

**eMarine Information Infrastructure
2010-13 IMOS EIF Facility Project Plan**

Infrastructure Investment:	Improving and enhancing the information delivery system for IMOS
IMOS Facility:	eMarine Information Infrastructure
Operating Institution:	University of Tasmania
Facility Leader	Roger Proctor; 03-6226-1977/04-0015-3449; roger.proctor@utas.edu.au
Collaborating Institutions:	<p>Members of the Australian Ocean Data Centre Joint Facility (AODCJF) - the AODCJF is a joint venture between six Australian Government marine data agencies - Australian Institute of Marine Science (AIMS), Australian Antarctic Division (AAD), Bureau of Meteorology (BoM), CSIRO Marine and Atmospheric Research (CMAR), Geoscience Australia (GA) and the Department of Defence (RAN Directorate of Oceanography and Meteorology).</p> <p>Members of the Tasmanian Partnership for Advanced Computing (TPAC) - TPAC is the expertise centre for Earth Systems Science (ESS) and is building Earth System Science (ESS) infrastructure on the national grid for both ESS modelling and to develop data sets relevant to this community.</p> <p>Members of the NCRIS eResearch Infrastructure Platforms for Collaboration (PfC) - components involved with eMII are:</p> <ul style="list-style-type: none"> • the Australian National Data Service (ANDS), establishing the national research data commons, supporting the "data federations" needed by 21st century research, and • the Australian Research Collaboration Service (ARCS) operating enhanced collaboration tools and services that support "research workflows" accessing instrument, compute and data resources nationwide. • AARNet Pty Ltd (APL), the company that operates Australia's Academic and Research Network (AARNet), is a not-for-profit company limited by shares. The shareholders are 38 Australian Universities and the CSIRO. <p>The CSIRO Tasmanian ICT Centre, developing a world-class ICT research capacity and conducting innovative applied research in the areas of sensor networks and data management.</p> <p>US-IOOS, the Integrated Ocean Observing System (IOOS[®]) is a federal, regional, and private-sector partnership working to enhance our ability to collect, deliver, and use ocean information in US coastal waters and the Great Lakes.</p> <p>MyOcean is a project granted by the European Commission within the GMES Program, whose objective is to define and to set up a concerted and integrated pan-European capacity for ocean monitoring and forecasting.</p>

	<p>IOC IODE The "International Oceanographic Data and Information Exchange" (IODE) of the "Intergovernmental Oceanographic Commission" (IOC) of UNESCO is to enhance marine research, exploitation and development, by facilitating the exchange of oceanographic data and information between participating Member States, and by meeting the needs of users for data and information products.</p>
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Nature of Investment:

The eMII project will provide a single integrative framework for data and information management, discovery and access for IMOS data, through the IMOS Ocean Portal, with increased emphasis on data integration (observations and models) and value-adding. eMII will continue (where appropriate) to host, manage and archive the data (raw and/or processed) from the IMOS facilities and support the exploitation of these data by the IMOS nodes. eMII will provide the standards, protocols and systems to integrate the data and related information into a single framework and will provide the tools to allow end users (i.e. researchers, managers and the public) to access and utilise the data.

The framework already developed, utilizing a distributed data store and access methods (via middleware) supported by ARCS, provides an end-to-end system, based on internationally recognized protocols and standards and operates robustly to join the related observing systems into the eMII framework, thereby coherently integrating data and access systems. A set of data products integrating data across observations and nodes will be made available, and subsequent products will also be integrated and discoverable to the IMOS scientists and other users. By adopting internationally agreed standards for metadata the description of data ownership, creation conditions, formats and data quality is formalized.

Processes for peer-review and comparisons will form a key part of the infrastructure providing an auditable and integrated and consistent framework for assessment and use of the data. The eMII will work closely with the Australian Ocean Data Network Development Office (IMOS Facility #12) and the Australian National Data Service to establish a distributed data model (the Australian Ocean Data Network, AODN), based on the IMOS model, linking partners such as Australian Ocean Data Centre Joint Facility (AODCJF) agencies, universities, and other research organisations and agencies such as TPAC. The AODN will ensure IMOS data is fully exposed to, and interoperable with, national (the Australian Research Data Commons) and international research, and wider, communities – this includes an opportunity to engage with New Zealand (see supporting letter).

Implementation Strategy: (commencing early 2010 to June 2013)

The eMII is developing a world-class information infrastructure for the discovery, access and delivery of IMOS data. The eMII proposal will support the data and information needs of the other IMOS components and much of the work will rely on the detailed planning that comes from the other proposals. eMII is also unique in that it is people-based and will provide the human resources required to integrate and provide access to the data generated by IMOS. An implementation plan to June 2011 is already in place and eMII will work with each of the investment areas to amend the current plan and develop a comprehensive work plan for the duration of the project. Such a plan is critical to identify requirements and to minimize risks. Much work has been completed on developing common data frameworks and schemas for the IMOS data and it is expected that this work will continue as additional multi-disciplinary observations (e.g. biological) are collected, and as international and interoperable standards become more mature.

The eMII has developed a distributed data management system for IMOS whose three main components are: the ARCS Data Fabric for cloud data storage including (wherever possible) data written in CF-compliant IMOS-prescribed netCDF format (network compliant data format) datasets on OPeNDAP (Open-source Project for a Network Data Access Protocol) servers hosting THREDDS (Thematic Realtime Environmental Distributed Data Services) catalogues; the GeoNetwork Metadata Entry and Search Tool as our metadata catalogue and search and discovery tool; the IMOS Ocean Portal based on OGC protocols delivering data via web services through a map-centred web portal. Improvements to the software tools used by eMII, including the metadata system, catalogue and Oceans Portal, are also likely with the increasing maturity of tools such as the Open Geospatial Consortium (OGC) interoperability interfaces and metadata encodings being developed by the Sensor Web Enablement (SWE) Working Group that enable real time integration of heterogeneous sensor webs into the information infrastructure.

Now that a framework is in place for the storage, access and delivery of data significant effort will be directed towards the delivery of as much IMOS data as possible in real or near-real time, data integration (of IMOS data and with non-IMOS data, including model-data fusion – notably interaction with BLUElink) and added-value product generation. The necessary work based on requirements and expectations of each investment area are indicated below. Strong emphasis will be placed on dynamic interactive data manipulation, i.e. 'on-the-fly' generation of, for example, customized bundled datasets, visualization and analysis products. A list of full time equivalent resources against each investment area for each year will be adjusted upon completion of an updated "Needs Analysis", and then iteratively for the life of the project, as needs are reviewed.

Investment Area 1: Argo Australia

The international Argo programme has a well developed data archiving system and eMII will not duplicate the existing data management systems. The eMII provides direct access to Australian Argo float data (currently about 300, but expected to increase with a greater emphasis on the Southern Ocean), and other floats in the Australian region, through the Ocean Portal. Float history, latest profile data and float trajectories can be plotted and metadata records obtained. Argo data is provided in near-real time to the WMO GTS. The eMII will collaborate with the Argo team to develop tools for more sophisticated data access and data product generation suitable for use in models, these will include 'standard' gridded products.

Investment Area 2: Enhanced Measurements from Ships of Opportunity

Data from Ships of Opportunity is stored on OPeNDAP servers and provided in near-real time to the GTS. The main work will be to develop data schemas and web delivery systems for the collected data, especially the newer datasets like the Continuous Plankton Recorder and bio-acoustics.

Investment Area 3: Australian Bluewater Observing System

The volumes of data will be low but diverse (physical, chemical, biological) and now includes new deepwater moorings. eMII will develop data schemas and develop standard time series products. eMII will aim to value add to all data collected by this investment area by making all data available from a single source, in real-time, and, by working with the facility, aid the integration of this data with the other IMOS and OceanSites products.

Investment Area 4: Australian National Facility for Ocean Gliders

Glider data is available from OPeNDAP servers and a sub-set is provided in near-real time to the GTS. eMII will continue to work with the Principle Investigators on data standards and schemas, on metadata for the gliders and on data products, on delivering more glider data in near-real time, and it is expected that additional sensors will bring new datasets and new challenges to integration.

Investment Area 5: Autonomous Underwater Vehicle

Data streams to be produced will include precisely geo-referenced benthic imagery, multibeam swath bathymetry, Conductivity, Temperature, Depth (CTD) profiles and fluorometer data measuring chlorophyll-a and colored dissolved organic matter (CDOM), turbidity (scattering in red) and photosynthetically active radiation (PAR), at the benthic reference sites.

Investment Area 6: Australian National Mooring Network

Most of the moorings are now operating and data is available from the OPeNDAP server through the Ocean Portal. A subset of the National Reference Stations is delivering data in real-time. Increased geographical coverage and the addition of more sensors (e.g. bio-optical) will bring new workflows to deal with. eMII is currently working with the Mooring group to develop a 'Moorings toolkit' for an end-to-end delivery (from sensor to quality-controlled netCDF file) of every sensor and mooring. It is anticipated that the toolkit will be generalized to encompass OGC SWE protocols for all IMOS sensors irrespective of platform. Subsequent work will focus on developing data products and integrating the data with other data streams via the Oceans Portal.

Investment Area 7: Australian Coastal Ocean Radar Network

The radar network is almost in place, currently with near-real time data from three sites and data recording in trial mode at one other site. This is a relatively new data collection method in Australia and one that is significantly different to most of the other data types. eMII is working with the facility to develop appropriate schemas, metadata and access methods. Most of the future work will be in developing data products and making these available. It is anticipated that the equipment will be movable and so the data structures will need to accommodate this.

Investment Area 8: Australian Acoustic Tagging and Monitoring System

Significant work has been carried out to make these data available, which, because of their nature, do not lend themselves to OPeNDAP delivery. The work so far has helped the facility to be at the forefront of the international tagging community, the Ocean Tagging Network. eMII will work to develop the mechanisms to fully integrate this data into the other data types, allowing the physical context of the tagging to be appreciated. Work will also be required to develop standard products and to make these available via the Oceans Portal.

Investment Area 9: Facility for Automated Intelligent Monitoring of Marine Systems

The development of a Sensor Network in GBROOS has made good progress since the start of IMOS, real time data from meteorological and temperature sensors is now available through the Ocean Portal or directly from the GBROOS website. Considerable effort has been put into the middleware that sits between the sensors themselves and the data delivery systems. Currently the middleware used is DataTurbine, also used to deliver real time data from the NRS (Maria Island at present) through the Ocean Portal. Issues such as sensor registration, QA/QC tagging, casual networks, sensor calibration and metadata tagging can, in part, be handled by DataTurbine. Effort in future will focus on improved middleware design and implementation; the maturing OGC Sensor Observation Service (SOS) is being trialled by AIMS and eMII in IMOS and by ICT in CSIRO. Collaboration across these institutes is likely to accelerate SOS implementation, allowing a consistent methodology to be applied across a large sector of the marine observation community. Most of these issues are also relevant to other investment areas and so the work done here will be used by the entire IMOS data framework.

Investment Area 11 : Satellite Remote Sensing

The AO-DAAC, developed by the Facility, is available through the Ocean Portal allowing direct access to the data, stored on an ARCS OPeNDAP/THREDDS server. Browsing of satellite 'thumbnail' images, data subsetting and aggregation and data delivery in a choice of formats are the standard operations. With the expected increase in the number of satellite sensor products, eMII can contribute by incorporating the AO-DAAC directly into the Ocean Portal, delivering the metadata to the national standard, and enhancing the automatic generation of a number of composite data products. Scope also exists to merge the delivery mechanism of the TPAC Digital Library with the Ocean Portal, allowing a single mechanism for aggregating and combining satellite imagery and climate (mostly model) datasets. As both IMOS and TERN will be using the same satellites and similar products it has been recognized as sensible for these projects to implement a strategy for integration to deliver a single set of land/ocean products.

Generic activities

In addition to direct support for the delivery, discoverability and accessibility of IMOS data from the Facilities, strong emphasis will be placed on data integration and community use of IMOS data. Every effort will be made to engage with the Australian modelling community (via BLUElink for example) to ensure uptake of IMOS data and IMOS involvement in the use of models for optimal observing system design (through Observation System Sensitivity Experiments).

Exploiting technology to deliver the 'integrated' view of IMOS data is seen as a fundamental activity of eMII. To this end dynamical data-fusion experiments utilising ARCS cloud data storage (Data Fabric) and the developing ARCS Compute Cloud should be possible through the IMOS Ocean Portal to analyse 'real world' environments using advanced analysis tools. This work will be carried out through close collaboration with ARCS, CSIRO Flagship programs and CSIRO-ICT and TPAC.

eMII is already investing in the regional nodes to facilitate data delivery (Mid term review recommendation) through co-funded positions in WA, SA, NSW and QLD. Further development and customisation of regional portal views (through the IMOS Ocean Portal) is seen as a mechanism for increased exposure and take up of IMOS data.

All activities are facilitated by continuous enhancements in data delivery to the Portal, in consolidating and improving search and discovery through the roll out of metadata standards for all data streams, and in increased access capability through adoption of end-to-end OGC SWE functionality and a wide range of web services.

Relevance of Facility Objectives to the IMOS Five Year Strategy

- 1) **Continue, and improve on, the delivery of an information infrastructure** [Strategic Priority 5, Strategic Priority 8].
 - a. through web access
 - b. through desktop analysis
- 2) **Improve the uptake and use of IMOS data through**
 - a. close association with the modelling community [Strategic Priority 2, Strategic Priority 6, Strategic Priority 9]
 - b. support for regional node activity [Strategic Priority 2, Strategic Priority 4, Strategic Priority 6, Strategic Priority 9]
 - c. interaction with the national and international community [Strategic Priority 2, Strategic Priority 6, Strategic Priority 9]

List of major activities – including major party(s) involved, duration, start, finish

Objective	Activity	Party	Duration	Start	Finish
1.1	Enhancements to the system to improve discovery, access and download	eMII, GeoNetwork, ANDS, ARCS	42 months	Jan 2010	June 2013
1.2	Implementation of end-to-end protocols (e.g. OGC SWE, UniSys RAMADDA)	eMII, OGC community, ICT, ARCS	42 months	Jan 2010	June 2013
1.3	Ocean Portal development	eMII, OGC community, ARCS	42 months	Jan 2010	June 2013
1.4	Desktop 3D data visualisation and analysis tool	eMII, CMAR	24 months	Sep 2009	Aug 2011

Objective	Activity	Party	Duration	Start	Finish
1.5	Support for AODN Development Office, NCRIS capabilities, and other national and international information infrastructure	eMII, AODCJF, NCRIS Capabilities (Auscope, ALA, TERN), ANDS, wider marine community (e.g. IOC-IODE, NZ)	42 months	Jan 2010	June 2013
1.6	Review of IMOS information Infrastructure	eMII, users	6 months	Jul 2010	Dec 2010
2.1	Provision of IMOS data for data assimilation	eMII, CMAR, BoM	42 months	Jan 2010	June 2013
2.2	Interaction with modelling community for observing system design	eMII, CMAR	42 months	Jan 2010	June 2013
2.3	Development of dynamical interactive data exploration capability	eMII, ICT, ARCS	30 months	Jan 2011	June 2013
2.4	Data user workshops / conference dissemination	eMII, ANDS	42 months	Jan 2010	June 2013
2.5	Continued support for Node data integration	eMII, Nodes	42 months	Jan 2010	June 2013
2.6	Development of data products	eMII, Nodes	42 months	Jan 2010	June 2013
2.7	Development of visualisation and analysis toolkit	eMII, Nodes, Facilities	30 months	Jan 2010	June 2012
2.8	Accommodation of new data types and better integration of SRS data	eMII, Facilities (new and SRS)	24 months	Jan 2010	Dec 2011

- List of major equipment to be purchased / developed

The eMII investment area will not have any major capital physical asset, apart from a few servers (value < \$100k) for development work and Portal hosting. However, the AODN and its related tools, partner support, partner computing resources, and expertise comprise a significant national asset. eMII is in partnership with the AODCJF and TPAC/ARCS for computing resources, and domain expertise.

Access, pricing regimes:

- How will data access be provided?

eMII will build on the existing infrastructure developed on ARCS systems for the delivery of IMOS data and work with AODCJF to build a single national distributed and federated network (AODN). This information infrastructure will ensure interoperability with similar services internationally, and with services from other related disciplines (e.g. the NCRIS capabilities Auscope, ALA, TERN, and international groups such as IOC-IODE).

eMII will address the multifaceted collaborative needs, as well as data and information seeking, use, processing and management needs of marine science researchers working in

an eScience environment; close contacts with ARCS and ANDS will be maintained ensuring that issues such as security/authentication (i.e. AAF/Shibboleth) and citation (PID, DOI) are addressed. Increasing use of web and Web2.0 services will be made. Options for multiple download formats will be considered through consultation with users.

- How will data and products be managed?

Sufficient flexibility to be reused by other communities, and will form the backbone infrastructure of the AODN. All IMOS data (including metadata) and data products will be written and stored to international standards. All data, products and services available through the AODN Oceans Portal will be described using harvestable metadata records that will enhance researchers' capacity to more efficiently discover relevant resources.

It is expected that considerable storage (through the ARCS Data Fabric) will be required for data products and derived data sets as in many cases it will not be possible to create these 'on-the-fly' in that they will require significant pre-processing and storage. Development of the Desktop 3D data visualisation and analysis tool will enhance users ability to generate products and derived datasets. It is envisaged that dynamical interactive analysis and product generation will be developed and will require high performance compute (HPC) time across the ARCS GRID. Consequently, an allocation of ARCS/AARNET compute resources (storage and HPC time) will be needed.

- What are the dependencies on external / other facilities (national and international)?
The effectiveness and interoperability of IMOS/eMII processes and services will depend on continued use of agreed standards by operators, government and research agencies and universities.

Ease of integration with other relevant software, hardware. This ranges from connections to instrumentation sending data, such as sensors, to middleware used for accessing and processing data and information, to authentication processes used by proprietary software.

The eMII central office will provide the foundation for regular review of external initiatives and developments, emerging e-Science capacity and needs, and the development required to meet those needs.

It is proposed that IMOS/eMII examines and, where appropriate adopts, the **EU INSPIRE Directive Implementing Rules** which set out how the various elements of the system (metadata, data sharing, data specification, network services, monitoring and reporting) will operate. Such an action will align IMOS/eMII with one of the major international developments in geospatial data management and delivery.

- Collaborative structures for allocation of priorities

IMOS is a collaborative service delivery arrangement which pursues a common vision, and gives priority to the services being user-centric in terms of satisfying national and international requirements for marine data and products.

The approach set out here is to focus on data streams not geographic locations or agencies, i.e. particular data stream, such as real time mooring data, will be dealt with on an end to end basis and then this applied to all appropriate data independent of location or affiliation. Priorities will be based on data streams with higher priority going to common data types and the needs/priorities of the User community. Delivery of real, or near-real time data will be given high priority to ensure rapid exposure of IMOS data to the national and international communities.

The governance and collaborative structures required are already in place through the Advisory Board and as part of the AODCJF and AODN.

Governance

For Performance indicators for eMII remain the same as in the original NCRIS proposal, i.e.

- Providing research infrastructure
- Meeting researcher needs
- Quality of research infrastructure
- Fostering Collaborative development of infrastructure
- Fostering interdisciplinary and world-class research

Key risks and risk management strategies

	Description of Risk	Rating of Likelihood	Rating of Consequence	Assessment of Net Risk	Proposed Treatment of Risk
1.	Inability to fully staff eMII office	likely	moderate	Medium	1. continue to advertise widely 2. explore secondments (staff, students) 3. target possible appointments 4. offer attractive pay packages
2.	As data volumes begin to build, a potential risk is slowness or other difficulties in transferring data because of bandwidth or instability in the network used to pipe data (i.e. TASLINK)	unlikely	Moderate	Low	This is outside of the control of eMII, but IMOS will present a strong 'use case motivation' to have any problems like this rectified in a timely manner. Greatly mitigated by having a distributed data centre and portal servers on the mainland connected by AARNET (10GB backbone)
3.	Lack of engagement from the IMOS nodes	unlikely	major	Moderate	Develop of communication and liaison mechanisms to ensure interoperability between the work of the nodes and the data. Place eMII appointments in nodes.
4.	Need to develop protocols and standards to allow data integration, including levels of metadata, from the various IMOS node system into a single repository framework.	unlikely	major	Moderate	Concentrate on data that is conformal and easy to do and then work on other data in conjunction with research collaborators.
5.	Data from the nodes not available or not available via the required format / mechanism	likely	major	High	Work with the nodes on data availability and support them to deliver this in the required format.
6.	Meeting the needs of a large and diverse group of key stakeholders and data streams	highly likely	major	High	Maintain a central coordinator and maintain stakeholder consultative process

	Description of Risk	Rating of Likelihood	Rating of Consequence	Assessment of Net Risk	Proposed Treatment of Risk
7.	Some stakeholders have no pre-existing strategic alignment with the benefits of making data available to other users	likely	major	High	Highlight benefits of collaboration and conforming with data management aspects, including reduced total cost of ownership
8.	Some of the stakeholders have little experience in the technology and procedures facilitating interoperability	highly likely	major	High	Establish training packages and guidance material through the project office. Establish reference groups to allow the interchange of experience through attachments and mentoring processes provided by more experienced collaborators. Work within international standards
9.	Data management and exchange procedures are not aligned with trends in the various international earth science areas inhibiting long term interoperability with the international community	likely	major	High	Ensure contributions from partners with connections to international data management programs are considered. Implement international standards and engage with the international community in the area of interoperability. Establish a reference group of collaborators with links to the international data management community to provide guidance to the project coordination team.
10.	Failure of eMII portal technology to deliver the desired tools and interoperability	unlikely	major	Moderate	Utilise web services and OGC compliant interoperability via stakeholder based systems to facilitate the ongoing functioning of the portal and related components.
11.	Long term failure of collaborative partners (e.g. AODN) to manage the perpetual stewardship of data including failure to manage technical obsolescence.	unlikely	major	Medium	Consult with partners with experience in maintaining perpetual data storage and managing technical obsolescence Create a reference team to advise on the issues of long-term stewardship of data. Encourage experienced centres to participate as host agencies where required.

Issues raised in the 2008 IMOS Review

32. A stable and functioning IMOS MEST v1 be made operational by the March 2009 Advisory Board Meeting. It was done, and formally released in June 2009. A change management system operates to maintain stability.

33. *As part of the business planning in 2009 a forward plan and priorities be established for implementation of facility data streams. This plan should re-set the milestones to be delivered in the period to June 2011. Priority should first be on MEST-ready datastreams which are not otherwise available. Whilst it is acknowledged that further MEST development is required, initial focus should be on delivery of IMOS data streams of defined quality to meet the needs of the user community represented by the nodes.* A forward plan involving a methodology for upload, archiving, and making data accessible has been developed which centres on the use of the ARCS Data Fabric. A CF-compliant netCDF standard has been developed which is suitable for most of the IMOS data types (AUV, AUScpr and AATAMS excepted) and allows effective use of OPeNDAP/THREDDS servers and web services (currently WMS, WFS and CSW). Non-netCDF compatible data is stored in native and other processed formats. We also provide a number of common data formats for download and will consider additional suggestions. All existing Facility data streams are now established and data available, although additional reformatting is needed for some streams (e.g. ACORN) to maximise the usability and uptake of the data stream. An important part of the process will be the handling of different levels of data, from raw research data through to QC'd products, and we have developed a methodology for this.

34. *eMII collaboration with and possible funding of other IMOS data providers is encouraged to maximise the speed of delivery of IMOS data streams.* eMII has looked at various options to do this. Currently eMII supports (co-funds) 5 posts in: AIMS to maximise GBROOS software developments for the benefit of the IMOS community; in CSIRO-ICT to develop an engineering toolbox for time series processing, currently being trialled by the ANMN; in WA-IMOS based at iVEC to aid coordination of WA-IMOS data with other (e.g. WAMSI/WASTAC) WA data to enhance the regional node; in SA-IMOS at SARDI to support SA-IMOS node activity; in NSW-IMOS based at RAN to support NSW-IMOS node activity, currently coordinating and processing co-funder legacy data. These posts are not to aid the data processing already funded through IMOS contracts, rather to allow increased efficiency in data transfer and metadata creation which aids eMII in its goals. With the expansion of IMOS through the EIF these posts will be important to ensure new data gets into the system as quickly as possible.

35. *eMII to develop mechanisms to obtain feedback from researchers to further improve data delivery and quality.* eMII has introduced web-based tools (through the eMII portal) to monitor interest in, and usage statistics of, IMOS data. eMII has also started the process of issuing monthly reports to disseminate activity to the community. A feedback process will be established to gather data on the service offered and analysis of this information will yield improvements to the systems.

Budget:

Detailed budget in 'Final IMOS EIF Project Plan' submitted to DIISR 26 February 2010

Although this Plan covers the years 2009-13, EIF Funding is provided for 2011-13 only, as the EIF work in 2009-11 will be resourced from the existing NCRIS funding.

Co-investments

UTAS In-Kind contribution for office accommodation, computer/network access etc.

Staffing details

Assumed that the present team of 12 eMII Office staff (currently comprising of Director, 2 Deputy Directors, Executive Officer, 3 Project Officers, Data programmer, 3 Systems programmers, Admin assistant) will endure, although it is acknowledged that as the project moves more towards information delivery, rather than infrastructure building, the make-up and tasks of the team may alter. In addition to the Office staff, eMII also co-funds 5 positions (in WA-IMOS, SA-IMOS, NSW-IMOS, GBROOS, and CSIRO-ICT). This regional effort is seen as continuing and has been included in the Staffing budget.

Acronyms

AAD	Australian Antarctic Division
AAF	Australian Access Federation
AARNET	Australian Academic and Research Network
AATAMS	Australian Acoustic Tracking And Monitoring System
AIMS	Australian Institute for Marine Sciences
ALA	Atlas of Living Australia
ANDS	Australian National Data Service
AODC-JF	Australian Ocean Data Centre – Joint Facility
AO-DAAC	Australian Oceans Distributed Active Archive Centre
AODN	Australian Ocean data Network
ARCS	Australian Research Collaboration Service
ARGO	International ARGO program
AUScpr	Australian continuous plankton recorder
AUV	Autonomous Underwater Vehicle
BoM	Bureau of Meteorology
CF	Climate and forecast
CMAR	CSIRO Marine and Atmospheric Research
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DOI	Digital Object Identifier
eMII	electronic Marine Information Infrastructure
eRSA	eResearch South Australia
ESS	Earth System Science
EU	European Union
GA	Geoscience Australia
GBROOS	Great Barrier Reef Ocean Observing System
GTS	Global Telecommunications System
HPC	High performance computing
ICT	Information Communication Technology
IMOS	Integrated Marine Observing System
IOC	International Oceanographic Commission
IODE	International Oceanographic Data and Information Exchange
iVEC	Interactive Virtual Environments Centre
MACDDAP	Marine and Climate Data Discovery and Access Project
MEST	Metadata Entry and Search Tool (GeoNetwork Open Source)
NCRIS	National Collaborative Research Infrastructure Strategy
NeAT	National eResearch Architecture Taskforce
netCDF	Network Common Data Form
NIWA(NZ)	National Institute of Water and Atmospheric Research, New Zealand
OGC	Open Geospatial Consortium
OPeNDAP	Open-source Project for a Network Data Access Protocol
PfC	Platforms for Collaboration
PID	Permanent Identification number
QC	Quality control
QCIF	Queensland Cyber Infrastructure Foundation
RAN	Royal Australian Navy
SOOP	Ship of Opportunity
SOS	Sensor Observation Service
SOTS	Southern Ocean Time Series
SWE	Sensor Web Enablement
TERN	Terrestrial Ecosystem Research Network
THREDDS	Thematic Real-time Environmental Distributed Data Services
TPAC	Tasmanian Partnership for Advanced Computing
US-IOOS	United States – Integrated Ocean Observing System
WMO	World Meteorological Organisation