

From databases to information flow: CIFOR and seamless integration of information systems

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Abstract

Seamless Integration of Information System – SIIS – is a project for managing institutional information and an effort to harness strategic information systems as a competitive bargaining strength. The project was to answer the requirements of sharing information to both internal and external stakeholders, where integration of information is a must and requires a holistic perspective and approach which synergistically integrates all functional area concerns in a systematic fashion.

The overall project was scheduled to take place in several phases from 2008 to 2010. The first phase aimed to re-engineer, replann and redesign the existing systems information into a data warehouse to serve all organizational needs. Six databases were integrated during the first phase; HR4U, publications database, publications inventory system, programme development database, research tracking system, and our GIS system. Phase I was also proposed as a model for further integration across all decentralised databased and information systems at CIFOR.

SIIS is not just talking about the system but also considers the IT triangle indicator - people, process and technology. This paper summarises the background and aims of this 9-month project, achievements and the options identified for taking the initiative forward. Although undoubtedly capable of further development, the implementation of fully SIIS is facing many challenges and need support from the whole organization

Introduction

CIFOR is a relatively young member of a network of international research institutions dedicated to improving agriculture and alleviating poverty. It has offices in Asia, Africa and Latin America and ongoing research in many countries. Research data must be consolidated from many projects and locations and communicated to partners and policy makers for CIFOR to fulfill its mission. Data management is a key element in CIFOR's success.

Over the next 8 years, CIFOR aspires to be the 'go to' place for information and analysis about linkages between forests, poverty and the environment, and consequences for climate change mitigation and adaptation policies. In order to so, CIFOR needs to reorganise its internal data and information to help the organisation reach its goal.

The organisation has "mountains of data" that needs to be organised and exploited by using a right tool. Situation faces now by CIFOR is that the current data and information posses are scattered and few databases owned are not well maintained. These important assets mostly are useful for their owners but hard for others to access, find and use. This situation must be changed by improving the ways of managing data and information, with the aim of making them available, easily accessed and used for CIFOR and for global/international public goods. The scattered databases need to be coordinated into an integrated system.

Despite of CIFOR's unique activities, which covers a wide range areas of research, education, learning and administration, there are several other similar organisations whose playing fields, which motivate the organisation to increase its competitiveness, by being able to provide a better and advance information and analysis through systematic implementation solutions which adapts to organisations' strength and opportunities. Therefore, an efficient system implementation has to pursue systematic design and goal-oriented principles that CIFOR activities are involved in.

This paper describes how CIFOR integrated those scattered stand-alone data system data to optimise information usage across the organisation. The approach used during the project is described in the paper. The implementation centered on the IT triangle of people, process, and technology. It ends with a description of a prototype of an integrated information system for decision making tools and as a planning aid.

Proposed Solution

Integration framework

Integration involves merging data from different sources and providing users with a unified view of these data (Lenzerini 2002). Solutions for combining heterogeneous data sources under a single interface have existed for some time, and one popular solution involves data warehousing. The warehouse system can extract, transform, and load data from several sources into a single repository as described in figure 1 (Ziegler et al. 2004).

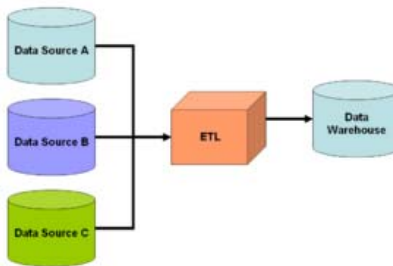


Fig 1. Data warehousing

The first model was designed to provide information on CIFOR research projects information by focusing on six primary information systems. Seamless Integrated Information Systems (SIIS) project answers to these aspirations. The goal of SIIS is helping CIFOR in the following areas:

- Managing institutional databases and facilitating and supporting other departments in developing and sharing their information
- Integrating the existing stand-alone databases in CIFOR to enable rapid access to and analysis of information for enhanced decision making
- Guarding the quality of information and maximising the existence of information
- Planning, implementing, and maintaining the tools for information management that will most effectively improve decision making
- Planning, implementing, and maintaining the flow of information to the external parties, either personal or other organisation, through available information channels
- Providing end users with the data and necessary analysis tools to evaluate the information and gain valuable insight into what is needed to achieve effective management.

The SIIS project began with a pilot project which covered 6 key databases. The stages are as follows

1. Database assessment

During the assessment we examined the feasibility and potential benefits of consolidating each database with the others. Our project team also analysed the existing systems, applications and business logic. The analysis focused on:

- a. Examining and documenting information pertaining to systems currently in place at CIFOR by analysing and clustering the database mapping result
- b. Identifying key clients and subject matter experts in each department.
- c. Interviewing key data owners from five departments in order to identify and document business information requirements, as well as current and major business needs.
- d. Assessing information requirements based on the existing databases
- e. Identifying areas for improvement.
- f. Formulating key recommendations to address areas for improvement.
- g. Developing database consolidation road map

We used results gained from the assessment to draw a road map that will give CIFOR information on how existing databases enhanced to generate new information.

2. Data alignment project, has four interrelated activities: data collection, data storage and collation, data analysis and mapping, and information dissemination strategy.
3. Database integration project. The integration framework was achieved by organising standalone processes into one continuous process. The integration made use of five main systems: resource mobilisation, research information systems, finance systems, and administration systems. Each of these systems contains a number of databases which feed into one to another (fig. 2).

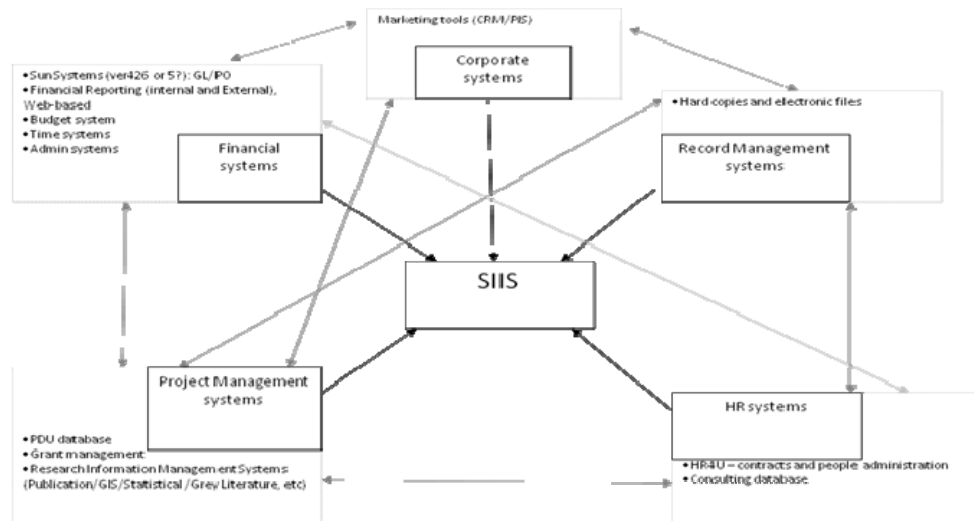


Fig. 2. SIIS framework

This development of SIIS will help CIFOR determine the most appropriate actions by addressing these questions:

1. What progress are we making as a result of our research and action?
2. What impacts have we made through our research?
3. What is the pattern of our dissemination output and what does impact look like, in one of specific region that CIFOR research is conducted to

People, process, technology

Data and information management

The integration effort encountered typical road blocks associated with data management and business processes. The first step was mapping: determining where field level relationships exist and how they relate between disparate data sources. We found the stand-alone databases contained similar data in different formats that had to be reconciled.

Developing a clear picture of what data exists and how to access and make use of it, so we can foster a culture of good data practice and control, ensuring that data is accurate and from a known source, and generate a new data from the existing data is about creating an overall business strategy to monitor and improve data throughout organisation. It is a convergence of people, technology and processes that helps an organisation to manage the availability, utilisation and security of their data. The cost of poor data management is hidden in inefficient business processes and excessive data management activities and in the inability to use information for strategic business advantage.

Prior to the integration, a strategy to manage data assets as a sustain effort to monitor and improve data throughout the organisation need to be considered. To govern data management well, three components – policies, process, measurement and monitoring – need to be cleared (fig. 3).

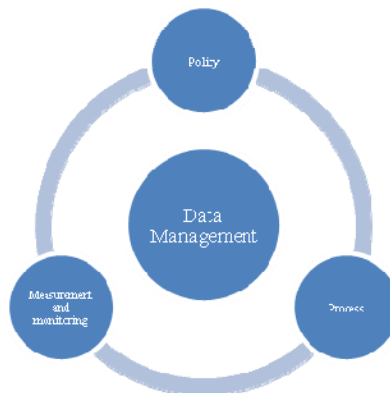


Fig 3. Components of a Data Governance program

Policy takes the form of a guideline that lays the groundwork for data quality and addresses production and preservation, security and protection, match and merge rules, and principles for authorisation.

Process is the actual means by which policies are enforced and measured and tasks that provide direction to the people who relate to the data production. It is also talking about accountability through better management of personnel and resources, reducing data duplication and formalising accountability for both structured and unstructured data.

Establishing and implementing roles and responsibilities for data management involves the development of agreements about who is responsible for development of data standards, data collection, data quality, data storage and maintenance, data access, and data use, as well as the processes that will be used to ensure all staff, including those in leadership positions, are held accountable for performing this work.

The implementation of roles and responsibility falls into three business categories; strategic, tactical and operational. In a strategic area, CIFOR Management Group will have authority over policies and procedures regarding business definitions of data, and the access and usage of the data. They will represent a cross-section of groups within CIFOR as of a rule-maker.

A particular issue- within specific subject area and domains- resolve by an individual data steward which will lead by a Program Director. They oversight and communicate related policies, procedures, standards and guidelines.

The tactical area falls into data expert, owner, and producer, everyone that defines, uses, and produces institutional data.

Measurement and monitoring provides the feedback to ensure that the whole effort continues to be relevant and add value to the organisation. It helps to determine how well the effort is working.

Process integration

Tabatabaie et al. (2008) explain how integration of business processes plays an important role. It could be accomplished by providing standards for data and business processes which will then be applied for various part of the system such as database or clusters of databases. As one result of business process integration, information may then flow seamlessly.

It recognises that the existing business process in CIFOR that are fragmented into subprocesses and tasks can endanger the performance of the information produced by the integration. Often, no one is responsible for the overall performance of the entire process. To promote a different approach and culture on the new process, a committed and visible leadership with clear communication is needed (Wilson et al.2003). Management must be involved from the beginning and remain involved by monitoring progress and providing direction. Responsibility for implementation cannot simply be handed over the to IT department and support becoming essential due to fundamental organisational change that will transforms the way an organisation does business. (Murray et al., 2001)

Technology integration

The integration road map is shown in Figure 4. It illustrates the relationship linking and its flexibility to supports the decentralisation of management and control over resources, enabling multiple capabilities to be evoked independently of processes that require intercession by decentralised processes. Some duplicate data management was omitted and links were created to reflect relationships across data pools. We modified each database to capture the missing data and forge connections across data sets so that the information is more accurate.

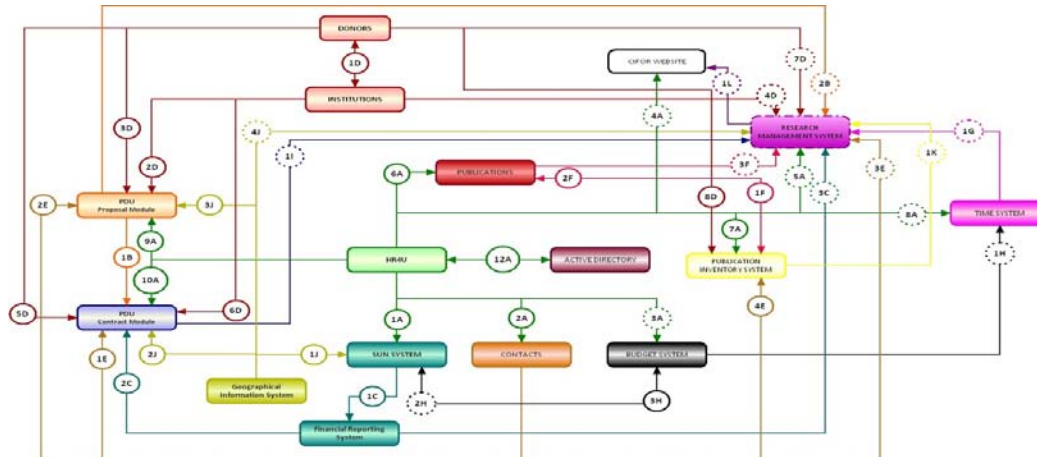


Fig.4 SIIS road map

References

ADEPTIA. 2010. ETL Software: Extract, transform, load, and manage data from single environment [cited 12 February 2010]. Available from http://www.adeptia.com/products/etl_software.html.

COHEN R., 2006. What's in a name? Data governance roles, responsibilities and results factors. *Information Management Online*, online. <http://www.information-management.com/news/1057220-1.html>

Maurizio L., 2002. "Data Integration: A Theoretical perspective". *PODS 2002*. p. 233–246.
 MURRAY M., COFFIN G., 2001. A Case study analysis of factors for success in ERP system implementations in *AMCIS 2001 Proceedings* .p. 1012-1018

ZIEGLER P., and Dittrich K.R. 2004. Three decades of data integration - all problems solved?". In *18th IFIP World Computer Congress (WCC 2004), volume 12, Building the Information Society*, Toulouse, France: Kluwer. p.3-12

TABATABAIE M., 2008. Exploring the boundaries of Enterprise Information Systems in *Proceedings of the Second York Doctoral Symposium on Computing*. P. Andrews and T. Lampert ed., Heslington Hall: University of York, p.19-27

WILSON B., D. Rogowski and R. Popplewell., 2003. Integrated services pathway: a best practice model." *Australian Health Review* 26: 45-51