for customers not procuring training services from culture collections, we find a combination of factors. While some state that this service is not needed and/or is taken care of in-house, others point to our lack of price-competitiveness. Worryingly, training is listed as the 2nd top service that repliers were not aware of as being provided by BRCs (see WP2.4 report).

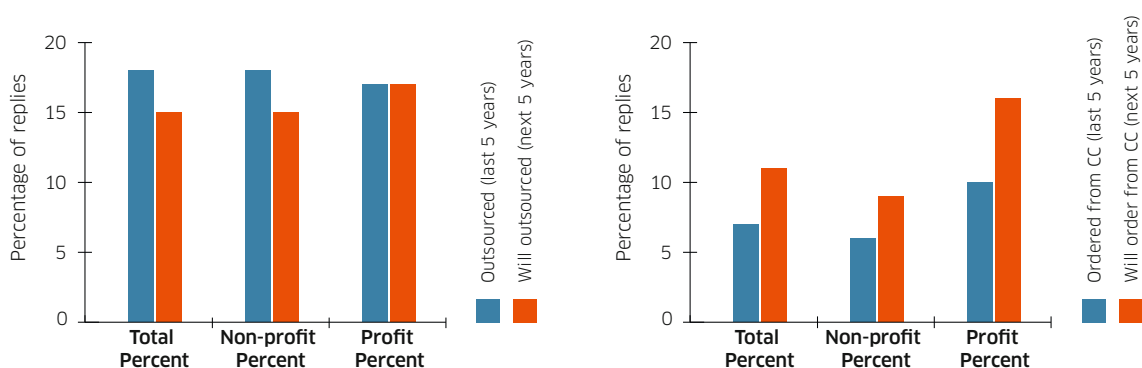


FIGURE 7.3. PAST AND FUTURE TRAINING DEMAND BY CUSTOMERS OF MEMBERS OF THE MIRRI CONSORTIUM. TOP: TOTAL OUTSOURCING [ANSWERED: 996 (758 NON-PROFIT AND 238 PROFIT)]; BOTTOM: OUTSOURCING TO CCS [ANSWERED: 775 (603 NON-PROFIT AND 172 PROFIT)].

Furthermore, the list of training topics identified by our customers (data from WP2 user survey- WP2.4) is markedly different when comparing the profit and the non-profit sectors. Such differences likely result from the specificity and differentiation in needs and skills required and available (Table 7.1. and 7.2.).

TABLE 7.1. GLOBAL TOP TRAINING TOPIC NEEDS IDENTIFIED BY CUSTOMERS OF MEMBERS OF THE MIRRI CONSORTIUM (ANSWERED: 477)

TRAINING SERVICE	TOTAL COUNT	TOTAL PERCENT
Microbial identification and characterization	211	44,23
Data analysis	188	39,41
Cultivation (e.g. anaerobic, fermenters, intracellular bacteria)	173	36,27
Molecular tools	165	34,59
Culture collection management	164	34,38
Preservation	156	32,70
Legal aspects related to the microbial/genetic resources	141	29,56
Taxonomy	140	29,35
Microbial detection and diagnostic techniques	134	28,09
Risk assessment	109	22,85
Handling of hazardous microorganisms	106	22,22
Genotyping	106	22,22
Phenotyping	59	12,37

TABLE 7.2. TOP TRAINING TOPICS IDENTIFIED BY NON-PROFIT (ANSWERED: 362) AND PROFIT (ANSWERED: 115) CUSTOMERS OF USERS OF THE MIRRI CONSORTIUM

TRAINING SERVICE	NON-PROFIT (COUNT)	NON-PROFIT (PERCENT)
Data analysis	163	45.0
Molecular tools	139	38.4
Microbial identification and characterization	138	38.1
Culture collection management	122	33.7

TRAINING SERVICE	NON-PROFIT (COUNT)	NON-PROFIT (PERCENT)
Taxonomy	115	31.8
Cultivation (e.g. anaerobic, fermenters, intracellular bacteria)	113	31.2
Preservation	111	30.7
Legal aspects related to the microbial/genetic resources	107	29.6
Genotyping	88	24.3
Microbial detection and diagnostic techniques	85	23.5
Risk assessment	79	21.8
Handling of hazardous microorganisms	78	21.5
Phenotyping	42	11.6

TRAINING SERVICE	PROFIT (COUNT)	PROFIT (PERCENT)
Microbial identification and characterization	73	63.5
Cultivation (e.g. anaerobic, fermenters, intracellular bacteria)	60	52.2
Microbial detection and diagnostic techniques	49	42.6
Preservation	45	39.1
Culture collection management	42	36.5
Legal aspects related to the microbial/genetic resources	34	29.6
Risk assessment	30	26.1
Handling of hazardous microorganisms	28	24.3
Molecular tools	26	22.6
Data analysis	25	21.7
Taxonomy	25	21.7
Genotyping	18	15.7
Phenotyping	17	14.8

Analysis of these results show that there is a much wider market for education and training within our customer base than the one currently being offered by MIRRI's culture collections. Further efforts are clearly required in adjusting our offer, adapting contents and content delivery and focusing on cost-efficiency and proper advertising to increase visibility. The pooling of common resources within MIRRI, and a central coordination of content production, courses offered, and advertising would be highly beneficial, and decrease current costs and duration of the theoretical face-to-face components.

Rebooting the current education and training offer and providing it via MIRRI would increase the reach of our target-audience, increase quality and efficiency of training that would also be more in-tune with the needs of our customers.

A solid education and training offer would strengthen MIRRI's brand recognition, and could become an important source of additional revenue.

d) Data, material and examples of good practice on new and potential technologies and tools for Education and Training (e.g. Augmented Reality, MOOCs) have been collected and are part of the focus of the upcoming deliverable D7.1 (Report on available and potential new electronic tools for training). See Annex WP7-2a and b for specific examples.

e) Contacts with Lifetrain/EMTRAIN Contacts with Lifetrain/EMTRAIN have been particularly fruitful. We have established an ongoing dialogue and have been collaborating, and making use of access to valuable tools, such as the Learning tools and Learning Methods Navigator (<http://www.emtrain.eu/learning-tools/>), and the ON-Course repository (<http://www.on-course.eu/>).

The ongoing Education and Training discussion forum formed within Lifetrain/EMTRAIN, and including other ESFRI project representatives is an important element of a likely future pan-ESFRI-BMS RI training consortium.

» **TASK WP7.2 COORDINATE EDUCATION AND TRAINING PROGRAMMES AND FACILITATE KNOWLEDGE TRANSFER**

Organization of training courses through the existing networks and collaborations at national, regional and international levels. A strategy to coordinate training programmes and facilitate knowledge transfer will be designed and could include the organization of technology transfer platforms and involvement of broader range of stakeholders and the setting up of national biological resource committees to strengthen coordination of training and education in the field of microbial diversity management.

Existing data seem insufficient to prepare the first deliverable presenting the European training offer (and eventual gaps that may concern mBRC's). For this reason we prepared two surveys.

The first one should target every people offering training in microbiology (e.g. people in charge of Masters Curriculum), excluding mBRCS's.

The second one will be centred on mBRC's. The mBRCs have been considered in a separate group and will be targeted by a specific survey. Trainings currently provided by mBRCs are indeed worth a particular attention. The task aims to assess (1) the features of their training organisation, and potential weaknesses (2) what should be considered as the recognized know-how of mBRCs in terms of training.

The final report will be partly based on the results obtained in both surveys.

a. Contact lists of training providers (excluding mBRC's):

- » Universities (under- & postgraduate levels), university-level colleges,...
- » Research institutes
- » Engineer / technician training
- » Public / private institutions
- » Lifelong training organisms (profit / non-profit; employed/unemployed workforce)
- » In-house training (microbiological based industries)

As an example, a list has been established to target French stakeholders (see Annex WP7-3).

MIRRI partners were asked to perform a similar task in their own countries, given the specificities of the each national educational system. Despite the complexity and tediousness of this preliminary step, we already have full contact lists from six different countries. The lists will be used for a first round a mass mailing

in English. We also expect that MIRRI partners will spread the surveys on their side in the every partner country using their own language. The answers will be ideally collected before the end of April 2014.

b. mBRC's Education and Training Contact Lists

We will make use the contact lists of mBRC's Heads of Education & Training activities previously compiled by WP2 (which includes a list of ECCO and non-ECCO members), and WP 7.1. This will significantly facilitate our communication with mBRC's across Europe.

c. Design of the questionnaires

Preliminary steps included discussions about the targets of the surveys (training providers in public / private organisms, mBRCs being considered separately - see below), the correct wording to employ for exchanges with the whole microbiologist community, and the more relevant alternatives of multi-choice questions given the current state-of-the art. A professional translator was contacted for grammatical and orthographical revision (Annex WP7-4).

The confidentiality policy statement (discussed by MIRRI partners during the second meeting in Athens) will be explicitly mentioned and available online (hosted by WP2 partners). The form will fit the graphical identity used for previous communications. The questionnaire will be spread by mass mailing.

Both surveys will help to draw a general picture on different of the training offer. We have identified, and elaborated questionnaires covering three main topics that are of relevance for our task:

- » **Training Course Organization and Structure:** This topic covers different aspects, including cost, number of attendants, duration, and type of evaluation. The goal of this questionnaire is to assess the habits and needs of the trainers and attendants, and to highlight relevant perspectives and limitations for future definition of improved training offers (e.g. unrealistic price / duration, insufficient interactions; lack of academic validation; inadequate academic level).
- » **Training Course Content:** This topic will identify the most relevant course contents (e.g. taxa, topics and technics), as identified by training providers. The respondents will also be asked to provide their view on current and future trends in microbiology by identifying topics that they expect to become more/less important.
- » **Adequacy of use of E-learning in Education and Training in Microbiology:** Current training offer mainly rely on face-to-face interactions. The survey will underline the habits and needs of customers that should be also met by the future offer; this may thus include e.g. (1) the development of online theoretical contents and exercises with automated correction; (2) the production and publication of demonstration videos explaining and illustrating specific technical procedures. Also, the survey will help to underline the weaknesses of the current offer supporting the relevancy of producing e-contents. Depending on the topic/skill concerned one may expect the lack/brevity of theoretical courses, course material, and bibliography intended to prepare courses. The expected benefits of complementing our current courses with online training include a reduction in costs, and improved teaching/learning experience (e.g. increased interest; enhanced course personalization, better involvement of attendants; Norvig 2013).

The survey may highlight regional differences at the European scale. Identifying local gaps in the current face-to-face training offer for particular skills/topics may also justify the development of an online training offer.

REFERENCE:

- » Norvig P, How to Make Online Courses Massively Personal, in Scientific American 309(2), July 2013

» TASK WP7.3 DEVELOP STRATEGIES FOR CAPACITY BUILDING

Biodiversity capacity needs have been assessed as part of the National Biodiversity Strategy and Action Plan process in each country. To date the specific needs to better understand and utilise microbial diversity has been relatively neglected. Several nations report the need for collections to provide support for biodiversity maintenance and sustainable utilisation. However, to date the culture collection community has had a low profile compared, for example, to botanists. It is essential that to be effective the opportunities for capacity building are coordinated to address not only the taxonomic impediment but to bridge our knowledge gap and address the lack of investment to enable us to make best use of our genetic resources. Human resource development in the BRC field depends upon education in Universities, vocational training, training courses and study visits in collections and through collection organizations. The initiative must take advantage of donor agency funded capacity building. For example at the European level the European Commission fund Marie Curie Host Fellowships for the transfer of knowledge for European organisations (universities, research centres, enterprises, etc.) needing development in new areas of competence, as well as at furthering the development of research capabilities in the less-favoured regions of the EU and in the associated candidate countries. Knowledge transfer fellowships will allow experienced researchers to be hosted at such organisations for the transfer of knowledge, research competencies and technology. A strategy will be developed to implement the outputs of tasks 7.1 and 7.2 above and address the needs identified for new expertise, facilities and technologies needed for new services arising from work packages WP2, WP5, WP6 and WP8.

The objective of this Task is to develop a strategy for capacity building to foster increased visibility of the microbial resource centres at the national and international level. Only a few MIRRI partner heads and curators have direct teaching responsibilities within university curricula but many BRCs offer training courses for students. These two activities need to be bundled in coherent curricula packages to link more closely the existing expertise of the BRC environment into the higher education system at national and international levels. The Deliverables of Task 7.1 (Design innovative learning programmes) and 7.2 Coordinate education and learning programs) antedate the Deliverable of Task 7.3 which will use the information provided to design a strategy for an improved offer to match the needs of stakeholders as analysed and already defined in other tasks.

II. SIGNIFICANT RESULTS

- » Information on education and training needs has been obtained from MIRRI customers, leading to a MIRRI's Education and Training Contact List
- » A view on Education and Training, Current Tools, and Contents was produced and used within MIRRI
- » Data, material and examples of good practice on new and potential technologies and tools for education and training have been compiled
- » Contacts with Lifetrain/EMTRAIN were established and workshops attended
- » Information of a similar WP on education from the EMbaRC project (EU FP7, Research Infrastructures, INFRA-2008-1.1.2.9) has been provided in order to canvas the WP leader on MIRRI WP7 - especially on the task 7.2.
- » Existing contact databases of microbiology-related training providers have been investigated
- » André Antunes has been in regular contact with the team behind the 'On-course' database developed by EMTRAIN project partners
- » At the French level databases developed by different public organisations (e.g. Engineer high schools Universities, Ministry for Education, professional bodies) were collected and respective database managers have been contacted

- » All MIRRI partners were asked to collect contacts of people offering training in their own countries
- » Two questionnaires have been designed taking into account different microbiologists' points of view. A professional English translator has been contacted for review. The questionnaire on-line forms will be hosted on Survey Monkey and uploaded by WP2 partners (March 2014)
- » The German Partner represents the microbiology community in the Senate Commission of the German Research Council, responsible for the development of long term strategies in education and research. The MIRRI Partner DSMZ is considered to become a focal point for a 'School of Taxonomy' with a combined Master and PhD curriculum
- » Training and Education has been considered of high importance by the BioMedBridges and the BMS projects for joint proposals in H2020 INFRADEV-4 calls

III. REASONS FOR DEVIATIONS FROM ANNEX I AND IMPACT ON RESOURCES

Task WP7.2: Work of this task is delayed. This should mainly affect others tasks of WP7 (e.g. WP7.3 action 2, tasks 7.1 and 7.2"). This delay is due to the (slightly underestimated) complexity of the task, and unexpected temporary changes in the team associated with this task (e.g. the unexpected long-term absence of WP7.2 task leader).

The deliverable "D7.2.1: Report on current Education and Training programmes" remain to be done. This will be a compilation of the results obtained after the surveys (rapid synthesis tools are implemented in SurveyMonkey; alternatively, but we may also use simple statistical tools used in similar market studies).

IV. EXPLAIN THE REASONS FOR FAILING TO ACHIEVE CRITICAL OBJECTIVES AND/OR NOT BEING ON SCHEDULE AND EXPLAIN THE IMPACT ON OTHER TASKS AS WELL AS ON AVAILABLE RESOURCES AND PLANNING

None.

V. STATEMENT ON THE USE OF RESOURCES

None.

VI. PROPOSE CORRECTIVE ACTIONS

The workload of WP 7.2 task leader was spread among other members of WP 7.

WORKPACKAGE 8 – DATA RESOURCE MANAGEMENT

I. SUMMARY OF PROGRESS TOWARDS OBJECTIVES AND DETAILS FOR EACH TASK

The objectives of work package 8 is to define concepts and strategies to improve the quality, quantity, interoperability and usage of data associated with biological material in biological resource centres (BRC) and culture collections (CC).

Progress towards the objectives was made by conducting in total four workshops, two in Athens (11.06.2013) and two in Rome (25/26.02.2014), as well as a WP8 satellite meeting as part of the MIRRI General Assembly on 23.11.2013 in Amsterdam. The four workshops fulfilled Milestones 6 (8.1.1), 7 (8.2.1), 8 (8.3.1) and 9 (8.4) of the DoW. The workshop corresponding to M9 was moved from month 24 to month 9 since it served as the basis for Deliverable 8.5 (8.4.1) which was submitted in October 2013. Deliverable 8.1 (8.1.1) has been submitted in April 2014. Regular WP8 telephone conference calls (telecons) have been established for information exchange and monitoring the progress of the work package. Furthermore, WP8 has participated in the user survey of WP2, as well as feedback information to several WPs in MIRRI.

The four workshops and one satellite meeting with internal (MIRRI) and invited participants as well as the user survey on user requirements in terms of deposition and access to data provided by MIRRI, have resulted in a detailed picture of the current data management and IT infrastructure in BRCs and CCs.

In summary, most BRCs and CCs are acting as proprietary entities with respect to data acquisition, data quality management, data exchange and interoperability. Despite the fact that 'OECD Best Practice Guidelines for Biological Resource Centres and CABRI guidelines for minimal datasets exists, standardized protocols for submission of strain specific associated data (metadata) to BRCs/CCs collections have not been commonly implemented. Heterogeneous and incomplete datasets in BRCs/CCs are the consequence. Furthermore, the lack of commonly agreed exchange formats as well as heterogeneous and often insufficient IT-competences hamper data exchange and interoperability between BRCs/CCs as well as third party databases. As a consequence, the usage of the accumulated knowledge stored in BRCs/CCs is hampered for stakeholders in academia and industry, and improved access to biological materials and its metadata is clearly needed. Gaps must be closed and important services must be covered.

Led by Vincent Robert (CBS-KNAW) a detailed status paper on the "*Data management in Culture Collections*" has been produced by WP8 (Annex WP8-1). The paper lists and discusses informatics infrastructure needs for BRCs and CCs, their curators, technicians, researchers, clients and end-users.

As the major outcome of the WP8 satellite meeting in Amsterdam the strategy paper "*MIRRI WP8 strategy paper about data resource management*" has been compiled (Annex WP8-2). The paper summarizes the current status of data management in BRCs and CCs as well as the vision for the MIRRI Information System (MIRRI-IS) as an integrated, high-quality, manually annotated, non-redundant micro-biological resource database.

In summary all milestones and deliverables due until month 18 have been reached. Further milestones and deliverables are expected to be delivered in time.

» TASK WP8.1: PROVIDE STRATEGIES FOR CONSISTENT ACQUISITION OF DATA

This task aims to define clear requirements and standards for data acquisition at the point of deposit. These minimum standards include, common data requirements on accession forms for depositors to complete; mechanisms for handling restricted data; the use of appropriate ontologies (controlled vocabularies); data formats and content to meet defined standards selecting the most appropriate from for example OECD-BRC,

CABRI, ABCD, MINE. A defined concept will deliver quality management to ensure optimum delivery of information services to users. Mechanisms will be developed for the MIRRI construction phase that will maximize the quality of metadata provided by depositors. A number of incentives are needed, these will include:

- » Furthering the work of EMbaRC in influencing Journal policy to set data provision requirements with deposit of microorganisms cited in publications.
- » Working with funding agencies to require minimum standards for data associated with strains used in the research projects for which they support and its deposit in BRCs.
- » Promulgation of the benefits of deposition of data to encourage data provision.

The final concept will provide incentive to maximize the quantity of data by depositors. Mechanisms for improving data acquisition processes for BRCs will be explored, including:

- » Re-evaluation of the system for unique identifiers across BRCs, currently provided by the World Data Centre for Microorganisms (WDCM).
- » Development of standard operation procedures (SOPs) to be implemented across MIRRI. The goal is to define a concept to maximize the quality management of storage of metadata.

Although CABI is leader of this task this is very much a cross work package activity. Exchanges lead up to useful discussions on strategy and metadata; the results of this task have been delivered by efforts across the whole project led by WP8 project team. These include:

- » A workshop organized at the annual project meeting in Athens June 11th on the MIRRI Information system, its scope function and needs; this workshop pointed to the need for an overall strategy document for the MIRRI information system.
- » Vincent Robert (CBS-KNAW) led the compilation of a status paper to facilitate the strategy development and help focus the effort. This paper brings together an analysis of available software, tools and strategies available for the management and dissemination of microbial resource centre (mBRC) data.
- » Alexander Vasilenko (VKM) led the assessment of data structures in particular an analysis of data fields from European collections and a summary paper on user needs covering issues in the background for the last three years which VKM have studied and reported on at workshops / conferences / spanning 2010 to 2012.

The work of this task is completed with the report Deliverable D8.1 *“Report on minimum standards for data acquisition and data management and mechanisms to incentivize the deposit of quality data”*. However the work based on this carries on with further tasks in this work package and of others.

- » Although current microbial collection standards for data management are adequate the effect of adding new data types and linkages out to other data sets needs to be monitored and adaptations made as appropriate.
- » The data task will be part of the outreach strategy through WP6 activities. Further work will be done to influence Journal policy to set data provision requirements with deposit of microorganisms cited in publications and work with funding agencies to require minimum standards for data associated with strains used in the research projects for which they support.
- » Work is needed to address promulgation of the benefits of deposition of data to encourage data provision and mechanisms for improving data acquisition processes for BRCs. Discussions on systems for unique identifiers across BRCs as well as standard operation procedures (SOPs) to be implemented across MIRRI are needed.

- » The MIRRI information strategy needs testing on users to provide guidance on next steps and through work package 6 and work package 5. WP8 will continue to work with BioMedBridges to find mechanisms to link MIRRI microbial strain data to other data sets.

With the overall goal of MIRRI is to stimulate the uptake and use of microbial diversity in research and development. MIRRI needs to know what data is out there and how effective links can be made to it and make MIRRI data interoperable with it. Importantly, MIRRI needs to know what data it needs to add to this and how making it available. To do this MIRRI needs to work closely with ELIXIR and other research infrastructures such as EU-OPENSOURCE, other players such as STRAININFO.NET and WDCM - their Global strain database. Ultimately, MIRRI needs to work with the user to see how best we deliver this information. The MIRRI information strategy addresses some of these needs and the MIRRI outreach and communication strategy and working with WP2 information gathering activities must support efforts in the ultimate design of the MIRRI data offer.

» TASK WP8.2 PROVIDE STRATEGIES FOR DATA EVALUATION AND CURATION

Task 8.2 is concerned with the development of strategies to evaluate and curate the present and future data in MIRRI to guarantee a continuous exchange and integration of data without extensive manual intervention. The aim is to provide standardized data formats and to develop control mechanism and programs (or easy-to-use Web Services) for the mostly automatic incorporation of missing information in blank data fields.

The first milestone (MS 7, M8.2.1) due within month 15 was the workshop on strategies for data evaluation and validation, which was held at “La Sapienza” University in Rome on February, 25th 2014. A cross-section of European collections, different in size and focus, presented their data management, evaluation and validation strategies. In summary, the majority use flexible in house databases, but also commercial software or are stuck in rudimentary management systems. The latter are searching for an “ideal” solution with good perspectives. However, during the discussion, it became clear that an optimal solution as well as ready for use general database templates do not exist.

Still, input of initial strain metadata by the depositors is often performed via paper based accession forms. Advanced collections offer web accession forms bypassing the transcription step and directly recording data only in digital form. Concerning data validation, biocurators are covering quite different parts of the *in house* pipelines, leading to heterogeneities in the curation and validation results. Only some collections have established specialized personnel, as data typists or data/taxonomy curators. Consequently direct quality assessment and exchange of validated information is impeded.

From recent European projects like MINE and CABRI it could be derived that common data fields (e.g. the CABRI full data set) enforce data exchange, but information within each single data field has to be strongly harmonized and standardized to allow for full comparability and interoperability. This holds true for each of the different strain catalogues, but also for whole sets of strain metadata. Within the workshop the problem of incompatibility could be nicely demonstrated for complex CABRI data fields like the “history of deposit” or “conditions for growth”. The proposed solution is a full atomization of datasets as performed in BacDive and the MIXS Standard. Furthermore, besides detailed specifications for each of the fields (compare Task 8.1), standard annotation protocols, controlled vocabularies, terminologies as well as ontologies have to be developed and applied.

The main achievement, agreed by all participants of the workshop, is the establishment of automatic comparison methods and a clearing house within the envisioned MIRRI-Information System (MIRRI-IS). BRCs would provide their information to the centralized MIRRI-IS system. Ambiguous data will be flagged or voted to finally provide an agreed and validated dataset.

The strategy for a common, standardized procedure for a data validation system includes:

- » Definition of a common set of data fields and the detailed description of the content of the fields
- » Automatic comparison of the data (backbone procedure)
 - » Creation of similarity matrices
 - » Versioning of data entries
 - » Calculation of similarity trees based upon the similarity matrices
 - » Pinpointing of errors for curation
 - » Data curation by curators of the BRCs
 - » Provisioning of validated data by the central clearing house

The data evaluation, validation and curation strategy within MIRRI-IS is an essential part, as it allows comparison of the data and error correction which is important for academic research and industrial partners. The outcome of the workshop and ongoing discussions will lead to the upcoming Deliverable 8.2 "*Report on strategies for data evaluation and validation and on potential mechanisms and improvements for ICT*" which is due in month 24.

» TASK WP8.3 PROVIDE STRATEGIES FOR DATA INTEGRATION AND INTEROPERABILITY

The objective of this task is to assess how MIRRI will implement data integration and systems interoperability on the information level. This task is therefore aimed at examining data management systems at involved collections, identifying further databases that could be integrated, analyzing terminologies and ontologies, in order to identify fundamental semantic concepts, studying possible interrelations among catalogue data and databases, by also studying the associated semantics, and comparing integration systems that could be adopted by the infrastructure.

The main achievement due within month 18 was the workshop on strain data and metadata, on semantic sources and on external databases to be considered for the integrated system (MS 8, M8.3.1). The workshop was held on February 25-26, 2014, in Rome, at the University of Rome "La Sapienza". In this workshop, three main issues have been faced and discussed. For each of them, an agreement has been achieved among participants, and next steps towards the preparation of the related deliverable (D8.3) have been defined.

The concept of a Minimum Data Set (MDS) for MIRRI has been examined in detail. Such a dataset could drive the attention to a limited amount of information, while hiding the crucial aspects of data formats, that must be stressed in order to achieve interoperability, and of applications' oriented data, that are essential for innovative downstream applications. In order to avoid such risks, partners agreed to organize the involved information on the basis of their application domains and to examine data in existing standards in order to identify proper data structures, including data type, values, syntax, best reference lists, terminologies, and ontologies when appropriate. This analysis, which is underway, may allow defining software objects around data types at the same time, as well as related analysis methods, thus supporting the creation of software models and libraries which not only can improve interoperability, but also support the design and development of application oriented software tools.

Many databases that could be usefully interconnected with collections' data have been discussed. It is clear that there is a great chance for an integration that may allow innovative downstream analysis, but a careful analysis of the numerous databases of possible interest is needed, with the aim of identifying the information that should be linked and the best way for establishing links. Moreover, lists of biomedical databases, such as the Nucleic Acid Research (NAR) online Molecular Biology Database Collection, will also be carefully examined in order to identify further databases of possible interest.

Semantic sources have proven to be an essential tool for data integration in life sciences. Their main role consists in the definition of a shared terminology for information sources, which is the best way to interconnect them and to enable related information systems to interoperate. The analysis of semantic sources which could be useful for the definition of proper data structure/contents of requested data and/or which could support interconnection with external databases is currently in progress.

These activities have been carried out in tight connection with other WP8 tasks. The initial concepts and ideas related to this activity have been presented at various conferences, mainly at poster sessions.

The outcome of the workshop and ongoing discussions will lead to the Deliverable 8.3 "*Report on workshop and surveys on current collection status of data management systems, metadata sources, semantic systems, and molecular, taxonomy, nomenclature, bibliography and environmental databases to be considered by the platform*" which is due in month 24.

» TASK WP8.4 PROVIDE STRATEGIES FOR ACCESS

The WP8.4 task aims at developing strategies for data access. This includes, for example, the use of appropriate ontologies (controlled vocabularies) which are essential to facilitate interoperability between data sets. In preparation of the deliverable D8.5 "*Report on user requests, desired features, and meta-analyses of the integrated platform*" VKM organized a workshop on features, navigation and access of the MIRRI portal back to back with the ECCO XXXII meeting in Athens (June 11-14, 2014). A summary paper on user needs and assessment of data structures in particular an analysis of data fields from European collections was prepared. According to the workshop report and discussions Deliverable 8.5 was submitted to EC in October 2013.

Deliverable 8.5 describes how the MIRRI infrastructure can provide an optimal information system to facilitate access to the data of BRC collections at various levels. A number of activities described in the MIRRI DoW were conducted to prepare the deliverable:

These comprise:

- » A user survey on content and extend of data retrieval from BRC collections
- » Monitoring user requests on collection sites and integration systems, such as CABRI
- » Defining the required features of the portal for access for all users, both internal and external to the project
- » Evaluating meta-analyses that the integrated platform should be able to perform.

Overview of results:

- » The components of a MIRRI-IS were compiled, analysed and allocated to six levels of priority:
- » *Priority one* - information problems to be solved
- » *Priority two* - data contents and structures necessary to resolve each of the information problems, data standards and vocabularies necessary for these data
- » *Priority three* - ontologies (or controlled vocabularies/dictionaries) connected to these data standards
- » *Priority four* - user-level functions, interfaces, algorithms, interchange protocols
- » *Priority five* - required software
- » *Priority six* - the information system as a final product

At priority level one, six generic information problems were identified for MIRRI to solve. At level two, the content of culture collection catalogues presented online were studied, a list of popular data fields was collected, and these were compared with recommended data standards to facilitate resolution of the identified problems at priority level one.

At level three it was discovered that absence of the necessary ontologies (or controlled vocabularies/dictionaries) may present an obstacle for the MIRRI information system. The first three generic information problems don't necessarily need ontologies. However, the last three generic information problems will be based on an advanced search system with the positive effect of an MIRRI information system may be minimal if we have no detailed specification of a core set of standard data fields and good curated ontologies (or controlled vocabularies/dictionaries).

CONCLUSIONS AND NEXT STEPS:

The obstacle discovered at the current stage refers to defining a core set of data fields across BRCs (MDS) invoking ontology/controlled vocabularies where necessary and feasible. They represent the central part of activities in the nearest future.

The subsequent workshops in Amsterdam and Rome (MS7 and MS8) focused on MIRRI-IS and MDS. VKM reported the main characteristics of future MIRRI MDS - which include a recommended list of field, type of fields, and comparison with the most popular datasets outside MIRRI. Moreover VKM collected the list of functions that may be implemented in MIRRI-IS. Evaluation of ontologies, protocols, software tools necessary for MIRRI-IS will be part of the preparation for the next deliverable D8.6 "Report on human and programmatic access" due in month 33.

II. SIGNIFICANT RESULTS

Discussions to date have resulted in the MIRRI WP8 vision to establish MIRRI-IS. MIRRI-IS intends to deploy an integrated, high-quality, manually annotated, non-redundant micro-biological resource database which provides all relevant information data and associated contextual data (metadata) about a particular biological resource. It will link these data to other relevant data sets to facilitate the generation of knowledge from data. It will provide high quality well curated strain data to enable discovery of new products and properties and drive innovation in microbiology. Innovative links to ecological (substrate and habitat), genomic and chemical properties and metabolic pathways to taxonomic and environmental relationships will facilitate the user finding microbial resources to enhance their studies and find new leads and products.

MIRRI-IS will define itself by:

- » high data quality and intensive data curation.
- » interoperability and data integration across BRCs/CCs.
- » providing an open platform for innovative downstream data analysis and product development.
- » establishing complementarity with ontologies used in other disciplines, applying appropriate data structure and standards interrogation of the information landscape at many levels; currently only possible through direct links via strain numbers and organism names.

MIRRI-IS will integrate services and resources, bridging the gap between the BRCs/CCs and the stakeholders. It will focus on smaller datasets, but very well curated, which are expected to be highly appreciated by the community, and will serve as a reference for academia and industry stakeholders. MIRRI-IS will be designed as the central entry point for users, curators and developers that need access to the integrated knowledge of BRCs/CCs and selected third party databases (Figure 8.1).

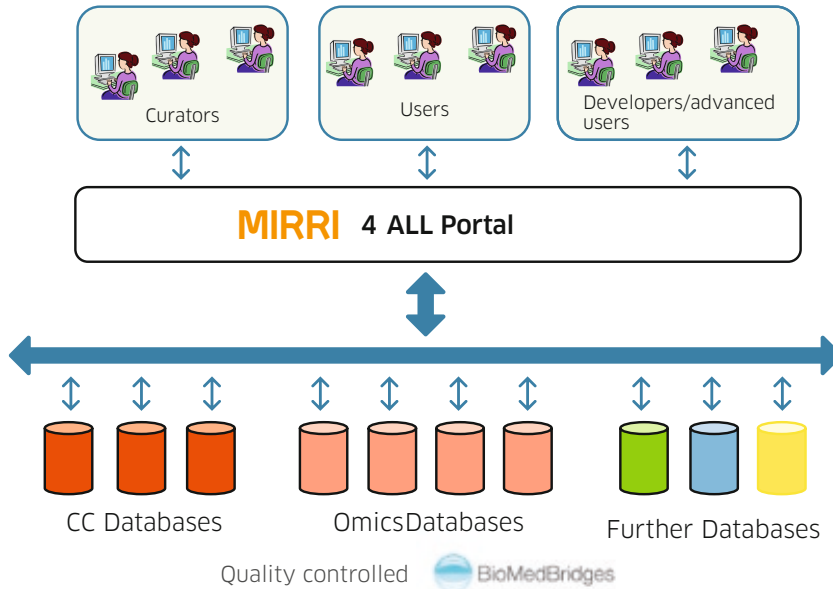


FIGURE 8.1: VISION OF THE MIRRI INFORMATION SYSTEM (MIRRI-IS) PROVIDING ACCESS TO INTEGRATED, QUALITY CONTROLLED INFORMATION AND ASSOCIATED CONTEXTUAL DATA (METADATA) ABOUT A PARTICULAR BIOLOGICAL RESOURCE.

III. REASONS FOR DEVIATIONS FROM ANNEX I AND IMPACT ON RESOURCES

No deviations.

IV. EXPLAIN THE REASONS FOR FAILING TO ACHIEVE CRITICAL OBJECTIVES AND/OR NOT BEING ON SCHEDULE AND EXPLAIN THE IMPACT ON OTHER TASKS AS WELL AS ON AVAILABLE RESOURCES AND PLANNING

None.

V. STATEMENT ON THE USE OF RESOURCES

The amount of person months used in this WP, to month 18, is commensurate with the achievements by all partners working in this WP.

VI. (IF APPLICABLE) PROPOSE CORRECTIVE ACTIONS

None.

WORKPACKAGE 9 – LEGAL OPERATIONAL FRAMEWORK FOR ACCESS TO MICROBIAL RESOURCES

I. SUMMARY OF PROGRESS TOWARDS OBJECTIVES AND DETAILS FOR EACH TASK

During the Kick-off meeting an action plan for WP9 was discussed and agreed upon. For **Task WP9.1**, questions were formulated and included in the Collection questionnaire (managed by WP2) to collect information on experiences with issues of intellectual property rights (IPR) and access and benefit sharing (ABS) and the use of material transfer agreements (MTAs). MIRRI partners also provided the MTAs for supply and accession of microbial genetic resources (MGRs) to third parties for an analysis. The Nagoya Protocol (NP) and the draft EU ABS regulations were compared and analysed to identify key-issues for mBRCs with regard to accession, supply and exchange of cultures. To influence the decision-making process with regard to the implementation of the NP, these key-issues were communicated at the following levels, (i) to the EC and the European Parliament (EP) Rapporteur, by the Task leader Gerard Verkley in coordination with the WP9 partners, (ii) to the national focal points (NFPs) and members of EP by individual MIRRI partners. WP 9 produced a document providing guidance to the partners for this process, and the Task leader regularly received feedback from the partners on developments. Several MIRRI communications were delivered to the EC and EP Rapporteur, which led to an invitation by the latter to discuss further in Brussels. In addition, MIRRI WP9 participated and contributed to international meetings on ABS in Japan, Brazil, and China, a CBD discussion forum, and responded to two requests for providing an overview of voluntary best practices, model clauses and standards, one by the EC and a second one by the Commission on Genetic Resources for Food and Agriculture (CGRFA) of the Food and Agriculture Organization (FAO) of the United Nations. Concerns and interests of MIRRI were heard and taken into account, especially concerning the scope, the proposed system of Registered Collections, and monitoring user compliance. At the second MIRRI Annual Meeting in Amsterdam the elements for a MIRRI policy and minimal requirements for enhanced compliance were discussed. Further input in the preparation towards Deliverable 9.1.1 (due M18) was provided, resulting in the timely submission of D9.1.1. In preparation for D9.1.2 (due M24), a draft for minimal requirements for transfer agreements was formulated and is currently being reviewed by partners.

For **Task WP9.2** a separate questionnaire comprising 19 questions was designed with the purpose to gain insight into the practical problems mBRCs experience in applying the current biosecurity regulations, viz., dangerous goods regulations, risk group classifications and especially export control. The Task leader Christine Rohde sent the questionnaire to all MIRRI partners on May 8th, 2013, setting a deadline by end of May. Because of the sensitivity of the topic of implementation of biosecurity by the partners, responses were dealt with confidentially, remaining only with the two WP9 Task leaders. Ten collections responded, often in a remarkably detailed way. For the analysis of the results, the mBRCs were anonymized. The implementation of the aspects addressed was classified in a range from “optimally implemented” to “clear obvious gap”. The results were summarized and presented during the second MIRRI Annual Meeting. The questionnaire was effective for the identification of weaknesses in the implementation of biosafety and biosecurity regulations, and for determining the gaps and weaknesses in biosecurity information resources available to the mBRCs. As also planned, a practical comparative biosecurity risk assessment was carried out. For this “exercise”, five fungal and five bacterial taxa were selected as subjects for a biosecurity risk assessment by the mBRCs. The aim was to identify and compare the methods and “tools” the mBRCs currently use for their risk assessments and also to compare the risk level these mBRCs assign to the taxa. Seven partner mBRCs participated. Streamlining risk assessment practices seems necessary, as the range of methods applied varied from a very detailed biosecurity SOP to a simple biosecurity risk assessment. These results will be used for developing more uniform tools for biosecurity risk assessment in the MIRRI mBRCs. The Milestone M.9.2.1 was thus achieved, and the results call for further collaborative actions in WP9.

» TASK WP9.1 DEFINE A MIRRI POLICY ON IPR AND ACCESS AND BENEFIT SHARING (ABS) IN COMPLIANCE WITH THE CONVENTION ON BIOLOGICAL DIVERSITY (CBD) (M1-36)

EU LEVEL ACTIVITIES

Task-coordinated activities and communications. A formal position document “Response of MIRRI to the Proposal for a Regulation of the European Parliament and of the Council on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization in the Union” was sent to DG ENVI of the European Commission (Vassilis Koutsouris, Hugo-Maria Schally), and to the Rapporteur Sandrine Bélier and her Shadow Rapporteur Gerben-Jan Gerbrandy for the ENVI Committee of the European Parliament (March 14, 2013) (Annex WP9-1). WP9 attended the “Workshop on Access to Genetic Resources and Fair & Equitable Sharing of Benefits” on March 19, 2013, organised by the ENVI Committee of the EP. MIRRI asked for a clearer description of the duties of “Union Trusted Collections” (Art. 7; later emended to “Registered collections”) (see Workshop Proceedings document IP/A/ENVI/WS/2013-02, p. 13). WP9 was invited for a meeting at EP Rapporteur Belier’s office on May 15th, 2013 to discuss the MIRRI response (Annex WP9-2), and also MIRRI’s view on the latest amendments published by the Rapporteur (PR\935365EN.doc), of which the ones pertaining to the very general definition of “Research and development” (amend. 28), the temporal scope of “new utilisation” (amend. 21 and 47), and the establishment of a Union Benefit Sharing Fund pending a global multilateral mechanism (amend. 71), for which it was suggested by MIRRI to use some funds to support collections that have difficulties to meet the criteria of “Union Trusted Collection”; to summarize what was discussed in the meeting, MIRRI sent a letter to Bélier (May 22, 2013) (Annex WP9-2).

Lobbying MEPs by individual MIRRI mBRCs. A letter “MIRRI Response to amendment 21 and 22 Access and Benefit Sharing_A7-0263-2013.pdf” (amendments A7-0263, Rapp. S. Belier) was sent on Sep 10, 2013, to the MIRRI partners with the request to forward the letter to their national MEPs. Although short notice, partners responded promptly. The letter called for attention to two amendments, i.e., the retrospective scope of the proposed Regulations (especially amendment 21) and the broad definition of “Research and development” to include DNA extraction, for example, nowadays needed for most routine identifications of MGRs (amend. 22). During the trilogue negotiations between the Parliament, the Council and the Commission, a document with an overview of the Council Presidency compromise text and comments was received by MIRRI. This text and input from some national representatives were used to draft another letter for MEPs to again lobby, and briefly note the key-points of importance for MIRRI. The mail “MIRRI key-points for the trilogue negotiations on the ABS Regulation for the Union” was sent to the MIRRI partners on Nov 1st, 2013, with request to forward to MEPs; a copy was also sent by MIRRI WP9 to key persons at the Commission. MEPs from Belgium, France, Germany, the Netherlands, and UK were thus informed.

MIRRI WP 9 RESPONSE TO THE EC INVITATION TO PROVIDE AN OVERVIEW OF MODEL CONTRACTUAL CLAUSES AND BEST PRACTICES

MIRRI received an invitation from H.-M. Schally of EC DG-ENVI Dir. E [Ref. Ares (2013) 2269577-18/06/2013] to provide information about model contractual clauses, best practices etc. developed in the microbial domain. A document was prepared by the WP leader in collaboration with several participants of WP 9.1, and sent to Schally’s office on July 19, 2013 (Annex WP9-3).

In response, the EC office informed the Task leader that the document will be attached in the annex of the official submission of the EU and its Member States to the Ad Hoc Open-ended Intergovernmental Committee for the Nagoya Protocol on Access and Benefit-sharing (ICNP 3).

NATIONAL / OTHER REGIONAL ACTIVITIES

Preparation of a guidance document. During the MIRRI WP9 meeting in Athens in June 2013, the need was expressed by the partners for guidance from WP9 for starting a dialogue with national authorities who are preparing for the entry into force of the NP. Such guidance would help to have a more harmonized input from

the collections in the different Member States. A Guidance Document was produced and feedback provided by several partners. The final document was sent to the partners on July 19, 2013 ("MIRRI WP 9 Guidance document 1v2.pdf", Annex WP9-4). Recommendations are provided on important issues to discuss, concerning inter alia temporal scope, criteria and requirements for "Union Trusted" Collections, third-party transfer, model contractual clauses and best practices used or under development in the microbial resource center community. While the negotiations for the EU Regulation on ABS were ongoing, the collections took action to become involved with the national processes towards NP implementation. Although at this time not all is clear concerning the outcome of the EU negotiations, it is important that mBRCs have started communicating with their domestic authorities to express their concerns and begin the process of clarifying which possible roles mBRCs can play for an effective implementation at national level.

MIRRI partners successfully established a fruitful dialogue with national competent authorities during the reporting period, and there is now direct contact on a more or less regular basis with policy makers and legal experts of the relevant Ministries in France, Greece, Italy, the Netherlands, Spain and the UK. Key-persons at National Focal Points, ministries, governmental committees etc. could be readily identified. In some countries, the most important public collections holding genetic resources first arranged to meet and discuss common problems and concerns, and set out a strategy, before approaching their national authorities. In other countries, national ABS stakeholder groups are established and meet regularly now. From the feedback provided to WP9 by the partners, it can be concluded that the authorities generally show an interest in the MIRRI's view on ABS. Most authorities are also willing to provide information about the national ABS policies. The governments seem to realize that they need the collections in order to be able to successfully implement the NP, and are prepared to listen to concerns and critical remarks made by the mBRCs concerning the development of the regulation for ABS in the Union. It is crucial that the mBRCs can make clear to the authorities what they (the mBRCs) can realistically do with the limited financial and personnel resources at their disposal. In some countries the possibilities for a successful dialogue seem less favourable, but overall the situation is hopeful. Still, important aspects for the practice of ABS regimes such as the establishment of check-points, the issuance of Certificates of Compliance, requirements for collections that want to apply for recognition for the Register, etc., that are crucial for implementation at national level, cannot be resolved before the EU ABS regulations is finalized, leaving many issues to discuss for MIRRI and other stakeholders at national level in coming time.

INTERNATIONAL OUTREACH ACTIVITIES

MICROB3

The EU 7FP project MicroB3 (Marine Microbial Biodiversity, Bioinformatics, Biotechnology) project organized a stakeholders workshop "Towards a Model Agreement on Access and Benefit Sharing for Marine Genetic Resources (with a focus on marine micro-organisms)", on 27-28 February, 2013 in Brussels. Ten MicroB3 partners met with different stakeholders: legal experts; scientists; economists; industry, government and culture collections representatives to discuss the legal work undertaken so far by the project's WP8, and especially the model Access and Benefit Sharing Agreement for marine genetic resources, being drafted as a deliverable of the WP. Five providing countries participated to the meeting with representatives from the scientific, legal and ministerial sectors. MIRRI WP 9 Leader and representatives of the EU consortia BlueGenics, PharmaSea, and SeaBioTech were present and exchanged experiences and ideas. On the first day legal and scientific experts introduced the framework of the ABS agreement and its synergies with research and development, while on the second day stakeholders analysed the core clauses of the Agreement.

CBD

David Smith (CABI) participated in a discussion group on 'Global Multilateral Benefit-Sharing Mechanism (Article 10 of the Nagoya Protocol) as an inter-sessional activity emanating from COP decision XI/1, section B'. The discussion ran from 8 April to 24 May 2013. There were four rounds of discussions structured around the questions contained in DoW Annex I to decision XI/1. In summary the discussion focussed on issues

where PIC and MAT may not be possible e.g. transboundary issues where genetic resources occurred in more than one country. The opportunity was taken to introduce the special case for microorganisms and ex situ collections of them. A number of participants in the discussion were invited to a meeting in September to discuss the consensus of these discussions that will be presented in a summary document.

Africa. David Smith contributed to specific interactions with Africa through participation in a work shop funded by Leeds University, Leeds African College and the WUN - The Worldwide Universities Network (WUN). The workshop Framework for the economic development of microbial resources in sub-Saharan agriculture was an opportunity to connect MIRRI to Kenya's developing biosciences policy on conservation and utilisation activities in microbiology.

EU-Brazil sectorial dialogues. The Brazilian Ministries of the Environment (MMA), of Development and Planning (MPOG), and of Science, Technology and Innovation (MCTI), in collaboration with the Brazilian Agricultural Research Corporation (Embrapa) organized the Workshop "The role played by biological collections under the Nagoya Protocol" held on June 18-20, 2013, in Brasilia, Brazil, within the program "EU Brazil Sectorial Dialogues - Action: Brazil-EU Dialogue on the implementation of the NP". Gerard Verkley was invited to represent MIRRI and provided input from the culture collections' side for the discussions on how to implement the Protocol and how the mBRC community could contribute to a workable solution that supports the main goals of the CBD while avoiding unnecessary administrative burdens for the collections and researchers (without intentions of commercial activities). MIRRI and several other stakeholders stressed the importance for the provider countries not to a priori obstruct research with commercial intent on ex situ MGRs, but to allow an atmosphere of trust to develop where benefits will be shared with parties entitled when utilization of such resources ultimately leads to commercialization. WP 9.1 task leader commented on the draft report of the Workshop. The final report was received August 2, 2013, and disseminated to the MIRRI partners August 29, 2013 (Annex WP9-5).

FAO CGRFA

Through David Smith MIRRI received an invitation from the Secretary of the intergovernmental Commission on Genetic Resources for Food and Agriculture (FAO-CGRFA), to provide an overview of voluntary codes of conduct, best practices and standards, to support the Commission's work aiming to reach international consensus on policies for conservation, access and sustainable use of genetic resources in line with the CBD. MIRRI's response underpins the importance of ex situ preserved MGRs within the wider range of biological resources used for global research in agriculture, food production, and plant health. An overview was submitted to the Commission's secretariat on March 14, 2014 (Annex WP9-6).

ABS SYMPOSIA AT OTHER INTERNATIONAL MEETINGS.

There has been considerable interest from BRCs in Asia and elsewhere for the draft regulations on ABS of the European Commission, as was very clear at the NITE-NBRC 10th Anniversary Symposium held in Tokyo, Dec. 6, 2012, which focussed on the consequences of the Nagoya Protocol for BRC management. Invited speakers Philippe Desmeth focussed on the work done in MOSAICC and MOSAICS while Gerard Verkley introduced the MIRRI project with special attention to its WP9, and the main features of the EU ABS draft regulations.

Gerard Verkley delivered a lecture at the 13th International Congress of Culture Collections (ICCC) of the World Federation for Culture Collections (WFCC) in Beijing, addressing the implementation of the NP in Europe and providing an update on MIRRI activities, in the symposium "Laws and Regulations: CBD, NP and IPR", on September 25, 2013.

MINIMAL REQUIREMENTS FOR AN MTA FOR DEPOSIT OF MGRS IN CULTURE

Currently used material transfer agreements for supply and deposit of MGRs (as far as available) were received from CABI, KNAW-CBS, CECT, INRA-CIRM, CRBIP, DBVPG, MUM, and MUT. Only CIRM provided a material accession agreement (MAA), other collections do not use one yet. The "Core MTA" that was adopted

by the European Culture Collections Organization (ECCO) in Feb 2009, was also taken into account. MTAs used by mBRCs outside Europe were also studied, and WP9.1 task leader met with other collections at a closed workshop organised by NITE-NBRC in Chiba, Japan, on Dec. 7, 2012. Attending mBRCs were BIOTEC, CCGMC-IMCAS, KTCC, NBRC, JCM and, for MIRRI, BCCM (Philippe Desmeth) and KNAW-CBS (Gerard Verkley). During this workshop experiences of using MTA's for accession, supply and exchange of material were shared, and ideas on how to assure compliance under the NP were exchanged. The information obtained during this workshop, and the response on questions 21-30 on IP and ABS in the Culture Collection questionnaire (WP2), provided essential input for formulating minimal requirements for transfer agreements. A preliminary list of minimal requirements was first presented and discussed at the second Annual Meeting in Amsterdam. An updated list of minimal requirements for MAA and MTA was circulated in December 2013, feedback processed, and is again with the partners for second reading. The process of development of the EU ABS Regulation and its final implementation at national level in the EU Member States is still ongoing, and although some issues have been settled in the trilogue negotiations, it will be some time (end 2014?) before the situation will be completely clear, and the minimal requirements for MIRRI can be finalized.

» **TASK WP9.2 DEVELOP A COMMON APPROACH FOR MBRCs ON RISK ASSESSMENT AND EVALUATE THE PRACTICAL IMPLEMENTATION OF THE BIOSECURITY CODE OF CONDUCT FOR BRCs**

GAP ANALYSIS IN BIOSECURITY INFORMATION RESOURCES.

A biosecurity questionnaire (Annex WP9-7) was designed in February 2013 and the design was introduced and discussed during the WP leader meeting in Ghent, Feb. 28, 2013. It was agreed that this questionnaire would not be part of the WP2 Collection questionnaire, because of the sensitive nature of the subject and the fact that more questions were needed than was feasible in the online WP questionnaires. The principle of this specialized questionnaire is that it is considering strictly the structure and key issues of the *Code of Conduct on Biosecurity for BRCs* (see below). The 19 questions included in the questionnaire were directly related to the seven key topics of the Code, and the results provide a necessary basis for all further work within this task. Responses were collected up to the end of May 2013. As the questionnaire has a focus on implementation of biosecurity by the partners, responses need to remain confidential. Analysis of results has been performed by the two WP9 Task leaders exclusively and remains in their hands. Code numbers have been given to the responding collections and a brief key was developed for classifying the responses regarding implementation. Ten collections responded in often remarkable detail, and these responses are sufficient for further work in Task 9.2. The main results are as follows:

- » Physical security of high risk MGRs is in order in all responding collections
- » Guidance for setting up biosecurity risk management procedures and risk assessment is desirable
- » More attention is required in some mBRCs towards export control implementation
- » Management and infrastructure weaknesses concerning biosecurity, mostly caused by lack of personnel or lack of sophisticated IT systems to support the staff in their work, need to be addressed
- » The procedural document of the Code of Conduct published in IJSEM* will have to be carefully taken into account (see below)
- » Current information resources for conducting risk assessment are limited
- » It seems necessary to elaborate a list of information resources for daily use in practice
- » Awareness raising through training needs development in some collections - for this purpose a guidance document will be set up by WP9

Export control is the most serious biosecurity issue which requires solid processes where failure is excluded. MIRRI will collect information on contact points and authorities for each country.

THE CODE OF CONDUCT FOR BIOSECURITY FOR BRCs.

MIRRI has taken the Code on board as it forms a solid basis for implementation of biosecurity risk management at the level of the mBRCs and can give MIRRI direction to develop a general policy on biosecurity. The Code was developed in a successful cooperation between EMbaRC and the GBRCN Demonstration Project, in which most MIRRI partners were also involved. The text of this Code was agreed upon in September 2011 during an EMbaRC/GBRCN Workshop in Utrecht. The Code was introduced to the 7th Review Conference to the BTWC, United Nations, Geneva, Dec. 2011 (IJSEM 63, 2374-2382, 2013). The document provides detailed information on all aspects regarding biosecurity and contains *inter alia* a general detailed flow scheme on export control in the supplementary materials. A short article on the existence of the Code and on the IJSEM publication was published in FEMS Focus 15 to highlight its significance on the occasion of the FEMS Conference, Leipzig, on July 21-25, Germany. This article refers to MIRRI and its related activities under Task 9.2.

Biosecurity risk assessment. As is explained in the DoW, mBRCs experience considerable difficulties in performing risk assessments in practice. In order to understand how mBRCs currently perform risk assessments and to identify gaps and weaknesses in the process, a practical comparative biosecurity risk assessment was started. A small group of MIRRI experts selected five fungal and five bacterial taxa as subjects for this assessment (Table 9.1.). Included were examples of recently emerged pathogens that, if ending up in wrong hands, could pose a potential threat to human and plant health, food security and/or could possibly inflict considerable economic damage. The ten partner collections that responded to the WP9.2 questionnaire were independently asked to perform the risk assessment for the organisms. The primary aim of this work was to determine what methods are being used currently by MIRRI mBRCs and to compare these methods as well as the outcome, i.e., the assignment of risk levels to each of these organisms. In addition, the participating mBRCs were asked to describe how they got to their final result. Seven partner collections responded. A first analysis of the results shows that the range of methods and tools used for the assessment is broad, varying from a very detailed biosecurity SOP to a simple biosecurity risk assessment. After the evaluation is completed, the next step will be to develop a streamlined guidance for MIRRI mBRCs to perform biosecurity risk assessments which would contribute to increased harmonization of biosecurity risk management throughout the Research Infrastructure.

TABLE 9.1. MICROORGANISMS SELECTED FOR THE PRACTICAL BIOSECURITY RISK ASSESSMENT

Bacteria	<i>Clostridium difficile</i> <i>Legionella pneumophila</i> <i>Vibrio mimicus</i> <i>Xylella fastidiosa</i> <i>Yersinia pseudotuberculosis</i>
Fungi	<i>Fusarium oxysporum</i> var. <i>cubense</i> race 4 <i>Phyllosticta citriasiana</i> <i>Cryptococcus gattii</i> (<i>Filobasidiella bacillospora</i>) AFLP-6 group, AFLP-4 group <i>Candida orthopsilosis</i> <i>Aspergillus arachidicola</i>

External expert contact partners will be identified by MIRRI to help fill gaps. Information on experts collected in previous work (several years ago) is still available, and can be taken on board and checked. The gap analysis will be performed in detail and the results distributed (confidentially). Using the German BAFA liaison, contact expert partners and authorities in Europe will be contacted by MIRRI in order to ask for support especially regarding export control matters which seem to be a difficulty in implementing biosecurity. There is a brochure “EU Cooperation in export Control of Dual-use Goods”, by BAFA. This will be used as a supplementary tool.

INTERNATIONAL OUTREACH ACTIVITIES

The Biosecurity Code was also presented at the International Medical Biodefense Conference, Munich, October 22-25, 2013. Christine Rohde presented a keynote speech at the UNODA-organised Conference on the UN Resolution 1540, the second so-called Wiesbaden Conference (Wiesbaden, Germany, December 2013).

II. SIGNIFICANT RESULTS

The deliverable D.9.1. was submitted on April 2, 2014. This document delivers the elements to achieve the main objective of WP9.1, which is to define a MIRRI policy on IPR and ABS, in compliance to the CBD. It also provides a package of minimal requirements that MIRRI needs to reach full compliance with the CBD and the NP, and IP issues.

The Milestone 9.2.1 was achieved. The gap analysis performed in Task 9.2 delivered a clear list of items that can be worked on in the second reporting period of MIRRI.

III. REASONS FOR DEVIATIONS FROM ANNEX I AND IMPACT ON RESOURCES

No deviations from the DoW occurred during the reporting period.

IV. EXPLAIN THE REASONS FOR FAILING TO ACHIEVE CRITICAL OBJECTIVES AND/OR NOT BEING ON SCHEDULE AND EXPLAIN THE IMPACT ON OTHER TASKS AS WELL AS ON AVAILABLE RESOURCES AND PLANNING

None.

V. STATEMENT ON THE USE OF RESOURCES

All resources were used as planned.

VI. PROPOSE CORRECTIVE ACTIONS

Not applicable.

WORKPACKAGE 10 – INNOVATIVE APPROACHES

I. SUMMARY OF PROGRESS TOWARDS OBJECTIVES AND DETAILS FOR EACH TASK

Though strategies to be developed in individual Work packages are still in their infancy the MIRRI vision is clearly visible from the content of WPs 1 to 9. WPs 1 to 3 will design the Central Coordinating Unit (Executive Secretariat), the Legal and Governance Structures and the Finance Plan of this distributed infrastructure. A second draft of the Business Plan (Business Case) has been finalized and sent, together with a Memorandum of Understanding to national stakeholders for indication of their interest in future support and funding.

Work packages 2, 5, 6, 7, 8 and 9 are strongly interlinked as they will explore, define and transfer the user needs into a MIRRI offer to foster academic research and enhance the bioeconomy in Europe with a hitherto unparalleled coordination of:

- » a broad depth and breadth of authenticated holdings
- » guidance on best practice and quality management tools to fulfil users requirements on resources
- » tailor-made services for isolation, metabolite screening, identification and maintenance
- » associated interoperable data, linking catalogue data with relevant data from public databases and the scientific literature
- » training and teaching programs in the management of microbial resources, filling a gap left by university curricula
- » centralized advice in legal and IP issues, biosafety and biosecurity, and other microorganisms-relevant rules and regulations

Figure 10.1. summarizes the present state of MIRRI achievements in a single diagram, focusing on four key elements of its vision:

Protection of investment spent by research agencies in supporting research on microorganisms by safeguarding key microbial resources

- » stored in academic research collections from negligence
- » covered in the scientific literature to verify results and to be available as references

Assurance that MIRRI partner collections play their responsible role in the chain of information connected to the transfer of resources from the provider to the isolator, depositor and on to the end-user according to articles laid down in the Convention on Biological Diversity and the Nagoya Protocol.

Coordination and harmonization of offers and expertise require the intense dialogue of MIRRI collection managers and their funding authorities on mandates and future development to minimize overlap in holdings and unnecessary duplication of holding strength in order to free space for expansion. Though heavily driven by historic and national interests, the first meeting of collections managers showed an awareness of the importance to move forward in order to build a truly coordinated European infrastructure.

The **Holistic approach to data management and use** is one of the challenges also recognized by other ESFRI infrastructures. Strain information scattered in different mBRCs, databases and the scientific literature must be identified, sorted, curated, made interoperable and provided by an open platform to serve the users need for data analysis and product development. As the dimension of the task is tremendous the responsible WP decided to concentrate on those datasets which are of high interest for users in academia and the bioindustry.

The **Integrated solution**, defining the place of MIRRI within the European landscape of users of resources and other stakeholders:

- » making the link with other ESFRI projects, above all in the BMS/BioMedBridges and environmental groups
- » reaching beyond Europe to connect to similar regional infrastructures in order to catalyse access to their megadiversity
- » fostering research in microbiology by providing resources, tools and expertise to contribute to finding solutions to the Grand Challenges; indirectly creating jobs and enhancing the development of the bioeconomy in Europe

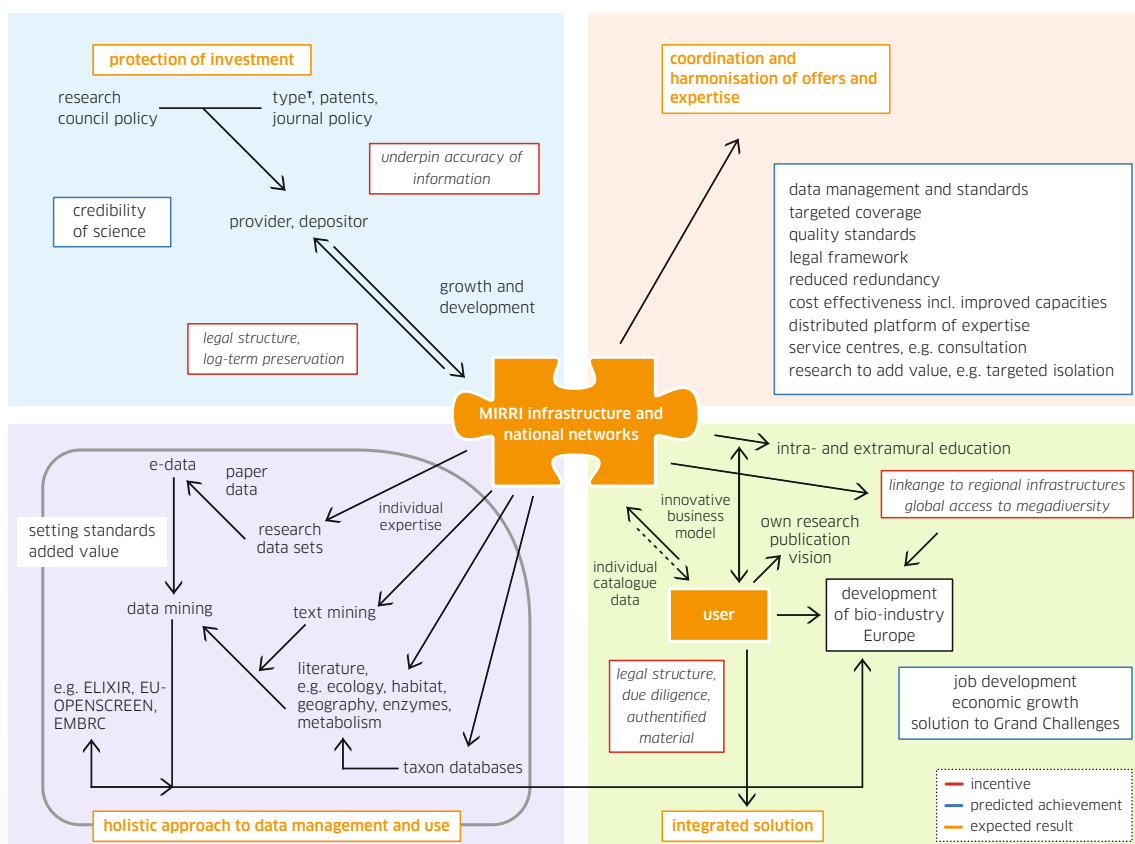


FIGURE 10.1. A SCHEMATIC REPRESENTATION OF THE MIRRI OFFER

II. SIGNIFICANT RESULTS

- » Smooth and effective communication among all Work Packages
- » Progress in all Work Packages clearly visible and delivered according to DoW
- » Development of a Business Case and Financial Plan
- » Outline of the MIRRI vision

III. REASONS FOR DEVIATIONS FROM ANNEX I AND IMPACT ON RESOURCES

No deviations from the DoW occurred during the reporting period.

IV. EXPLAIN THE REASONS FOR FAILING TO ACHIEVE CRITICAL OBJECTIVES AND/OR NOT BEING ON SCHEDULE AND EXPLAIN THE IMPACT ON OTHER TASKS AS WELL AS ON AVAILABLE RESOURCES AND PLANNING

None.

V. STATEMENT ON THE USE OF RESOURCES

All resources were used as planned.

VI. PROPOSE CORRECTIVE ACTIONS

Not applicable.

PROJECT MANAGEMENT



PROJECT MANAGEMENT

CONSORTIUM MANAGEMENT TASKS AND ACHIEVEMENTS

OBJECTIVES:

The Preparatory Phase (PP) project management of MIRRI ensures an adequate flow of all activities within the project to guarantee successful implementation. This includes the provision of comprehensive general coordination, sound administration and a legal and financial management according to the rules set by the European Commission and the Consortium Agreement. The aim is to enable fair and transparent decision-making processes, constant monitoring of the progress of the PP project and steering of all activities and implementation of corrective actions. The organisation of regular meetings (e.g. General Meetings, workpackage meetings, Steering Committee Meetings, Advisory Board Meetings) ensures a profound communication flow on all levels within and outside the PP consortium. This guarantees efficient and timely reporting to the European Commission as well as enabling MIRRI to address ethical and gender issues.

» TASK WP1.1 SCIENTIFIC AND GENERAL COORDINATION

The key objective of the project management was to carry out and to guarantee the effective coordination and management of the project: especially the day-to-day administration, coordination, and monitoring of the project's progress.

The task implies the coordination of the overall project and related activities. The achievements of the project's objectives, such as the deliverables and milestones, including their timely provision, was constantly reviewed and supervised. Where necessary, corrective actions were implemented e.g. three months activity reports were introduced to keep the management up date with the latest developments in all tasks of the workpackages and to immediately start any corrective action, if necessary. All decision-making processes were made on a fair and transparent basis and were in line with the rules defined in the collateral established Consortium Agreement. A proper consideration of ethical and gender issues were also part of the Management Workpackage as well as the analysis of events that may impact on the project and finding alternative solutions. The reinforcement of the relevance of existing tasks or workpackages or topics was thereby considered in particular.

The Coordinator acted as the intermediary between the Consortium and the European Commission and executed the project management by taking over the responsibility for the MIRRI Preparatory Phase project. Strong contacts were established to ESFRI and especially to the Health & Food Domain (former BMS-RI) as well as to CoPoRI (Communication and Policy Development for Research Infrastructures in Europe), their activities were intensively traced to participate successful in the Horizon 2020 programme of the EC. The Coordinator and the Management Team were supported by the MIRRI Steering Committee as an auxiliary body for the execution of the project. It is composed of the Coordinator Erko Stackebrandt (DSMZ), Chantal Bizet (IP) and David Smith (CABI).

A high level Advisory Board consisting of Iain Gillespie (UK), Lodovica Gullino (Italy), Indrikis Muiznieks (Latvia), Janet Thornton (UK), and Daniel Ramón Vidal (Spain) closely followed the progress of the project and gave valuable advice on the general strategy to help to maximise MIRRI's impact at several meetings, like the Kick-Off Meeting (November 2012), the 2nd General Meeting (November 2013) and the Steering Committee-Workpackage Leader Meeting in Ghent (February 2013). Experts and stakeholders were also involved at the General Meeting to provide further input to several workpackages.

» TASK WP1.2 ADMINISTRATIVE, LEGAL AND FINANCIAL MANAGEMENT

In this task the day-to-day management of the Preparatory Phase issues was handled. The monitoring of the project costs were predicted and monitored to control both, the overall costs incurred and EC support granted. Special attention was set to the distribution of the Central Budget and to the budget of the different workpackage meetings. This verification and adjustment of different financial accounts of the consortium budget was handled by the financial department, which is assigned to all financial issues regarding this project for internal adjustment of how to proceed with different financial approaches. For example an open call for the composition of the MIRRI web presence and print works for MIRRI was established: the order was allocated to the company zwei & einz, Braunschweig.

In March 2013 a Consortium Agreement for the Preparatory Phase was set up and accepted by all 16 Partners of the project. The agreement is based on the DESCAs model for FP7 projects (<http://www.desca-fp7.eu/>) lays down in detail the decision-making, governance and financial procedures as well as access rights inside the Consortium. Within the Consortium Agreement a confidentiality agreement (Non-Disclosure Agreement) was designed and signed by the Collaborating Parties, the members of the Advisory Board, Third Parties, and other Subcontractors.

» TASK WP1.3 MEETINGS AND COMMUNICATION

This task addressed the management related communications and meetings. The Coordinator and the management team were in close contact with the European Commission's representatives e.g. the project officer and administrative officer, which guaranteed a fruitful communication flow at all project levels: between Partners, Workpackages and activities (e.g. General Meetings). The Coordinator summarised the progress of the project by collecting 3 month activity reports from each workpackage, the status of the deliverables and milestones, and information concerning upcoming events and tasks. The summary and outcome of these reports were published on the secured internet site of MIRRI for all participants of the consortium. The Steering Committee met during the reporting period on a regular basis by conference telephone calls as well as face-to-face meetings in parallel to the general meetings or separate meetings.

The establishment and development and update of the MIRRI website (www.mirri.org) were a key tool in both, internal and external communication strategies. The internal password protected area of the MIRRI website was used, in addition to face-to-face meetings, phone or video conferences and email, as the main communication and archive tool within the consortium. It contains all information relevant for implementing the project (deliverables, milestones, contracts (Grant Agreement, Consortium Agreement, MoU), reports (3-months-reports, financial status (of Workpackage Meetings), joint documents (guidance notes on special topics), events, project meetings, minutes of meetings, contact persons etc.). This comprehensive management platform also contains online document editing features to facilitate the preparation of reports and studies and also provides the possibility to upload documents by the users for internal use for specific workpackages. The Kick-Off Meeting with 90 participants (Braunschweig), the 2nd General meeting with 63 participants (Amsterdam) as well as several Workpackage (Valencia, Amsterdam, Rome) and Workpackage Leader-Steering Committee Meetings (Ghent, Athens, Amsterdam), Advisory Board Meetings (Braunschweig, Amsterdam), Steering Committee Meetings (Paris, Athens, Amsterdam), and in-house meetings (Braunschweig) on a regular basis were thereby key management tools in drawing together key report content and control points for delivery. All meetings, except the Workpackage Meetings, were completely organised, executed, and supervised by the Coordinator and the management team. The execution of Workpackage Meetings was supported regarding organization and financial issues. All kinds of information regarding these meetings (programmes, flyer, lectures, and protocols) and post-processing procedures were directly published on the MIRRI webpage. Besides these meetings an expert meeting was organised in Hanover, including the directors of 11 leading European mBRCs that first met to discuss future perspectives of a pan-European infrastructure like MIRRI and its requirements for implementation.

During regular in-house meetings, besides a good communication flow within the management team, the preparation of a detailed stakeholder analysis in cooperation with an external management expert was established.

» TASK WP1.4 REPORTING

The Coordinator and his team collected, merged and checked three-monthly internal progress and financial reports (shortened from six-monthly reports) from the specific workpackage leaders, which were reviewed by the Steering Committee and published on the internal website of MIRRI at www.mirri.org to be available for all Partners and Collaborating Parties. The Coordinator and his management team were also responsible for timely collection, review, consolidation, and preparation of the first periodic report P1 (M1 - M18) according to the Grant Agreement. Financial statements were collected and will be approved by an external auditor. These aspects ensured that the project's output, such as deliverables, milestones, periodic reports and financial statements were punctually delivered to the European Commission. The status of the deliverables and milestones were constantly monitored. During the reporting period the following deliverables were submitted to the European Commission via the ECAS system (Table 1.1.):

TABLE 1.1. LIST OF SUBMITTED DELIVERABLES DURING THE REPORTING PERIOD

DELIVERABLE	SUBMISSION DATE
D1.1 Kick-off meeting	11.07.2013
D2.1 Compilation report on outputs	27.05.2014
D4.3 Draft short Business Plan	06.06.2013
D5.1 MIRRI Website	31.05.2013
D5.2 Annual General Meeting	17.12.2013
D5.4 A strategy and implementation plan	25.02.2014
D7.1 Report on available and potential new electronic tools for training	08.05.2014
D8.1 Report on minimum standards for data acquisition and data management	17.04.2014
D8.5 Report on users requests, desired features, and meta-analyses of the integrated platform	29.10.2013
D9.1 Report on strategy and minimal requirements for enhanced compliance to CBD	02.04.2014

The submission of Deliverable 6.7 "Workshop to identify improved services, the priority actions and implementation mechanisms" was postponed after reconciliation of the EC project officer Ann Uustalu from month 15 to month 25 (December 2014). As well the Deliverable 7.3 "Report on current E&T programmes" was postponed to month 23 (September 2014) in accordance with the EC.

PROBLEMS AND ENVISAGED SOLUTIONS

The consultant Prof. Ian Gillespie resigned due to new commitments as Director of Science (June 2013) at NERC (Natural Environment Research Council, UK). Advice in writing, developing and reviewing the MIRRI Business Plan, including the financial model, cost model and controlling instruments has to be switched to another expert. The search of a new expert in this field of international finance and accounting experts is under progress. Nevertheless Ian Gillespie will administer his position as chair of the MIRRI Advisory Board. He will participate in the annual project meetings, will take part in telephone conferences, face-to-face meetings and will receive regular information on the main MIRRI activities from the Coordinator. He will also provide guidance on the overall strategy and in that way helps to maximise the impact of the initiative.

CHANGES IN THE CONSORTIUM

The MIRRI coordination was transferred from Dr. Dagmar Fritze in January 2013 to Prof. Dr. Erko Stackebrandt at 1st of February 2013. This change was conducted by the first amendment of the Grant Agreement to the EC.

LIST OF PROJECT MEETINGS, DATES AND VENUES

The following list provides a list of all MIRRI project meetings from 01.11.2012 to 30.04.2014 comprising the corresponding dates and venues.

TABLE 1.2: LIST OF PROJECT MEETINGS

NO.	MEETING	NUMBER OF PARTICIPANTS	VENUE	DATE
General Meetings				
01	General Meeting: 1st MIRRI Kick-Off Meeting	90	Braunschweig	27.-30.11.2012
02	General Meeting: 2nd MIRRI General Meeting	63	Amsterdam	19.-22.11.2013
Advisory Board Meetings				
03	Advisory Board Meeting: 1st AB Meeting	5	Braunschweig	28.11.2012
04	Advisory Board Meeting: 2nd AB Meeting	6	Amsterdam	21.11.2013
Steering Committee Meetings				
05	Steering Committee Meeting: 1st SC Meeting	3	Paris	11.01.2013
06	Steering Committee Meeting: 2nd SC Meeting	4	Athens	11.06.2013
07	Steering Committee Meeting: 3rd SC Meeting	4	Amsterdam	19.11.2013
Steering Committee - Workpackage Leader Meetings				
08	Steering Committee - Workpackage Leader Meeting: 1st SC-WP Meeting	13	Ghent	28.02.2013
09	Steering Committee - Workpackage Leader Meeting: 2nd SC-WP Meeting	37	Athens	11.-12.06.2013
10	Steering Committee - Workpackage Leader Meeting: 3rd SC-WP Meeting	12	Amsterdam	19.11.2013
Workpackage Meetings				
11	Workpackage Meeting: 1st WP2 Meeting	8	Valencia	18.-19.02.2013
12	Workpackage Meeting: 1st WP3 Meeting	13	Amsterdam	19.11.2013
13	Workpackage Meeting: 2nd WP2 Meeting	10	Amsterdam	20.11.2013
14	Workpackage Meeting: 1st WP8 Meeting	13	Amsterdam	23.11.2013
15	Workpackage Meeting: 2nd WP8 Meeting	12	Rome	25.-26.02.2014
Other Meetings				
16	Microbial Resource Centers Heads Meeting: 1st mBRCs Heads Meeting	14	Hanover	17.02.2014

PROJECT PLANNING AND STATUS

The MIRRI Project is divided into 10 Work Packages with independent Milestones and Deliverables. Intense interactions between individual tasks are necessary for their completion, not only for the Project Management (WP1) and Definition of Innovative Approaches (WP10), but also for all those work packages that deal with the design of the infrastructure (WP2), its governance and legal status (WP3) and the legal operational

framework for access (WP 9). These three WPs define the rational for operational cost of the central coordinating unit and the governance structure of the distributed infrastructure. WP5 to WP8 are instrumental in defining the MIRRI offer to users and thereby influencing the other element of the financial plan of the next phase. It is especially the interaction between management/steering committee and the task leaders of WP5 to WP8 to guarantee the timely preparation of strategies to address synergies and complementarity. The resulting services and processes must ensure coordination, harmonization, integration and interoperability of data, applications and other services between MIRRI partner collections and these activities must be translated into actions for which funding mechanisms must be explored. The two main elements are the basis the financial component (WP4) of an envisaged ERIC legal structure for MIRRI in the next phase.

At the time of writing, all WPs are well advanced, having reached all anticipated Milestones and submitted almost all Deliverables and several first drafts of strategies are already circulating.

In the actual phase one main focus is the preparation of the Intermediate Review (18.06.2014) and planning of the 3rd Mid-Term Review Meeting taking place in Amsterdam from 19th–20th of June 2014. The external expert who was proposed by the EC is Leo M. Schouls, PhD from The Netherlands.

IMPACT OF POSSIBLE DEVIATIONS FROM THE PLANNED MILESTONES AND DELIVERABLES

None.

ANY CHANGES TO THE GRANT AGREEMENT NUMBER 312251

The second Amendment of the MIRRI Grant Agreement (Annex I) was conducted and communicated to the EC by the introduction of Special Clause 10 for Partner 9 (INRA). The amendment was accepted by the EC and came into force at 01.11.2013. This issue led to an amended MIRRI Grant Agreement (Annex I). In this version Special Clause No. 10 was added to article 7 of the Grant Agreement whereas the text of Part A and Part B of the DoW (Description of Work) was also revised and replaced any former versions.

A third amendment of the Grant Agreement is in preparation by introducing three additional Collaborating Parties: 1. Culture Collection of Industrial Importance Microorganisms (CMII, Romania), 2. Scandinavian Culture Collection of Algae & Protozoa (SCCAP, Denmark), 3. Public Health England (PHE, United Kingdom). In the DoW several text passages will be revised and new paragraphs will be introduced.

The legal details of Universiteit Gent (beneficiary no. 8) were modified by replacing the former legal representative no. 1 Prof. Paul Van Cauwenberge by Prof. Anne De Paepe and by replacing the former legal representative no. 2 Prof. Luc Moens by Prof. Freddy Mortier. This amendment came into force at 01.11.2013.

DEVELOPMENT OF THE PROJECT WEBSITE

The MIRRI website was established at the start of the project in November 2012. The webpage is available at www.mirri.org and is divided into two main areas:

The first one is a free accessible public area, that is structured in different main categories "About MIRRI", "Events and Meetings", "Workpackages", and "Partners". These webpages provide general information on the project as well as beneficial contact data.

The second one is an internal area that is accessible for members of the consortium only by entering an appropriate password. This area provides internal information for download and is subdivided into different folders e.g. "Meetings & Conferences", "Documents", "Deliverables", and "Workpackages". One important aspect of this area is the possibility for members of the consortium to upload files and share these ones with other participants.

The contents of both areas are constantly updated and adapted under the prevailing requirements.

MIRRI is also represented at different social media. Links to the relevant profiles are also provided at the webpage and are set to Facebook, Twitter, LinkedIn, and Google+, respectively.

COORDINATION ACTIVITIES DURING THE PERIOD

In this part activities will be described that were not mentioned in the “Consortium management tasks and achievements”.

One of the most important aspects is the establishment of a Memorandum of Understanding (MoU) within the Consortium. After several rounds of improvement by the Partners and Collaborating Parties, the Steering Committee approved a final document that can be adjusted or amended for specific national concerns for sending to the national stakeholders. In parallel a detailed Business Case has been finalized which can now be submitted along with the MoU. The objective is to receive an approval by the stakeholders by sending a “Letter of Intent” to receive non-binding support at the current state of MIRRI’s development. Preliminary discussions with the German ESFRI Bureau in Bonn in June–July 2013 regarding the improvement of the MoU built the basis for the evolution of this document.

Other important contacts with political stakeholders were established e.g. a meeting with Dr. Henk van Liemp, German Coordinator of Bioeconomy and member of Managing Board of DSMZ, was conducted in September 2013 to explore the political and financial basis for a research infrastructure. Meetings with members of the French Ministry of High Education and Research (since June–July, 2013), with members from the National Infrastructure in Health, Biology and Agronomy “IBiSA” (January 16th, 2014) and from the National Alliance for Life Sciences and Health “AVIESAN” (March, 2014), raised the awareness of MIRRI and led to an intense follow-up communication with French MIRRI partners.

To guarantee a good communication flow within the management team and the DSMZ MIRRI participants, regular in-house meetings were established. The director of the DSMZ, Prof. Overmann is thereby directly embedded in MIRRI-related issues e.g. the Nagoya Protocol, Training, German collection networks, and Finances.

In order to evaluate possible funding schemes in H2020, MIRRI also participated at the Helmholtz Information day on HORIZON 2020 – “70 Billion Euro for Research Funding” (16.01.2014) in Braunschweig.

Following the ESFRI Evaluation of MIRRI in Brussels, March 15th 2013, by the Assessment Expert Group (AEG), MIRRI submitted a progress response to points raised in the report to Prof. Murat Ozgoren (ESFRI Health and Food SWG Chair).

COOPERATION WITH OTHER PROJECTS/PROGRAMMES

- » Participation at the BMS-RI Coordinators’ Meeting in Munich, December 10, 2012
- » Participation and organization of the 1. SC-WP Meeting, Ghent, February 28, 2013
- » Participation at the Assessment Expert Group Interviews in Brussels, March 15, 2013
- » VAAM Meeting, workshop lecture, Bremen, March 12, 2013
- » Meeting with Coordinator of ERINHA in Paris, March 18, 2013
- » Participation and TRUST workshop lecture, Shanghai, China, May 22-23, 2013 (related to WP 6 and WP9)
- » Submission of FAME proposal to the EU, June 2013
- » Lecture to ECCO members on first 6 month period of MIRRI, June 14, 2013

- » Infect ERA participation in Lisbon. Lecture on MIRRI, June 26-27, 2013
- » Meeting with David Smith and participation in BMS group meeting in Heathrow, London. Follow up activities concerning deposition of data and biological resources with Ronald Frank, EU-OPENSREEN, July 02, 2013
- » MIRRI-related lectures at FEMS meeting, Leipzig, Germany, July 02, 2013
- » Written MIRRI profile communication to Enterprise Europe Networks Magazine
- » September and October 2013: Lectures with MIRRI relevant Topics in China (WFCC) and October 2013 in Brazil (National Microbiology Conference)
- » September 23th, 2013. ISBE-Synergies Workshop. Imperial College London, UK. Lecture on MIRRI
- » November 2013: Meeting with Prof. Friedel, SAG Göttingen about establishment of German mBRC Network
- » Meeting with French AVIESAN to report on MIRRI, Paris, January 16, 2014
- » Meeting with the French Biobank consortium (Biobanques) within BBmBRC, Paris, January 17th
- » From March 2014 on several telephone conferences and meeting with BMS IS and ENV IS on joint H2020 INFRADEV 4 projects
- » Participation at the 2nd International Conference on Research Infrastructures (ICRI 2014) Brussels, April 02-04, 2014
- » Lecture on MIRRI during a Cost Action FA 1006 Meeting, Helsinki, May 08, 2014

DELIVERABLES AND MILESTONES TABLES



DELIVERABLES AND MILESTONES TABLES

TABLE 1. DELIVERABLES

DEL. NO.	DELIVERABLE NAME	VERSION	LEAD BENEFICIARY	NATURE	DISSEMI-NATION LEVEL	DELIVERY DATE FROM ANNEX I (PROJECT MONTH)	ACTUAL / FORECAST DELIVERY DATE (DD/MM/YYYY)	STATUS NOT SUBMITTED/ SUBMITTED	COMMENTS
D1.1	D1.3.1 Kick-off meeting	1.0	1	R	PU	1	11.07.2013	submitted	-
D2.1	D2.1.1 Compilation report on outputs	1.0	7	R	PU	18	27.05.2014		
D4.3	D4.4.1 Draft short Business Plan	1.0	2	R	PU	6	06.06.2013	submitted	-
D5.1	D5.1.1 MIRRI Website	1.0	1	R	PU	1	31.05.2013	submitted	-
D5.2	D5.1.2 Annual General Meeting	1.0	1	R	PU	12	17.12.2013	submitted	-
D5.4	D5.1.4 A strategy and implementation plan	1.0	1	R	PU	12	25.02.2014	submitted	-
D6.7	D6.4.2 Workshop to identify improved services, the priority actions and implementation mechanisms	1.0	8	R	PU	15		not submitted	postponed to M25 (in accordance with EC)
D7.1	D7.1.1 Report on available and potential new electronic tools for training	1.0	11	R	PU	18	08.05.2014	submitted	-
D7.3	D7.2.1 Report on current E&T programmes	1.0	11	R	PU	18		not submitted	postponed to M23 (in accordance with EC)
D8.1	D8.1.1 Report on minimum standards for data acquisition and data management	1.0	10	R	PU	18	17.04.2014	submitted	-
D8.5	D8.4.1 Report on users requests, desired features, and meta-analyses of the integrated platform	1.0	10	R	PU	12	29.10.2013	submitted	-
D9.1	D9.1.1 Report on strategy and minimal requirements for enhanced compliance to CBD	1.0	5	R	PU	18	02.04.2014	submitted	-

TABLE 2. MILESTONES

MILESTONE NO.	MILESTONE NAME	WORK PACKAGE NO.	LEAD BENEFICIARY	DELIVERY DATE FROM ANNEX I DD/MM/YYYY	ACHIEVED YES/NO	ACTUAL / FORECAST DELIVERY DATE (DD/MM/YYYY)	COMMENTS
MS1	M2.4.1 Evaluation of feedback from resource providers	WP2	UVEG-CECT	30/04/2014	Yes, mostly	31/05/2014	The resource providers have been surveyed. The results are being evaluated and will be delivered in D2.1.
MS2	M2.4.2 Evaluation of feedback from other stakeholders	WP2	UVEG-CECT	30/04/2014	Yes, mostly	31/05/2014	Other stakeholders (users) have been surveyed. The results are being evaluated and will be delivered in D2.1.
MS3	M3.1.1 Mechanisms for State or Government input	WP3	SPP-PS	30/04/2013	Yes, mostly	31/08/2014	Latest update concerning the ESFRI mechanisms has still to be integrated in the digest prepared for the MIRRI participants.
MS4	M4.3.1 List of potential funders	WP4	CABI	30/04/2013	Yes, in part	30/09/2013	Data was compiled for ESFRI and RI country contacts by date but still awaiting partner input to finalise report.
MS6	M8.1.1 Workshop on minimal standards for data acquisition and data management	WP8	JacobsUni (CABI)	31/07/2013	Yes	11/06/2013	Workshop was organised as a satellite to the MIRRI meeting in Athens; MS 6 & 9 have been finalized in the WP 8 workshop in Schiphol in November. Results were communicated in D8.1.
MS7	M8.2.1 Workshop on strategies for data evaluation and validation	WP8	JacobsUni (DSMZ)	31/01/2014	Yes	25/02/2014	MS7 has been reached by the workshop organised by Paolo Romano and Boyke Bunk in Rome 25./26.02.2014.
MS8	M8.3.1 Workshop on strain data and meta-data, on semantic sources and on external databases	WP8	JacobsUni (USMI)	30/04/2014	Yes	26/02/2014	MS8 has been reached by the workshop organised by Paolo Romano and Boyke Bunk in Rome 25./26.02.2014.
MS9	M8.4.1 Workshop on features, navigation and access of the MIRRI portal	WP8	JacobsUni (VKM)	31/10/2014	Yes	11/06/2013	Workshop was organised as a satellite to the MIRRI meeting in Athens; MS 6 & 9 was finalized in the WP 8 workshop in Schiphol in November. Results were communicated in D8.5.
MS10	M10.1.1 Compilation of user feedback via WP5 on innovation delivery mechanisms	WP10	DSMZ	31/01/2014	Yes, mostly	30/06/2014	More information about priorities of MIRRI in terms of support to R&D and the impact of MIRRI on society is needed.

ANNEXES





COORDINATION & CONTACT

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