# Developing a
# Shared Information Reservoir (SIR)
# for Agricultural Research for Development
# from a Regional perspective

*'from local information to global knowledge'*

Position Paper by

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# Content

# Acronyms and Abbreviations

| | |
|---|---|
| ARD | Agricultural Research for Development |
| ASARECA | Association for Strengthening Agricultural Research in Eastern and Central Africa |
| CORAF | Conference des responsables de la recherche agronomique africains |
| FAO | Food and Agricultural Organization |
| FARA | Forum for Agricultural Research in Africa (sub-Saharan) |
| IR | Information Reservoir |
| ICAR | India Council for Agricultural Research |
| IGP | Indo-Gangetic Plains |
| IPM-Europe | Integrated Pest Management Network Europe |
| KARI | Kenya Agricultural Research Institute |
| KEFRI | Kenya Forestry Research Institute |
| MoA | Ministry of Agriculture |
| NAIS | National Agricultural Information System |
| NAIFP | National Agricultural Information Focal Point |
| NARO | National Agricultural Research Organisation (Uganda) |
| NATP | National Agricultural Technology Project (ICAR, India) |
| ON | Organisational Node |
| RAIS | Regional Agricultural Information System |
| SACCAR | Southern African Centre for Co-operation in Agricultural & Natural Resources Research and Training |
| SIR | Shared Information Reservoir |
| SPAAR | Special Programme for African Agricultural Research |

# 1. General context

## 1.1 Agricultural information in the development process

Agricultural Research for Development (ARD) plays an important role in addressing global challenges of ensuring food security, sustainable use of natural resources and poverty alleviation in the next decades. Generally accepted scenarios indicate the need to double global food production in order to feed the rapidly increasing world population. This has to be achieved against a background of increased pressure on the natural resource base and reducing agricultural area.

The complexity of the issues and the urgency to address these problems require coherent policies and appropriate actions that are executed at the right level by the various stakeholders. The scope of agricultural research is broadening in order to cope with the increased complexity.

Over the past decades the understanding has emerged that problems are not solved in isolation but through interdisciplinary approaches that link 1) biophysical and socio-economic disciplines and 2) the research and development sector. This demands institutional change where borders between disciplines and between research and development domains are crossed. It is also necessary to devise information systems that support this broadened interaction.

Effective use of information is a basic prerequisite to address the global challenges. It requires involvement of relevant *stakeholders* at the various levels in the developing and industrialised countries that form the global agricultural research system. This includes ministries, research institutes, universities, extension agencies, NGOs, farmer organisations, large-scale producers and small farmers as well as international organisations of the UN and CGIAR institutes.

Research has an important role to play in the *rural development* process. Information systems are important for solving problems of agricultural producers to enhance production and income in a sustainable manner. It should allow local produces and intermediary organisations to access and share relevant information. Furthermore it provides the scientific communities accesses to primary and secondary research results. It also helped to foster partnerships to collectively address the global challenges.

Information systems also play an important role for informed decision making for *policy and planning* via analysis, modelling and monitoring of changes in the social, economic and biophysical environment.
Policy and management require information for priority setting especially scenarios across many dimensions. In addition decision support systems are necessary for effective resource allocation and analysis of the investments on key themes and monitoring of the progress of activities. It is essential for tracking changes in the socio-economic situation, the natural resource base, agricultural production/ consumption and socio-economic factors. Easy access to information on 'who is doing what where?' is a key element at in decision making to avoid duplication and utilise existing resources. Timely and concise overviews of activities by region, sector and organisation/network are key for policymakers and managers.
In addition it is important for *management of* internal processes in organisations as well as external relations e.g. analysis of own activities, partners, outputs and efficiency of ARD-efforts as well as financial and personnel systems. It is crucial for efficient use of scarce resources, targeted partnerships between ARD actors and efficient use of existing scientific and local knowledge.

The regional (supra-national) level is an appropriate level to organise information management interaction. It can involve a critical mass of key players and results can have a good span of impact at the global level.

## 1.2 Present constraints in information use

Comprehensive and structured information on the various aspects of ARD is presently not available in northern and southern countries. There are several reason for this.

*In-compatibility of information systems*
Many database-systems were developed with one specific institutional, thematic or geographical focus. For example financial systems have been rarely connected to other functions such as project management, maintaining external relations or library and documentation systems. As a result most systems wit specific

organisation or network classification system. Formats and classification systems are not broadly applicable. As a result exchange of information between various systems is difficult. Initiatives that started several years ago such as AGRIS/CARIS, SPAAR and IPM-Europe tried to overcome some of the constraint by trying to harmonise on 1 aspect.

*Not captured or only partially available*
Much scientific information and local knowledge is poorly *accessible*. It is either not documented or if documented only available in hard-copy form in scattered institutions. Early information systems applied a concept of centralised data-collection by focal points and central storage on mainframes. Information was at best available at the central level but decentralised access was limited and information not up to date. These systems often registered abstracts of publications whereas the source documents still had to be ordered.
Official publication usually will be available in the official library systems. Gradually these are coming available on-line and early attempts are made to access these various databases through a central tool in combination with standardisation. However globally only a selected number of systems are accessible yet on the Internet/WWW. However, for grey literature the situation is much more difficult.

*Limited political interest and lack of resources*
Poor availability and access to information lead to poor use, which contributes to a vicious circle of lack of resources and reduced motivation for information management In general budget for information management, are thin.

*Limited critical mass in NARS*
Generally information and documentation staff is a support unit with limited staff. To capture the possibilities of ICT to offer user-oriented products new skills are required embedded in a team with certain critical mass to bring about the changes. This point is strongly connected to the former. There are signs that the situation is changing with NARS like Pakistan and India specifically creating teams for this.


## 1.3 Need for change, the way forward


The complexity of the global problems and the number of actors involved increase the volume of relevant information. The rapidly developing information and Communication Technology (ICT) with enhanced storage and communication possibilities allow dramatic progress in the next decades with developing and using knowledge. To this end information systems need to be developed from a broad concept that make information widely accessible. Use of common standards for data exchange is required together efficient search and analyse tools.

Many organisations and networks are starting a process of reassessing the functionality of in-house systems and move towards more integrated systems that serve various purposes and are accessible on the Internet/Web. They are devising systems that allow re-use of information and sharing of data in a global context. Slowly it is realised that it is worthwhile to standardise core-information for re-use and thereby reduce the cost of information and increase the value for money. Organisations are in different stages of the development from a 'single function application' towards more integrated systems. A decisive step in the process is the decision to standardise data. This holds for information for internal use as well as for application in a globalized economy, which is the topic of this paper. There is an increasing willingness in organisations and networks to use common standards for sharing information between organisations, countries and networks.

This paper tries to address concepts and key issues to be considered in developing shared information systems especially at the regional level and tries to serves as guide in the process.

## 2. The concept of a Shared Information Reservoir (SIR)

Sharing agricultural information in an open platform or 'information reservoir' is a step towards building a global knowledge system. The term 'Information Reservoir' is used instead of 'system' since the information reservoir is a product of various information systems that are increasingly interlinked. The actors that manage information are stakeholders in the south, north and international agencies. Several principles and key demands are attached to the concept of a Shared Information Reservoir (SIR).

### 2.1    Principles and key demands

- **Synchronisation between systems; compatibility and standards**
  Many different databases have been developed for a specific purpose. These often focus on a theme e.g. forestry, on one information pillar e.g. organisations or publications or on a region (e.g. Africa). Alternatively it deals with internal issues e.g. finances of projects, human resources of ARD-organisations. It is important to devise information systems from a broad consolidated perspective to reduce duplication in data collection and enhance re-use of data. Harmonised systems can consolidate scope, speed and quality of information offered to end-users. This requires application of suitable standards for key variables of ARD information especially in fields used via e.g. XML/IDML and basic *classifications* as well as software tools that integrate and synchronises data from the various systems.

- **Web-based platforms**
  The rapidly expanding availability of the Internet and ICT technologies greatly increases the possibilities for sharing and accessing information. The WWW can be considered a central medium for data storage and access. Key organisations are or will be on-line in the near future. Accompanying measures need to be developed for the medium-term for those who are not online in the short-medium term.

- **One-time data entry**
  Re-use of data for internal and external application reduces the unit cost of information, ensures synergism and avoids duplication of data-collection. At present many information systems collect the same information. Single data entry in an open transparent system allows multiple use of the same data. Increasingly part of the information for internal processes (financial management, progress and output registration) will be shared and data of others used for internal information systems. This requires design and development of new systems with an overall vision using standards.

- **One window access**
  Users should be able to retrieve information in a single search and not be obliged to browse through many web pages in scattered databases, ending up with compiling data themselves. This requires system tools for synchronisation of information.

- **Decentralised management and access**
  Sustainability of information systems can be enhanced, when the responsibility for information management is decentralised to the lowest appropriate level. Input and updating then rests with the owners of the data and not with a central co-ordinating agency. Quality control can be assured at organisational, national or network level. Web-based systems complemented by accompanying off-line tools e.g. CD-ROMs allows access, use and generation of information by users at local level.

- **Central versus decentralised storage**
  Storage of data can be at a central server using part of a shared software and data or at an independent system. If Web-technology is used storage can be at an in-house server or at external provider. The choice depends on a number of factors such as the size of the organisation and possibility to link internal systems. Additional factors are the in-house ICT capacity, reliability, speed and costs of national tel.com systems and the budget available for data management as well as developing and maintaining the information system infrastructures.

## 2.2    Pillars of a Shared Information Reservoir (SIR)

It is useful to distinguish in discussions on knowledge and information systems a limited number of major components or '*pillars*' of information. Most of the required information can be distinguished according to the following 'pillars':

1. **Organisations** relates to the names, mandate / type of organisation, contact address, products. It can be aggregated with information on **Expertise** which refers to the human resources of experts, scientist, co-ordinators, managers etc. and could form a separate pillar
2. **Activities**. This provides information on programs, projects in the field of on research and development as well as training-education activities.
3. **Products** or outputs of activities/ organisations. This includes publications, databases, GIS-datasets, models, technologies for agricultural production/ consumption-NRM, services.
4. **Technologies/ Lessons learnt**. This pillar contains more or less validated information on technologies, methods etc., which are produced by research, private sector, other agencies or local knowledge.
5. **Factual data/ 'fluid'** info. This pillar contains fluid or rapidly changing information such as agenda's, news, market prices and socio-economic data.
6. **Factual data/'static'** info. This pillar is concerned with information that has a long shelf life and is rather static. It relates to e.g. biophysical data on e.g. climate, soil, and water.
7. **Internal information**. This relates to information on each of the pillars with a high value for internal process. It has generally a greater level of detail and concerns information on e.g. human resources, financial processes and marketing information.

For re-use of information it is important to relate the various components to each other. For e.g. data on activities/ projects ('pillar 2') should be searchable by Organisations involved 'pillar 1') which includes research institutes, universities, private sector and local knowledge providers. Also 'Products' ('pillar 3') should be related to the organisations that produce it, the experts involved and activities carried out.

In a shared system external public information can be used as a basic component for internal management systems. The public part of updated and new information can be shared in a global context.
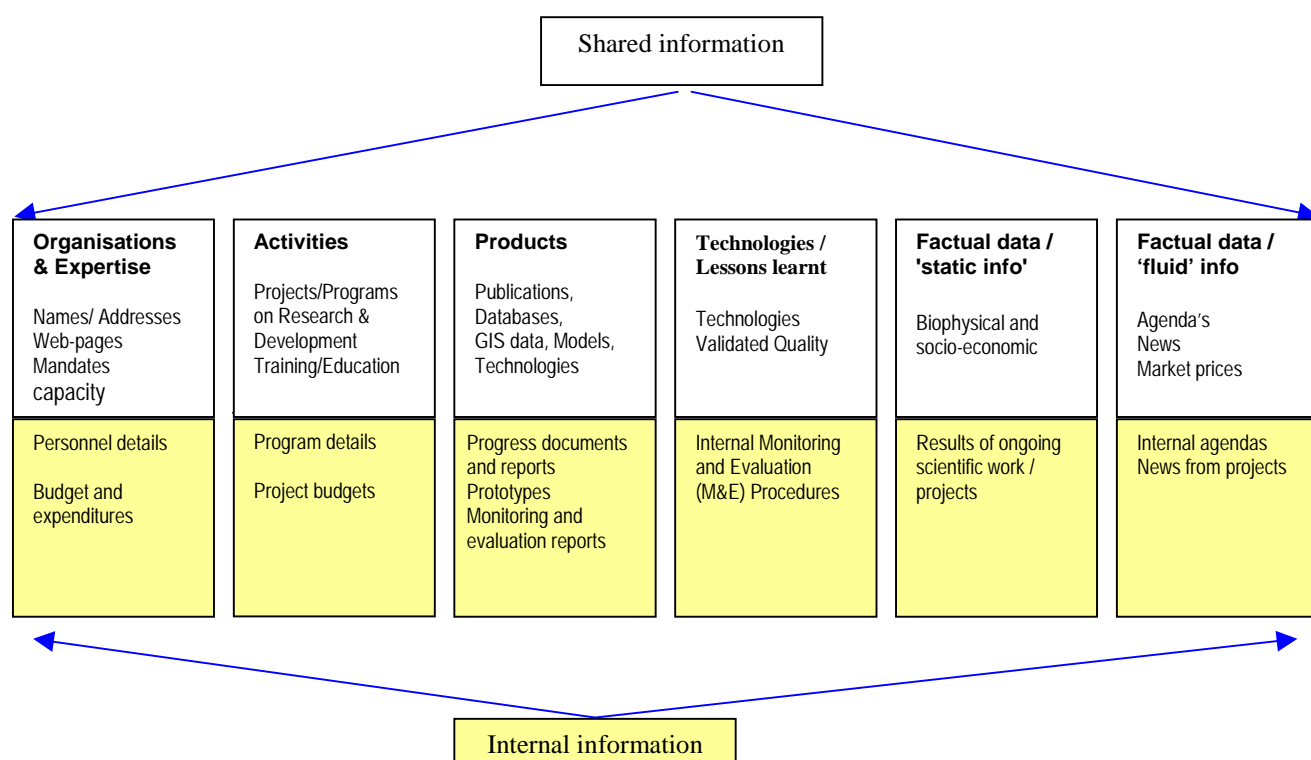


**Figure 1**    Overview of a synchronised system at the organisation level with key information pillars and an internal and external component

## 2.3 User-groups and their information needs

The information should address key demands of various user-groups. The information required by policymakers and managers in the public, private or NGO sector is considered the same and in this overview no differentiation is made. The following groups with their specific information requirements can be distinguished:

- **Policymakers** of stakeholders groups require information for priority setting, allocation of investments and increasing efficiency by avoiding duplication and building on existing information. Information required includes key policy documents, trends and changes in socio-economic and biophysical factors, available expertise and investments searchable by country/region, theme or sector. Aggregated factual information on key social, economic and environmental issues is essential for priority setting, to monitor trends, to identify constraints, and to develop scenarios for development at the (supra-) national and global level.

- **Managers** of the various stakeholders groups (public, private or NGO) need information to monitor investments, activities (projects), to identify partners for collaboration and to remain up-to-date with ARD developments. The kind of information required includes overviews of activities and organisations, available expertise, synthesised outputs of research.

- **Researchers and advisors** need detailed information to respond to research and policy questions, enhance the quality of the work by using existing information and partnerships and networks. The kind of information required includes contacts (expert and organisations), funding sources, factual information and research outputs such as models and publications.

- **Development practitioners** (extension services, development agencies, NGOs) require information to address end-user needs by converting information into applicable knowledge. Information required includes e.g. technologies and contacts, lessons learnt and best practices, market and price information on agricultural inputs and outputs.

- **Agricultural producers** and small farmers (technologies, market information) require location-specific information on technologies, contacts, lessons learnt and best practices, market and price information on agricultural inputs and outputs. Inn addition specific information on soils, pests, crops, weather forecasts and expert systems for sustainable management of production systems.

- **Agribusiness**, including small and medium scale enterprises (SME) They are involved in various parts of the production cycle e.g. seed- or fertiliser supply, tools and machinery, food processing, marketing, finance or other services. They require information on a large number of aspects, including management info, information on markets, consumers, policies and legislation, technologies, producers, research projects and organisations and funding agencies.

- **Educational and training organisations** require information on training materials they can use, expertise, lessons learnt, relevant other courses, user needs, policies, programs, projects and funding agencies.

## 2.4    Organisational aspects of developing a Shared Information Reservoir

Taking into consideration the technological developments and user-demands the following key features can be distinguished for developing a Shared Information Reservoir (SIR):

- **Sharing data and synchronisation between systems; conceptualisation**

Many databases exist or are being developed for external and internal use. This relates to information on organisations, publications, projects, experts etc.. It is important to stimulate harmonisation between existing and new information systems to reduce duplication in data collection wasting scare resource. Re-use of information lowers the unit cost of collected information.

Users want easy access to information on a particular topic or organisation, which requires consolidation of the information offer to end-users and appropriate tools for presentation. Application of suitable classifications and compatible structures is essential. Pillars of a shared information system can be compiled collectively but used for different applications at different scale levels. Strong software tools are required that synchronise and integrate data from the organisation to the shared system and vice versa.

- **Decentralised management; role of focal points**

Decentralised information management implies that information is collected and managed by Focal Points. These can be situated at various levels for e.g. the *regional, national, network and (sub) organisation* level. The emphasis on data management will be at the organisation level when shared information is spin-of internal corporate information. In the scheme these are referred to as *Organisational Nodes (ON)*. Information of ONs can be brought together, enriched and validated by thematic or geographic focal points. Schematically this can be pictured in Figure 2. Networks participate in the global SIR by making available part of the organisational data for a specific theme. They can act as custodians for a specific theme and enrich it with additional features, classifications, quality observations ('validation') relevant for the network. They operate at various scale levels and reinforce work of organisational focal points.

The system of sharing information in a global context can be visualised as follows:

| LEVEL | INFORMATION RESERVOIR (IR) | | |
|---|---|---|---|
| *IV. GLOBAL* | GLOBAL INFORMATION RESERVOIR | | |
| *III. (SUB-)REGIONAL* | (SUB-)REGIONAL INFORMATION RESERVOIR (Reg. IR) | Reg. FP | Reg. FP |
| *II. NATIONAL* | NATIONAL INFORMATION RESERVOIR (Nat. IR) | Nat. FP | Nat. FP |
| *I. ORGANISATIONAL* | ORGANISATION/ NETWORK NODE (ON) ON | | ON |
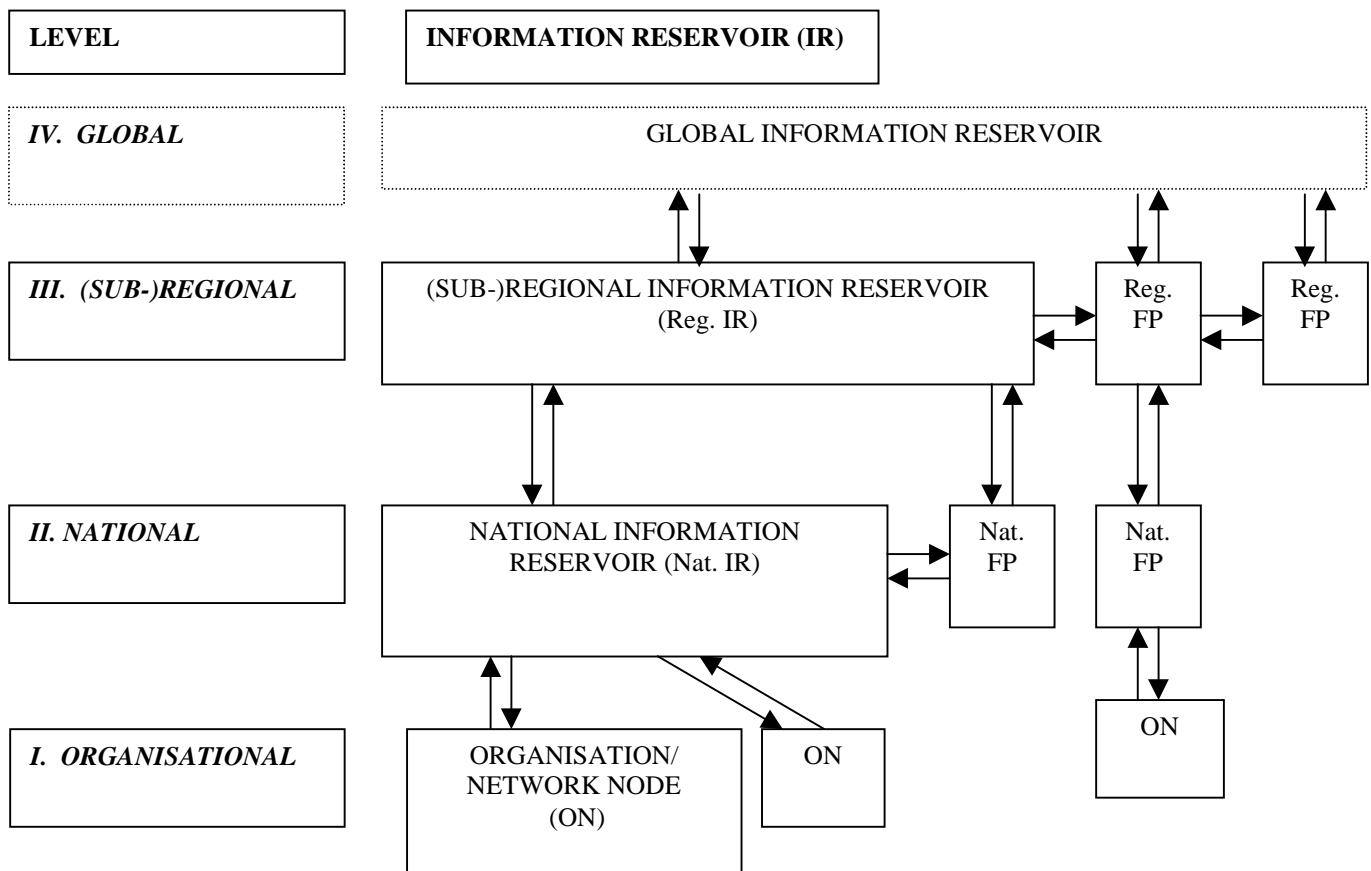
**Figure 2**        Diagram indicating links between information reservoirs from organisational to global level

## 2.5      Options for sharing information in a regional context

Several options exist for managing and storing information ranging from individually developed systems to shared and synchronised systems. Meta-information systems operate on the assumption that all information stays physically at the original source.
In shared decentralised-central systems information is stored centrally in a shared database on the Web/Internet, while information control is decentralised and carried out by focal points or nodes.
Synchronised systems are more advanced systems combining central facilities and standards with decentralised storage. The various options are developed in more detail hereunder.

### 2.5.1      Physically individual systems independently built by organisations, networks, national and regional organisations

In this option organisations develop information systems without guidance or standards for formats, classification, names of organisations etc.
It requires substantial financial resources and scarce expertise for development and maintenance of the information infrastructure (well-structured databases, web sites and maintenance). Creating a one-window access requires major efforts. When in future data will use shared standards as IDML/XML, information in these systems will become accessible at higher aggregation levels. In the short–medium term standards are not applied and therefore information sharing is hampered.
One approach is to develop meta-databases that pinpoint to remote repositories. These meta-databases offer a first overview of the wide range of data sources and information systems. Since the information sources use non-compatible formats, classification systems and organisational names it is not possible to prepare overviews and analysis for decision-making. Integration or synchronisation s well as quality control is not assured. Analysis tools for this type of systems are not yet functional. Data in these information systems need to be synchronised in order to reduce overlap and provide information in a user-friendly manner.

### 2.5.2      A shared information reservoir with decentralised data management

This option is cost-effective and allows a quick start for many national or regional organisations to structure their own information. Such a shared platform does not require substantial skills and resources to develop a solid database engine and manage a central web server. In addition it does not need continuous and costly updating of rapidly changing data of the 'outer' environment e.g. on other ARD organisations since these are maintained by other focal points. 'Outer' information is instantly available and should be more accurate.
The information of the individual organisation, network or country can be made visible and used as a subset of the decentralised-centralised system. The scheme below shows the information flows.
An existing shared information platform is WISARD, which uses experiences of past systems and international standards where applicable to classify the field of agricultural research and development. It registers information on the pillars 'Organisations', 'Activities' and 'Products' which is updated by focal points in (inter)national organisations, networks and national nodes.

Due to the harmonised data entry WISARD provides pre-constructed views with information on 'Projects', 'Organisations' and 'Products' with a geographical, thematic and institutional focus. Overviews of projects by university, donor or region are standard 'screen outputs'. National landscapes of ARD organisations (Ministries, Universities, NGOs, private sector) or networks with email address and homepages emerge as direct outputs. The Netherlands landscape of ARD organisations is almost complete.

The structured manner of sharing information allows analysis, zooming in by combining questions on projects on a particular theme and geographic region. Advanced searches are also possible, e.g. listing all soil & water projects in West Africa and the organisations involved. This 'advanced searching' feature will be of increasing importance when large volumes of information will be made available.

Also the Interdev system on local knowledge is using this principle but also stresses off-line use, which is facilitated by up- and down loads of information which is option 3.
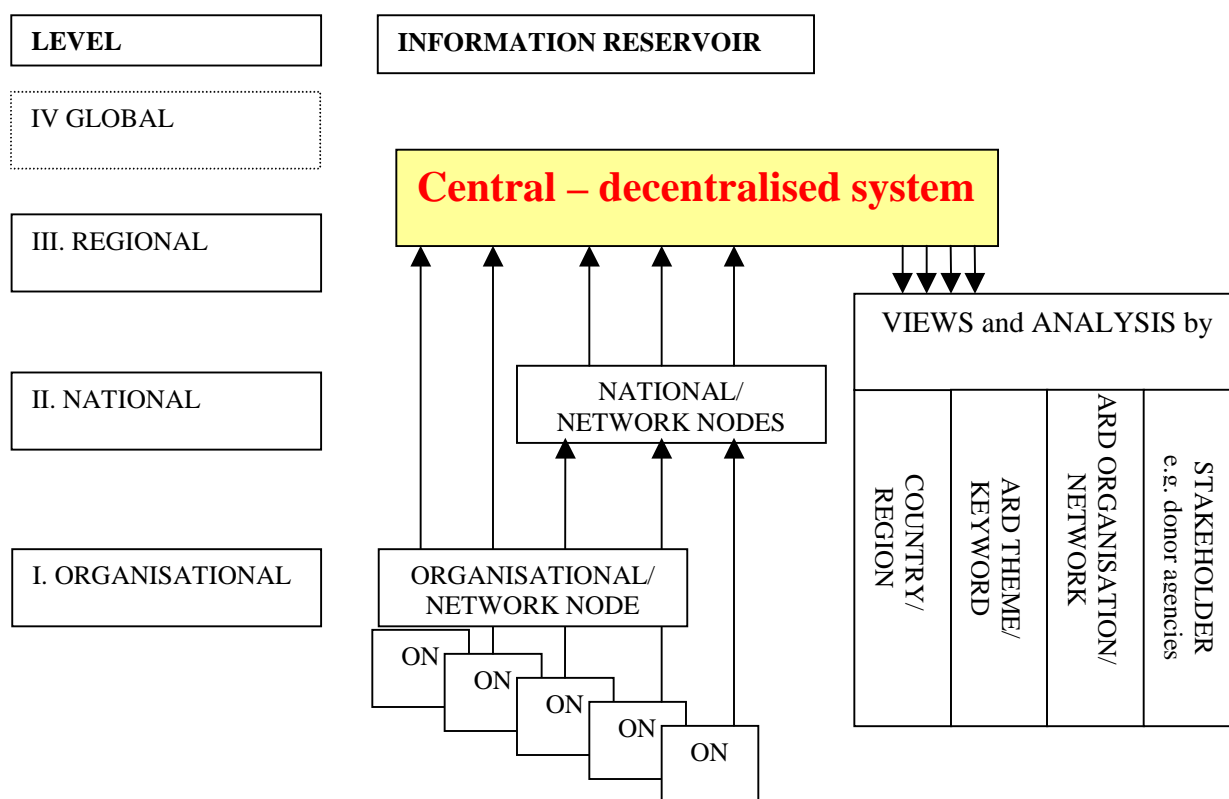
**Figure 3**        Structure of the central-decentralised system

### 2.5.3    A synchronising information reservoir

The basis for a synchronising information reservoir is a well-structured organisational information system, which contains internal management information and shares just one portion of its basic data as public information in a SIR. The latter requires, as in option 2, generally accepted standards for classifications, exchange formats and hierarchy regulations for data management.

In this option the structure and classification of the shared platform can be used as basis for complementary synchronising systems. These can be either copies of the shared system as the off-line systems in Interdev or web-based systems with additional functionality e.g. for internal management. It requires additional resources to build the complementary system and maintain data, which are not shared at the national/organisational level. Synchronisation tools are needed between the organisational system and the national/regional reservoir. The synchronisation is a 2-way process: uploading the public part of the 'internal' information and downloading changed 'external' information.

An example of this evolution in this direction is the Consortium of national agricultural systems of India, Pakistan, Nepal and Bangladesh partners in the Eco-regional Program of the Rice heat Consortium for the Indo-Gangetic Plains.  Management of the 2 countries expressed the strong need to have a regional information system on *'Who is carrying out What research Where?'* Many national, regional or international organisations carried out activities of and the need was felt to get a better grip on the activities at the regional as well as in the national level of the various countries. Complementary to this India has built an internal management system that synchronises data at the global/regional level.
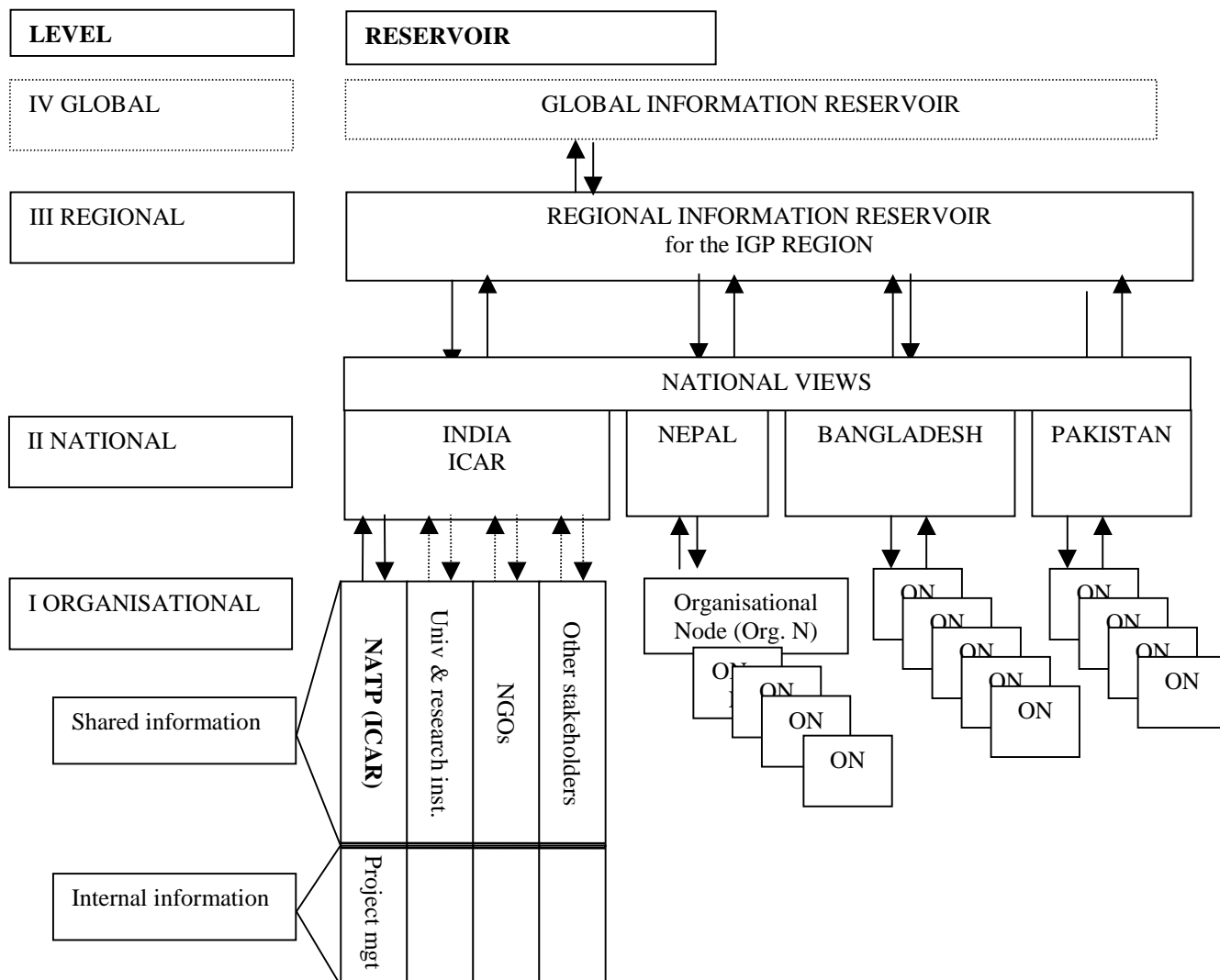
**Figure 4**        Overview of a central - decentralised system with synchronisation

It is envisaged that over time most organisations will arrive at this type of systems that share some part of the information in an international context and other information is specially geared to serve internal needs.

## 3.  Regional level information strategy: key aspects

The (sub) regional level is especially important for catalysing conceptual development, support and facilitation of these processes and ensuring capacity building. They can provide a basic building block for a shared global information reservoir. An example of an infrastructure from a regional perspective is presented in the annex for E. Africa. Several key aspects must be addressed in order to arrive at a coherent strategy to establish a regional level information reservoir.

1.  **Connectivity**
    This includes several issues, such as E-mail, Web/the Internet, CDROM. The South is not yet fully on-line, but a rapid increase of Web presence for many organisations is expected in the coming years. In the transition phase the use of alternative media (such as CD-ROM) may be considered.

2. **Institutional capacity**
   There is a substantial need for institutional capacity building on network building and management information systems. This involves staff on information management as well as technical staff for hardware maintenance and programming. This needs to be a continuous process since the demand from the private sector for trained staff is big resulting in a regular brain drain to other sectors or other countries.

3. **Information content**
   The content of the information platforms needs to address the specific questions of various user-groups. Although they may change and vary, basic information needs can be identified. Information 'pillars' as outlined above can be used for various user domains, e.g. for policy development, program/project management and content info. To start building a shared regional level information reservoir it is recommended to register key ARD actors in each country in the region. This can be done at the organisational level making use of an organisational node per organisation or at the national level with a national node.

4. **Information access & presentation**
   Software becomes rapidly user-friendly. Full access in an easy way to key information on names of organisations, project data etc. is essential for ARD management at various levels. This requires harmonised classification systems for various pillars. There are different layers of classification and different manners of presentations.

5. **Compatible (exchange) formats and classifications**
   There is need for harmonising sharable key features (names of organisations, countries, acronyms, etc.). Formats and classifications need to have a minimum-level of standardisation in order to assure the use of shared information at a higher level (e.g. the regional level). This allows for access to and analysis of data sets.

6. **System design**
   Management procedures include decisions on decentralised/central physical storage, input and updating, and tasks for central/national/network/organisational nodes. Physical storage at own web sites is costly and may take several years; central facilities reduce burden and provide access to modern systems linking organisational info to shared info. Decentralised data management is not equal to decentralised hosting of data: data-ownership can be both in a central and in a decentralised database. It is required to develop a consolidated concept for implementation by the various actors.

7. **Organisational principles**
   There is a need to define and agree on tasks and responsibilities between organisational, national network and regional focal point. It can be a evolutionary process where a start is made by central nodes who gradually transfer foal point responsibilities to the appropriate level. End –users should have the possibility to interact and ensure quality control in an open system. Focal points at organisational level have a major task sharing and updating information. Network, national or regional focal points may have clearing house tasks e.g. to add network specific classification act as a custodian for a particular domain or to control data entry and quality within its domain. The central tasks include support to focal points, central tasks for a system management, capacity building and monitoring the client-orientation of the system.

8. **Quality control.**
   There is a need for a quality control mechanism to be in place at the organisational, network or national level. Information is theme-related and networks may play an important role in quality control.

9. **Sustainability of the systems**
   The various components of this shared system need to be funded and staffed adequately. Focal point tasks are to be funded by the respective organisation and networks that benefit from using a system in stead of developing and managing their own system. In addition it will be increasingly required to participate in shared systems in order to be part of the global ARD community. Financial resources are essential for the sustainability of the system, including human resources, hardware and network.

# 4. Developing a Shared Information Reservoir: a Step-wise approach

A number of steps need to be taken to develop an information reservoir. Since generally limited experience with the Internet and/or web-based databases is available a gradual but steady process is required to introduce and familiarise key institutions with the technology and to provide (on the job) training. A regional information strategy has to address various technical and organisational issues to be successful. A technically sound information system is a major tool to support ARD but on its own is however not sufficient. Key determinants for a successful process are the organisational aspects. The suggested approach includes interactions, workshops, training programs and assignment of special tasks to specialised groups.

A first step is to get going is to create at a **core group** with sufficient critical mass that can catalyse the process. Important tasks are to map the major actors, sources, activities and type of information offered and involve the key actors in the process. This complex effort requires inputs and participation of all stakeholders in the region, national and regional organisation, international organisations and advanced centres. Various users need to be taken into account e.g. policy makers, managers, scientists, NGOs, extension agencies, agricultural producers and farmers, small medium enterprises/ private sector.

The second step is to develop a *consolidated concept for operation*. *Discussion needs to be organised resulting in a plan and agreement to* address the development of a regional level information reservoir. This should take the global context of standards and technology available in to account.
- Conceptualise of a web-based system that is scalable and can integrate users-needs at different scale levels, can handle different sorts of data. The output should be that all actors work operate from a
- Decentralised management by ARD actors at the organisational level supported with national/ regional/network focal points;
- Complementary measures for off-line input and searching;
- Use common formats and classifications for key variables at the regional and global level
- Quality control rules and regulations to avoid duplication or confusion by using agreed names etc;
- Measures for scaling-up information from organisational to global level and scaling-down new information from outside to the participating organisations
- Assuring financial support for the various measures

The third step is starting the **implementation**, which has several components.
- Important is composing a regional directory of key ARD organisations which can be used by the various stakeholders
- Awareness raising to senior management, politicians and the various ARD stakeholders is another parallel activity.
- Technical issues need to be addressed in order to develop the design and model of the information reservoir. Often this aspect involves outside specialists and experts
- Harmonising existing datasheets. International, advanced agencies and national organisations have major data sets relevant to the region, which would benefit from increased accessibility and harmonisation. This relates to information on e.g. soil, water availability, forest area, and climate data.
- A support program needs to be in place to ensure availability of the necessary hardware infrastructure, and to build capacity at the various levels to develop and manage the information resources.
- A very important element is capacity building in the region involving focal points, international (regional) actors advanced organisations and the private sector.

The fourth step is **consolidation and improvement.** It includes a.o.
- Institutionalising procedures, regulations and processes to further enhance content, quality and accessibility of the information

**Annex 1        Schedule for developing a regional information reservoir**

In the table below the suggested stages or pint of attention to establish a regional information platform are elaborated focussing on all (organisational, national and regional) levels.

| **Check- list for developing a regional level information reservoir** |
| --- |
| |
| **A.        Get going** |
|    1.   Creating a core group |
|    2.   Scoping of the national, regional landscape for key actors, connectivity |
| |
| **B.        Conceptualisation and mind-setting** |
|    3.   Preparation of concepts and options |
|    4.   Consensus building for a consolidated concept<br>       Organising meetings to inform stakeholders<br>       Political commitment and financial support |
|    5.   Identification of user needs of various stakeholders |
|    6.   Identification of key implementing agencies, experts and partners |
|    7.   Planning activities and phases |
|    8.   Securing human and financial resources to guarantee sustainability of the system |
| |
| **C.        Implementation** |
|    9.   Public awareness raising and promotion; fund raising |
|    10.  Improve infrastructure for access and management of information<br>    • Focal point access to adequate PC and Web-connectivity<br>    • Design complementary measures for off-line use |
|    11.  Design and development of the information reservoir<br>    • Designing databases: prototype input/output; fine-tuning , building ,adjusting to user needs |
|    12.  Training and capacity building<br>    • Information analysis and conceptual development<br>    • Database building and user interfaces<br>    • Data input (classification) and quality control<br>    • Information management |
|    13.  Developing the organisational infrastructure<br>    • Identification of national, stakeholder and network focal points<br>    • Clarify task and responsibilities ('custodians') of information domains |
|    14.  Phased data entry:<br>    • Creating the organisation directory by national stakeholder co-ordinators<br>    • Harmonising existing databases into sharable system<br>    • Ensuring synchronising of inputs between various information systems<br>    • Designing of shared regional user-defined outputs |
| |
| **D.        Consolidation and improvement** |
|     • Assure technical management and interaction/ feed back with various users<br>    • Designing quality control mechanism |
| |

**Annex 2.     Knowledge infrastructure for E. Africa with organisational nodes**

| LEVEL | INFORMATION RESOURCE |
|---|---|

| IV GLOBAL | GLOBAL INFORMATION RESOURCE |
|---|---|

| IIIa REGIONAL | AFRICA RAIS | Central America RAIS | Latin America RAIS | ASIA RAIS | Europe RAIS |
|---|---|---|---|---|---|

| IIIb SUB-REGIONAL | ASARECA RAIS | CORAF RAIS | SACCAR RAIS |
|---|---|---|---|

| II NATIONAL | UGANDA NAIS | KENYA NAIS | NAIS of other ASARECA members, including Org. Nodes |
|---|---|---|---|

| I ORGANISATIONAL | NARO (Org. Node) | KARI Org N | KEFRI Org N | MoA Org N |
|---|---|---|---|---|

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