



Australian Government
National Water Commission

Australian Water Resources 2005

A baseline assessment of water resources for the National Water Initiative
Level 2 Assessment
Australian Water Resources Information System: User Requirements



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Information System**

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Glossary

ABS	Australian Bureau of Statistics
ANZLIC	Australian New Zealand Land Information Council http://www.anzlic.org.au/
API	Application Program Interface
Application	A program that performs a specific function directly for a user. Applications can make use of SDI.
Architecture	The organisational structure and operating environment of the SDI, including the relationships between its parts, and the principles and guidelines governing their design and evolution over time.
ASDD	Australian Spatial Data Directory http://asdd.ga.gov.au/asdd/
AWDIP	Australian Water Data Infrastructure Project
AWR2005	Australian Water Resources 2005
AWRIS	Australian Water Resource Information System
Binding	Specific syntax and parameter values used by a client to invoke a specific server operation
BOM	Bureau of Meteorology
BRS	Bureau of Rural Sciences
BWRA	Baseline Water Resources Assessment
Catalogue	A registry that, in the SDI context, is usually used to describe spatial data sets.
Client	A software component or an application that accesses a service. Clients may be categorised in three ways Thin clients where the client supports only human-interface code, such as a web browser or a minimal PDA or WiFi handset, and must also support non-proprietary standards. They typically lack long-term memory such as disk drives. Application code and data access both run remotely and are entirely dependent on an external network connection. Thick clients where the client supports all the human interface and application code, may support some or all data access code, and may support long-term data memory. Human interface code may be entirely customised and not conform to non-proprietary standards. May not even support human interfaces i.e. may be entirely automated remote processes. May operate at times without network connection. Chubby clients have capabilities somewhere on the spectrum between thick and thin clients i.e. may support some application and data code, and may store limited amounts of data. Will usually but not necessarily support human interfaces. May operate well for limited time without network connection.
CMA	Catchment Management Authority



Component	Software that packages the client or server implementation of a service and can provide the realisation of a set of interfaces. A component consists of software code (source, binary or executable) or other equivalents such as scripts or command files.
Conceptual Architecture	An overview of the services, data, technology and institutional environment of SDI. It describes, in general terms, both what the SDI will include and how it will operate.
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Custodian	The authoritative manager of an SDI resource, whether data set, service or component, who is responsible for the declaration of the policies regarding use and accounting for the resource.
Datastore	Any type of persistent storage for components and data. Content may be static or dynamic. May include database systems, file systems, structured text storage, XML repositories etc.
DMZ	Demilitarized Zone - A part of the network that is neither part of the internal network nor directly part of the Internet. Basically a network sitting between two networks.
EB-XML	Electronic Business using eXtensible Markup Language
ebRIM	EB-XML Registry Information Model
ESCAWRI	Executive Steering Committee for Australia's Water Resource Information
FGDC	Federal Geographic Data Committee (USA) http://www.fgdc.gov/
GA	Geoscience Australia (Australian Government) http://www.ga.gov.au/
Gazetteer	A dictionary of geographical names. May encompass locations, cultural and landscape features and may embody various naming conventions including official name, names in common usage, traditional and community-based names. Attributes of gazetteer entries may include geographic coordinates, extent and topology. May be implemented through Web Feature Service for SDI applications such as user interfaces.
GIS	Geographic Information System
GML	Geography Mark-up Language (OGC) http://www.opengis.org/docs/02-023r4.pdf
HTTP	HyperText Transfer Protocol
ISO	International Organisation for Standardisation http://www.iso.org/
LDAP	Lightweight Directory Access Protocol
Map	A pictorial representation or portrayal of geographic



	data.
Metadata Standard	Data will be documented according to the FGDC Content Standard for Digital Geospatial Metadata (CSDGM) and/or the ISO 19115.
NLWRA	National Land and Water Resources Audit
NRDD	Natural Resource Data Directory. NSW node of the ASDD. www.canri.nsw.gov.au/nrdd/
NRM	Natural Resource Management
NWC	National Water Commission
NWI	National Water Initiative
OASIS	Organisation for the Advancement of Structured Information Standards http://www.oasis-open.org/who/
OGC	Open Geospatial Consortium http://www.opengis.org/
PDF	Adobe Portable Document Format
Persistent Bindings	Persistent Bindings link a type of information resource (e.g. spatial data layer) to a display tool (e.g. web mapping application). They can be compared to filetype associations in e.g windows explorer.
Registry	A listing of the specific, individual services, components, datasets or other entities that comprise the SDI or are relevant to its users. Instance registries are used to identify, locate, and describe individual instances. Many registries refer to associated Type Libraries that record the allowed types within registry classes e.g. types of services, types of user authorities.
Resource	Data, services and components that are published and underlie the creation of all useful products. Resources are presented to the internet as Web Services.
Schema	A schema is an expression of the Type using a particular data modelling language. Types can be described as classification taxonomy for a set of schema definitions. The OGC application data modelling language is GML and each schema fragment corresponding to a given type is defined in GML.
SDI	Spatial Data Infrastructure
Server	(a) A software component that delivers a service. (b) A physical implementation of such a component that provides the realisation of its operations.
Service	A collection of operations, accessible through one or more interfaces, that allows a user to evoke behaviour of value to that user. A server delivers each service. A service may encapsulate many processes. A “service instance” is another name for a server (b).
Site	A location (e.g. URL) at which a system is accessed.
SKM	Sinclair Knight Merz
SLD	Styled Layer Descriptor
SOA	Service Oriented Architecture. A service-oriented



	architecture is a collection of services that communicate with each other. The services are self-contained and do not depend on the context or state of the other service. They work within distributed systems architecture.
SOAP	Simple Object Access Protocol (W3C) http://www.w3.org/TR/2000/NOTE-SOAP-20000508/
SSO	Single Sign On
Taxonomy	The science, laws, or principles of classification; systematics
Thesaurus	A list of synonyms a search engine can use to find matches for particular words if the words themselves don't appear in documents
W3C	World-Wide Web Consortium http://www.w3.org
Web Coverage Service (WCS)	Supports electronic interchange of geospatial data as "coverages" – that is, digital geospatial information representing space-varying phenomena. A WCS provides access to potentially detailed and rich sets of geospatial information, in forms that are useful for client-side rendering, multi-valued coverages and input into scientific models and other clients. The WCS may be compared to the OGC Web Map Service (WMS) and the OGC Web Feature Service (WFS); like them it allows clients to choose portions of a server's information holdings based on spatial constraints and other criteria. Unlike WMS (OGC document 01-068r3), which filters and portrays spatial data to return static maps (rendered as pictures by the server), the Web Coverage Service provides available data together with their detailed descriptions; allows complex queries against these data; and returns data with its original semantics (instead of pictures) which can be interpreted, extrapolated, etc. - and not just portrayed. Unlike WFS (OGC Document 02-058), which returns discrete geospatial features, the Web Coverage Service returns representations of space-varying phenomena that relate a spatio-temporal domain to a (possibly multidimensional) range of properties.
Web Feature Service (WFS)	Serves vector data (points, lines and polygons) to the web for use by applications on remote websites. Provides interfaces for describing data manipulation operations on geographic features using http as the distributed computing platform. A Web Feature Service request consists of a description of query or data transformation operations that are to be applied to one or more features. The request is generated on the client and is posted to a web feature server via http. The web feature server then reads and (in a sense) executes the request. The OGC Web Map Service (WMS) allows a client to overlay map images for display served from



Web Map Service (WMS)	<p>multiple Web Map Services on the Internet. In a similar fashion, the OGC Web Feature Service allows a client to retrieve geospatial data encoded in Geography Markup Language (GML) from multiple Web Feature Services</p> <p>Produces maps of georeferenced data. A "map" is a visual representation of geodata; a map is not the data itself. These map views are rendered in a 2D pictorial format such as PNG, GIF or JPEG. The WMS specification thus enables the creation of a network of distributed Map Servers from which clients can build customised maps. A particular WMS provider in a distributed WMS network need only be the steward of its own data collection. This stands in contrast to vertically integrated web mapping sites that gather in one place all of the data to be made accessible by their own private interface.</p>
Web Service	<p>Application logic accessible across a network using standard Internet protocols. Web Services combine the best aspects of component-based development and the Web. Like components, Web Services represent functionality that can be easily reused without knowing how the service is implemented. Unlike current component technologies that are accessed via proprietary protocols, Web Services are accessed via ubiquitous Web protocols (e.g. http) using universally accepted data formats (e.g. XML).</p>
WRON	Water Resources Observation Network.
WSDL	Web Services Description Language (W3C)
XML	<p>Extensible Mark-up Language (W3C)</p> <p>http://www.w3.org/XML/</p>



Executive Summary

User groups

User group	Typical requirements that could be met through AWRIS
Policy and strategy analysts	Review, evaluation, assessment of policies, strategies. Identify the essential elements of a particular issue Provide evidence that justifies a specific position Inform members or senior staff
Program, Project and Resource Planners and Managers	Setting benchmarks and reporting criteria, status reports Identify data gaps and areas of priority for funding assistance Determine validity of creating the program or project, or using the resource.
Business Planners and Managers	Determine characteristics of water in specific areas Determine water access rights, trading Identify areas of business opportunities and risk Provide information and advice to customers
Advanced Researchers	Obtain data to input into models or conduct independent analysis Test a hypothesis Review data etc, prior to more sophisticated analysis Understand data availability, reliability, accuracy and currency. Identify and review research and water information related activities
Elementary Researchers	Understand the current Australian water management environment Obtain predefined information to answer specific questions Find more information on timely 'issues of the day' Quote facts and figures, obtain maps and diagrams that will improve the quality of assignments, media stories etc Help in setting the scene and providing introductory / contextual / preliminary information
'Public'	Answer to specific questions as they arise



User group	Typical requirements that could be met through AWRIS
	Similar tasks to elementary researchers

AWRIS Vision

In order to be a success AWRIS should meet the following vision:

“AWRIS will provide a comprehensive, credible, open view of Australia’s water resources data and information. It will allow users to review and investigate this data, understand the data in context, and bigger picture details about the data. AWRIS will help further (and add value to) the discussion about water.”

Critical Success Factors

Specific critical success factors for AWRIS to succeed are listed below.

- 1) Provide **easier and faster discovery** of, **access** to and **sharing** of nationally consistent water resources data and information over time.
- 2) Provide greater **understanding** of the water resources data and information that is discovered.
- 3) Provide a **comprehensive, exhaustive and authoritative** system, which also indicates where the **gaps** exist.
- 4) Give users appropriate **context, help** them view and apply related information and **guidance through** the discovery process.
- 5) Be responsive, user centred, professional and beyond reproach.
- 6) **Coordinate and add value** to tools and systems that are already available or will be available.
- 7) Help facilitate **standard and coordinated approaches** to water resources data and information.
- 8) Be **‘community’ run**: not owned by any one group but contribution and responsibility of everyone in the industry – a **collaborative** effort – but with some protection.

Key User Requirements

Rank	Requirement	Reference
1	Determine whether others have asked similar questions, including how they answered the question, and what other questions they have asked.	3.10
2	Generate customised and ad hoc reports using a wide set of predefined templates and information elements, data sets, or other information that may be applicable and available.	2.2
3	Search & display metadata about: data, information, data	3.3



	sources, people, projects, references,	
4	Preview data and information and indicative maps without needing to access the source.	3.4
5	Identify what studies, other information or research exists that can help understand an area/topic.	6.6
6	Access, review and download reports that are relevant to specific reporting frameworks, such as the State of Environment, National Water Initiatives, and Water Management Plans. Review reports that are relevant to specific measurement parameters, such as water quality measures, caps, allocations, etc.,	2.1
7	Conduct simple searches and obtain meaningful search results	3.1
8	Search for data and information by multiple dimensions including by: data sets, information elements, time periods, topics, jurisdictions, locations, organisations, relevance, availability of (information), research, or document type, where from, quality, reliability, certainty, data collection method, dates, frequency etc.	3.2
9	Determine who are the data holders and how to access the data where data is not immediately accessible or where data can be obtained offline agencies/catalogues/websites	4.2
10	View a directory of people, projects, stakeholders and organisations	1.1
11	Obtain a list of similar previous and popular searches	3.6
12	Understand what questions to ask about a topic	3.9
13	Provide data that can be used to help reporting, delivery of initiatives and requirements	4.6
14	Understand the type of data and information that is available at different scales	6.4
15	Identify gaps or missing information and data	4.7
16	Navigate by: spatially, topic, data type, topics, jurisdictions, locations	7.1
17	"Drill down" through data and information: starting at a high level, digging deeper	7.4
18	Provide information and results to AWRIS	7.7
19	Update data/information/metadata/results/observations (contribute to the AWRIS)	7.8



1 Introduction

This section provides details on:

- background to the project;
- the Australian Water Resources Information System;
- objective of the user requirements phase;
- information Architecture Theme Phase Two Work plan;
- user requirements methodology;
- document purpose, and;
- related documents.

1.1 Background to the project

As a requirement of the Intergovernmental Agreement on a National Water Initiative (the NWI), and the National Water Commission Act 2004, the National Water Commission (the Commission) is developing a baseline assessment of water resources, known as Australian Water Resources 2005 (AWR2005) to be released in 2 stages in mid 2006 and December 2006

The primary purpose of AWR2005 is to provide the Commission with a baseline picture on a range of water management and resource issues from which future comparisons, and the success of NWI reform processes can be measured.

AWR2005 will address three headline parameters:

- Water Availability (How much water do we have? How much do we store? What are the variability factors? What are the connections between resources?).
- Water Quality/River and Wetland Health (What's the condition of our water resources? What are the key environmental assets for each system? Are our water systems healthy and able to sustain appropriate biodiversity?).
- Water Use (How much water is under entitlements/licences? How much is allocated? How much do we use? What types of water are used? For what purposes?).

Contained within these headline parameters are specific indicators and measures of the condition of the nation's water resources. These include indicators of water storage in surface water and groundwater storages; connectivity of water resources; river health conditions; and water usage.

1.1.1 The Australian Water Resources Information System

A requirement of AWR2005 is to develop a repeatable framework and to work towards the establishment of an ongoing water resource information asset. This asset will include a set of interoperable tools that will access data published through a distributed water data infrastructure to deliver future



water resource assessments. These tools will be known collectively as the Australian Water Resource Information System (AWRIS) and will be one of the most important outputs of the project.

More information about the tools that will make up AWRIS can be found in the Australian Water Resources Information System - System Architecture document, but some fundamental characteristics are outlined below:

- AWRIS will provide on-going access to annual biophysical data (water availability, water use and river and wetland health) and some water management information for Australian surface water and groundwater management areas.
- AWRIS will allow future assessments to be made as a matter of routine. The availability of transparent water resources data, information and knowledge will facilitate improved decision making processes and build public trust and confidence in the overall process.
- Collation and reporting of data gathered for AWR2005 and subsequently displayed under AWRIS will be used in performance indicator and benchmarking assessments. Consistency at a national level in terminology, measurement and data collation is being sought to ensure that AWR2005 and the accounting standards are harmonised. This will, in time facilitate:
 - an agreed national understanding of the current status at catchment/groundwater management unit level of ecological assets, flows, usage and management regulation and implementation;
 - a common hydrological and river health basis for informing debate about water availability, entitlements and usage and the occurrence/protection of environmental assets in priority catchments/management units;
 - a step towards uniform national terminology on water measurement parameters;
 - clarification of critical geographic and knowledge gaps;
 - improved understanding of where further investment is required to deliver NWI outcomes, and;
 - a basis and method by which some changes resulting from the NWI can be assessed.
- AWRIS will be a distributed database system and set of interoperable web-based interrogation tools.
- These tools and the infrastructure supporting them will form an “enduring asset”, which is sustainable and scalable to deliver assessments which may have an extended set of data and functional requirements.
- The infrastructure will be open and accessible to third party tools.
- Any work will build upon the foundations laid by related projects, notably the Australian Water Data Infrastructure Project (AWDIP).



1.2 Document purpose

The purpose of this document is to describe the requirements of the potential users of a proposed AWRIS. These requirements will be used to define the scope and system architecture and to develop and implementation plan for AWRIS. This information is being gathered as part of the AWR2005 Project.

1.3 Related documents

This document should be read in conjunction with the suite of documents that present the proposed AWRIS user requirements, system architecture and implementation plan. These documents include:

- InfoArchTheme_AWRIS_SystemArchitecture_Sept06.doc (Australian Water Resources Information System - System Architecture).
- InfoArchTheme_AWRIS_ImplementationPlan_Sept06.doc (Australian Water Resources Information System - Implementation Plan).

Other documentation has been created during the AWR2005 project that is related to this document. The information contained in this document succeeds all information contained in previous documentation. However, previous documentation does provide a good insight and context to this report.

- Phase Requirements Overview (Excel): Overview of requirements reviewed by the Commission.
- AWRIS User requirements scores (Excel): Individual scores for each of the user requirements, against AWRIS critical factors in successfully meeting the AWRIS vision.
- Steering committee presentation (PowerPoint): Presented to the steering committee on 18 July 2006.
- NWC User Requirements Background (Word): Description of the user requirements project as background reading for workshop and interview participants.
- Appendix F Theme Report: Information Architecture Discovery Phase Theme Report (Word): Deliverable from AWR2005 discovery phase.

1.4 Objective of the user requirements phase

The primary objective of the user requirements phase is to understand users and their requirements that must be supported by the AWRIS.

Understanding and describing AWRIS in detail, validating this with stakeholders and users is a *critical* stage in the process before finalising and documenting the tool. It is fundamental to the enduring success of AWRIS.

The Validation stage ensures the following:

- Providing stakeholders the opportunity to understand and be clear about what the enduring asset will look like and what requirements will be met, and to provide feedback on what is to be implemented.
- Provides the opportunity to further identify who the users are and how they will interact with the product, and what is going to be useful. For the product to be an enduring asset this must be as clear as possible as it defines functions the tool must be able to deliver and how the tool will deliver them.
- Ensures that AWRIS is implemented to meet the specific requirements of users and against defined use cases, rather than trying to fit the tool into existing systems or frameworks that may not meet requirements (therefore reduce the ability for the tool to be an enduring asset).
- Ensures the enduring asset is useful and valuable to the range of users in the long term.
- Expectations of what will be developed are managed and clear.
- Help understand what needs to be implemented, and help determine the best approaches to ensuring user needs are met.
- Provide direction for those developing and building the AWRIS tools.
- Highlight any areas of inconsistency, ambiguity and incompleteness early, rather than during the build phase. Finding problems during the build can be expensive and time consuming and usually results in a product that does not meet requirements.

1.5 User requirements methodology

In order to test, validate, and obtain more detail about users and requirements, the following activities were completed.

- 1) **Finalisation of priority audience groups with the Commission.** A high level description of the audience groups for the enduring asset was developed during the Discovery Phase. This description was reviewed and finalised prior to presentation to stakeholders.
- 2) **Final review of data availability.** Data was identified in the discovery phase reports from all assessment themes. This data was reviewed to provide more details on what the AWRIS model will look like prior to presentation to stakeholders.
- 3) **Identification of stakeholders.** The Commission identified appropriate contacts to assist with validation of the requirements.
- 4) **Workshop preparation.** Including gathering of: information about the project and its requirements; what information is required; questions to be answered in order to validate requirements; pre-workshop activities participants will be asked to undertake. This also included liaison with other projects and other themes to introduce the issue and ensure that linkages and efficiencies in consultation and interviews.
- 5) **Conduct workshops and interviews.** Six workshops and sixteen interviews were conducted with potential AWRIS user groups including:
 - other Commission staff;
 - other Australian Government agencies (strategic and technical);
 - inter - jurisdictional agencies (eg MDBC);
 - peak bodies and representative groups, and;
 - students and researchers.

A full list of participants can be found at Appendix A: Stakeholders.

The overarching agenda for each workshop included the following:

- Introduction to the AWRIS concept, and the data/information in scope;
 - validation and further definition of the potential AWRIS users and their requirements;
 - describing the tasks/scenarios that the users will complete using AWRIS, and;
 - discussion of proposed functionality and tools that might meet those requirements.
- 6) **Draft and final iteration of validated requirements specifications.** Following engagement with stakeholders, a draft iteration of validated requirements was created. This was presented to system architects and the Commission to review, and has informed the Australian Water

Resources Information System - System Architecture and Implementation Plan documents. The validated user requirements were completed based on the Commission and project team feedback, and are included in this document.

- 7) **User testing.** In order to ensure that the Information Architecture design and wire frames will be usable and useful, a round of user testing will occur once AWRIS tools have been defined, and the preferred AWRIS implementation model has been identified. User testing will involve testing with up to five defined priority users of AWRIS. Participants will review AWRIS against specific scenarios or activities (user requirements), and will provide feedback on how to improve the specifications to ensure AWRIS will be both usable and useful.



2 AWRIS Users

The following are major potential AWRIS users as initially defined by the Commission², through previous reviews of the National Land and Water Resources Australia 2000, and as identified during the workshops and interviews.

This section provides details on:

- the definition and scope of AWRIS users;
- general characteristics of an AWRIS user;
- details of potential user groups, and;
- key organisations and groups.

2.1 Definition of AWRIS users

An AWRIS user is defined as ‘an individual, group or organisation that will access, interact with, and use at least one of the tools / products that will make up the AWRIS’. An AWRIS users includes those who access and view simple data and information using AWRIS tools, through to power users who are interacting with the system in more complex ways, such as downloading datasets, providing collaborative-style feedback, and accessing metadata. In the Australian Water Resources Information System - System Architecture document, AWRIS users are labelled ‘End-user AWRIS’.

Other users of AWRIS will include system administrators, custodians and data contributors, brokers, and supervisors. These users are described and reviewed in the Australian Water Resources Information System - System Architecture document

2.2 General characteristics of an AWRIS user

Who actually uses the AWRIS will depend on the type of information, services and tools provided, and the scope and level of detail to be provided. It is anticipated that users, over time, will ‘define’ themselves as they gain a better understanding of what is on offer and how they are able to use AWRIS. This being said, the consultation process undertaken for this study has provided evidence that there are some general characteristics of potential users.

AWRIS will have the potential to be used by an extremely wide range of people in many different communities across Australia and internationally. Key characteristics of all stakeholders interviewed have provided some indication of the characteristics of potential AWRIS users. These are summarised below.

- **Internet savvy:** It is expected that users will already use the internet for their research and information requirements. Subsequently, potential

² The audience groups as defined by the National Water Commission. The National Water Commission also expect that the audience groups for this site will be similar to the audience group for the Land and Water Australia site, but these groups are yet to be identified.



users of AWRIS will be the ‘internet generation’ or those who have successfully adapted to the internet paradigm. The internet and innovative information sharing techniques and technology is a seamless part of their daily life. These potential users use the internet and associated technologies for work, communication, research, shopping, banking, learning, and entertainment. It is expected that users will have experience using common tools such as search engines, maps and software interfaces.

- **Not technically minded.** It is expected that, although users may use the internet and technology as a seamless part of their life, most AWRIS users will not have specific or advanced technical skill sets that enable them to interact with complex programmes and interfaces, or conduct complex data analysis. However, a small and important group of users will have these advanced and specialist skills.
- **Continue with existing networks.** Although users will be internet savvy, they will continue to utilise existing networks to complete tasks, at least until they are confident that using AWRIS is the only, quickest, most reliable or easiest method. They are, however, concerned of the risk of continuing to rely on their own existing networks. They perceive these networks as constantly changing, and growing rapidly as the subject of water resources becomes more and more important in Australia.
- **In the water ‘industry’.** Most users will have a specific and ongoing primary interest in water and water resource data and information: the majority of their work is concerned with water and the water ‘industry’. Some other users will have a secondary interest in water, and will use AWRIS to answer specific questions as they arise. An example may be a business investor who is researching the viability of developing a business in a specific area and wishes to understand what water is available for use.
- **Task driven.** Potential users expect to interact with AWRIS to complete specific activities or tasks, to ask questions or perform queries, and to discover and learn about what research and activities occurring around Australia. It is not expected that users will be ‘browsing’ the site without a specific purpose in mind.
- **Demand for information.** It is expected that the users will have a high demand for a large and varied amount of information about water resources. Typically, these users want access to as much information as possible, and build up their own knowledge banks, and communities of interested parties. The information collated and the activities of these users will lead to the output of additional water related information or analysis, and establish their own linkages and connections between the data and information that is available.
- **Unsure what questions to ask.** There is no one set of ‘questions’ or query types that users will ask– in most cases users found it difficult to define the questions they wished to ask. It could be argued that user requirements, needs and questions are still developing and will change



over time, especially as users delve deeper into a topic and explore the issues.

- **Difficult to identify data requirements.** Users found it difficult to identify specific data and information requirements in any detail – they are more likely to want to review a large amount of information to determine what they require, or explore at a high level only. Users perceive that their queries are often simple but answers and information provided are complex and difficult to obtain. When asking a question, in the first instance the query may be relatively simple (eg, How much water in Australia? Who uses more potable water for gardening: Melbourne or Sydney) and the AWRIS user may not be aware or accept the complexities that may be involved to answer the question.

2.3 Details: potential user groups

During the Discovery Phase, the potential AWRIS user groups were grouped according to organisations that may use the system:

- Australian Government (Commonwealth Ministers, relevant departments, forums and agencies);
- State and Territory Governments (Ministers, state departments, agencies, inter-jurisdictional committees, service providers);
- Regional Bodies: (catchment management organisations, irrigation companies, water supply companies, local governments, indigenous communities);
- Peak Industry and Environmental Groups (National Farmers Federation (and State FF) conservation, industry, and environment groups and NGOs), and;
- General Public: (industry / students / researchers / interested public / consultants / international queries).

Workshop and interview participants rejected this grouping of potential users. They indicated that a more appropriate way to group users is by the different roles that they may have, and the tasks that they may perform in that role.

The potential user groups identified by participants are:

- policy and strategy analysts;
- program, project and resource planners and managers;
- economic/business planners and managers;
- researchers;
 - elementary researchers;
 - advanced researchers, and;
- general public.

Each of these user groups are likely to be found within the organisations identified above. They also noted that an individual may interact with AWRIS



in many different roles, depending on the situation or the tasks they need to complete.

The user groups identified by participants are defined further in the following sections.

The following sections define and describe each of the user groups, provide examples of the types of activities where stakeholders believe AWRIS could assist the user groups. Each section also contains (in greyed boxes) a possible profile of the user, including scenarios that demonstrate how they might use AWRIS. These profiles and scenarios are fictional, but are based on examples and information provided by stakeholders during consultation.

2.3.1 Policy and strategy analysts

Policy and strategy analysts provide critical examinations of water-related subjects and examine positions, courses of actions, and principles that relate to water.

Policy and strategy analysts are commonly employees working for government agencies, peak bodies, regional groups, special interest and industry groups that are interested in water related policy and strategy. The examinations and information that analysts provide is used to inform and guide others (such as ministers, senior staff in an organisation or members of a peak industry groups), to develop a specific line of argument that provides a rationale, policy or position, and to inform the development of further policy and strategy.

Maria, Policy Analyst

Maria is a Policy Analyst with a local council. She has been asked by her CEO to review a new draft policy to help reduce water consumption in the both business and residential sectors. Maria wants to determine whether predicted water savings in the area are realistic, the effects on industry and council ratepayers, and whether there are any precedents or examples of similar policies in action in another region in Australia.

John, Horticulture Society

John is a senior member of a regional Horticultural Society. A report has just been released which indicates that the Horticultural Industry in his region are using twice as much water as other regions. He has a great deal of experience in the industry and understands the market across Australia, and doesn't believe the results of the report. However, he has no facts that validate this belief. Before he responds to the report he wants to review the data and methods that were used during the analysis, as well as compare his region with other regions across Australia.

Some examples of the types of activities where AWRIS could assist policy and strategy analysts are described below.



- Review and evaluation of the success and effects of particular policies and strategies.
- Identification of the essential elements of an issue, and the correct questions and information to answer the questions.
- Provide evidence that justifies a specific position.
- Provide reports, updates, information to organisation members and / or senior staff.
- Participate in discussions and debates using a shared and consistent view of data and information – a consistent approach to facts, and conducted in the right context and with data.
- Review of analytical work that has been completed, and accessing higher level summaries of data and information.
- Identify and review ‘hot spots’, patterns and relationships / causes.

2.3.2 Program, project and resource planners and managers

Program, project and resource (PPR) planners and managers determine priorities, manage, review and evaluate the delivery of water related programs and projects, and the use of water related resources.

It is anticipated that the majority of PPR planners and managers will be involved in programs, projects and resource management at larger scales (eg national) or cross jurisdictional boundaries. Staff in the National Water Commission would most likely be included in this group, particularly those who are helping to implement and review outcomes of the National Water Initiative.

Luke, Manager: Water Initiatives, Ryder Shire Council

The Ryder Shire Council has funded a new position to set in place a number of initiatives to improve the use, quality, supply and saving of water. Luke has the responsibility to set in place a number of projects to do so. He wants to know what other similar programs exist in Australia, and what other areas similar to Ryder Shire are doing. He also wants to know if there is additional funding that may be available, and to understand the type of benefits or results the Council can expect from implementing water initiatives.

Gayle, Communications Manager, ASRA Water

ASRA water has recently conducted a campaign to inform domestic customers on how to save water in and around the home, in preparation for greater water restrictions in the future. Gayle would like to review the success of this project, including understanding how much water has been saved. She would also like to benchmark her campaign against other similar campaigns across Australia.

Some examples of the types of activities where AWRIS could assist PPR planners and managers are described below.



- Obtain contextual background information to support funding for a program or project, or using a resource.
- Identify data gaps and areas of priority for funding assistance.
- Setting benchmarks and reporting criteria.
- Identifying and reporting on the progress and success of programs and projects, particularly against agreed criteria, or developing benchmark information and status.
- Supporting COAG reforms within States and identifying progress.

2.3.3 Economic/business planners and managers

Economic/business planners and managers are individuals and organisations that are involved in the planning and management of business activities with a component that relates specifically to water. This is a broad group that includes:

- Agribusiness / water consultants.
- Planners and managers undertaking business activities such as water trading and accounts, and management of water utilities.
- Industries that have interests in water management such as mining, horticulture, irrigators, agriculture, or tourism.
- Financial institutions including banks and insurance planners.
- Planners and managers that require water related information to complete specific activities.
- Business representatives that provide information to their customers (extension officer role).

Blue sky Industries

Blue Sky Industries are hoping to build a new chemical production plant, and are targeting a number of locations across the globe, including Australia. They are looking to identify regions that would be best suited for this type of plant. Prior to detailed investigation, Blue Sky Industries have developed a set of criteria they hope will provide a short list of suitable regions. One of the key criteria is access to significant amounts of suitable water for production. Blue Sky Industries need to know where water is being used in a similar way, where water is available for use, and if the quality of the available water is suitable for their requirements.

USPC Pumps

The United States Pumping Corporation (USPC) is interested in distributing a new type of water pump monitor in Australia. However, the level of investment required to set up in Australia is significant. Prior to entering the market, USPC wants to understand the type of pump systems that are already in use and how much water is collected without pumping. Dairy farmers and horticulturalists are their core customer base so they are also interested in knowing what pumps they use.



Some examples of the types of activities where AWRIS could assist economic/business planners and managers are described below.

- Determining water access rights, water trading, or allocations.
- Understanding water in different locations, including the demand and availability of water, water quality, and the typical use of water in an area.
- Use water data and information to review areas of business opportunities /risk, and provide reliable market intelligence to allow for informed commercial investments.
- Obtain water data and information that can be used to complete a business activity, complete a task, or create specific infrastructure.
- Provide answers to customers' questions and provide information and advice.

2.3.4 Researchers

Researchers are defined as those who are engaged in a 'diligent or systematic enquiry or investigation, using water data and information, to discover facts or principles'. Researchers are – generally – seeking data and information to help them answer specific questions. In some cases however, researchers could also be seeking data to help them justify a position or prove a specific hypothesis.

In respect to AWRIS, researchers have been divided into 'elementary researchers' and 'advanced researchers'.

2.3.4.1 Elementary researchers

Elementary researchers are researchers who require high level or elementary data and information about water. It is anticipated that elementary researchers will be made up primarily of students, including high school, environmental science and policy undergraduate students. However, elementary researchers could also include members of the media.

Michael: Economics Undergraduate

Michael is studying first year economics at the University of Tasmania. As part of his coursework, he is required to give his tutorial group a presentation describing how natural resource conditions in an area lead to economic growth. Michael wants to provide some evidence that the growth of Australia's population and economy has a relationship to the availability of water in specific areas, and examples where innovative water use or access has led to economic growth. He would preferably like to be able to include graphs and maps in a presentation if they already exist.

Jane: Science Undergraduate

Jane is in the second year of a Bachelor of Science degree with a major in Environmental Hydrology and Water Resources at Flinders University. After a field camp in Port Lincoln where Jane has learnt how to measure and collect hydrological data, she is required to collect additional regional water data and other information relevant to Port Lincoln area, and to review the



hydrological data of similar location outside of South Australia.

Some examples of the types of activities where AWRIS could assist elementary researchers are described below.

- Quoting facts and figures, providing maps and diagrams that will improve the quality of assignments or media reports.
- Obtaining information to answer assignment questions.
- Helping set the scene or providing introductory/contextual/preliminary information.
- Understand the current environment in Australian regarding water and water management.
- Learning how to obtain and review water related datasets and information.

2.3.4.2 Advanced Researchers

Advanced researchers include any individual or organisation that require detailed, complex water information, who manipulate and analyse data to complete research activities, or who require access to raw or original data sources to conduct further interrogation or analysis.

It is anticipated that advanced researchers will be made up of those studying at a post-graduate level (eg PhD students) or university programs (eg river health projects).

Advanced researchers can also be commissioned by third parties to answer specific questions or solve specific problems. In these cases, researchers will usually have a set or (relatively) short amount of time to complete a task, and are not able to explore extensively or divert from the work that has been set.

Researchers can also set their own problems, or conduct research to develop knowledge or theory development. In these cases, researchers will usually have a longer amount of time to complete a task including longer reviewing existing research, and are provided with more freedom to explore in depth or divert from original scope.

Julie: PhD Student

Julie is a student about to begin a PhD in environmental science. She hopes to investigate the relationship between groundwater and surface water, and in particular the effects that capturing surface water flows has on groundwater volume. Before she starts, she would like to know what Australian research on the topic has already been completed, and the type quality and reliability of information that is available to help her find answers.

Gerry, CSIRO

Gerry is an environmental engineer with the CSIRO, and has been commissioned to review the impacts and issues of building a new reservoir to accommodate increased water requirements in outer Sydney. To do this, Gerry will collate a number of data sets, including rainfall data, water quality information, water flows and volume, and use established models to



determine the effects and impacts of the reservoir. Gerry wants to know where this information exists, the quality and reliability of the data, and what he needs to do to be able to access the data. He also wishes to run a number of preliminary tests of the data before he downloads data sets or requests access to data.

Some examples of the types of activities where AWRIS could assist advanced researchers are described below.

- Identification, review, understanding of what information is available from different sources, including the reliability, accuracy and currency of the data, how the data was collected, the quality of the data and how it can be used.
- Access to, or information on how to obtain, data from a number of different sources.
- Test relationships between data sets, review data etc, prior to more sophisticated analysis.
- Obtain data to input into models or conduct independent analysis.
- Integrate data from disparate sources.
- Identify and review of water related research activities that are occurring throughout Australia.

2.3.5 General public

The general public includes any member of the Australian community that has an interest in water, or has a water related question they wish to answer. They are similar to ‘elementary researchers’ except their data and information needs are perhaps at an even higher level.

Mavis, Ballarat resident

Mavis is anxious about all the news stories that refer to Australia running out of water. She doesn’t understand why there are so many different ‘answers to the problem’, and why people think that Australia is running out of water anyway. She would like to read something that explains why it seems Australians are short of water, and what different options are available. She would like to read something that is objective, easy to understand and describes all points of view.

Karen, dinner party debater

Karen recently went to a dinner party, where one guests argued that Australia’s water problems could be easily fixed if Australia built more dams to collect rain water. She argued that there is no point building dams if there is no water to collect, and that water still needs to flow into forests, rivers, and oceans to maintain a healthy environment. Instead, she argued that Australia needs to rethink its industry base, and save water. She argued that Australians use and waste more water than many other countries. During the dinner party debate she realised that no one really knew any facts but were only expressing opinions. She now has logged on to the World Wide Web



and wants to find some information that will clarify the issue.

Some examples of the types of activities where AWRIS could assist the general public are described below.

- Quoting facts and figures about key water related topics, providing maps and diagrams.
- Finding information about Australia as a whole, as well as their local area.
- Answering questions about water, especially about topical water related issues of the day.

2.4 Key organisations and groups

The number of organisations that may wish to use AWRIS is estimated to run into the hundreds. However, the following lists some of the main organisations and groups.

<p>Australian Government</p>	<p>Commonwealth Ministers with responsibility for environment and resources National Water Commissioners Commonwealth Departments and agencies / eg NWC, BOM, DAFF, DEH, BRS, ABS, PM&C, CSIRO / R&D Corporations / CRCs Multi jurisdiction forums - COAG / Murray-Darling Basin Ministerial Council / NCC / ARMCANZ</p>
<p>State and Territory Governments</p>	<p>Ministers and ministerial councils (including role in ARMCANZ, MDBC) State government departments and policy makers Inter-jurisdictional committees – Murray-Darling Basin, Lake Eyre Basin and Great Artesian Basin Service providers (eg Tasmania Hydro, Sydney Water, Goulburn-Murray Water) Educational institutions within jurisdictions at all level</p>
<p>Regional Bodies</p>	<p>Catchment Management Authorities Irrigation Companies Water supply companies Local Governments Indigenous communities</p>
<p>Peak Industry and Environmental Groups</p>	<p>National Farmers Federation (and State FF) Conservation groups eg ACF, WWF Industry groups eg ANCID, WSAA, AWA Local environment groups and NGOs</p>
<p>Industry</p>	<p>Industries and industry groups with an interest in water: eg mining horticulture, irrigators, agriculture.</p>



	Financial institutions including banks and insurance. Retailers, distributors, agribusiness companies Consultants, agribusiness advisors, and water 'experts'
International	International universities and research centres Multinational business Overseas governments OECD World Bank United Nations International Monetary Fund UNESCO



3 AWRIS User Requirements

This section describes the major requirements of potential AWRIS users as defined by participants during the workshops and interviews, and including Commission feedback.

These requirements are based upon discussions with Commission staff and validation with potential users of the system. These requirements have not been identified through a process of reviewing and mapping individual user business processes, therefore detailed use cases and requirements based on workflows cannot be extrapolated at this point in time.

This section contains the following information:

- definition of a user requirement;
- steps to identify user requirements;
- critical success factors, and;
- user requirements in detail.

3.1 Definition of an AWRIS user requirement

An AWRIS ‘user requirement’ is defined as: ‘a need or requirement of an individual, group or organisation that will result in interaction with the user interface/s of AWRIS’.

3.2 Steps to identify user requirements

AWRIS user requirements were identified using the following steps:

- 1) Initial definition of indicative user requirements. This was developed by reviewing typical user requirements of similar tools and products that have some similarity to AWRIS. These were combined with the user requirements defined by the National Water Commission during the Discovery Phase of the project.
- 2) Workshop participants were asked to review a summary of AWRIS, including the anticipated user requirements that AWRIS may help meet.
- 3) During consultation with participants (workshops and interviews) users were asked to define user groups, to specify what these groups want to achieve, and validated, edited and added to the initial list of requirements. They also attempted to prioritise requirements, including defining the key requirements/criteria that AWRIS *must* meet in order to be successful.
- 4) The project team collected and collated all requirements. Using affinity diagramming methods, these requirements were grouped, consolidated and re-organised to provide the final detailed list of requirements. The project team also reviewed the key requirements/criteria that participants believe AWRIS must meet, to develop a key set of eight ‘critical success factors’ of AWRIS.
- 5) The project team devised and implemented a simple scoring system to prioritise of each of the identified requirements. A high score indicates



that the requirement is a high priority with users, and the greater the need for the requirement to be addressed in order for AWRIS to meet the critical success factors. Individual scores against each user requirement can be found in Appendix B, Requirements scores.

3.2.1 Issues with defining user requirements

Participants experienced some difficulties in defining the user requirements of AWRIS. This was primarily because of the following issues.

- Users found it difficult to conceptualise AWRIS, or to describe requirements of a system that does not exist. This was particularly evident when users were unable to conceptualise the specific tool that would meet their requirement. Participants generally conceptualised AWRIS as an internet and map based set of tools.
- Many users had no prior opportunity or exposure to anything similar to AWRIS.
- User requirements are wide ranging and specific, and vary widely at any given time.

Some users noted that once AWRIS was developed they will be able to use and review the system, and this will help them define in more detail what they require from the system.



3.3 AWRIS vision and critical success factors

During the consultation process, participants were asked to identify the critical requirements that AWRIS *must* meet in order to be considered successful. These were collated and reviewed to produce an AWRIS vision and critical success factors for AWRIS.

In order to be a success AWRIS should meet the following vision:

“AWRIS will provide a comprehensive, credible, open view of Australia’s water resources data and information. It will allow users to review and investigate this data, understand the data in context, and bigger picture details about the data. AWRIS will help further (and add value to) the discussion about water.”

Specific critical success factors for AWRIS to meet this vision are (in order of priority):

- 1) Provide **easier and faster discovery** of, **access** to and **sharing** of nationally consistent water resources data and information over time.
- 2) Provide greater **understanding** of the water resources data and information that is discovered.
- 3) Provide a **comprehensive, exhaustive and authoritative** system, which also indicates where the **gaps** exist.
- 4) Give users appropriate **context, help** them view and apply related information and **guidance through** the discovery process.
- 5) Be responsive, user centred, professional and beyond reproach.
- 6) **Coordinate and add value** to tools and systems that are already available or will be available.
- 7) Help facilitate **standard and coordinated approaches** to water resources data and information.
- 8) Be **‘community’ run**: not owned by any one group but contribution and responsibility of everyone in the industry – a **collaborative** effort – but with some protection.



3.4 User requirements: detail

The following table details each of the specific user requirements as defined by the potential users of AWRIS. It also shows the user requirements score that gives an indication of the priority of the requirement.

No.	User requirement	Score of 24
1: Base Content requirements <i>Refers to the basic set of information that the system needs to deliver. This will primarily involve requirements of static content, basic maps and presentations of data sets, and well structured mechanisms to find information.</i>		
1.1	View a directory of people, projects, stakeholders and organisations involved in the water industry and related to water resources data and information	17
1.2	View pre-developed static detailed content and data, including pre-developed maps, about specific and key topics, regions and sites around Australia	16
1.3	Use one authoritative tool / system to quickly locate, and find links to be able to access, water data and information	16
1.4	Access the current and most useful versions of water data and information that is available	16
1.5	View assistance and information that it is context of what the user requires from the tool or system	13
1.6	Understand the vision of water management, key industry and government bodies, projects and initiatives, including the role of the National Water Commission and other key organisations	12
1.7	View pre-developed static information about water in general that provides a useful overview of the state of water in Australia.	12
1.8	View a directory of reports, whitepapers, research papers, documents etc	12
1.9	View existing water management plans and entitlements	10
1.10	View 'new water' information (recycling, desalination, etc)	10
1.11	Obtain an up to date overview of the state of water / the water industry including latest events and issues	8
1.12	View and receive updates and/or new data or information that has been provided, or has been added	7
1.13	View frequently asked questions	5
2: Reporting requirements <i>Refers to the different types of reporting requirements of users beyond basic web content. This includes the way that the information is organised in order for users to use data according to standard reporting structures, through to the different tools and mechanisms that they require.</i>		



2.1	Access, review and download reports that are relevant to specific reporting frameworks, such as the State of Environment, National Water Initiatives, and Water Management Plans. Review reports that are relevant to specific measurement parameters, such as water quality measures, caps, allocations, etc.,	18
2.2	Generate customised and ad hoc reports using a wide set of predefined templates & information elements, data sets, or other information that may be applicable and available.	19
2.3	Query maps and obtain additional information about an area, using mapping layers of different information, drilling down to more detailed and smaller areas, and panning (etc)	10
2.4	Print maps	13
2.5	View graphs on a key water related topics and key regions	12
2.6	Generate, print and export graphs and tables of data	10
2.7	Access reports and updates on real-time monitoring of activities and measures	10
2.8	Access to online advanced data visualisation & advanced mapping tools if required	10
3: Discovery and querying requirements		
<i>Refers to the way that users wish to be able to find data and information and answer specific water related questions.</i>		
3.1	Conduct simple searches and obtain meaningful search results	18
3.2	Search for data and information by multiple dimensions including by: data sets, information elements, time periods, topics, jurisdictions, locations, organisations, relevance, availability of (information), research, or document type, where from, quality, reliability, certainty, data collection method, dates, frequency etc.	18
3.3	Search & display metadata about: data, information, data sources, people, projects, references, etc	19
3.4	Preview data and information and indicative maps without needing to access the source	19
3.5	Filter and refine searches and queries	16
3.6	Obtain a list of similar previous and popular searches	17
3.7	Save search and query results & re-execute	7
3.8	Provide intelligent querying that helps to minimise errors / incompatibility, and that employs strategies to deal with gaps in data and information	14
3.9	Understand what questions to ask about a topic	17
3.10	Determine whether others have asked similar questions, including how they answered the question, and what other questions they have asked.	24

4: Data access requirements		
<i>Refers to the way that users need to access actual data sets and information, including downloading the data.</i>		
4.1	Obtain / export / access to raw data at the lowest level possible, as well as at various levels of aggregation	14
4.2	Determine who are the data holders and how to access the data where data is not immediately accessible or where data can be obtained offline agencies/catalogues/websites	18
4.3	Obtain / export / access to raw data in an efficient and time effective manner	9
4.4	Access and download data on a particular topic and or region for further processing in a number of methods: eg for models, GIS software or tools such as Microsoft Word and Excel, spatial, temporal, at different scales and degrees of accuracy etc	11
4.5	Obtain information about all water resources data and information that is available (completely exhaustive) or linked to the data that does	14
4.6	Provide data that can be used to help reporting, delivery of initiatives and requirements	17
4.7	Identify gaps or missing information and data	12
4.8	Users are provided with updates regarding changes to data sets, and data processes such as change to collection methods.	10
5: Data and information analysis and manipulation requirements		
<i>Refers to what users require in order to use and to create meaning from the data and information that they access using AWRIS</i>		
5.1	Understand what data and information can answer specific questions	16
5.2	Access information that helps the user understand how the information and data can be queried / used	14
5.3	Identify how data has been used by others to answer questions / make decisions / conduct research and analysis etc	16
5.4	Understand what data is able to be compared - spatially and temporally	16
5.5	Understand the relationships between data sets – eg environmental flows versus extractions	15
5.6	Compare and review information across locations (eg towns)	13
5.7	Understand the boundaries and considerations that should be taken into account when using the data.	15
5.8	Conduct interrogations of the data and methodology (used in reports or analysis)	14
5.9	Compare information over time	12
6: Contextual understanding		

<i>Refers to user requirements based around their need to understand and comprehend the data and information they have access to, including relationships between data and information.</i>		
6.1	Obtain background and contextual information about water resource information	13
6.2	Understand the information and data in the context of a 'water balance' or complete system	11
6.3	At each level and jurisdiction to management units and even in some cases specific locations, understand the information that is: able to be accessed via AWRIS, available via other sources (eg other sites, agencies etc), and expected, but unavailable	16
6.4	Understand the type of data and information that is available at different scales	17
6.5	Provide some simple analysis of the similarities/differences in data sets that will help with contextual understanding of the data or information	12
6.6	Identify what studies, other information or research exists that can help understand an area/topic	19
6.7	Provide definitions and common descriptions of key terms used in Water Resources Information	10
7. Information architecture (Navigation)		
<i>Refers to how users require information to be grouped and presented.</i>		
7.1	Navigate by: spatially, topic, data type, topics, jurisdictions, locations	17
7.2	Provide links and cross referencing between key similar locations (eg similar CMAs) and between key locations (eg Melbourne Versus Sydney)	15
7.3	Provide access to data at the following levels: National / State / Catchments / location	15
7.4	"Drill down" through data and information: starting at a high level, digging deeper if required	17
7.5	Provide feedback on data and information provided by AWRIS	12
7.6	Ask a question to the AWRIS administrator	10
7.7	Provide information and results to AWRIS	17
7.8	Update data / information / metadata / results / observations (contribute to the AWRIS)	17



3.5 Key user requirements

The following lists, in order, the key user requirements as defined by the user requirements score. All the requirements scored 17/24 or above. This indicates that the requirement must be addressed in order for AWRIS to achieve its vision. Almost all discovery and querying requirements (3.x) are key user requirements.

Rank	Requirement	Reference
1	Determine whether others have asked similar questions, including how they answered the question, and what other questions they have asked.	3.10
2	Generate customised and ad hoc reports using a wide set of predefined templates and information elements, data sets, or other information that may be applicable and available.	2.2
3	Search & display metadata about: data, information, data sources, people, projects, references,	3.3
4	Preview data and information and indicative maps without needing to access the source.	3.4
5	Identify what studies, other information or research exists that can help understand an area/topic.	6.6
6	Access, review and download reports that are relevant to specific reporting frameworks, such as the State of Environment, National Water Initiatives, and Water Management Plans. Review reports that are relevant to specific measurement parameters, such as water quality measures, caps, allocations, etc.,	2.1
7	Conduct simple searches and obtain meaningful search results	3.1
8	Search for data and information by multiple dimensions including by: data sets, information elements, time periods, topics, jurisdictions, locations, organisations, relevance, availability of (information), research, or document type, where from, quality, reliability, certainty, data collection method, dates, frequency etc.	3.2
9	Determine who are the data holders and how to access the data where data is not immediately accessible or where data can be obtained offline agencies/catalogues/websites	4.2
10	View a directory of people, projects, stakeholders and organisations	1.1
11	Obtain a list of similar previous and popular searches	3.6
12	Understand what questions to ask about a topic	3.9
13	Provide data that can be used to help reporting, delivery of initiatives and requirements	4.6
14	Understand the type of data and information that is available at different scales	6.4
15	Identify gaps or missing information and data	4.7
16	Navigate by: spatially, topic, data type, topics, jurisdictions, locations	7.1
17	"Drill down" through data and information: starting at a high level,	7.4



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	digging deeper	
18	Provide information and results to AWRIS	7.7
19	Update data/information/metadata/results/observations (contribute to the AWRIS)	7.8



4 AWRIS Components

As part of the analysis process, the project team reviewed the user requirements, and identified and described the types of components that are required by AWRIS in order to meet user requirements.

Each individual component is required by users to satisfy a range of needs. These components and the user requirements formed the basis for the development of AWRIS system architecture.

This section provides an overview of these AWRIS components. More detailed information, including the specific user requirements that each tool addresses, can be found in Appendix C, AWRIS Tool Details

4.1 External Discovery

Users require the ability to discover AWRIS, and water data and information, using external tools. This includes external search engines and resources such as Google, and through websites and portals.

The External Discovery Component should be available for all to use and made available through a standard web browser. Related to external discovery are metadata and taxonomy/folksonomy requirements.

4.2 Internal Search

Users require the ability to discover content, information, reports, data etc that AWRIS contains, or links to. Internal discovery is a fundamental requirement for accessing data and information.

AWRIS internal discovery component requirements range from a simple content based search component to help find related information, through to the requirement to conduct sophisticated, intelligence- based searches. Related to internal search are metadata and taxonomy/folksonomy requirements.

4.3 Metadata

Users require access to metadata to obtain information about data and content. Metadata may describe, for example, how, when, and by whom it was received, created, accessed, and/or modified and how it is formatted.

Without metadata describing available datasets these cannot be discovered through a catalogue/index. The metadata entry component is closely linked to the catalogue application, and is also required for internal and external discovery components.

4.4 Taxonomies

Users require the ability to search, discover and access information via taxonomies: ordered classification of topics, labels, based on underlying principles and schemas.



Taxonomies are usually developed by a central organiser and are used to develop information architecture and navigation. It is hierarchical, that is, everything is grouped under specific labels, which are in turn also grouped.

4.5 Folksonomies³

Users require the ability to extend an existing taxonomy and to also categorise data and information using labels that they are more familiar with. These labels can be used to create navigational links to help other users find and organize that information later.

Users also need to know who created the label, and other associated labels and interpretations, allowing improved discoverability of and ability to explore data and information. They require relationships between data and information to be developed without the restriction of hierarchies, and users to drive discoverability.

4.6 Static Web Content

Users require that some water resources data and information is presented as static website content through the web browser.

This content will interact with other AWRIS components (such Content Management System Component) to manage access to content and information

4.7 Static Reports

Users require that some water resources data and information is presented as static reports. Static reports may include various forms such as PDF, Word, Excel or any other non-html/xml document.

This may include the ability to access, review and download reports that are relevant to specific reporting frameworks, such as the State of Environment, National Water Initiatives, and Water Management Plans. Review reports that are relevant to specific measurement parameters, such as water quality measures, caps, allocations, etc.

4.8 Dynamic Reports

Users require the ability to generate customised and ad hoc reports using a wide set of predefined templates and information elements, data sets, or other information that may be applicable and available.

This may include variations to reports that are relevant to specific reporting frameworks, or reports that rely on regular data updates.

4.9 Collaboration

Users require the ability to share information, and communicate with others interested or involved in Australian water resources data and information. Collaboration components can be divided into three categories.

³ <http://www.uie.com/events/uiconf/2006/articles/folksonomies/>



- 1) Electronic communication components send messages, files, data, or documents between people and hence facilitate the sharing of information, such as email or web publishing.
- 2) Electronic conferencing components that also facilitate the sharing of information, but in a more interactive way, such as internet forums and chat rooms.
- 3) Collaborative management components facilitate and manage group activities, such as knowledge management systems that could collect, organize, manage, and share various forms of AWRIS information

4.10 Data Download

Users require the ability to identify access and download data and information from AWRIS.

The data download component could be used to manage aspects of data download, such as restricting the types of information available for downloading and the managing methods of downloading data such as through FTP or RSS⁴.

4.11 Mapping / Spatial

Users require the portrayal of water data and information that has a geo-location depicting water data and information in space, including relationships between points in space, in two dimensions. In its widest sense users require a web-mapping viewer that can be used both for discovery (search spatially) and results display.

These components will be generic and relatively simple to be able to support diverse users, and to be deployable on wide range of low-end browser platforms.

Some users will wish to invoke their specialised, high-end client components (desktop or web-applications) for further, more advanced functionality.

4.12 Data Visualisation

Users require AWRIS allow for advanced data display. Users may require more meaningful representation of data as 2D or 3D images using techniques such as colorization, 3D imaging, animation and spatial annotation to create an instant understanding from multi-variable data.

It is expected that these will include advanced mapping capabilities of feature, coverage and 3-dimensional map services, as well as (graphical) display and attribute selection of (temporal) data sets.

4.13 Usage Analysis

Users require the ability understand how others are using AWRIS.

⁴ Rich Site Summary or Really Simple Syndication. RSS is a form of XML. Content in a website is created as an RSS document that can be accessed like news feeds. Users are able to read this content on their site in near to real time, and determine whether they would like to follow the link and learn more information.

The information can be used to assist users in determining what data, information and resources are useful to them

4.14 Almanac

Users require a compilation of useful and relevant information regarding water resources and information.

4.15 Model Orchestration

Users require the ability to conduct tasks that may require orchestration.

“Orchestration”, in this context, refers to the process of combining different web-services (e.g. models) on the fly to perform a specific task.

Combining means determining the order in which they are called, linking outputs from one service to inputs of another, managing batch processing and possibly alerting another service (or the user!) when (part of) the process is completed.

A model orchestration component can be used to define routines developed for specific purposes and made available for others to use

4.16 Content Management System

Users require the ability to access data, information and content that are effectively managed, and to import and create documents.

A Content management system will allow for the effective management of content, information and objects such as maps, images, reports and data, as well as the management of structures that store and allow access to the information.



5 AWRIS design requirements

This section provides a conceptual overview of the design requirements of AWRIS. This includes:

- overview of users design requirements;
- naming;
- branding;
- design theme;
- page structure;
- mock-ups of key functionality(home, search, reports, map maker);
- information architecture, and;
- standards and compliance.

The conceptual designs are based on user requirements, requirements of all Australian Government websites, and better practise design principles.

Using the conceptual designs as a reference point, complete design specification documentation⁵ can be developed and applied in a more specific nature. Complete design specifications will also take into account many factors that have not constrained the description of user requirements, such as the final system architecture, implementation plan / roll out of functionality, re-use of existing tools and frameworks, agreed standards, and other relevant constraints that will emerge during the development of detailed AWRIS specifications.

5.1 Overview of users design requirements

Most design requirements were provided at a high level. Many potential users had no prior opportunity or exposure to anything similar to AWRIS. Participants found it difficult to conceptualise AWRIS, or to describe design requirements of a system that does not exist. However, participants did, when prompted, agree that as the design of AWRIS tools, content and functionality need to support the following requirements.

- Provide easier and faster discovery of, access to and sharing of nationally consistent water resources data and information over time.
- Enable users to complete relevant activities and tasks, as well as not hindering users in completing these activities and tasks.
- Responsive, user centred, professional and beyond reproach.
- Utilises standards, coordinated approaches, and well integrated with existing resources.

⁵ Design specifications document the specific and detailed design characteristics of a product that is to be produced. It is used by developers to produce a final product. Design specifications usually detail agreed and finalised site menus, navigation, screen resolutions, templates, colour palettes, text type, functionality, and content rules.



- Users feel confident that AWRIS is authoritative and community driven.
- Comply with the requirements of all relevant Australian Government and better practise design principles.

5.2 Web address, site name and branding

The brand for the AWRIS portal is established through a combination of design elements including:

- Australian Government branding;
- site name and title;
- graphics / images, and;
- colours.

It is assumed that the AWRIS portal will assume ownership of the www.water.gov.au URL and that it will represent an evolution of the AWR2005 website.

The graphic design and branding for the AWR2005 website is largely based on the design of the National Water Commission website; it uses a similar layout, colour palette and the water image in the banner of each page. If the AWRIS portal is to establish a more independent identity from the Commission a new or refined graphic design will need to be developed (refer to Section 6.3, Design theme below).

The name of the AWRIS portal is still to be determined; the working title is 'Australian Water Resource Information System'. Typically the titles of other Federal government portals are short or include the website URL (refer to <http://www.agimo.gov.au/services/portals> for examples). Based on these examples the portal name could be shortened to 'Australian Water Resources' followed by the URL. They should feature prominently in the banner of all pages. It could be complemented on the home page by a few words or possibly a tag line that will assist communicate the portals scope.



The appropriate Australian Government brand options to use for the AWRIS portal include:



5.3 Design theme

The design theme for the AWRIS portal should attempt to communicate the following characteristics.

- Professional but simple and accessible for all users.
- Authoritative.
- Action orientated, progressive, step by step where appropriate.
- Not identify with any specific user group, organisation, company or industry, or with a specific urban or rural flavour.
- If labels or logos are provided, they should be a comprehensive list of all government, agency and private sector people participating, with no one logo overarching the others.
- Designed to display at 800 x 600 screen resolution with no horizontal scrolling. The screen width should be flexible not fixed width. In addition it should degrade gracefully at lower resolutions.
- Communicate the scope of water resource information and tools i.e. water availability, river and wetland health, water use, maps, graphs, dynamic and static content.
- Ensure that graphic aides such as maps utilise maximum screen size.

5.4 Page structure

Consideration will need to be given to the range of tools and their usability in developing an overall page structure and layout, particularly use of screen space for the map and data visualisation tools, for example it may not be appropriate for pages with these tools to include a left menu where they also need to include a map and legend or layer control.



5.5 Mock-ups of key functionality

This section includes a range of wire frame diagrams that show different elements of the user interface for some of the proposed AWRIS tools. Wire frames are a tool to guide the design process and to show basic layout. They highlight the approximate position and priority of elements such as navigation, branding, content, functionality etc.

Wire frames are included in this report to demonstrate how user requirements could be met. They are not intended to illustrate the final graphic design of the AWRIS interface, which would be demonstrated in a design specification document.

The wire frames have been created based on a 1024x768 screen.

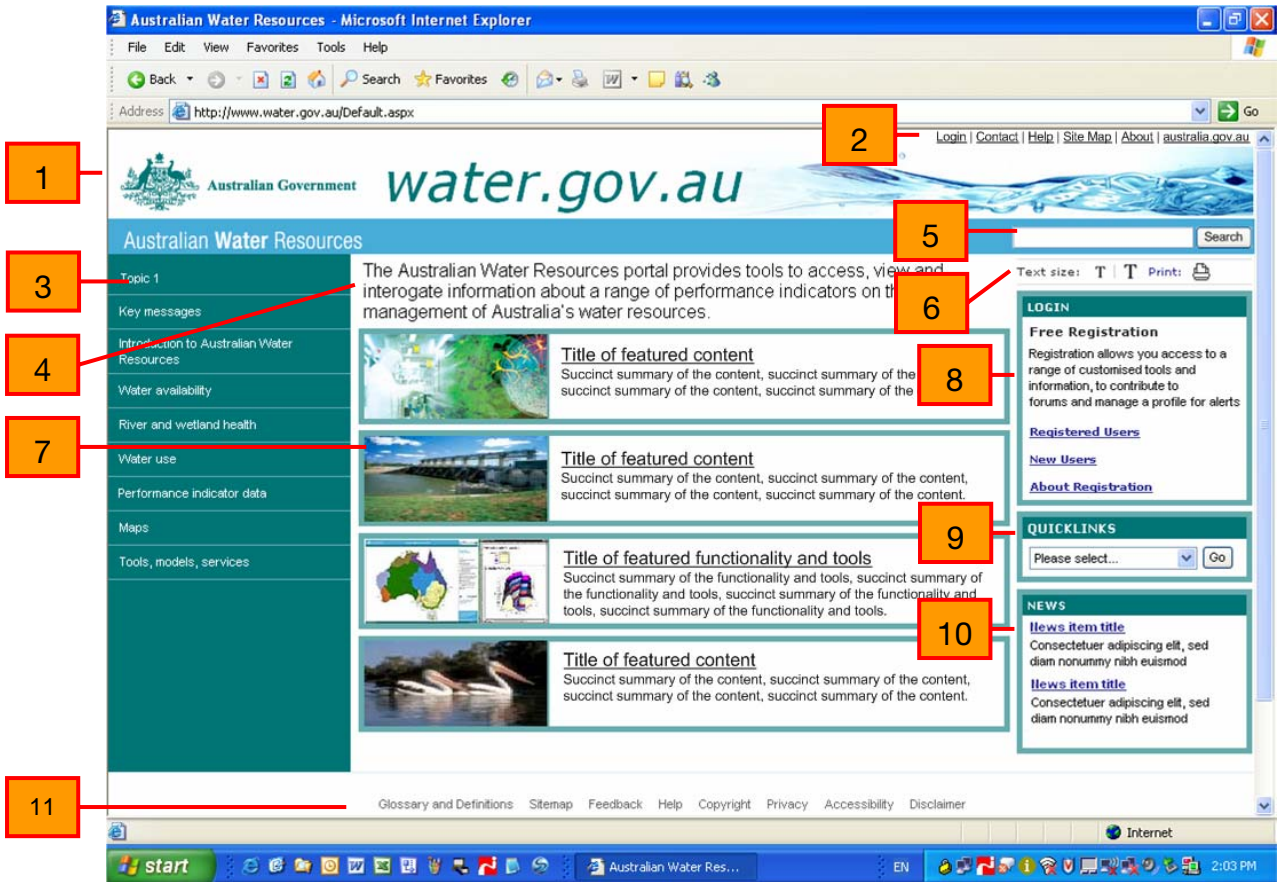
The wire frames include:

- home page;
- internal advanced search page;
- reports, and;
- map maker.



5.5.1 Home page

The wire frame below illustrates key elements of a portal home page.



Key elements

Ref.	Page element	Description
1	Banner	Banner for the home page including Australian Government logo, site name and image. Should act as a link back to the home page from inner pages per web convention.
2	Utility menu	Home page utility menu (same as pre-login utility menu on inner pages except it does not include a link to back to the home page). Presented in a consistent position on all pages in the portal. Includes links to the Login, Contact, Help, Site Map, About and www.australia.gov.au.
3	Main topic menu	Primary topic menu that supports navigation to all key content and functionality available through the portal. Persistent on most pages especially static content pages. It may not feature on some pages that are associated with specific functionality, particularly if they require significant screen width e.g the Map maker. Expands to reveal subcategories as users drill down



Ref.	Page element	Description
		into a section.
4	Welcome message	The home page should feature a succinct welcome message or by-line that clearly defines the scope of the portal.
5	Simple search	Keyword search input field and button.
6	Text resizing and print functionality	Text resizing and print functionality.
7	Content feature	Area to highlight example content and functionality such as contributing to the portal. Could include thumbnail image to create a point of interest.
8	Login	Links to login to the portal to access 'My profile & workspace' functionality such as saved searches and reports.
9	Quicklinks	Navigation to support linking to popular content and functionality.
10	News and events	Highlight of recent news and/or events. Link through to featured items and to more comprehensive list of news and a calendar of events.
11	Footer	Standard page footer.

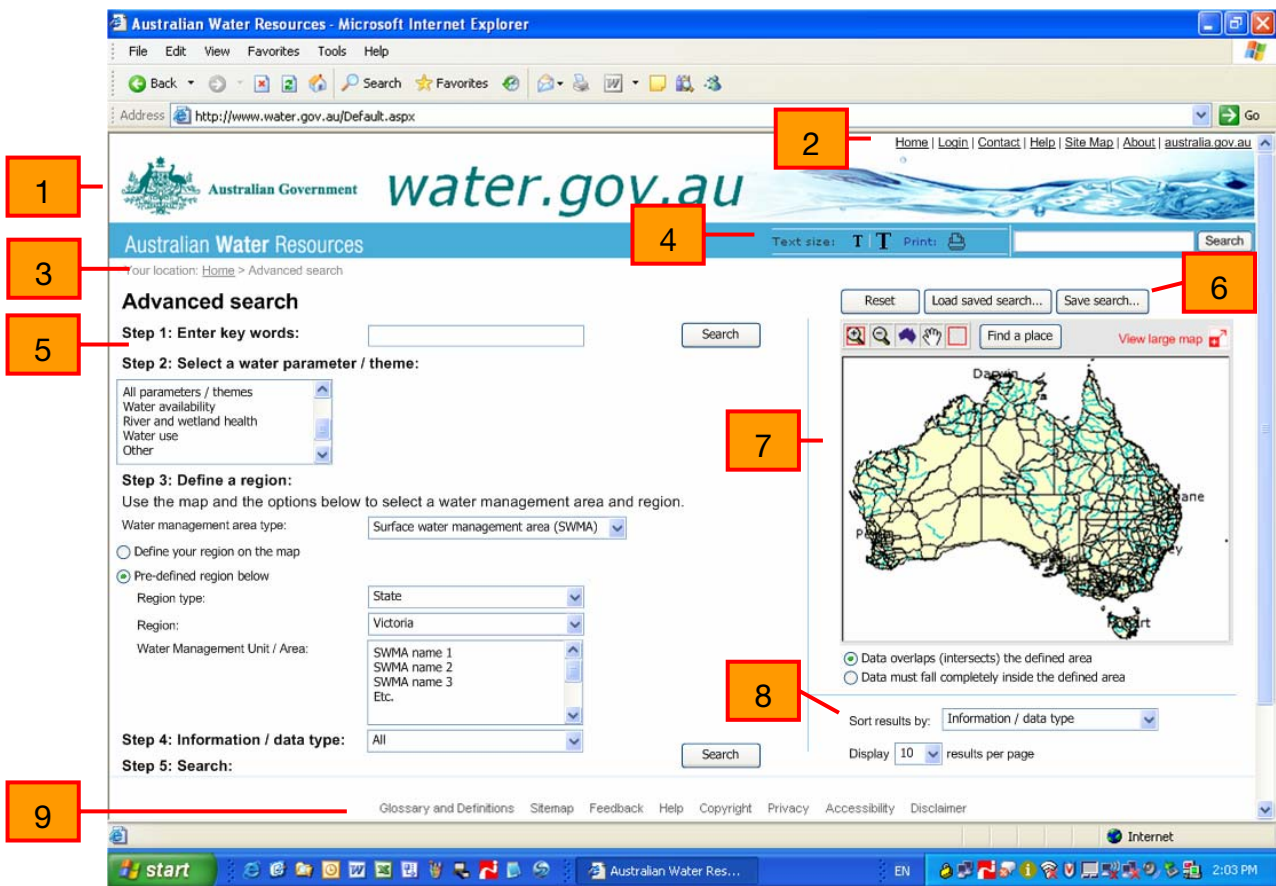


5.5.2 Internal advanced search page

Discovery Tools enable the user to discover data and information via external (e.g. Google) and internal (e.g. AWRIS content and reports) search engines, Essential for the discoverability is the availability of metadata describing the data. Without metadata describing available datasets these cannot be discovered through a catalogue/index.

Related to discoverability are Taxonomies/Folksonomies. These are ordered (hierarchical) classifications of topics, labels, based on underlying principles and schemas.

The wire frame below illustrates key elements of the internal advanced search page that would support discovery of content and functionality available through the portal.



Key elements

Ref.	Page element	Description
1	Banner	Banner for the home page including federal government logo, site name and image. Should act as a link back to the home page from inner pages per web convention.
2	Utility menu	Standard pre-login utility menu presented in a consistent position on all pages in the portal. Includes



Ref.	Page element	Description
		links to the Home, Login, Contact, Help, Site Map, About and www.australia.gov.au.
3	Breadcrumb navigation	Indicates the position of the page that the user is currently viewing in the information architecture of the portal, supports navigation back up the hierarchy.
4	Text resizing and print functionality Simple search	Text resizing and print functionality. Keyword search input field and button.
5	Advanced search options	Step by step process to configure a simple or advanced search query. Note: The final wire frame will need to illustrate all proposed functionality such as the ability to include time periods, report types etc. in the search parameters.
6	Reset Saved searches	Button to reset the search criteria to the default settings. Access to functionality to support saving and re-using saved searches.
7	Area definition map and gazetteer	Map and functionality to define an area of interest associated with the search.
8	Display of results	Options to support sorting results and the number of results to be displayed on a page.
9	Footer	Standard page footer.



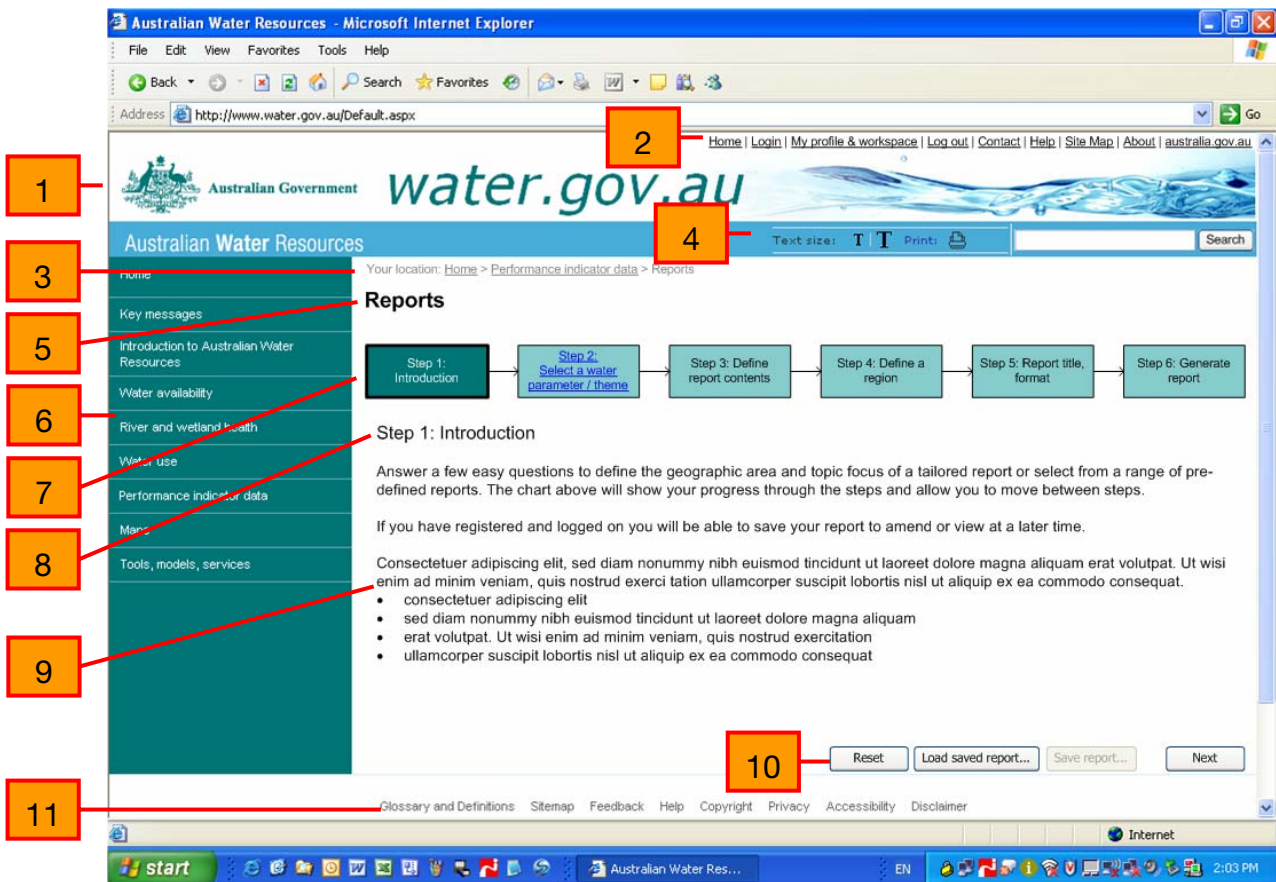
5.5.3 Reports

It will be possible to access pre-configured and tailored, static and dynamic reports through the portal.

The dynamic report component generates dynamic reports/contents with information or data that changes over time. It facilitates access to a variety of underlying dynamic that are not part of the AWRIS content, that is the data that are residing in databases from contributing systems and jurisdictions. The presentation of the reports will be through predefined report templates.

Reports: version one

The wire frame below illustrates key elements of the first page of a tool used to generate reports.



Key elements

Ref.	Page element	Description
1	Banner	Banner for the home page including federal government logo, site name and image. Should act as a link back to the home page from inner pages per web convention.
2	Utility menu	Standard post-login utility menu presented in a consistent position on all pages in the portal. Includes links to the Home, Login, My profile & workspace, Log

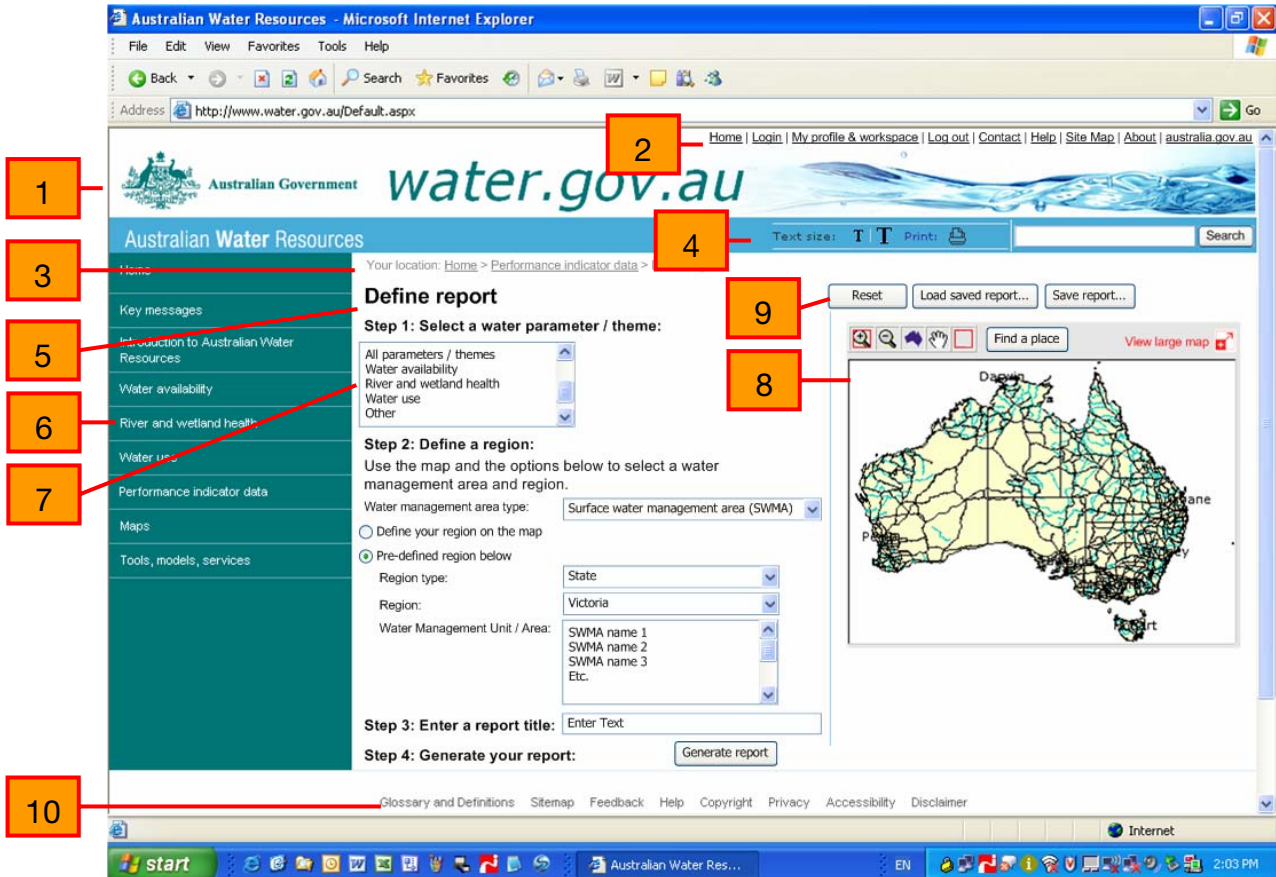


Ref.	Page element	Description
		out, Contact, Help, Site Map, About and www.australia.gov.au.
3	Breadcrumb navigation	Indicates the position of the page that the user is currently viewing in the information architecture of the portal, supports navigation back up the hierarchy.
4	Text resizing and print functionality Simple search	Text resizing and print functionality. Keyword search input field and button.
5	Page title / tool name	Name of tool the user is currently using, in this case Reports.
6	Main topic menu	Primary topic menu that supports navigation to all key content and functionality available through the portal. Persistent on most pages especially static content pages. It may not feature on some pages that are associated with specific functionality, particularly if they require significant screen width e.g the Map maker. Expands to reveal subcategories as users drill down into a section (not illustrated).
7	Steps in a process graphic	Graphic used to communicate to the user the steps in a process and the step that they are currently completing. Also supports navigation to the next and previous steps where appropriate.
8	Step name	Step in the process that the user is currently viewing.
9	Content	Content section of the page, in this case explaining how the Report tool works.
10	Saved reports Process navigation	Button to save and access saved reports. Button to navigate to the next step in the process.
11	Footer	Standard page footer.



Reports: version two

The page below illustrates key elements of an alternative configuration of a tool used to generate reports. In this approach the steps are presented on one page in a similar configuration as the advanced search page. Note: this approach is potentially not as flexible as the one illustrated in the previous example. It does illustrate some of the functionality that would be accessible at various steps in the previous example.



Key elements

Ref.	Page element	Description
1	Banner	Banner for the home page including federal government logo, site name and image. Should act as a link back to the home page from inner pages per web convention.
2	Utility menu	Standard post-login utility menu presented in a consistent position on all pages in the portal. Includes links to the Home, Login, My profile & workspace, Log out, Contact, Help, Site Map, About and www.australia.gov.au.
3	Breadcrumb navigation	Indicates the position of the page that the user is currently viewing in the information architecture of the

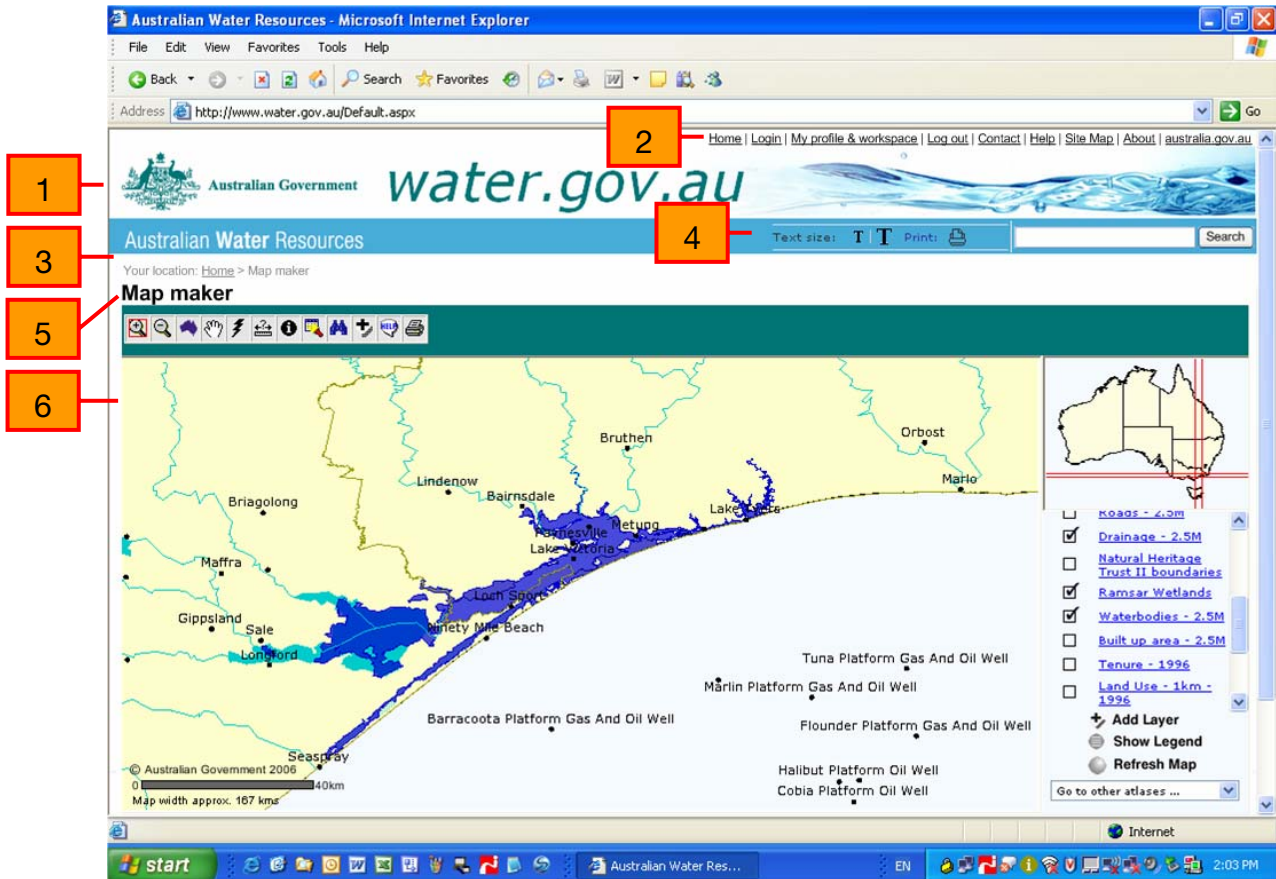


Ref.	Page element	Description
		portal, supports navigation back up the hierarchy.
4	Text resizing and print functionality Simple search	Text resizing and print functionality. Keyword search input field and button.
5	Page title / tool name	Name of tool the user is currently using, in this case Define report.
6	Main topic menu	Primary topic menu that supports navigation to all key content and functionality available through the portal. Persistent on most pages especially static content pages. It may not feature on some pages that are associated with specific functionality, particularly if they require significant screen width e.g the Map maker. Expands to reveal subcategories as users drill down into a section (not illustrated).
7	Report configuration options	Step by step process to configure a report.
8	Area definition map and gazetteer	Map and functionality to define an area of interest associated with the report.
9	Reset Saved reports	Button to reset the report criteria to the default settings. Buttons to save reports and access saved reports.
10	Footer	Standard page footer.

5.5.4 Map maker

Mapping / spatial refers to the portrayal of water data and information that has a geo-location. In its widest sense it is a web-mapping viewer that can be used both for discovery (search spatially) and results display.

The wire frame below illustrates key elements of the first page of the info enquiry tool.



Key elements

Ref.	Page element	Description
1	Banner	Banner for the home page including federal government logo, site name and image. Should act as a link back to the home page from inner pages per web convention.
2	Utility menu	Standard post-login utility menu presented in a consistent position on all pages in the portal. Includes links to the Home, Login, My profile & workspace, Log out, Contact, Help, Site Map, About and www.australia.gov.au.
3	Breadcrumb navigation	Indicates the position of the page that the user is currently viewing in the information architecture of the portal, supports navigation back up the hierarchy.



Ref.	Page element	Description
4	Text resizing and print functionality Simple search	Text resizing and print functionality. Keyword search input field and button.
5	Page title / tool name	Name of tool the user is currently using, in this case Map maker.
6	Map maker functionality	Content and functionality section of the page including map tools, map interface, context map, layer control, legend, scale, add and remove layers etc. per the requirements. Note: the functionality illustrated is indicative only; see the requirements for a more detailed specification.

5.6 Information Architecture

Information architecture, in this instance, refers to the way information is organised, structure and labelled, so users can complete tasks and find information easily.

The information architecture of AWRIS should meet the following requirements:

- Be logical to all the different types of users and ensure that users access information using multiple paths.
- Be extensible, and support the management, maintenance and any proposed future expansion of system.
- Make effective use of, and be well integrated with, taxonomies.
- Allow for and ‘learn’ from the developing folksonomy and updated data and information (including metadata), to be able to improve the AWRIS information structure.
- Enable effective navigation and drilling down through data and information.
- Be supported by enterprise wide and tool specific navigation mechanisms, including traditional menu structure, searches, and spatial navigation mechanisms.
- Provide for structured cross referencing between similar content and information, as well as ample opportunity for organic cross referencing to occur based on user-defined relationships.

Priority base level information classifications according to user requirements and the requirements of the Commission are outlined in the following table.



Category	Includes...
Spatial	Jurisdictions (Commonwealth, state, LGA) River basins Catchments / Surface water management areas Groundwater management units Other key locations (major towns, hotspots, areas of interest)
Topics	Water use / quantity / health / availability/ allocation / management Governance and management issues - licences, allocations, management plans, planning schemes historic records
Contextual information	Role/vision of the Commission Information about water systems in Australia. Definitions
Report type	Defined by the major and requested reporting frameworks in use across Australia, including all National Water Initiative projects, Reports against water accounting frameworks, the State of Environment, and Water Management Plans.
Data type	Defined by traditional data type descriptions, and will most likely be in the metadata information layer

5.7 Standards and compliance

The AWRIS portal should meet the better practice standards and guidelines provided on the Australian Government Information Management Office (AGIMO) website (www.agimo.gov.au).

5.7.1 The Guide to Minimum Website Standards

The Guide to Minimum Website Standards (<http://www.agimo.gov.au/practice/mws>) includes a range of minimum standards that all federal government websites must follow, specifically in relation to:

- information provision;
- metadata;
- electronic publishing;
- electronic record keeping and archiving;
- web content accessibility;
- authentication;
- privacy, and;
- security.

5.7.2 Better Practice Checklists

The AGIMO website also includes a range of better practice guidelines in the form of checklists (<http://www.agimo.gov.au/practice/delivery/checklists>).



While all of the checklists are relevant to the AWRIS portal, the following are of particular relevance:

Checklist number	Title
2.	Website Navigation
3.	Testing Websites with Users
4.	Use of Cookies in Online Services
6.	Use of Metadata for Web Resources
8.	Managing Online Content
15.	Information Architecture for Websites
16.	Implementing an Effective Website Search Facility
17.	Spatial Data on the Internet
19.	Access and Equity Issues for Websites

5.7.3 Australian Government Web Guide

The AGIMO website also includes an online web guide for Government websites (<http://www.agimo.gov.au/webguide/home>). The guide includes information about planning, structure and design, content and maintenance. Some of this content overlaps with the Guide to Minimum Website Standards and Better Practice Checklists, however in addition it includes relevant information and resources in relation to branding federal government websites (see <http://www.agimo.gov.au/webguide/structure/branding>, and <http://www.agimo.gov.au/branding>). The implications for the AWRIS portal are discussed briefly below.



Appendix A Stakeholders

Organisation	Participants
National Water Commission	Colin Chartres Helen Foard Anne-Marie Wilson Craig Bradley Peter Hyde Volker Aeuckens Harry Abrahams Murray Radcliffe Paula Haahes Matt Kendall Judy Hagan
Department of Environment and Heritage (DEH)	Janet Pritchard Louise Rose Chris Derrick Linda Wiland Belinda Allison
Murray Darling Basin Committee (MDBC)	Julianne Martin Dianne Flett Awadhesh Prasad Kate Hollingsworth Frederick Bouckeart Greg Long Stephen Sunderland
Bureau of Rural Sciences	Steve Hostetler Dave Barratt Baskaran Sundram
ABARE	Tim Goesch
Land and Water Australia	Jim Donaldson
Department of Agriculture, Fisheries and Forestry	Brendan Moran
Bureau of Meteorology	Jim Elliot
ABS	Mette Creaser
CSIRO	Brad Sherman Wendy Proctor Lorraine Bates Albert Van Dijk Ejaz Qureshi Shahbaz Khan
University of Canberra	Linda Merrin



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Australian National University	Karen Ivkovic
Engineers Australia	Andre Kaspura
ANCID	Kim Russell
National Farmers Federation	Vanessa Findlay
World Wildlife Fund for Nature	Averil Bones
Irrigation Association of Australia	Jolyon Burnett
NSW Irrigators' Council	Doug Miell (Richard Hopkins)
University of Adelaide	Fred Rechnagel (RH)
University of South Australia	Simon Beecham (RH)
Flinders University of SA	Craig Simmons (RH)
Department of Prime Minister and Cabinet	Brenda Dyack
Australian Water Association	Chris Davis
Adelaide University	Dr Friedrich Rechnagel
Flinders University	Professor Craig Simmons
University of Queensland	Bob Beeton
The Chamber of Minerals and Energy of Western Australia	Cara Babb



Appendix B Requirements scores

The project team devised and implemented a simple scoring system to prioritise of each of the identified requirements. The user requirements score indicates how well each requirement corresponds to the critical success factors (described below). Each requirement was reviewed against the eight critical success factors of AWRIS and provided with a score of 0-3 (0= requirement not related to critical success factor, 3 = directly related to critical success factor), with a possible top total score of 24.

A high score indicates that the requirement is a high priority with users, and the greater the need for the requirement to be addressed in order for AWRIS to meet the critical success factors.

Requirements	Score (Maximum is 24)	Easier and faster discovery of, access to and sharing of water resources data and information	Provide greater understanding of the water resources data and information that is discovered	Coordinate and add value to tools and systems that are already available or will be available	Provide a comprehensive, exhaustive and authoritative system, which also indicates where the gaps are	Help facilitate standard and coordinated approaches to water resources data and information	Be 'community' run: not owned by any one group but contribution and responsibility of everyone in the industry – a collaborative effort	Give users appropriate context; help them view and apply related information and guide the query (discovery?) process	Responsive, user centred and professional
Base Content requirements									
View a directory of people, projects, stakeholders and organisations	17	3	3	3	3		2	2	1
View pre-developed static detailed content and fundamental data, including pre-developed maps, about specific and key topics, regions and sites around Australia.	16	3	3		3	1	1	3	2
Access to the most current and useful versions of water data and information that is available	16	3		2	3	3	2		3
View contextual information to help the user interact with AWRIS	13	3	3			1	1	3	2
Understand the vision of water management, key industry and government bodies, projects and initiatives, including the role of the National Water Commission and other key organisations	12		3	2	2	1	1	3	
View pre-developed static information about water in general that provides a useful overview of the state of water in Australia.	12	3	3		3			3	
View a directory (and repository) of whitepapers, research papers	12	3	2		2		2	3	
View existing plans and entitlements	10	3	1		3		1	2	



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View 'new water' information (recycling, desalination etc)	10	3	1		3		1	2	
Obtain an up to date overview of the state of water (industry) including latest events and issues	8		3		2			3	
View and receive updates and new data or information has been provided, what has been added	7	2	1		1				3
View frequently asked questions	5	1	1	1				1	1
Reporting									
Access, review and download reports that are relevant to specific reporting frameworks, such as the State of Environment, National Water Initiatives, and Water Management Plans. Review reports that are relevant to specific measurement parameters, such as water quality measures, caps, allocations, etc.,	18	3	3	3	3	3		3	
Generate customised and ad hoc reports using a wide set of predefined templates & information elements, data sets, or other information that may be applicable and available.	19	3	3	1	2	3	1	3	3
Query maps and obtain additional information about an area, using mapping layers of different information, drilling down to more detailed and smaller areas, and panning (etc)	11	3	3	1	2				2
Print maps									
View graphs on a particular topic and/or region combining data from different sources	7	3		1	1	1			1
Generate, print and export graphs of data	7	3		1	1	1			1
Access reports and updates on real-time monitoring of activities and measures	7		3		1	1	1		1
Access to online advanced data visualisation & advanced mapping tools if required	7		3		1	1	1		1
Discovery and Querying									
Conduct simple searches and obtain meaningful search results	18	3	3	3	3	2	2	1	1
Search for data and information by multiple dimensions including by: data sets, information elements, time periods, topics, jurisdictions, locations, organisations, relevance, availability of (information), research, or document type, where from, quality, reliability, certainty, data collection method, dates, frequency etc.	18	3	3	3	3	2	2	1	1
Search & display metadata about: data, information, data sources, people, projects, references,	19	3	3	3	3	2	2	2	1
Preview data and information and indicative maps without needing to access the source	19	3	3	3	3	2	2	2	1
Filter and refine searches and queries	16	2		2	2	2	2	3	3
Obtain a list of similar previous and popular searches	17	1	2	3	1	1	3	3	3
Save search and query results & re-execute	7	2				1	1		3

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Provide intelligent querying that helps to minimise errors / incompatibility, and that employs strategies to deal with gaps in data and information	14	2	2	2	1	1	1	2	3
Understand what questions to ask about a topic	17	2	3	2	1		3	3	3
Determine whether others have asked similar questions, including how they answered the question, and what other questions they have asked.	24	3	3	3	3	3	3	3	3
Data Access									
Obtain / export / access to raw data at the lowest level possible, as well as at various levels of aggregation	14	3	2	1	2	1	2		3
Determine who are the data holders and how to access the data where data is not immediately accessible or where data can be obtained offline agencies/catalogues/websites	18	3	2	3	3	2	2		3
Obtain / export / access to raw data in an efficient and time effective manner	9	3		2			1		3
Access and download data on a particular topic and or region for further processing in a number of methods: eg for models, GIS software or tools such as Microsoft Word and Excel, spatial, temporal, at different scales and degrees of accuracy etc	11	3		1	2	1	2		2
Obtain information about all data that is available (completely exhaustive) or linked to the data that does	14	3	1	2	3	1	1		3
Provide data that can be used to help reporting, delivery of initiatives and requirements	17	3	1	2	1	3	1	3	3
Identify gaps or missing information and data	12	1	3		3		1	2	2
Be made aware of the latest data sets and any changes to data processes, such as change to collection methods etc.	10	3		1			1	2	3
Data and information analysis and manipulation									
Understand what data and information can answer specific questions	16		3	1	2	2	2	3	3
Access information that helps the user understand how the information and data can be queried / used	14	2	3	3	1	1	1	1	2
Identify how data has been used by others to answer questions / make decisions / conduct research and analysis etc	16	2	3	2	1	1	2	3	2
Understand what data is able to be compared - spatially and temporally	16	2	3	2	1	1	2	3	2
Understand the relationships between data sets – e.g. environmental flows versus extractions	15	1	3	1	2	1	2	3	2
Compare and review information across locations (eg towns)	13	1	2		2		2	3	3
Understand the boundaries and considerations that should be taken into account when using the data.	15	1	3			3	2	3	3
Conduct interrogations of the data and methodology (used in reports or analysis)	14	1	3		2		2	3	3
Compare information over time	12	1	2		2		1	3	3

FINAL REPORT – AWRIS – USER REQUIREMENTS

Contextual understanding	0							
Obtain background and contextual information about water resource information	13	2	3		2	3	3	
Understand the information and data in the context of a 'water balance' or complete system	11	2	1		2	3	3	
At each level and jurisdiction to management units and even in some cases specific locations, understand the information that is: able to be accessed via AWRIS, available via other sources (eg other sites, agencies etc), and expected, but unavailable	16	1	3	2	1	3	3	3
Understand the type of data and information that is available at different scales	17	3	1	2	3	2	3	3
Understand what isn't known – gaps, not available, previously available	17	2	2	2	3	2	3	3
Provide some simple analysis of the similarities/differences in data sets that will help with contextual understanding of the data or information	12	1	2	1	2	1	1	2
Identify what studies, other information or research exists that can help understand an area/topic	19	3	3	2	3	2	3	3
Provide definitions and command descriptions of key terms used in Water Resources Information	10		2		3	1	1	3
Information architecture (Navigation)								
Navigate by: spatially, topic, data type, topics, jurisdictions, locations	17	3	1	2	3	2	3	3
Basic locations able to be interlinked	15	3	1	2	1	2	3	3
Provide access to data at the following levels :National / State / Catchments/location	15	3	3	3	3	3		
"Drill down" through data: starting at a high level, digging deeper if required	17	3	2		3	1	2	3
Provide feedback on data and information provided by AWRIS	12			2	2	2	3	3
Ask a question to the website administrator	10		2		2		3	3
Provide information and results to AWRIS	17	2		2	3	1	3	3
Update data/information/metadata/results/observations (contribute to the AWRIS)	17	2		2	3	1	3	3



Appendix C AWRIS Tool Details

As part of the project, the different components of a potential AWRIS solution have been defined, based on the user requirements. This section describes the user requirements for each of these components in detail. It should be read in conjunction with Section 4

Each description of the user requirements of the components contains the following information:

- A short description of the component, based on the users’ perspective.
- The related user requirement numbers as defined in Section 3.4: User requirements: detail
- A definition of the user requirements.
- Identification of other AWRIS components that are related to this component, and how the interaction might occur.

AWRIS Tool	External Discovery
Description	<p>External Discovery refers to users being able to discover data and information via external tools, such as external search engines..</p> <p>The External Discovery Component will allow users to locate AWRIS and some information within AWRIS through external resources such as Google. The External Discovery Component should be available for all to use and made available through a standard web browser.</p>
Related User Requirements	<p>1.1, 1.2, 1.3, 1.4, 1.5, 1.7, 1.8, 1.9,1.12, 2.3, 2.5, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 4.2, 4.3, 4.5, 4.6, 4.7, 4.8, 6.3,</p>
Definition	<p>The users of this Component require the following field definitions:</p> <p>Locate AWRIS and its information using alphanumeric character set.</p> <p>Search for people, projects and organisations that are involved in the water industry.</p> <p>External user locate pre-developed or dynamic information and contents including maps, reports, graphs, water management plans, whitepapers, research papers and other relevant documents.</p> <p>Register/publish AWRIS information with external resources to promote external discovery.</p> <p>Facilitate dynamic creation of keywords and AWRIS information to effectively promote AWRIS to external resources.</p> <p>Interface and presentation is clear, intuitive and responsive to allow AWRIS user to manage information with ease.</p> <p>Domain names (web addresses) should be easy and</p>



	<p>intuitive, and meet relevant guidelines (http://www.domainname.gov.au/) Entry pages should be found using a suite of possible key words and using external search engines. Designed so to be discovered by all popular search engines, especially when key search terms are used Search engine results provide a concise summary of AWRIS system and topics Accessible from all similar initiatives, websites, and applications across Australia Promoted in an appropriate manner so that all those who could have a use for AWRIS are aware of its existence. Be made aware of the latest data sets and any changes to data processes, such as change to collection methods etc. At each level and jurisdiction to management units and even in some cases specific locations, understand the information that is: able to be accessed via AWRIS, available via other sources (eg other sites, agencies etc), and expected, but unavailable</p>
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Interactions with other Components/applications

Component	Interaction	Comment
Internal Discovery Component	Interact with internal discovery Component results to identify keywords and relevant information	Keywords are used to publish/register AWRIS to external resources
Static Web Content	Interact with static and dynamic reports/contents to relevant information	Download via Hyperlinks
Data Download	Identify publicly available data to download	Publish to external resources

AWRIS Tool	Internal Discovery – Internal Search
Description	Internal discovery refers to the ability for users of AWRIS to be able to discover content, information, reports, data etc that AWRIS contains, or links to. Internal discovery is a fundamental requirement for accessing data and information. AWRIS internal discovery component requirements range from a simple content based search component to help find related information, through to the requirement to conduct sophisticated, intelligence- based searches.
Related User Requirements	1.1, 1.2, 1.3, 1.4, 1.5, 1.7, 1.8, 1.9,1.12, 2.3, 2.5, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 4.2, 4.3, 4.5, 4.6, 4.7, 4.8, 6.3,
Definition	The users of this Component require the following field



	<p>definitions:</p> <p>Be able to locate AWRIS and its information using keyword alphanumeric character set search.</p> <p>Be able to search for people, projects and organisations that are involved in the water industry.</p> <p>Be able to search for pre-developed or dynamic information and contents including maps, reports, graphs, water management plans, whitepapers, research papers and other relevant documents.</p> <p>Conduct simple searches and obtain meaningful search results</p> <p>Search for data and information by multiple dimensions including by: Key words; Themes; Topics; Data sets, data types; Spatial dimensions, such as jurisdictions and locations. This could possibly be subdivided into different location descriptors (management units, states, postcodes etc); Information elements; Time periods, availability periods (from – to); Projects, frameworks; Organisations, people, stakeholders; Relevance; Availability of (information); Document / report type.</p> <p>Display meaningful information and search returns. This may include: Weighting / relevance of search return; Description of the information returned; Thumbnail of information resource if applicable; A URL reference; Metadata details</p> <p>Ability to preview data and information and indicative maps without needing to access the source</p> <p>At each jurisdiction to management unit level, understand the information that is: Currently available through AWRIS; To be available through AWRIS in the future; Available via other sources (eg agencies, websites, catalogues); Expected, but not available</p> <p>Save searches and query results & re-execute them at a later date</p> <p>Interface and presentation is conforms to W3C guidelines for presentation, layout and use of colours to allow AWRIS user to manage information with ease.</p> <p>The search results should return within a timely manner to minimise reposting of queries.</p> <p>Be made aware of the latest data sets and any changes to data processes, such as change to collection methods etc.</p> <p>The search result may prompt the user to further define the search parameters including:</p> <p>Providing a list of matching search parameters through prompts such as “Did you mean”</p> <p>Obtain guidance and assistance is determining what information and data is required to be discovered</p>
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	<p>(understand what questions to ask about a topic).</p> <p>Filter and refine searches and queries – to be able to drill several layers down from a general result set to find specific data and information.</p> <p>View what other AWRIS users have been attempting to discover / search, including popular searches and related searches.</p> <p>Users should also be able to understand what data and information was accessed by others through publications of previous user interactions, comments and reviews.</p> <p>Provide relationships between search results and other search results e.g. “people who searched for water use also search for water allocation”</p> <p>Link search results to information in other categories e.g. “water use information is also available in the water allocation almanac”</p> <p>Link search results to related keywords and labels (through the use of the taxonomy/folksonomy component)</p> <p>link search results based on metadata entry e.g. “the author of this water assessment also wrote these water-use articles”</p>
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Interactions with other Components/applications

Component	Interaction	Comment
Static Web Content	User use the Discovery Component to locate static information only	e.g. locate data that has not changed since 1900. Will rely heavily on metadata information describing currency.
Static Web Report	User use the Discovery Component to locate static information only	e.g. locate reports that has not changed since 1900. Will rely heavily on metadata information describing currency.
Data Download	User use the Discovery Component to locate downloadable data only	
Almanac	User use Discovery Component to search for almanac information only	
Dynamic Reports	User search for dynamic reports only	Report may contain links to static web content / report
Metadata / Service Catalogue	User use the metadata service catalogue as a discovery Component	



Directory Service (Yellow Pages)	Directory Service lists high level almanac entries	
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AWRIS Tool	Internal Discovery - Metadata
Description	<p>Metadata is information about a particular data set which may describe, for example, how, when, and by whom it was received, created, accessed, and/or modified and how it is formatted.</p> <p>Without metadata describing available datasets these cannot be discovered through a catalogue/index. The metadata entry Component is closely linked to the catalogue application.</p> <p>The metadata component is made available to all AWRIS users. However, certain metadata entries could be limited to certain groups such as custodians of the relevant datasets.</p> <p>Some metadata, such as file dates and sizes, will be required to be easily be seen by users; other metadata can be hidden or embedded and unavailable to computer users who are not technically adept. Metadata is generally not reproduced in full form when a document is printed.</p> <p>The metadata entry Component should be available through a standard web browser.</p>
Related User Requirements	1.1, 1.2, 1.3, 1.4, 1.5, 1.7, 1.8, 1.9,1.12, 2.3, 2.5, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 4.2, 4.3, 4.5, 4.6, 4.7, 4.8, 6.3,
Definition	<p>The users of this component require the following field definitions:</p> <p>View pre-developed metadata content and water metadata.</p> <p>Conduct simple metadata search such as input of simple keywords and obtain meaningful metadata search results that describe relevant AWRIS metadata types including:</p> <p>Source of information</p> <p>Quality, reliability, certainty, data collection method, dates, frequency etc.</p> <p>Definitions, standard units that are used</p> <p>Preview metadata without needing to access the source</p> <p>Being able to obtain a list of similar or popular metadata searches</p> <p>Metadata on multiple dimensions, but specifically on data and information, and on locations.</p> <p>Ability to perform discovery of the type of information and metadata:</p> <p>Source of data or information</p>



	<p>Availability, including how to access information Associated people, projects, references Quality, reliability, certainty, data collection method, dates, frequency etc. Scope/scales used or applicable to the data and information Any calculations or methods that have been used What comparable data/information exists Versions available Methodology to obtain data, data management Definitions, standard units that are used Characteristics of the data set that help explain what is being measured Boundaries and considerations to take into account when using the data. Ability to upload and link metadata describing data and information services through this component Be able to export the metadata into formats useful for external use such as Excel or CSV. Obtain metadata about all water resources and or linked to other metadata that does Ability to group metadata under a particular label through the use of the taxonomy/folksonomy component. Be able to identify gaps or missing metadata information Compliance with existing metadata standards Dublin Core Simple and Qualified AGLS Spatial / ANZLIC metadata Interface and presentation is clear, intuitive and responsive to allow AWRIS user to manage information with ease. Obtain metadata quickly and from one location View the current data/information metadata/ Be able to provide intelligent metadata querying abilities that helps to minimise errors Determine if others have requested for similar metadata searches Obtain metadata at the lowest level possible Metadata includes information that may describe boundaries and consideration that should be taken into account when using the data</p>	
Interactions with other Components/applications		
Component	Interaction	Comment
Catalogue Service	Link to relevant metadata fields	e.g. Hyperlink legend to summary metadata



Contributing Systems	Query spatial data service	Image service, Feature Service, Terrain (3D) Service, Coverage Service
Mapviewer	Displays geographic extent of queried metadata	Where possible displays point / line / poly for eg study area
User / role administration	Depending on user profile user is able to publish metadata or only to view metadata	Needs to link into existing LDAP structure

AWRIS Tool	Internal Discovery – Taxonomy / Folksonomy
Description	<p>Taxonomies are the ordered classification of topics, labels, based on underlying principles and schemas. Taxonomies are usually developed by a central organiser and are used to develop information architecture and navigation. It is hierarchical, that is, everything is grouped under specific labels, which are in turn also grouped.</p> <p>A Folksonomy is an extension of a taxonomy that allows users of the taxonomy to also categorise data and information using labels that they are more familiar with⁶. These labels can be used to create navigational links to help other users find and organize that information later. Users can also discover who creates the label, and other associated labels and interpretations, allowing improved discoverability of and ability to explore data and information. It allows labels and relationships between data and information to be developed without the restriction of hierarchies, and allows for users to drive discoverability. The labels are commonly known as tags and the labelling process is called tagging.</p> <p>A folksonomy can be represented by a component that is available through the web browser and is easy to use. It should provide the ability to create a tag or label and search on the labels.</p> <p>The process of folksonomic tagging is intended to make a body of information increasingly easier to search, discover, and navigate over time. A well-developed folksonomy is ideally accessible as a shared vocabulary that is both originated by and familiar to its primary users.</p>
Related User Requirements	1.1, 1.2, 1.3, 1.4, 1.5, 1.7, 1.8, 1.9, 1.12, 2.3, 2.5, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 4.2, 4.3, 4.5, 4.6, 4.7, 4.8, 6.3,
Definition	The users of this component require the following field definitions:

⁶ <http://www.uie.com/events/uiconf/2006/articles/folksonomies/>



	<p>Create labels using alphanumeric characters to build up a taxonomy or a folksonomy</p> <p>Assign labels to two or more groups of information presented through AWRIS</p> <p>Extend folksonomy to support GeoTagging such as GeoURL. GeoURL that is a location-to-URL reverse directory. This will allow you to find URLs by their proximity to a given location</p> <p>Search for user-assigned or general labels across AWRIS</p> <p>May group labels under a Super Label</p> <p>Display information based on matching labels.</p> <p>Be able to quickly access taxonomy and folksonomy quickly and from one location</p> <p>Taxonomy and folksonomy may describe information of created data to assist users accessing the most up to date such as best version of AWRIS NSW water resource data and information.</p> <p>Facilitate access to information based on label information or text</p> <p>Be able to conduct simple label searches</p> <p>Be able to filter and refine search/queries and view search results</p> <p>Be able to use intelligent label querying that helps to minimise errors / incompatibility</p> <p>Be able to understand if a label has been associated with particular key word search</p> <p>Utilise labels with user-predefined text and information to create relationships between data sets – eg environmental flows versus extractions, and view relationships that others have made with different topics, themes, keywords</p> <p>Identify how data has been used by others to answer questions / make decisions / conduct research and analysis, and what linkages others have made</p> <p>Facilitate and assist in the development of consistent definitions and terms</p>
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Interactions with other Components/applications

Component	Interaction	Comment
Internal Discovery Component	User use Discovery Components to search for labels only	
Static Web Content	Labels are placed on static pages or reports.	Labels are searchable by the Discovery Component
Static Web Report	Labels are placed on static pages or reports.	



Data Download	User downloads information grouped under a single Label	Download all references for chlorine contamination
Almanac	Labels may be placed on almanacs or indices for reference	Download all references for chlorine contamination
Mapping/Spatial	Show labels on maps	Labels may refer to external resources or another map view.

AWRIS Tool	Static web content
Description	Static web content Component facilitates access to AWRIS contents in the form of html/xml web pages that are created and updated using a manual process. The static web content component is made available through the web browser and interacts with other AWRIS components (such Content Management Component) to manage access to contents and information
Related User Requirements	1.5, 1.6, 1.10, 1.11, 6.7
Definition	<p>The users of this Component require the following field definitions:</p> <p>Static web contents must be easily discovered through the components defined in this document</p> <p>Static web contents must include information describing concurrency of information (in the content body) and other relevant metadata as per AGLS.</p> <p>The 2006 Baseline Water Assessment reports and any subsequent reports produced beyond this time.</p> <p>Interface and presentation is designed around appropriate W3C standards using Cascading Style Sheets that enforces clear layout, web-friendly colours and printer-friendly pages.</p> <p>Access to backend static information that may range from General information, facts and figures, graphs to key maps on predetermined Australian water resources, key locations, topics and questions.</p> <p>Information about water related projects across Australia, including National Water Commission projects and National Water Initiatives. This should include status information, and the methods and data used in measuring the success of the initiatives.</p> <p>Static information should include background and contextual information about water resource information that helps users understand what is available and how it can be used.</p>



	<p>Specific information about the connectivity of water resources, including how water information fits into the bigger picture or the water balance</p> <p>A glossary of water terms, descriptions, definitions used etc, including alternate terms that are used across Australia. This includes ‘standard’ definitions of general terms that help people understand water information – eg “Olympic swimming pools, Sydney harbours”. This is ultimately linked to the Almanac component.</p> <p>Information about the National Water Commission, including the long term vision for water and water management in Australia.</p> <p>Information on new water (recycling, desalination etc) – there may not be any data but some introductory information and links to appropriate sites</p> <p>Provide some simple analysis of the similarities/differences in data sets that will help with contextual understanding of the data or information</p> <p>Static Web Components facilitate the creation of the FAQ (Frequently asked questions)</p>	
Interactions with other Components/applications		
Component	Interaction	Comment
Internal Discovery Component	User use Discovery Components to search for static information.	Links between resources discovered by the External Discovery Component and Internal Discovery Component.
Static Web Content	A static content with links to almanac through anchors	
Data Download	User download static pages or reports	PDF
Almanac	Almanac is typically static	
Dynamic Reports	User may perform a query to identify updated or changed information.	Query result is presented in dynamic report.
Metadata / Service Catalogue	Static information with reference to metadata information	
Directory Service (Yellow Pages)	Static information is listed in the Directory Services	e.g. Organisation structure
Taxonomy /Folksonomy	Categorise static report/content with a label	May be able to group information together under a



	super Label.
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AWRIS Tool	Static report
Description	<p>Static report Component facilitate access to AWRIS reports in various forms such as PDF, Word, Excel or any other non-html/xml documents that will be accessed, viewed and downloaded using AWRIS.</p> <p>The static report Component should be made available through the web browser and interacts with other AWRIS Components (such as Content Management Component) to manage access to static reports.</p>
Related User Requirements	1.2, 1.7, 1.8, 1.9, 2.6, 4.6
Definition	<p>This users of this Component require the following field definitions:</p> <p>Static reports must be printer-friendly such that it must support:</p> <p>W3C layout and presentation that is supported by all printers</p> <p>Cascading Style Sheets (CSS) that is designed for standard paper sizes (A4, A3 etc) and colours</p> <p>Use of web-safe colours that are widely supported by standard printers</p> <p>Support of the XHTML-Print specification by W3C that is widely supported by Postscript and PCL-based printers</p> <p>Static reports must include information describing concurrency of information (in the content body) and other relevant metadata such as:</p> <p>Expiry date</p> <p>Name of author</p> <p>Keywords</p> <p>Descriptions</p> <p>Search engine instructions such as No-Cache</p> <p>Information about where the document was downloaded from</p> <p>Interface and presentation is designed around W3C standards using Cascading Style Sheets that enforces clear layout, web-friendly</p> <p>Includes up to date, contextual information to help the user to interact with AWRIS</p> <p>Access, review and download reports that are relevant to specific reporting frameworks, such as the State of Environment, National Water Initiatives, and Water Management Plans. Review reports that are relevant to</p>



	<p>specific measurement parameters, such as water quality measures, caps, allocations, etc.,</p> <p>Obtain templates and standard reporting Components, such as National Water Accounting reports.</p> <p>Obtain, provide information and references to whitepapers, research papers, studies, events and other reports</p> <p>View graphs on a particular topic and/or region combining data from different sources</p> <p>Generate, print and export graphs of data</p> <p>Provide data that can be used to help reporting, delivery of initiatives and requirements</p> <p>View existing plans and entitlements</p>	
Interactions with other Components/applications		
Component	Interaction	Comment
Internal Discovery Component	User use Discovery Components to search for static information.	Links between resources discovered by the External Discovery Component and Internal Discovery Component.
Static Web Content	A static web report include hyperlinks to almanac through anchors	
Data Download	User download static pages or reports	PDF
Almanac	Almanac is typically static	
Dynamic Reports	User may perform a query to identify updated or changed information.	Query result is presented in dynamic report.
Metadata / Service Catalogue	Static information with reference to metadata information	
Directory Service (Yellow Pages)	Static information is searchable and listed in the Directory Services	
Taxonomy /Folksonomy	Categorise static report/content with a label	May be able to group information together under a super Label.

AWRIS tool	Dynamic Report
Description	The dynamic report component should be made available through the web browser and interacts with other AWRIS components to manage access to a variety of underlying



	<p>datasets, often dynamic AWRIS datasets that changes over time.</p> <p>The dynamic report component facilitates query access by AWRIS user to AWRIS information for presentation through predefined report templates. The dynamic report component generates dynamic reports/contents with information or data that changes over time.</p>
<p>Related User Requirements</p>	<p>1.5, 2.1, 2.2, 2.6, 2.7, 4.1, 4.5, 4.6, 4.7, 5.4, 5.8, 5.9, 6.4</p>
<p>Definition</p>	<p>The users of this component require the following field definitions:</p> <p>Dynamic reports must be easily discovered through the components defined in this document</p> <p>Dynamic reports must include information describing concurrency of information (in the content body) and other relevant metadata such as:</p> <p>Generate customised and ad hoc reports using a wide set of predefined templates & information elements, data sets, or other information that may be applicable and available.</p> <p>Access, review and download reports that are relevant to specific reporting frameworks, such as the State of Environment, National Water Initiatives, and Water Management Plans. Review reports that are relevant to specific measurement parameters, such as water quality measures, caps, allocations, etc.,</p> <p>Generate, print and export graphs of data</p> <p>Access reports and updates on real-time monitoring of activities and measures</p> <p>Obtain / export / access to raw data at the lowest level possible, as well as at various levels of aggregation</p> <p>Compare and contrast information over time</p> <p>Provide data in a format that can be used to help reporting, delivery of initiatives and requirements such as CSV or MS Excel/</p> <p>Obtain up to date information about all water resources data and information that is available (completely exhaustive) or linked to the data that does (through internal or external Discovery components)</p> <p>Identify gaps or missing information and data</p> <p>Understand the type of data and information that is available at different scales.</p> <p>Dynamic reports must be printer-friendly such that it must support:</p> <p>W3C layout and presentation that is supported by all printers</p>



	<p>Cascading Style Sheets (CSS) that is designed for standard paper sizes (A4, A3 etc) and colours</p> <p>Use of web-safe colours that are widely supported by standard printers</p> <p>Support of the XHTML-Print specification by W3C that is widely supported by Postscript and PCL-based printers</p> <p>Dynamic reports must be generated interactively by AWRIS within an acceptable waiting period that minimises repeat requests.</p> <p>Obtain up to date directories of people, projects and organisations, and information on specific locations activities and measures</p> <p>Provide data that can be used to help reporting, delivery of initiatives and requirements</p> <p>View contextual information to help the user interact with AWRIS</p> <p>Understand what data is able to be compared - spatially and temporally</p> <p>Conduct interrogations of the data and methodology (used in reports or analysis)</p>	
Interactions with other Components/applications		
Component	Interaction	Comment
Internal Discovery Component	User use Discovery components to search for information available only dynamic reports.	Links between resources discovered by the External Discovery component and Internal Discovery component.
Static Web Content	Dynamic contents with links to static pages or reports.	e.g. Links to Almanac or historical information
Static Web Report	Dynamic contents may have linked to static pages or reports.	e.g. Links to Almanac or historical information
Data Download	Ability to export dynamic data into other formats.	Dynamic reports contain results that are exportable.
Almanac	Dynamic content may refer to AWRIS information that with reference to a particular information in the Almanac.	
Mapping	A dynamic report is linked to the mapping/spatial Component to represent the results graphically.	This may be a two-way interaction
Metadata / Service	Produce a dynamic metadata report	e.g. report on water flow in the Yarra



Catalogue		
Directory Service (Yellow Pages)	User use Directory Services to lookup available dynamic reports.	
Taxonomy /Folksonomy	Categorise links or dynamic reporting Components with a label	May be able to group information together under a super Label.

AWRIS tool	Collaboration Components
Description	<p>Collaboration components are components that enable AWRIS users to access information resources, share information, and communicate with others interested or involved in Australian Water Resource Data and Information. Collaboration components can be divided into three categories, namely:</p> <p>Electronic communication components send messages, files, data, or documents between people and hence facilitate the sharing of information. Examples include:</p> <p>Electronic conferencing components also facilitate the sharing of information, but in a more interactive way.</p> <p>Collaborative management components facilitate and manage group activities.</p>
Related User Requirements	1.12, 1.13, 3.6, 3.9, 4.3, 4.4, 5.4, 5.5, 7.8
Definition	<p>This users of this component require the following field definitions:</p> <p>Collaboration components must be easily identified through intuitive symbols or instructions to access, share and communicate information.</p> <p>Provide comments and feedback on data and information from AWRIS, including the ability to modify content and information if applicable.</p> <p>Determine whether others have asked similar questions, including how they answered the question, and what other questions they have asked</p> <p>Identify how data has been used by others to answer questions / make decisions / conduct research and analysis etc</p> <p>Identify what studies, other information or research exists that can help understand an area/topic</p> <p>View a directory of people, projects, stakeholders and organisations involved in the water industry and related to water resources data and information</p>



	<p>View and receive updates and/or new data or information has been provided, what has been added</p> <p>View frequently asked questions</p> <p>Obtain a list of similar previous and popular searches</p> <p>Understand what questions to ask about a topic</p> <p>Determine whether others have asked similar questions, including how they answered the question, and what other questions they have asked.</p> <p>Determine who are the data holders and how to access the data where data is not immediately accessible or where data can be obtained offline agencies/catalogues/websites</p> <p>Obtain / export / access to raw data in an efficient and time effective manner</p> <p>Interface and presentation is designed around W3C standards using Cascading Style Sheets that enforces clear layout, web-friendly colours and printer-friendly pages.</p> <p>Facilitate working together to meet common objectives, such as development of consistent standards, definitions, or reporting mechanisms.</p> <p>Provide information and results to AWRIS</p> <p>Understand what data is able to be compared - spatially and temporally</p> <p>Understand the relationships between data sets – eg environmental flows versus extractions</p> <p>Update data/information/metadata/results/observations (contribute to the AWRIS)</p>
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Interactions with other Components/applications

Component	Interaction	Comment
Internal Discovery Component	Discover information made available through a collaboration Component.	
Data Download	Download data directly through the collaboration Component	e.g. Download AWRIS informational manuals
Almanac	Use collaboration Component to manage almanac update	Assign roles to AWRIS users to manage specific almanac
Dynamic Reports	Ability to generate dynamic reports through/within a collaboration Component	Links to dynamic resources such as RSS
Metadata / Service Catalogue	Locate, present, discuss and maintain metadata	Use Collaboration Component to track changes or variations to metadata
Directory	User use the Directory	e.g. search for information



Service (Yellow Pages)	Service to locate collaboration Component	that is sharable and editable by all.
Taxonomy /Folksonomy	Categorise collaboration Components or information with a label	May be able to group information together under a super Label.

AWRIS tool	Data download
Description	<p>Data download component provides the ability to AWRIS users to identify access and download data and information from AWRIS. The data download component could be used to manage aspects of data download, such as restricting the types of information available for downloading and the managing methods of downloading data such as through FTP or a RSS feed.</p> <p>The data download component should be available through a standard web browser and is intuitive to promote regular data downloads.</p>
Related User Requirements	4.1, 4.2, 4.3, 4.5, 4.6, 4.7, 4.8, 5.1, 5.2, 5.3, 5.4, 5.5, 7.5, 7.6, 7.7
Definition	<p>The users of this component require the following field definitions:</p> <ul style="list-style-type: none"> Obtain / export / access to raw and aggregated data. Obtain / export / access to raw data in an efficient and time effective manner Where data is not immediately accessible, determine how to access the data offline via other agencies/catalogues/websites Preview data and information and indicative maps without needing to access the source Access and download data on a particular topic and or region for further processing in a number of methods: eg for models, GIS software or components such as Microsoft Word and Excel, spatial, temporal, at different scales and degrees of accuracy etc Provide data that can be used to help reporting, delivery of initiatives and requirements Determine who are the data holders and how to access the data where data is not immediately accessible or where data can be obtained offline agencies/catalogues/websites Obtain information about all water resources data and information that is available (completely exhaustive) or linked to the data that does Provide data that can be used to help reporting, delivery of initiatives and requirements



Interactions with other Components/applications		
Component	Interaction	Comment
Internal Discovery Component	Discover downloadable data, information or reports	
Static Web Content	Static web pages that are downloadable e.g. HTML, Ms Word	
Static Web Report	Static reports that are downloadable e.g. PDF	
Almanac	Download portions of the almanac for external / offline use	Almanac may be used for source information for other devices e.g. GPS
Dynamic Reports	User perform query to produce dynamic reports that is downloadable in PDF or Excel.	
Metadata / Service Catalogue	Use the Metadata Service Catalogue to search specific information based on metadata entry	e.g. search for bore-hole site analysis performed by SKM, between 1997-1999 in Gippsland.
Directory Service (Yellow Pages)	User use the Directory Service to locate downloadable information	e.g. search for PDF only.
Usage Analysis	Track data or information that has been frequently downloaded	Useful for capacity planning and profiling
Taxonomy /Folksonomy	Categorise downloadable information with a label	May be able to group information together under a super Label.

AWRIS Tool	Mapping / Spatial
Description	Mapping / spatial refers to the components that depict water data and information in a space, including relationships between points in space, in two dimensions. Part of this is a web-mapping viewer. Furthermore, the portal will enable data download (save to disk) and launching of standard browser plug-ins such as office components, PDF readers, etc., depending on the service type of the search result. It will further allow for advanced data display. It is expected that these will include advanced mapping capabilities of feature, coverage and 3-dimensional



	<p>map services, as well as (graphical) display and attribute selection of (temporal) data sets.</p> <p>These components will be generic and relatively simple to be able to support users from the diverse Community of Interest, and to be deployable on wide range of low-end browser platforms. Portal users can invoke their specialised, high-end client components (desktop or web-applications) for further, more advanced functionality.</p>
<p>Related User Requirements</p>	<p>1.7, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 4.1, 4.4, 5.6, 5.7, 5.8, 5.9, 6.4</p>
<p>Definition</p>	<p>The users of this component require the following field definitions:</p> <p>Drag across maps to provide information about that area (ie provide a Minimum Bounding Rectangle (MBR) functionality rather than clicking on an image maps. A MBR allows a user to drag across an area and provide information about it, regardless of boundaries)</p> <p>Generate maps at different scales and using different layers</p> <p>Query maps and obtain additional information about an area, using mapping layers of different information, drilling down to more detailed and smaller areas, and panning (etc)</p> <p>Add typical layers, boundaries etc to provide further information</p> <p>Print maps</p> <p>Produce thematic maps that represent map information through a variety of ways such as colour coding, symbols or line thickness</p> <p>Use maps to compare similar locations when possible</p> <p>Allow for quick viewing of data spatially to determine whether the user wishes to download</p> <p>Simple process to generate reports, data and information based on the spatial views that (eg data being viewed, coordinates etc)</p> <p>Some pre-developed maps that show answers to specific questions (eg SW-GW interactions)</p> <p>Ability to download data in GIS form, to be able to query and analyse in offline systems</p> <p>Provide coordinates information, be able to capture coordinate information on the map</p> <p>When appropriate, access to advanced functionality such as adding layers or querying data is available for those that would like to use it, but should not be required to access basic maps.</p> <p>Include typical and expected functionality including: Conventional formats, legends and icons;</p>



	<p>a map scale; Zooming and panning, rotating the view; Printing maps; Measuring distance; Ability to save or export maps; Setting an active layer, adding or deleting layers; Ability to find specific locations; and Access to metadata; Introductory pages should include brief but comprehensive start up that can be easily bypassed to access more advanced mapping components by more experienced users. Icons should be conventional, have descriptive alternate text (help bubbles) to help users understand their meaning, and be described in detail in the help file. The map window as large as possible, if able 65 percent of the screen, and be resizable. Use spatial components to navigate and drill down to lower spatial representation Provide a simple process to download the data being viewed spatially The mapping interface must be usable for: the novice who is not familiar with mapping and GIS software; users who know how to use maps and have experience with pre-configured layers; through to the technically experienced users. This is particularly important as the maps will be used as a primary navigation component to access data and information.</p>
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Interactions with other Components/applications

Component	Interaction	Comment
Internal Discovery Component	Discovery Component is used to locate information that is presented through mapping/spatial Component.	Perform a search of AWRIS data that is represented through a map interface.
Static Web Content	Map link to static web pages or reports.	Two-way relationship (map <-> static contents)
Static Web Report	Map link to static web pages or reports.	Two-way relationship (map <-> static reports)
Data Download	Map is exportable to the clipboard or a bitmap for reports	User produces customised dynamic reports with dynamic maps and dynamic contents.
Almanac		
Dynamic	User performing a spatial	



Reports	query to produce dynamic reports	
Metadata / Service Catalogue	Map data includes references to various metadata standards or information.	User may use the map to locate information based on metadata entry.
Directory Service (Yellow Pages)	Directory services include links to pre-defined map views or map contents	
Taxonomy /Folksonomy	Label areas or points on the map with a label (geo-tagging)	May be able to group mapping information together under a super Label.

AWRIS Tool	Data visualisation
Description	<p>Data visualisation refers to the presentation of (usually complex and multivariate) water data and information in a visual manner. Data visualisation may involve a set of techniques to turn a set of data into visual insight. It aims to give the data a meaningful representation by exploiting the powerful discerning capabilities of the human eye. The data is displayed as 2D or 3D images using techniques such as colorization, 3D imaging, animation and spatial annotation to create an instant understanding from multi-variable data. It aims to provide more meaning and context by representing data and information usually visually rich formats. Typical data visualisation components include animation, 3-D rendering, and other multimedia and graphics components. Part of this is a data visualisation viewer. Furthermore, the portal will enable data download (save to disk) and launching of standard browser plug-ins such as office Components, PDF readers, etc., depending on the service type of the search result. It will further allow for advanced data display. It is expected that these will include advanced data visualisation capabilities such as graphing.</p> <p>The data visualisation Component will be generic and relatively simple to be able to support users from the diverse Community of Interest, and to be deployable on wide range of low-end browser platforms. Portal users can invoke their specialised, high-end client Components (desktop or web-applications) for further, more advanced functionality</p>
Related User Requirements	2.3, 2.5, 2.7, 2.8, 4.4, 5.6, 5.7, 5.8, 5.9, 6.4,
Definition	The users of this component require the following field



	<p>definitions:</p> <p>Display information in more than two dimensions: groundwater basins, quality of water at different levels etc</p> <p>View graphs on a particular topic and/or region combining data from different sources</p> <p>Access reports and updates on real-time monitoring of activities and measures</p> <p>Be able to export visualise data into data formats compatible with popular desktop visualisation software</p> <p>Be able to change data visualisation parameters</p> <p>Access data on a particular topic and or region for further processing in a number of methods: eg for models, GIS software or Components such as Microsoft Word and Excel, spatial, temporal, at different scales and degrees of accuracy etc</p> <p>Compare and review information across locations (eg towns)</p> <p>Understand the boundaries and considerations that should be taken into account when using the data</p> <p>Conduct interrogations of the data and methodology (used in reports or analysis)</p> <p>Understand the type of data and information that is available at different scales</p>	
Interactions with other Components/applications		
Component	Interaction	Comment
Internal Discovery Component	Discovery component is used to locate information that is presented through the data visualisation component	
Static Web Content	Static web pages/reports contain links to dynamic/static graphs.	Such as homepage with links to usage analysis
Static Web Report	Static web pages/reports contain links to dynamic/static graphs.	
Data Download	Visualisation data download for use in external applications	
Almanac	Visualisation data references specific almanac information	
Dynamic Reports	Dynamic reports produce output suitable for graphical visualisation e.g. graphs or 3-D objects.	



Metadata / Service Catalogue	Users refer to metadata to qualify data visualisation output e.g. source and precision of data.	
Directory Service (Yellow Pages)	Users use the Directory Service to locate specific data visualisation component	
Taxonomy /Folksonomy	Categorise visualisation data with a label	May be able to group information together under a super Label.

AWRIS Tools	Usage Analysis
Description	<p>Usage analysis refers to the components, techniques, and methods that are used to understand how the a system is being used, usually through capture and analysis of statistics and counts such as unique visits, views, downloads, user pathways, successful transactions, or referrals. The information can be used to measure against performance indicators, or to improve the system based on the activities of users.</p> <p>The usage analysis component is presented within an environment/context that supports data download (save to disk) and launching of standard browser plug-ins such as office components, PDF readers, etc., depending on the service type of the search result. It will further allow for advanced data display through trend and distribution analysis. It is expected that these will include advanced data visualisation capabilities such as graphing.</p> <p>The usage analysis component should be able to perform generic and relatively simple tasks to be able to support users from the diverse Community of Interest, and to be deployable on wide range of low-end browser platforms. Portal users can invoke their specialised, high-end client components (desktop or web-applications) for further, more advanced functionality.</p>
Related User Requirements	3.6, 5.5,
Definition	<p>The users of this component require the following field definitions:</p> <p>View frequently asked questions</p> <p>View pre-developed information on key and popular topics, themes, locations etc.</p>



	<p>Obtain a list of similar previous and popular searches</p> <p>Identify how data has been used by others to answer questions / make decisions / conduct research and analysis etc</p> <p>Provide feedback on data and information provided by AWRIS</p> <p>Compare and review usage analysis across locations</p> <p>View graphs on usage analysis</p> <p>Obtain statistics on various user interactions with AWRIS such as:</p> <p>Listing of popular and busiest pages</p> <p>View how information is being referred from one page to another</p> <p>Identify the duration of time that a user typically access a page</p> <p>Number of visits, and number of unique visitors</p> <p>Visits duration and last visits</p> <p>Authenticated users, and last authenticated visits,</p> <p>Days of week and rush hours (pages, hits, KB for each hour and day of week),</p> <p>Domains/countries of hosts visitors</p> <p>Hosts list, last visits and unresolved IP addresses list</p> <p>Most viewed, entry and exit pages</p> <p>Files type</p> <p>Web compression statistics</p> <p>OS used</p> <p>Browsers used</p> <p>Visits of robots</p> <p>Worms attacks</p> <p>Search engines, key phrases and keywords used to find AWRIS</p> <p>HTTP errors (Page Not Found with last referrer, ...),</p> <p>Other personalized reports based on url, url parameters, referrer field for miscellaneous/marketing purpose</p> <p>Number of times AWRIS site is "added to favourites bookmarks".</p> <p>Screen size (need to add some HTML tags in index page)</p> <p>Ratio of Browsers with support of: Java, Flash, RealG2 reader, QuickTime reader, WMA reader, PDF reader (need to add some HTML tags in index page)</p> <p>Cluster report for load balanced server ratio.</p> <p>Interface and presentation is designed around W3C standards using Cascading Style Sheets that enforces clear layout, web-friendly colours and printer-friendly pages.</p>
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	<p>Understand the relationships between data sets – eg environmental flows versus extractions</p> <p>Determine whether others have asked similar questions, including how they answered the question, and what other questions they have asked.</p> <p>Obtain key data and information quickly</p>	
Interactions with other Components/applications		
Component	Interaction	Comment
Internal Discovery Component	Discovery Component is used to locate specific AWRIS system usage information	E.g. Locate more frequency used AWRIS information
Data Download	Usage analysis is downloadable or exportable for offline analysis.	Export data usage in CSV for trend analysis
Almanac	Almanac will be used to describe specific usage analysis information	
Dynamic Reports	Usage analysis is presented through dynamic reports, displaying usage graphs, error reports or user profiles.	

AWRIS Tool	Almanac
Description	<p>An almanac is compilation of useful and relevant information, in this case data and information regarding water resources and information. It is often referred to as a volume containing a collection of miscellaneous facts and statistics on many subjects.</p> <p>This component will be generic and relatively simple to be able to support users from the diverse Community of Interest, and to be deployable on wide range of low-end browser platforms. Almanac users can interact with other users through other components (such as the Collaboration or Content Management Components) to manage any almanac updates (where AWRIS people can contribute and maintain specific information related to AWRIS.) similar to updating information in Wikipedia</p>
Related User Requirements	1.3, 1.4, 3.2, 3.3, 3.9, 3.10, 4.5, 4.6, 4.7, 5.1, 5.2, 5.3, 5.4, 5.5, 6.1, 6.2, 6.6, 6.7, 7.8
Definition	<p>The users of this component require the following field definitions:</p> <p>Update the almanac using a combination of: alphanumeric character sets</p>



	<p>maps</p> <p>graphs</p> <p>uploaded data sets</p> <p>static reports (PDFs or Word)</p> <p>visualisation</p> <p>audio and video</p> <p>mathematical calculations</p> <p>View pre-developed almanac information about water in general that provides a useful overview of the state of water in Australia</p> <p>View pre-developed almanac content and data, including pre-developed maps, about specific and key topics, regions and sites around Australia</p> <p>Provide almanac definitions and common descriptions of key terms used in Water Resources Information</p> <p>View a directory of people, projects, stakeholders and organisations involved in management of the AWRIS almanac</p> <p>Update data/information/metadata/results/observations via an AWRIS system</p> <p>Create and view almanac linking data and information, including where data and information can be compared and reviewed across locations (eg towns)</p> <p>Search for almanac data and information by multiple dimensions including by: data sets, information elements, time periods, topics, jurisdictions, locations, organisations, relevance, availability of (information), research, or document type, where from, quality, reliability, certainty, data collection method, dates, frequency etc.</p> <p>Provide definitions and common descriptions of almanac key terms used in Water Resources Information</p> <p>Update almanac data/information/metadata/results/observations through other components such as Content Management or Collaboration components</p> <p>Obtain Almanac data and information quickly and from the one location</p> <p>Access the most up to date, best version of water resources almanac data and information that is available</p> <p>Understand what questions have been asked about a particular almanac entry</p> <p>Determine whether others have asked similar questions, including how they answered the question, and what other questions they have asked.</p> <p>Obtain information about all water resources almanac data and information that is available (completely exhaustive) or</p>
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	<p>linked to the data that does</p> <p>Provide almanac data that can be used to help reporting, delivery of initiatives and requirements</p> <p>Identify gaps or missing almanac information and data</p> <p>Understand what almanac data and information can answer specific questions</p> <p>Access information that helps the user understand how almanac information and data can be queried / used</p> <p>Understand what almanac data is able to be compared - spatially and temporally</p> <p>Understand the relationships between the various almanac data sets – eg environmental flows versus extractions</p> <p>Obtain background and contextual information about water resource almanac information through the use of other components such the Discovery components</p> <p>Identify what studies, other information or research exists that can help understand a particular almanac</p> <p>Interface and presentation is clear, intuitive and responsive to allow AWRIS user to manage information with ease.</p>	
Interactions with other Components/applications		
Component	Interaction	Comment
Internal Discovery Component	Discovery component is used to locate almanac information	
Static Web Content	Almanac creators need access to authorities' information, typically static information.	
Static Web Report	Almanac creators need access to authoritative information, typically static reports.	
Metadata / Service Catalogue	Almanac includes parameters that define specific almanac data, which is further described through metadata.	
Directory Service (Yellow Pages)	Directory Service lists all Almanac entries	
Taxonomy /Folksonomy	Categorise almanac information with a label	May be able to group almanac information together under a super Label.



AWRIS Tool	Model Orchestration
Description	<p>"Orchestration", in this context, refers to the process of combining different web-services (e.g. models) on the fly to perform a specific task. Combining means determining the order in which they are called, linking outputs from one service to inputs of another, managing batch processing and possibly alerting another service (or the user!) when (part of) the process is completed.</p> <p>A model orchestration component can be used to define routines developed for specific purposes and made available for others to use.</p>
Related User Requirements	4.4, 5.6
Definition	<p>The users of this component require the following field definitions:</p> <p>Be able to select one AWRIS data feed or search result as input into another AWRIS search functionality.</p> <p>View the search of a model orchestration through interfaces or presentation that is easy to understand and decipher the following information:</p> <p>Input data and source of input data</p> <p>Time taken to process each service within the orchestra of services</p> <p>Output data and precision of output data</p> <p>Be prompted that a model orchestration process will take some time to process.</p> <p>Be prompted via email or other means that a model orchestration process has completed, with a link to directly access the result page.</p> <p>Provide definitions and common descriptions of AWRIS model orchestration</p> <p>View a directory of people, projects, stakeholders and organisations involved in maintaining the AWRIS model orchestration</p> <p>view linkages and relationships between the various web services that make up an orchestration</p> <p>Compare AWRIS web services results across locations for selection into a model orchestration</p> <p>Access and download data from a number of model orchestration a for further processing in a number of methods: eg for models, GIS software or Components such as Microsoft Word and Excel, spatial, temporal, at different scales and degrees of accuracy etc</p>



Interactions with other Components/applications		
Component	Interaction	Comment
Internal Discovery Component	Discovery component is used to locate available model orchestration routines	AWRIS user make available private/public model orchestration
Data Download	Model orchestration result available for direct download or export to specific format.	
Almanac	Model search and result with links to reference information made available by the almanac	
Dynamic Reports	Model orchestration triggering dynamic reports to deliver bundled output e.g. dynamic reports (may contain maps) with model orchestration results.	
Metadata / Service Catalogue	Expose metadata information associated to model orchestration output	A model orchestration output may be complex requiring further output definition such as quality and parameters.
Directory Service (Yellow Pages)	Directory Service lists available pre-defined model orchestration for re-runs	
Taxonomy /Folksonomy	Link specific model orchestration with a label	May be able to group several model orchestrations together under a super Label.

AWRIS Tool	Content management system
Description	<p>Content management system is a component that allows the effective management of content, information and objects such as maps, images, reports and data, as well as the management of structures that store and allow access to the information.</p> <p>A content management system represents a set of automated processes that may support the following features within AWRIS:</p> <ul style="list-style-type: none"> Import and creation of static information relevant for AWRIS including multimedia material Identification of all key users and their roles The ability to assign roles and responsibilities to different instances of content categories or types.



	<p>Definition of workflow tasks often coupled with messaging so that content managers are alerted to changes in content. The ability to track and manage multiple versions of a single instance of content.</p> <p>The ability to publish the content to a repository to support access to the content. Increasingly, the repository is an inherent part of the system, and incorporates enterprise search and retrieval.</p>	
Related User Requirements	1.2, 1.6, 1.7, 1.8, 1.9, 1.11, 1.13, 4.2, 4.3, 5.8, 7.5, 7.6	
Definition	<p>The users of this component require the following field definitions:</p> <p>Import and creation of documents and multimedia material, as well as Specific and key topics, regions and sites around Australia, and in general that provides a useful overview of the state of water in Australia.</p> <p>Identification of all key users and their roles that interact with AWRIS</p> <p>The ability to assign roles and responsibilities to different instances of content categories or types.</p> <p>Definition of workflow tasks often coupled with messaging so that content managers are alerted to changes in content. The ability to track and manage multiple versions of a single instance of content.</p> <p>The ability to publish the content to an AWRIS repository to support access to the content. The repository could be an inherent part of the system, and incorporates enterprise search and retrieval, as defined in the Internal and External Discovery Components.</p> <p>Provide meaningful and useful navigation paths within the content management component</p> <p>Interlink and cross reference relevant data and information</p> <p>Be able to contribute content and information to the AWRIS Workflow or process that is easy to use by various levels of AWRIS users without the need to conduct extensive training</p> <p>Interface and presentation is clear, intuitive and responsive to allow AWRIS user to manage contents with ease.</p>	
Interactions with other Components/applications		
Component	Interaction	Comment
Internal Discovery Component	Discovery component is used to locate content management portals or components	
Static Web	Parts of the CMS references static web contents and	Such as AWRIS profile.



Content	reports.	
Static Web Report	Parts of the CMS references static web contents and reports.	Such as AWRIS financial statements.
Almanac	Parts of the CMS links to lookup information available through the almanac component	
Dynamic Reports	Specific parts of the CMS retrieve data from the dynamic components	RSS or triggering of dynamic reports
Metadata / Service Catalogue	Manage metadata updates through content management workflow process	Content management delivers a managed environment to maintain data.
Directory Service (Yellow Pages)	Incorporate Directory Service into specific parts of the portal (web parts)	
Taxonomy /Folksonomy	Categorise CMS information with a label	May be able to group CMS information together under a super Label.

