

1. Introduction

Filling the gaps, and resolving inaccuracies and ambiguity in the information used by government and business in New Zealand offers a significant benefit for the economy through better decision making, efficiencies and the ability to respond quickly and with certainty as issues arise. With New Zealand's reliance on its biological industries, information about organisms (every living thing – bacteria, fungi, insects, plants) is critical. Compilation of a simple standard list or catalogue is inadequate as information must be continually updated as new knowledge continuously comes to light through a huge variety of sources. NZOR was conceptualised as a cross-sector, collaborative, science-based solution. A five year project to develop the "NZOR product" was initiated in 2007.

NZOR is a dynamic standard data-set of all the names accruing to New Zealand's terrestrial, freshwater and marine biodiversity. It offers a "mechanism for disambiguation" of the many names which may apply to a single organism. NZOR provides organisations, individuals and systems with a means of dealing with complexity and instability of taxonomic knowledge.

Landcare Research has led the design and development of the NZOR system, managed the governance and advisory group inputs, hosted the data infrastructure and web services, and provided the expertise, IP, and international connections to enable project partners to see their ideas realised.

The initial project partners were MAF BiosecurityNZ, Ministry of Fisheries ERMA and the Department of Conservation (DOC) as key data users; Ministry of Research, Science and Technology (now Ministry of Business, Innovation and Employment) as a funder of core science infrastructure; and NIWA, Landcare Research and Te Papa as data providers. Various restructures and mergers now mean that the key data user partners are the Ministry of Primary Industry, the Environmental Protection Agency and the Department of Conservation. During the development phase, partners have participated in a steering group and advisory and technical groups and some have provided data and use cases to test the system.

The development of the NZOR framework is now complete and a number of key databases are accessible. The response from stakeholders to the initial demonstrations has been positive and significant applications that essentially fulfil its potential and vision are in the pipeline. The intention and hope of the project partners is that NZOR data and services will form an essential part of NZ's data access systems and be openly and freely available to all. NZOR aligns with Open Government policies and fits within emerging E-Government initiatives. NZOR is now moving from the developmental or 'proof-of-concept' phase and requires a new business model to support on-going governance, maintenance and development of the core NZOR infrastructure plus fund potential expansion to new users and data providers. Our preferred model is based

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"To create an accurate, authoritative, comprehensive and continuously updated catalogue of taxonomic names of all New Zealand biota and other taxa of importance to New Zealand. This catalogue will be electronically available through one or more portals, and will be directly integrated into biodiversity and biosecurity systems used by central government ministries, departments, and agencies, local government, research institutes, NGOs and the wider community. It will form a key part of New Zealand's bioinformatics infrastructure, supporting scientific research and biodiversity and biosecurity management.

on a shared knowledge and shared cost basis. This specifically proposes the continued involvement of the original project partners extending to the funding of baseline maintenance and support for NZOR while integration and expansion opportunities are secured.

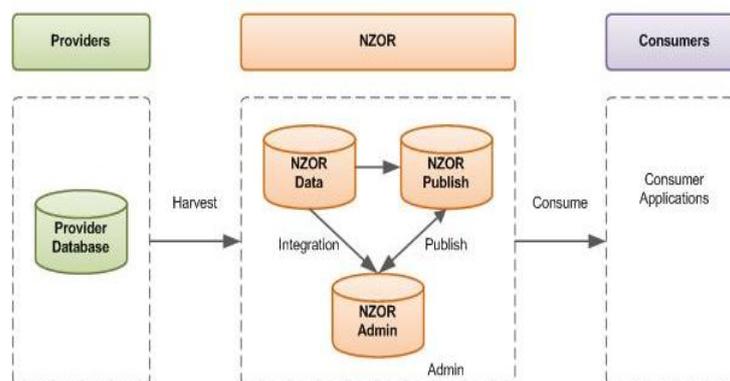
2. Executive Summary

NZOR is conceived as a web services-based product to be embedded within the IT systems of data providers and users of the 'names' services. NZOR is a component of a wider open access biological data system and through its cross agency partnership, it has demonstrated that systems can be made accessible across different agencies and collaboration can provide significant benefits. The support of TFBIS in funding to Landcare Research for the initial development of NZOR was contingent on the expectation that, should NZOR be successfully developed, full implementation would become the responsibility of the partners. NZOR is a new technology platform which requires investment to transition it from a concept/science endeavour to a business tool aiding policy direction or operations.

At its commencement, NZOR gained support from the Chief Executives of all partners with an expectation that a governance and sustainable funding model would be developed prior to completion of the development project. The governance/steering group for NZOR considered that the business case should be updated, especially given the multiple changes in agency structures and priorities. This revised case reinforces the initial intent and structure of NZOR, refreshes the expected user needs and proposes a potential future investment model including ongoing governance, and maintenance and development costs.

3. From Concept to Implementation.

NZOR is the information infrastructure necessary to deliver the NZOR vision. It provides a information communications pathway for dynamically harvesting taxonomic data from multiple providers, integrating that disparate data to create a single national consensus data-set (a national standard data-set), and providing a set of services and tools to deliver that standard information to end-users.



The TFBIS funded project has allowed us to deliver the core elements of this infrastructure. We envisage three phases for successful uptake of the NZOR services: Baseline Support, Service Development, and Integration and Research.

Baseline Support: This phase underpins the other phases and maintains the core infrastructure, data integrity and capability necessary for NZOR. Maintaining NZOR so that it can become part of business as usual operations in partner and end-user organisations is the goal for this phase. The maturing of the NZOR product / service package through gaining understanding of end-user challenges and trouble-shooting issues as they arise is captured in this phase. Promotion of NZOR to end-users, increasing the profile of the tool to government agencies and work to secure more stable long-term funding of any / all phases is also incorporated in this phase.

Service Development: This phase delivers additional services based on the current framework, infrastructure and capability. This might include adding further data-streams, upgrading software and hardware platforms to incorporate new technology or meet market requirements, improving interoperability features etc. These developments generally benefit all end-users and partners and may arise as special projects, part of on-going programmes (eg related research or established applications) or as an essential extension to baseline support.

Integration and Research Projects: These are discrete projects to create new services or significantly extend existing capabilities to integrate NZOR with the systems of end-user organisations, add further connectivity or upgrade client data. These projects are generally initiated by a “client” end-user. Also included here are wider research projects to make step-change functional or science improvements which will benefit all end-users and/or contributors. Projects which leverage the existing NZOR data and services in further taxonomic, biosystematics or informatics research in New Zealand or internationally will also be supported in this phase.

The baseline phase requires on-going commitment over reasonable period(s) to support the delivery of the service and underpin further development. The emphasis on the further two phases will change in accordance to end-user needs and international trends.

4. Implementation of NZOR

NZOR is an interagency collaboration which has already demonstrated significant benefits from working together and supporting development through the highly skilled Informatics capability at Landcare Research. The NZOR governance/steering group has developed a preferred approach for the next phase:

- **Governance:** NZOR retains an independent governing/steering group tasked with providing advice on strategic directions, new partnerships, promotion, project oversight etc. Members would be expected to meet their own costs of participation in this group and also contribute to the overall governance costs
- **Ongoing baseline and development support:** Landcare Research has been the main TFBIS contractor and has provided the core developers through their highly skilled informatics capability. The governance/steering group prefers to develop a long-term relationship with Landcare Research for provision of the core infrastructure and scientific and technical support. We may periodically review progress and performance. Some financial contributions from partners would be expected to maintain these core services (see Section 5 below and Appendix 2 for details)
- **Service Development:** NZOR is a service to be embedded within providers and users. The costs for installation, maintenance and training would be expected to be borne by the partners. There may be some generic developments which would benefit multiple partners. Funding may be sought from external bodies or from contributions from partners. Development may be sourced from a range of providers.
- **Research and Integration:** Partners may have specific requirements for research or new applications. These may be conducted ‘in house’ or through external contracts with funding from internal or external sources.
- **Collaboration:** NZOR is also one of the few cross-agency initiatives which challenges traditional approaches and attitudes. As such the lessons learned from the development of NZOR have benefits for future initiatives. Some funding may be necessary to capture and disseminate such findings.

5. Business Model

This next phase of development primarily focuses on requirements for baseline delivery. A range of tasks is outlined in Appendix 3 along with some ideas for expansion of services and research.

It is critical that we establish some form of long-term funding free of the vagaries of contestable processes and our preferred approach is a mixed model consisting of contributions to overall NZOR functions, support for specific projects of wider benefits and more generic research. At this stage our analysis focuses on developing a financial model for wider review. Our initial annual budget estimates against functions follows.

Governance:

Executive Support: Executive Secretary, services, communication	\$15,000
Partners: (own in kind costs)	-

Baseline NZOR :

IT Systems Support: Internet hosting, server hardware, software licencing	\$12,000
NZOR Core Maintenance: Maturing of NZOR product and service	\$84,000
NZOR Quality Control: Data validation issues	\$10,000
NZOR User Support: Advice and questions, documentation, registration	\$17,000
NZOR Promotion and Outreach: NZ and international	\$44,000
Partners and Data Providers: Own in kind costs	-

Total: **\$182,000**

This analysis includes the costs incurred by Landcare Research and sub-contractors in maintaining and providing a service to end-users which will support the on-going growth and development of NZOR.

We recognise that there is a significant contribution of in-kind costs from partner organisations – particularly from data providers but are not able to quantify these for this analysis.

The calculations here are based on estimates for the 2012/13 year. Increases in annual costs in subsequent years will be impacted by

- The level of automation that can be achieved
- The level of service demanded by end-users
- On-going technical development of IT systems
- Efficiency gains as staff become more familiar with the system

Financial / funding priorities within the partner organisations relating to NZOR have developed and changed since the outset of the project. Therefore in developing the partnership funding model we need to consider and balance:-

- Application of NZOR to each organisation – utilisation and benefit
- Ability to contribute financially
- Extent and value of in-kind services provided

A revised model will be developed following discussions with partners

6. Timing

The TFBIS funded project to develop NZOR ends in June 2012. Significant integration opportunities such as MPI's Joint Border Management System (JBMS) are at least 2 years away. To avoid the risk of NZOR falling into the chasm between development and implementation, the plan and facilities to sustain the service and maintain momentum should be approved before September 2012.

While the ultimate goal is to secure support for a ten year programme to maintain and develop NZOR, the natural and political ebb and flow of priorities will require regular review of both financial and in-kind investments from each agency. Government departments are currently developing investment plans for the

next four years and provision for NZOR support could be secured in this process. Ultimately NZOR should become an operational budget line rather than a “research” budgeted item.

It is interesting to note that the high-profile Atlas of Life Australia project ends in June 2012 and faces a hiatus in development until new sources of support are found; even though the project is considerably less technical and more community-based (implying wider ranges of funding opportunities) than NZOR. Other international developments in this area are working under similar 2-10 year time-frames.

7. Conclusions - Where to now

It is important that we develop some ongoing support for NZOR’s implementation and ongoing development. This will require commitments for cash contributions plus agreement that agencies invest in the installation of NZOR within their information management systems. The Steering Group has endorsed the general approach within this Business Case but further work is required on potential financial models. This will require one:one meetings with partner organisations in order to reach agreement as to amount and proportionate contributions from each organisation. We will also need agreement as to responsibilities and deliverables (primarily by Landcare Research – but also from NZOR participants) on an annual basis and we will need to ensure that NZOR is a key part of any programming for major integration projects – such as JBMS. We fully anticipate that NZOR will be an ongoing and dynamic part of management systems in a number of agencies so we will need agreement on processes for tackling more extensive service development and future research.

Further Reading.

Here you will find background material and further contextual details relevant to the business case to sustain NZOR. Additional information is now available on www.nzor.org.nz, with a demonstration website at demo.nzor.org.nz

1. A reminder why NZOR was initiated – and why it's still relevant (or more relevant) now.

NZOR was designed with New Zealand's current and future "business" needs in mind and the expectation that current inefficiencies and inaccuracies through isolated interrogation of data and expertise could be overcome through wider collaboration of research providers and data users. Increasing demands for more integration in the delivery of services to support policies and operations lend further credence to the need for NZOR. NZOR can directly support the Government's Economic Growth Agenda especially in 'enabling better science, innovation and trade' and 'removing red tape and unnecessary regulation'..

NZOR supports exporters by providing certainty over the names of organisms which might be used as barriers to trade, underpins our biosecurity system by identifying risk organisms before and at the border, provides certainty for applicants considering importing new organisms, and supports ongoing pest management activities.

NZOR also supports the recent publication of the Green Growth Advisory Group which offered several recommendations relevant to NZOR. These include a dashboard of green growth indicators (which would include biodiversity and biosecurity metrics), encouragement of collaborative processes for the management of natural capital and resolution of complex issues at the interface of economic development and environmental protection.

NZOR underpins the management of our natural resources across marine, freshwater and terrestrial ecosystems. Fisheries management relies on authoritative identification of target and non-target species and potential invasive species. Our biosecurity system supports the economic sector and threats to our natural environment – NZOR provides the knowledge base in an open and accessible process for better management of our environment. NZ is also a recognised 'global hotspot' for biodiversity and our contribution to international data sharing and taxonomic initiatives such as the Global Biodiversity Information Facility (GBIF) is underpinned by accurate organism names..

Effective management of the Conservation estate through accurate species recognition requires the 'one stop shop' process embedded through NZOR.

Essentially any issue that relies on authoritative species identification will benefit from access to a maintained standard set of names of organisms which includes the multiplicity of relationships between names and the organisms they purport to represent.

2. Market Analysis

NZOR's strength is that it makes a backbone contribution to the outcomes of organisations that will use it for trade, science, border and conservation purposes. It's weakness (as a product) is the same: it delivers information to a decision support system but does not "front" the ultimate outcome. Therefore, once fully integrated and assimilated into other systems, NZOR is unlikely to be highlighted (at least in the public eye) as the engine room for the successes achieved by the applications it feeds.

The value and concept of NZOR is difficult to describe to the lay-person (including financial decision-makers) in organisations which might utilise the NZOR data or services in the future. However, partners in the original project represent most significant needs and drivers for the development and implementation of NZOR. Their needs are diverse and have developed through the course of the initial project, and are almost certain to continue to change over the following ten years.

- **Economic Growth.** Assuring export markets of the integrity of NZ's products – particularly in developing systems that enable faster processing of short shelf-life fresh produce at the destination and answering shipment-level bio-security challenges from other countries – will be an important contribution of NZOR. The need to be more responsive to importers seeking to introduce new biologically-based products - such as new strains of disease resistant plants, or seed stocks to develop our horticultural and agricultural industries– also supports to need for a central updated and internationally connected source of data. Niche products and markets such as biotechnology and natural medicines face particular challenges which may be reduced by access to NZOR. Efficiency and customer service improvements for MPI and EPA deliver against current public service objectives.
- **Border Biosecurity.** The new Joint Border Management System (JBMS) is being developed in conjunction with NZ Customs and Immigration departments. JBMS will need to access (and feed back into) a single comprehensive database of organisms as a background system which enables good decision-making at the border. The first stage of JBMS (shared information and greater collaboration at the border) is underway. The business case for full revision of all background systems for JBMS (Tranche 2) is in progress, with approval expected in 2013. The JBMS team at MPI are already aware of NZOR and its architecture and expect to integrate this into JBMS in 2013/14. However, the scope and extent of funding required and available is not yet determined. As this is the most immediate and critical application for NZOR the involvement of MAF to a greater extent than other stakeholders in the working group is proposed. International agreements and treaties (such as CITES) which must be supported with systems and out-bound as well as in-bound surveillance will also rely on robust integrated data sources such as NZOR.
- **Global biodiversity.** New Zealand sits at the global table in respect to intergovernmental and international agreements (CBD and IPBES) and is committed to achieving a variety of obligations in relation to conservation outcomes and science (knowledge and systems) contributions.
- **Conservation.** Just as DOC is charged with playing their part in the economic development of New Zealand's resource, so are other organisations – government and business, expected to play their part in conservation of NZ's biodiversity and are likely to need to rely on

Biosecurity achieves multiple outcomes for NZ

- Increased trade and market access
- Enhanced economic growth
- Protection of natural heritage, ecosystems integrity and landscape
- Optimised human health
- Lifestyle, culture and recreation
- Protection of cultural resources

Market Access

Horticultural exports are challenged on the basis of potential presence of organisms (insects, mites, fungi, bacteria or plant material) in shipments. With a short shelf-life product, delays in correct identification, ascertaining presence and source are critical and expensive. Recent work at Landcare Research has enabled reassessment of pest status of the oribatid mite by the Australian Quarantine Service.

authoritative sources of data about pests, diseases and both un-wanted and treasured organisms to underpin advice and decisions. DOC manages the “big picture” for conservation in New Zealand and operate a number of Integration of data from new sources – including work with organisations to format and validate programmes to record and validate biodiversity data. New Zealand conservation efforts are also supported by national collections held by CRI’s, and in which much of the taxonomic investigation and improved understanding is developed – which must be propagated to operational systems such as NZOR.

- Science System. As this business case is being developed the Ministry of Science and Innovation is being folded into the wider Ministry of Business, Innovation and Employment. The future funding for back-bone science (databases and applications such as NZOR) will need to be supported with ever-strengthening economic arguments.

Future potential end-users which make up the “market” include:-

- Regional Councils Regional Councils require authoritative reference sources for biodiversity data for consenting, monitoring, “State of the Environment” reporting and other purposes. Current challenges around national collection and sharing of environmental data, increasing re-use value and access, play to the need for NZOR.
- Other central government agencies – an ideal would be for NZOR to become the reference for regulators and in RMA consenting processes.
- International organisations driven by Convention on Biological Diversity and with significant implications for supporting the role of the new IPBES
http://www.iucn.org/about/work/programmes/ecosystem_management/ipbes/
- Universities and Museums – at the cutting edge of new research, universities require resources of knowledge, and the opportunity to update / add new information
- NGO’s – many NGO’s support community-led environmental science and require resources (preferably free of charge) to support field science and education.
- Consultants - often delivering information and advice for government
- Minerals and Energy Sector for impact assessments and remediation plans
- Primary industry, resource users (water, pollution) and exporters
- Land developers

3. Organisation Capability and Capacity

The reasons that Landcare Research initiated and led the development of NZOR, remain valid for their continued management (stewardship, custodianship and curation) of the NZOR product / service.

- Landcare Research leads NZ’s effort in the collection and organisation (and dissemination) of information and knowledge about NZ’s terrestrial biodiversity. It is embedded in the CRI core purpose in the outcome - “to improve measurement, management and protection of New Zealand’s terrestrial ecosystems and biodiversity, including the conservation estate.” Landcare Research manages six (PDD, CHR, NZAC, ICMP, Ethnobotany, NVS) nationally significant biodiversity related collections/databases and the associated taxonomic data. Web portals provide access and usability to this data.
- The Informatics team at Landcare Research develops data management and sharing systems for a wide range of resources, research projects, publications and applications.
- Landcare Research is engaged in international research and development including GBIF funded programmes and partnerships.
- Landcare Research is involved in NeSI and developing the connectivity and computing power to deliver significant science data systems for use by other researchers and external organisations.

Collectively, the original NZOR steering group continues to represent the range of NZ economic development, risk mitigation and science interests and applications for NZOR. The intention to provide on-going support in principle was indicated by NIWA, Te Papa, DOC, MAF Biosecurity, EPA and Landcare Research. This “team” of organisations (with the addition of an appropriate representative of regional government) provides NZOR with

- Connection to most significant end-user applications
- Input of relevant developments and issues that could affect how NZOR is shaped or delivered

Capability and Capacity Risks. Risks on establishing a project with the structure, funding and deliverables proposed include many generic challenges around changes in organisational proprieties, change in government priorities, changes in personalities in the leadership team, and debate around equity of contributions and benefits. Specific risks in this project are:-

- Landcare Research does not currently offer 24/7 support for on-line applications
- Landcare Research does not have a service culture

4. Development Phases

Baseline

There are two key activities of this phase

- Continuation of the collaborative approach with the steering participants in the initial project (now as partners) : Landcare Research, DoC, MPI, EPA, Te Papa and NIWA. As Regional Councils are also significant end-users, inclusion of a representative of the councils, through the Biosecurity or Biodiversity Special Interest Group is recommended.
- Landcare Research as “host” organisation and service provider. Services and deliverables identified in Appendix 2.

Service Development

Opportunities for service development will be identified and discussed with the project partners, including review of budgetary requirements. The following are envisaged in this work

- Integration of data from new sources – including work with organisations to format and validate
- Creation of data outputs to meet specific and general end-user requirements
- Development of data management and supply tools
- Development of web-sites or other user interfaces
- Extension of international connections

Integration and Research

Current web-based information resources are generally isolated silos of information with the content accumulated and managed by a single provider. This model is inefficient because it invariably requires some degree of internal duplication of externally derived information content. The next generation of the web-based information resources will be built on a global platform of 'web services'. In this model locally generated information is managed locally but integrated with appropriate national and global information through access to relevant web-services provided by appropriate experts. NZOR is designed according to these principles and derives its content from the best available external sources. NZOR is therefore primed to become part of this new integrated ecosystem of web services. Opportunities to fund integration and further research should continue to be sought through the life of NZOR. Here we focus on client or end-user specific requirements, or new science / technology to be employed. These opportunities are likely to contribute wider value to the tool and build the sustainability story for NZOR in a step-change...even though that may not be the core reason for funding. These will include any or all of:-

- a. Integration projects to embed NZOR into the software architecture of user organisations – in situations such as the MBI JBMS.
- b. Investment from government agencies (MPI, DoC) and science funders (MBIE).
- c. Investment from Landcare Research core funding and integration with research strategies
- d. Training end-users and data providers in utilisation of NZOR and in biodiversity data management techniques based on the learning from NZOR.
- e. International opportunities to develop bio-informatics and data integration technologies based on NZOR. We note that international consortia are typically not interested in funding the management of New Zealand's data per se, but may be interested in collaborations and technology partnerships.
- f. Development of NZOR platform to be used by different audiences
- g. Funding from philanthropic organisations with an environmental focus (such as Tindall Foundation)

DOC has built a suite of tools for its own use and for others involved in conservation management, to better manage New Zealand's precious natural heritage.

The tools centre around the use of consistent information on species and ecosystems, using this information to prioritise and deliver the most cost effective work and to monitor and evaluate the effectiveness of that management. DOC is also establishing national monitoring of the trend and condition of the biodiversity of natural lands in NZ. These systems will transform the effectiveness of the departments conservation management. These systems are dependant in many ways on the accurate naming of species and holding and opening access to this data. NZOR delivers strongly in this space.

There are around 3800 indigenous species at some level of risk of extinction in NZ. In addition there also around 3000 that need further data to assess their threat status accurately. Many species being inventoried and managed can be identified and described by only a few specialists, so an accurate system to support identification and avoid naming confusion is immensely valuable. The transaction costs involved in use of the current multiple sources of species names are significant. A tool like NZOR to reduce the likelihood of making mistakes is especially relevant when the pressure is on to extract the best value for conservation from a limited budget dollar.

Appendices

1. Background

The vision which guided the establishment and initial funding of NZOR was:-

“To create an accurate, authoritative, comprehensive and continuously updated catalogue of taxonomic names of all New Zealand biota and other taxa of importance to New Zealand. This catalogue will be electronically available through one or more portals, and will be directly integrated into biodiversity and biosecurity systems used by central government ministries, departments, and agencies, local government, research institutes, NGOs and the wider community. It will form a key part of New Zealand’s bioinformatics infrastructure, supporting scientific research and biodiversity and biosecurity management.

This vision was supported by stakeholders and funded through the TFBIS programme which supports NZ’s Biodiversity Strategy administered by DoC. The initial three year implementation project focussed on delivering the technology platform, baseline data and governance structures to lay the foundations for achieving the vision. The scope of the project included:-

- population of NZOR with existing digital sources of terrestrial, freshwater and marine data from NIWA, Landcare Research, and Te Papa supplemented by data from the Species 2000 New Zealand lists, and from global sources (such as Species 2000/Catalogue of Life) relevant to New Zealand and of known provenance and quality.
- gap and priority analysis for further building NZOR content through contributions from identified additional providers.
- tools to support initial and future data providers and tools to support end users to adopt and integrate NZOR information and services into their systems.
- web based access to allow users to search current taxon concept information and view and download lists of organism names.
- a functional governance structure with responsibility for ensuring quality of service and data.

The initial TIFBIS project is now complete and the team celebrate success in the:-

- Establishment of an effective Governance Group to tackle governance issues and an Advisory Group providing input on technical issues. This process has helped to ensure that the development of NZOR can meet the goal of integration with a range of national systems and priorities of stakeholder agencies.
- During the project, Landcare Research scientists (Jerry Cooper et al) have also been actively involved in developing technology / standards for GBIF Global Names Architecture and working with international organisations While global biodiversity data sharing is a big field and NZ is a small player, the technology developed by Landcare Research for the Global Compositae Checklist is world-leading in its approach and design. The same technology was utilised in the development of NZOR.
- Delivery of a technology platform which harvests and integrates data from multiple distributed data sources, generates consensus data and provides tools and interfaces for directly embedding live data into end-user systems. This has demanded a greater understanding of the requirements for data provision both for Landcare Research scientists and for data providers.
- An NZOR website provides end-user access to search for data. While the website does not deliver the integrative technology directly, it demonstrates the technology opportunities for end-users and provides insights into how the data available could be integrated into end-user data-base systems.
- Data from Landcare Research and NIWA is loaded

The initial project also suggested that the following should be considered (even if not completed)

- Gap and priority Analysis for further building content / additional providers
- Tools to support data providers
- Tools to support end-users for adoption and integration

At the time of the initial project inception, there was very little happening on the world stage and activity and opportunities to participate in global initiatives have arisen and been incorporated as far as possible during the project. Landcare Research has provided internal investment to assist with the connection to international data sources through the partnership in the EU Framework 7 project – 4D4Life(<http://www.4d4life.eu/>). Landcare Research is one of the three regional providers (along with USA and China) to the catalogue of life. Global projects and networks (such as SP2000 and the Global Names Architecture) tend to focus on the data catalogue as an end-point, whereas NZOR focuses on the use of catalogued data to support decision making with significant economic consequences. This is where the NZOR concept and design is well ahead of developments in other countries. The inclusion of data from the rest of the world is more significant to end-users than initially expected , and the connectivity of NZOR with international data sources is essential to deliver against the vision. Landcare Research has applied for further TIFBIS funding to support the integration of key international databases.

2. Costs for 2012/13 to deliver Baseline Support to NZOR

Detailed breakdown of costs with two scenarios.

- 1) Support and maintenance levels which would allow NZOR to develop according to end-user needs, and to engage with end users in embedding and establishing NZOR as a dynamic national standard data-set.
- 2) basic maintenance which would not allow NZOR to grow but which keep the project ticking-over whilst end-user engagement gains momentum. This scenario has the danger that insufficient investment may see NZOR stall and is not favoured by Landcare Research.

Details of Tasks	Scenario 1	Scenario 2
Governance	\$15,000	\$15,000
IT System Support <ul style="list-style-type: none"> - Software licences - Version updates (software platform) - DBA / system administration - Internet Hosting / bandwidth - Server hardware 	\$12,000	\$12,000
NZOR System Maintenance <ul style="list-style-type: none"> - External data source configuration (providers CoL, GNA) - Monitoring of system - Maintenance of data website - Maintenance of information website - Maturing of product – bug fixing, response to technical issues 	\$84,000	\$50,000
Quality Control Detecting and following up on data validation issues	\$10,000	\$10,000
User Support <ul style="list-style-type: none"> Questions and feedback Documentation Advice for users and providers of taxonomic systems Operating expenses (travel etc) Registration of new users 	\$17,000	\$ 8,000
Promotion and Outreach <ul style="list-style-type: none"> Promotion to end-users for uptake Seeking funding Exploring international opportunities International operating expenses (travel etc) 	\$44,000	\$5,000
Total	\$182,000	\$100,000

Assumptions and notes

- Both of the above scenarios assume that NZOR only includes the current data sets from Landcare Research, NIWA and TePapa
- Landcare Research only provides support in business hours (not 24/7) and must allow for up to 5% down-time in hardware / software service and support.
- Hosting costs are lower than commercial equivalents due to existing Landcare Research infrastructure.