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Report on Case Studies

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Abstract: This deliverable reports the practice of three Latin American communities that have performed a successful collaborative work, and that have also hosted advanced network services as part of their regular tools to spread and build knowledge.

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For more information on ELCIRA, its partners and contributors please see http://elcira.redclara.net (this website will be available in October 1st 2012).

DELIVERABLE ROUTE

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1.- INTRODUCTION

In Latin America, starting with ALICE2 project[1], and more recently with ELCIRA[2] project, there has been important initiatives to build and disseminate the collaborative work and the use of advanced network as a facilitator of this new way of doing research. In order to highlight the performance of outstanding researcher's communities, RedCLARA has developed a setseries of cases studies[3] of selected communities which are distinguished from others due to f the goals they pursue and the collaborative model they use to achieve them. These experiences, procedures and strategies are disseminated through the RedCLARA's portal.

In this deliverable, the team of ELCIRA Work Package 6 (Extending and Strengthening the Collaboration Platform) reports the practice of three Latin American communities that have performed a successful collaborative work, and that have also hosted advanced network services as part of their regular tools to spread and build knowledge.

2.- BEST PRACTICES AND CASE STUDIES IN LATINAMERICA

In the new context of e-Research and the use of collaborative tools to produce knowledge, the research and academic communities found a way to collaborate in the global village and to adapt their current practices to the new virtual environment. By doing so, some of these communities has discovered the force and the advantages of been global. Also, they have become aware of the richness they own and the special role they can play by sharing scientific knowledge produced in Latin America and by involving international colleagues to the current work they do.

For these case studies we seek three communities recognized for their overseas collaboration and also because the research issues they address are closely related to Latin America relevant issues.

These communities are:

[1] Latin America Interconnected with Europe 2 http://alice2.redclara.net
[2] Europe Latin America Collaborative e-Infrastructure for Research Activities http://elcira.redclara.net
[3] http://www.redclara.net/index.php?option=com_content&view=article&id=143&Itemid=528&lang=en

- CRIA (Reference Center on Environmental Information)
- INBio (National Biodiversity Institute)
- SPRACE (São Paulo Research and Analysis Center)

By presenting the experience and the performance that have allowed these communities to reach a notable growth and international scope, RedCLARA wants to spread and share with the academic and research community from Latin America and Europe, these remarkable practices contributing to the recognition of the research quality in the region.

2.1 REFERENCE CENTER ON ENVIRONMENTAL INFORMATION - CRIA

About CRIA

CRIA is a non-governmental and civil society organization of public interest. CRIA's mission is to share information and tools for data analysis related to environmental management, preservation and sustainable use of biodiversity in Brazil.

Established in December 2000 and with almost 14 years of existence, this organization works to build a data infrastructure, web tools and services with a focus on data information management on Brazilian biodiversity. The information they handle is available in a free and open way for anyone interested.

CRIA also have an information system (Species Link) which integrates the record samples of plants, animals, insects and microorganisms deposited in the Brazilian biological collections and some other international collections.

The following facts illustrate the robustness of its infrastructure:

- CRIA have more than 360 data providers.
- The system Integrates more than 6.9 million sample records deposited in various biological collections (botanical, biological or microbiological), available online in free and open way.
- The system records an average of 1.3 million visits per day. 95% of these visits comes from Brazil and the rest from Latin America and Europe.

Contributions to reinforce the science development

Since the need for further research on climate and biodiversity was identified (United Nations Conference held in 1992 in Rio de Janeiro) CRIA developed, with the support of the Brazilian Ministry of Environment, the Brazilian biodiversity data infrastructure, which eventually became the Species Link network.

Species Link has developed various projects including the INCT Virtual Herbarium of Plants and Fungi (a thematic network integrating more than 90 Brazilian herbariums), and other international herbariums which are carefully selected. This project ensures the systematization and management of information, as well as the accuracy and quality of data and images that are shared with the public.

The implementation of this virtual herbarium started 6 years ago, and in December 2014 will be completed the first phase, with a total of 110 integrated herbariums. If the phase two is approved, CRIA will be able to integrated in the next 6 years, the other 170 Brazilian herbariums to this powerful information system, thus becoming the national reference for virtual view of the flora and fungi of Brazil.

The INCT is the main example in CRIA of the use of a data infrastructure for the development of e-science.

Collaborative work in an international network

Since it was established, CRIA has been weaving a wide network of international collaboration. Initially, CRIA begins organizing academic events on biodiversity in collaboration with the Committee for Data in Science - CODATA, and then, the co-ordination and participation in several collaborative projects with major infrastructure biodiversity data, which are:

- The Global Biodiversity Informatics Conference-GBIC, organized in partnership with the Global Biodiversity Information Facility (GBIF).
- The Brazilian Hub for Catalogue of Life, cooperation dating from 1996 which has allowed CRIA to join the Global Species Database Partners.
- The EUBrazilOpenBio coordinated by CRIA, which was funded by the European Commission, the National Research Council and the Open-Bio project.

- The EU Brazil Cloud Connect, a project funded by the EC ICT and the CNP, which is currently underway.
- The Biodiversity Virtual e-Laboratory and the Wide Marine (a data infrastructure on marine biodiversity), both projects funded by the EC.
- The CREATIVE-B, a project that seeks to integrate different biodiversity data infrastructures.
- The Odata, a collaboration project between Brazil and United States funded by the National Science Foundation.
- The Global Roadmap for biodiversity data infrastructures research, conducted in collaboration with the Chinese Academy of Science and the Atlas of Living Australia.

Furthermore, in Latin America CRIA have also collaborated and promoted the development of I3B Network - Ibero-American Biodiversity Information Facility, a CITED's project funded. CRIA have also collaborate with Conabio-Conabio in Mexico, which is the main Latino-American initiative for using biodiversity data and the formulation of public policies. CRIA also maintains a good and close relationship with the National Biodiversity Institute in Costa Rica -INBio.

Finally, CRIA also participate in larger projects such as the collaboration with the Group on Earth Observations (GEO) which, through the GEO Biodiversity Observation Network (GEO BON), study how to integrate global data collections and satellite observations species to create "common variables" to be globally monitored. These variables will provide common parameters to measure, analyze and evaluate the impacts on biodiversity.

Challenges and new developments

While CRIA has become a robust research center, achieving very successful results and enjoying the support of a wide network partners, it still faces an important number of challenges and obstacles in order to keep growing and contributing to science from Brazil.

CRIA is a very small institution (composed of only 10 people) whose main problem is the financial sustainability. Like many other organizations of its type (nonprofit organization focused on the regional development), it faces the problem of not having continued funding, and therefore the need to constantly seek and participate in calls and partnerships to obtain funding from different donors. This

financial uncertainty makes very difficult the financial projection of the center. In order to counter this uncertainty, CRIA has taken some preventive measures such as the transfer of all its data, systems and information hosted on CRIA's server to the Internet Data Center (IDC) of the National Network Brazilian Research - RNP, thus ensuring the continuity of the work they have built to date.

Despite this scenario, CRIA maintains a positive attitude and in the short-term it plans to maintain the infrastructure that houses the INCT - Virtual Herbarium of Flora and Fungi, and to double the number of suppliers improving not only the data quality, but also the tools for analysis, and continuing to strengthen all its international interactions.

Another important CRIA's goal is to improve the partnership with the Brazilian government in order to enhance and ensure the continuity of the biodiversity initiatives CRIA leads.

2.2 NATIONAL BIODIVERSITY INSTITUTE - INBIO

About INBio

INBio is a research and biodiversity management center, established in 1989 to support efforts to know the Costa Rica's biodiversity and to promote its sustainable use.

Costa Rica is ranked among the richest countries in biodiversity in the world. Within its territory live more than half a million species, representing 3.6% of the global biodiversity. However, only 18% of these species are known which makes difficult to effectively manage the country's biological richness.

INBio's work focuses on generating, processing and sharing information on Costa Rica's biodiversity, in order to used this information to build values, to promote actions and to support public policy. The actions of INBio has been based on different important elements such as, the biodiversity national inventory, the environmental education or bioliteracy, the bioprospecting or search for sustainable uses of biodiversity, the use of ICT for biodiversity, and the territorial management for the conservation and sustainable use of biodiversity.

Contributions to reinforce the science development

INBio's mission is to promote greater awareness of the value of biodiversity as a means to preserve this biodiversity and to improve the quality of human life. Therefore, the main activities carry out by the Institute focus on the benefits of conserving biodiversity as a way to ensure the proper functioning of the ecosystem, which provide essential services for human well-being, such as water, food, construction materials, clean air, control of natural events such as landslides and floods, scenic beauty and tourism, among others.

During the 25 years of existence INBio has generated and published information on the Costa Rica's biodiversity with the goal of providing quality information to support decision-making on biodiversity conservation, and to generate knowledge and support bioliteracy. The work done by INBio is known for:

- Documenting a new specie every 2 days.
- Have documented 30% of all known species in Costa Rica.
- Share, in a free and open way through the system Atta, the information INBio has about the species of Costa Rica.
- Have developed the second largest biological collection in Latin America and the only fully digital with about 3,400,000 specimens.
- And, have produced to date more than 2,500 scientific publications.

Pursuing the goal of raising awareness about the biodiversity of Costa Rica to convince the public of the importance of conserving the biological richness of its country and be involving in their protection, INBio has fueled an ongoing process of promoting the bioliteracy with more than a million and a half educational and recreational experiences on biodiversity, as well as the publication of over 250 books and educational materials on Costa Rica's biodiversity. INBio has also develop several courses and workshops addressed to different population segments, including the training program for nature guides (accredited by the Costa Rican Tourism Board - ICT) which supports sustainable tourism initiatives taking place in this country. Today ecotourism represents one of the main sources of foreign exchange in Costa Rica.

As a science facilitator and support for the definition of public policies, INBio has actively participate in the development of several management plans for protected areas and it has serve on different national committees that have advised public institutions on issues related to biodiversity conservation, such as the National

Network of Biological Corridors and the Commission on Sustainable Tourism Certificate -CST.

INBio is also engaged in the development of a national framework for accessing genetic resources and equitable benefit sharing.

Collaborative work in an international network

In the frame of the collaborative work at nationally and internationally level, INBio has established partnership with both public and private institutions for the implementation of national biodiversity inventories, bioliteracy, bioprospecting, biodiversity informational technology, and land management and planing policies.

In the field of communication and information technologies (CTI), INBio is part of the international community of informatics for biodiversity, participating in the development of tools and standards that allow implementing portals and technology platforms that support various national, regional and thematic networks. Examples of these networks are the Thematic Network of Species and Specimens of the Inter-American Biodiversity Information Network (IABIN), the Herbarium Network of Central America and the Caribbean, the Biodiversity Network of Environmental Information System of Mesoamerica (SIAM), and the national information biodiversity networks of Bhutan, Benin and Chile.

Among the tools and technology that INBio shares with the scientific community, it is important to underline the tool kit to build web portal on biodiversity, which is intended to support scientific research, educational and decision-making processes concerning biodiversity conservation. Among these tools we can highlight :

- The Customizable Portal of the Global Biodiversity Information System -GBIF (2006-2013). This free software tool was developed by GBIF to integrate data from more than 400 million records of specimens distributed in several databases around the world. INBio extended the functionality of the system to integrate not only data about the presence of species but also a summary of information associated with these species (such as habitat, distribution, supply, condition, images, applications, common names, among other information). The portal has been used by national, regional and global networks such as the National Biodiversity Information System of Costa Rica (CRBio), the IABIN Network of Biological Collections of Chile, and the National Biodiversity Information Network of Bhutan, among others.

- The Node Portal Toolkit - NPT (2013 -2014). The NPT is based on the software Drupal and it includes a functionality to integrate and share open and free data on biodiversity. It includes mechanisms for data integration on taxonomy, species records, specimen records, images and metadata of institutions that provide data. The system also generates distribution maps from the specimen data. The NPT began as an effort from the community of GBIF nodes, and now it is used by the National Biodiversity Information System in Benin. The system allows data synchronization with GBIF as a mechanism for quality control and returning data.

On the other hand, INBio makes part of the group of institutions involved in the specification of the Plinian Standard Core (PLIC), which specifies the basic concepts needed to integrate and retrieve species information stored in databases managed by institutions distributed on a regional basis. In this partnership are involved the University of Granada, the GBIF Node in Spain, the National Commission for the Knowledge and Use of Biodiversity (CONABIO, Mexico), the Alexander Von Humboldt Institute (Colombia) and the University of Sao Paulo (Brazil).

Finally, through the Atta Information System, INBio manage its processes for capture, management, generation and dissemination of information on biodiversity. This system maintains a relational database with information about species, specimens, images and geographic information, which enables the integrated management information from multiple biological collections. Atta is one of the contributions that INBio make available to the scientific community for the free use of knowledge.

2.3 SÃO PAULO RESEARCH AND ANALYSIS CENTER - SPRACE

About SPRACE

SPRACE was established in 2003 thanks to the financial support of Foundation for the Support to Research of the State of São Paulo (Fundação de Amparo à Pesquisa do Estado de São Paulo – FAPESP). SPRACE's objective is to offer the necessary means to researchers on high-energy physics from the State of São Paulo in order to participate in experiments of this kind.

The Center started its operations in March 2004, in association with the Distributed Organization for Scientific Analysis and Research (DOSAR). Short afterward, it got

merged with SAMGrid, the distributed processing system from the experiment DZero. In 2005, SPRACE became part of the Open Science Grid (OSG), a consortium of universities, national laboratories and computer centers sharing a network infrastructure on research networks through a common middleware.

Thanks to the Open Science Grid, SPRACE has participated in Monte Carlo generation and data reprocessing of the DZero experiment and has become a Tier-2 of the hierarchical computer structure that is being used for the CMS experiment.

SPRACE brings together the DZero members into collaboration at the Fermi National Accelerator Laboratory (Fermilab) and in the Compact Muon Solenoid (CMS) at the European Organization for Nuclear Research (CERN). Also, the center offers more than ten Teraflops of processing capacity and contributes to the processing, storage and analysis of the data generated by these experiments.

Contributions to reinforce the science development

SPRACE inspired and led the GridUNESP project that put in place the first "Campus Grid" in Latin America. GridUNESP is composed of eight data processing and storage centers distributed throughout the State of São Paulo. They are interconnected through the Grid architecture. With this project, SPRACE allowed to make viable a central computing structure dedicated to research, which today has around 250 researchers and is currently used by students and researchers at UNESP, as well as external researchers.

SPRACE also has a strong commitment with the teaching and promotion activities. It has elaborated high-energy physics courses and the teaching material developed is available in the website for those who wish to use the content. With the promotion project "Elementary Structure of the Matter: a poster in each school", SPRACE was able to promote the basic understanding about this topic in almost every secondary school of Brazil, including Amazonia.

The annual event Master Class is one of the other promoting activities that SPRACE carries on with secondary-level students. This virtual event gathers students from all over the world during a whole day to carry out mini-research activities on identification of particles, simulating the real work of a researcher in the area. The event has been very successful since it allows the interaction and collaboration of the students thanks to the video-conferences where they can

exchange about the experience, share the data and results obtained and share the knowledge acquired.

SPRACE also managed and created an open-source simulation game for PC called SPRACE GAME. This game allows the user to simulate the manipulation of particles and the construction of atoms and elements. SPRACE GAME was launched in Brazil and was translated into English with the support and leadership of CERN, allowing this teaching material to be known all over the world.

Collaborative work in an international network

The conformation of SPRACE is in itself an example of collaboration between peers since this center was born by the initiative of three most important state universities of São Paulo: UNESP, UNICAMP and UFABC.

So from the beginning, SPRACE has been building networks of collaboration at the national and international level, making possible its integration into research groups with high level of scientific recognition, such as CERN.

Among the contact network and the collaborative activities of SPRACE, we can mention:

- SPRACE started its operations in March 2004, in association with the Distributed Organization for Scientific Analysis and Research (DOSAR)
- It got merged with SAMGrid, the distributed processing system from the experiment DZero
- In 2005, SPRACE became part of the Open Science Grid (OSG)
- SPRACE is associated to Exotica group, which is dedicated to the research of new physics beyond the standard model.
- SPRACE is also associated to the Heavy Ion group, which is dedicated to exploring the properties of the quantum chromodynamics (QCD) theory.

Also, SPRACE is currently participating in the program IPCC (Intel Parallel Computing Centers) together with INTEL and Fermilab for software development in the high-energy area.

3.- APPENDIX: COMMUNITIES STAFF INTERVIEWED

The information reported in this Deliverable was collected thank to the help of the reported communities staff who kindly accepted to be interviewed by RedCLARA.

The interviewed collaborator are:

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