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Exploring the Global and Local Networks of National Information System Integration Initiatives: A Case Study of National Cultural Collection Integration from an Actor-Network Perspective.

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Abstract:

Australian Museums Online (AMOL) was the earliest attempt to make Australia's distributed cultural collections accessible from a single online resource. Despite early successes, significant achievements and the considerable value it offered certain groups, the project ran into operational difficulties and was eventually discontinued. By using Actor-Network Theory and analysing the global and local actor-networks, it is revealed that although the project originated from large, state museums, buy-in was restricted to individuals, rather than institutions and the most significant value was for smaller, regional institutions. Furthermore, although the global networks that governed the project could translate their visions through the local production networks, because the network's underlying weaknesses were never addressed, over time this destabilised the global networks. This case study offers advice for projects attempting to consolidate data sources from disparate sources, and highlights the importance of individual actors in championing the project.

INTRODUCTION

Advances in information and communications technologies continue to facilitate the integration of databases and the ability of organisations to share information content across geographical and regional boundaries. In the public sector, such integration brings with it the opportunity to enhance and improve services provided to the community through the "joining-up" of agency services under the banner of e-Government. In particular, there are potential benefits to the community when previously isolated agencies choose to share content on a national rather than a regional basis (De Andrade et al., 2011, Perri et al., 2005) Despite the obvious benefits to be derived from inter-agency collaboration, several non-technical factors are commonly identified as barriers to success. These include lack of understanding of other agencies' policies; a lack of communication between policymakers and service providers; lack of time for collaborative effort, and unclear goals and objectives (Johnson et al., 2003). As a consequence, when developing systems which integrate data across jurisdictional boundaries, there is an inherent tension between the global requirements of an integrated and standardised system, and the local requirements of each jurisdiction contributing to the integration effort (Ellingsen et al., 2007, Henningson and Hanseth, 2011, Rolland and Monteiro, 2002)

In this paper we explore the tensions between global and local requirements of a national data integration project through a case study of the earliest attempt to consolidate Australia's Heritage records into an online resource called AMOL (Australian Museums Online) from 1996 to 2003. Through a historical analysis of events, the case study looks at the construction of the project, its significant early successes, attempts at operationalisation, and the eventual demise. Despite the significant benefits AMOL offered Australian museums – particularly smaller institutions – the project escalated in scope and reach, before being scaled-down and eventually recommended for a complete redevelopment into a new resource.

In analysing the events surrounding AMOL we draw on Actor-Network Theory as a lens due to the tight interplay between various parties, the crucial role of mobilising social networks and the sheer number of organisations. Other studies into suboptimal technology implementations set a strong framework for how ANT can be used to understand the role social networks in the success or failure of a technology implementation (Mahring et al., 2004, Heeks and Stanforth, 2007, Stanforth, 2007, Hardy and Williams, 2008). In particular, Stanforth (2007) and Heeks and Stanforth (2007) offer valuable insights into the tensions between global and local forces in driving projects.

This case study aims to extend this previous work by further examining the global / local tensions, and apply these within a single country context and viewing the different types of actors and networks as local (communities, outreach services of larger museums) and global (state museums, collection councils, state

governments, federal government). Through the use of Actor-Network Theory, this case study aims to offer valuable insights into why an early attempt into heritage collection database integration did not achieve the outcomes planned by the global governing network, and demonstrate the true value of the resource was providing resources that were not initially envisaged. The case study also probes the difficulties that arise between managing global and local requirements in national eGovernment initiatives. These insights may assist similar future projects that integrate disparate data sources, and involve numerous stakeholders.

GLOBAL AND LOCAL DIMENSIONS OF INFORMATION INTEGRATION

Many of the benefits promised by e-Government implementation are premised on the ability to “join-up” and integrate the services of multiple agencies (Pollitt, 2003). However progress towards a seamless web of government services is patchy and rarely follows a linear trajectory (Bekkers and Homburg, 2007). The reasons that government agencies have difficulty providing a common and flexible infrastructure for delivering services go beyond technical issues and include political, legal and economic issues associated with integration (Bekkers, 2009).

In e-Government literature, the term “integration” has been used with both technical and non-technical meanings and there is often confusion with the term “interoperability”. Scholl and Klischewski (2007) consequently define e-Government integration as “*the forming of a larger unit of government entities, temporary or permanent for the purpose of merging processes and/or information sharing*”. Integration is therefore about the forming of agreements among agencies from which point it is possible to begin to consider the “*interoperation*” of functional activities and the “*interoperability*” of information systems. Interoperability is usually discussed in terms of the middleware that enables shared data and functionality exchanged between heterogeneous systems (Moen, 2000). Any standard set of protocols that enable the exchange of data and functionality will be embedded in the commitments and agreements of the agency representatives who have established an integration project. The success of integration projects is therefore just as dependent on the constraints imposed by the political, social, legal and economic environments as it is on technical considerations (Scholl and Klischewski, 2007).

When agencies come together to form agreements as the basis for integration and collaboration there are generally a set of common principles or a vision which embodies a common sense of purpose and objectives for the participating agencies as a whole. However, any integration initiative will invariably require that agencies adhere or adjust to a common global standard. When organisations are required to move to a standardised process and or make consequent adjustments to their systems and operating procedures, there are inevitably tensions between the global requirements imposed by the new standard and the local functionality and flexibility of existing operations (Rolland and Monteiro, 2002, Ellingsen et al., 2007, Madon et al., 2007). As the integration of systems across multiple jurisdictions becomes increasingly necessary for federal governance (e.g. in the European Union and Federal/State relations in Australia) understanding the entanglement of social and technical issues across multiple jurisdictions and how associated problems can be ameliorated, is a critical concern in the success of integration initiatives (Henningsson and Hanseth, 2011). The case study presented in the remainder of this paper explores a failed national integration project in Australia in order to understand the interplay and dynamics of the various actors involved in the initiative.

THEORETICAL LENS: ACTOR-NETWORK THEORY - UNDERLYING CONCEPTS

Actor Network Theory (ANT) has its origin with sociologists Michael Callon, Bruno Latour and John Law. This theory offers a rich lens for understanding the relationships between technology and social elements. The central tenant of ANT is the actor-network, where agency and context are interrelated and interdependent. The theory enables an approach to understand how networks of aligned interests are created, and how actors form alliances by enrolling other actors (both human and non-human as a heterogeneous network (Hanseth et al., 2004)) to strengthen and stabilise alliances made up of humans and technology artifacts (Mahring et al., 2004, Callon, 1986).

In Callon’s (1986) seminal article about scallop fisherman in Saint Briec Bay, he describes four stages involved in creating a stable actor-network. This process is also referred to as “translation” in Actor-Network Theory literature. These processes are: (1) problematization (an actor defines approaches and roles of other actors); (2) interessement (the actor must convince other actors that their position is consistent with their own interests and create incentives for non-aligned actors); (3) enrollment (defining roles for all actors in the network and describe how all actors will relate to one another); (4) mobilization (methods to mobilise other actors to enact the initiator’s vision – the stability creates an institutionalised actor-network).

It should be noted that Mahring et al (2004) state that at any point, translation may not pass through all the processes, and it may fail at any stage. Mahring et al. also suggest that the stages are more interrelated and fluid

than the above separation implies. They write that recent work in ANT “paints a picture of a fluid translation process where the order of things is created and maintained through actors’ strategic efforts to negotiate and maneuver one another into networks of aligned allies” (p. 214), nevertheless, the four stages of translation still provide a suitable mechanism for describing analysis of results.

Additional to stages listed above, there are two additional key concepts used in the case study:

(1) inscription – the process where technical objects embody the ways they are used. This should not be understood as a deterministic view that agency is *inscribed*; nor should it be viewed in subjectivist view that the artifact is always flexible.

(2) Obligatory Passage Point – the situation that must occur for all actors within the heterogeneous network to be performing their intended function and reach translation of the original concept.

Importantly for this study, ANT also supplies specific mechanisms for describing global and local heterogeneous networks (Heeks and Stanforth, 2007, Stanforth, 2007, Law and Callon, 1992).

Actor-Network Theory and the Local / Global framework

Law and Callon (1992) analysed a project to build new military aircraft in the UK during the 1950s and 1960s – the TSR.2 project. This analysis centred on two different networks: a *global network* (seen as being ‘outside’ the project that provides resources and support necessary for the project to exist); and a *local network* (seen as being ‘inside’ the project; the relationships of actors that actually implement the project). Law and Callon then propose that whether or not these networks will ultimately succeed or fail “is a function of three interrelated factors”: the ability of the global network to provide resources for an expected return; the ability for the local network to be developed using these resources (sourced from the global network) to develop the project; and, the capacity for the project to develop an “obligatory point of passage between the two networks”.

Law and Callon suggest that the TSR.2 aircraft project fails because neither the local nor global networks could be sustained over the duration of the project. The project trajectory can be mapped on a two dimensional graph with the x-axis representing the mobilisation of the local networks and the y-axis representing the involvement of the global network. The AMOL project trajectory is mapped on this figure (figure 1) later in the document.

Stanforth (2007) and Heeks and Stanforth (2007) use this local / global network analysis to great effect when analysing eGovernment Project trajectories and the implementation of eGovernment Projects in developing world contexts. These analyses give a solid foundation to how this case study can be analysed, and their observational frameworks lend themselves to the analysis of the AMOL case study presented in this paper. By embracing the global/local network tensions, ANT provides a useful lens for observing project implementation, and as Stanforth (2007) and Heeks and Stanforth (2007) demonstrate, when it is applied to eGovernment projects over longitudinal case studies, can provide powerful insights into power relations and the importance of stable networks in delivering successful technology projects.

RESEARCH METHODOLOGY

To perform this case study, the Western Australian Museum’s (WAM) official records were examined in detail (File No. 1246/01, 1246/02, 1246/03, 1246/05 and 1246/06). The WAM was represented on the Heritage Collections Council (HCC), the On Line Working Group (OLWG), and also in the regional implementation of AMOL, thus there are extensive official records documenting the entire project. These records document all relevant AMIS / AMOL strategic plans, tenders and reviews; minutes from all the OLWG meetings; minutes from HCC meetings where AMIS / AMOL is discussed; correspondences between the WAM’s outreach program manager and regional museums; relevant consultation documents; notes from executives; and emails from WAM staff about AMOL. All of the records were read and summarised to form the basis of the case study background listed in the following section (WAM, 1993-2003).

These records were selected for the basis of the study for a variety of reasons: availability (the complete records were available for extended loan and analysis); the difficulty locating the primary sources (as the relevant events started almost 20 years before the research started, it would very difficult – and sometimes not possible – to locate many of the relevant actors for interviews); and lastly due to access restraints (it would very difficult, and often not practical, to access the records from other institutions).

These records are extensive (spanning several thousand pages), though there is a skew towards the Western Australian implementation and experience. This bias should be considered through the discussion of this case study, as records from other key agents were not studied. Nevertheless, the focus on Western Australian records does assist close analysis of global versus local network tensions.

AMOL – A HISTORIC BACKGROUND

The role of documenting heritage collections has changed and matured significantly over time (Bennett, 1995). In 1975 Australia had over 1000 small or medium sized regional museums and 25 large museums. This important aspect of Australia's cultural heritage became the focus of the Commonwealth Government to work out ways to better manage this distributed collection (Pigott, 1975). This spread was known as Australia's Distribution Collection, and in 1993 efforts began to combine all of these records into a common online system.

In 1993 the Australian federal government convened the Heritage Collections Council (HCC), a body consisting of directors and their delegates from significant Australian museums. The council's purpose was two-fold: (1) to improve access to the country's distributed cultural heritage; (2) improve conservation standards.

Australia's *distributed cultural heritage*, refers to the cultural collections (as distinct from natural history collections) which are distributed amongst several hundred museums and historic societies across the country. This case study looks at HCC's first purpose – improving access to the country's cultural heritage. At the time the HCC was convened, the World Wide Web was beginning to be adopted by the public and by museum communities. The HCC believed the web would be an ideal way to access the country's heritage collections, and they established the On Line Working Group (OLWG) to develop this resource. At the same time, the *Computer Interchange of Museum Information* was leading an initiative to provide a standard mechanism for exchanging cultural information (ZM39.50-1995, ratified by ISO to become ISO 23950) (Moen, 1998).

The OLWG proposed that a website could be developed that aggregated collection information from the full range of Australian museums, inclusive of community based historical societies, right through to large state and national museums. This site could also provide a directory of Australian museums, and act as a 'window' to Australia's museum community. Thus in October 1995, the National Museum of Australia was commissioned to develop pilot site called AMIS (Australian Museum Integrated Services).

When the AMIS pilot site was launched in June 1996, it provided a national directory of 850 museums and an online database of 43,000 artefacts. Based on the early successes, funding is pledged from state governments, the federal government and state museums to roll this out to the entire country. AMIS did not utilise the new ZM39.50 standard for retrieving and querying data, instead relying on a flatter system of combining excel-based imports of collection data metadata. However, the OLWG was committed to using the new ZM39.50 standard and joined an international project, *CIMI Pilot on Interoperability*.

In November 1996, AMIS is replaced with the AMOL beta site (Australian Museums Online). With AMOL, the purpose of the site expands from providing a partially integrated collection database and museum directory, to also offer other services such as museum documentation and a museum professionals' forum. The tender to build and operate the expanded AMOL service is awarded to the National Museum of Australia.

In early 1997 the Western Australian Museum becomes involved in two additional ways: providing a subset of its Anthropological collection, and recruiting regional museums throughout WA to join the project. This involvement coincides with a fundamental change in the technical infrastructure of the system with distributed server systems planned. The distributed server infrastructure enables data representative of that geographic region to be hosted in Western Australia (western division) and Victoria (eastern division), which is then backed up to central database in Canberra. More importantly, this regionalised approach encourages individuals from within state museums to champion rolling regional museum collections into AMOL. The personal relationships between individuals in state museums and individuals within small regional museums enable rapid deployment of collection data and museum information into AMOL. Also throughout 1997, AMOL investigates central protocols / metadata standards for collection management; expanding the scope of AMOL as an authority on museum informatics. As these investigations continue, concerns are raised about the suitability of ZM39.50 as a method for storing and searching collection data, which confuses the final plans of how a live, operational version of AMOL can display aggregated collection data.

On 30 July 1997, AMOL is officially launched, though it had been mostly running in its current format for several months. By August 1997, problems with data currency and integrated collections are causing considerable concern; the lack of resolution about how to efficiently structure a system that integrates disparate data sources continues to cause problems for AMOL throughout its life. In October 1997, concerns are raised with the OLWG about the absence of Natural History collections – although the website was initially designed exclusively for cultural collections, some stakeholders raise concerns that Natural History has been neglected. The OLWG take note of user feedback and emerging requirements and decide to redevelop the early release of AMOL. In December 1997, a new tender is prepared for museums to manage AMOL. In early 1998 this contract is awarded to the Powerhouse Museum, who manage AMOL right through the entire life of the website.

In 1998, AMOL wins several awards, and many different museums become heavily involved in contributing content, collection records and documentation. The WA Museum's Outreach Service becomes very heavily involved in promoting AMOL to the regions, and one individual in particular works extensively with smaller museums across WA, NT and regional QLD to encourage involvement with AMOL – particularly in areas that do not have internet access. Amongst the successes, awards and user buy-in throughout 1998, issues with integrated metadata and databases continue, and a final decision that ZM39.50 is not suitable for use in the AMOL website is reached. Plans to redevelop the web service are implemented, and the new version of AMOL is launched on 15 September 1998.

In 1999, the OLWG commission an independent review of AMOL, in particular investigating financial and operational sustainability. The review finds many strengths and as well as some weaknesses. The collaborative, decentralised governance model – identified as a strength in getting many groups engaged in a short timeframe – also makes a sustainable business model very difficult. Regional access is cited as a considerable issue (both access to technology and connectivity) and financial sustainability is a particular problem as there is not yet any operational funding and project funding cannot be guaranteed. The independent review recommends developing a 3-year strategic plan to provide a business case for a continuation of federal funding, and provide clearer governance of AMOL. During this period the Powerhouse Museum retain the rights to develop, host and maintain AMOL. In Western Australia, the staff that had been champions of advocating AMOL and subscribing regional museums left the museum in mid-2000. Subsequently, regional involvement in the west begins to wane.

In late 2001, DiscoverNet, an education service for school students is launched; this is last major service launched by AMOL, and the last attempt to broaden the audience and expand the scope of AMOL. DiscoverNet was aimed at reinterpreting the museum collection data to provide information appropriate for 8-12 year olds, and also provide teacher resources.

In August 2002 the HCC enlist Deakin University to audit the site. The review finds many strengths of AMOL, but recommend that without a complete redevelopment and restructure the site would lose relevance to its audience. They also warn the technical infrastructure has reached absolute capacity. To redevelop the website, considerable new investment is required. From 2002 to 2003, there is a stagnant period where the Powerhouse Museum maintains the site in a skeleton form. In late 2003, the Council of Cultural Ministers (council consisting of all the arts ministers all levels of government) decide out of session to fund the overall redevelopment of AMOL, and a new service, Collections Australia Network, is eventually developed.

APPLYING GLOBAL VS LOCAL NETWORKS IN ANT TO AMOL

This case study covers an eleven-year history of the project, from project conception in 1993, through to the recommendation to completely redevelop the website in 2003. It does not cover the next iteration of the website resource when it was redeveloped into the Collections Australia Network (CAN; 2004 – 2011).

Based on the Western Australian Museum records, ten key events or turning points can be clearly identified. In *table 1*, these turning points are analysed in terms of which actors are enrolled, not enrolled and the implications to the actor-networks involved in maintaining the project trajectory. Later, in *figure 2*, these events are mapped into Global / Local networks matrix as devised by Law and Callon (1992). *Figure 2* maps the trajectory of the project over the eleven-year scope of the case study. Descriptions of the points in this matrix can be found in *table 1*.

From a point of high involvement and interest from the global networks (A), the supplier works increasingly with small regional institutions to build a strong local network delivering the foundations of the AMOL project (B and C). This takes the project trajectory on an increasingly regional, local approach with the local network founded on personal relationships. This is partially at the expense of translating the global network's vision, but is consistent with a degree of localisation that is required for the global network's goals to be successfully executed (Rolland and Monteiro, 2002).

The global network is reinvigorated and given the chance to inscribe their vision and gain more control when a new supplier is contracted to redevelop the site, and a member of HCC is dedicated to work on the project full time (D). This redevelopment is performed according to rounds of feedback, consultation and user statistics and demonstrates a functional and successful relationship between the global and local networks. An obligatory passage point is passed to make a successful, stable translation of the global network's actor-network.

However, the supplementary and additional functions of AMOL are increasingly used by the local network, perhaps at expense of focusing on data integration. Thus new ways of using the resource are emerging, but it does not entirely reflect the original purpose and foundation for the site. Nevertheless, AMOL continues to win awards and increase its user base, thus strengthening the local networks and keeping the global networks involved in return for their investment (E).

Formally abandoning the mechanism for data integration without a viable alternative exacerbates some of the underlying technical issues with the project (F). The WA Museum records indicate there are complaints about the currency of the data, and also the absence of data. As the resource was initially developed to provide a single point of access to Australia’s distributed cultural collection, this persistent content currency issue shows that despite large victories in other areas and the presence of an extensive online catalogue, the global network’s original vision has not quite translated.

Independent contractors are commissioned to make a three-year strategic plan to help stabilise the AMOL actor-network; suggesting a governance framework and ways to achieve operational financial stability (G). This report was perhaps written with a bias to delivering outcomes for the local network, and at least in WA does not reinvigorate the global network to become further involved. This disconnect is further entrenched when the WA Museum’s Chief Executive (who was extensively involved in AMOL), and the individual responsible for the Outreach Programs with all the western division’s regional museums both leave the organisation (H). With that, the local network – which is built extensively on personal relationships – and the global network – strongly built between the communications of these two individuals – both weaken considerably.

DiscoverNet, which is an attempt to reinterpret collection information for younger audiences, was launched by AMOL as a way to extend the actor-network to new audiences. Although somewhat used by the target market, the technology was limiting and fails to engage education areas en masse as planned (I).

Deakin University is commissioned to review AMOL. Finding both strengths and weaknesses in the project, the report suggests that because of considerable technical issues, content currency problems, competing priorities and governance problems, the site should be completely redeveloped, and refocused on key areas of strategic need. No funding is initially pledged, and the site is “frozen” for over a year, with it offering basic services (such as documentation, and the existing collection catalogue and museum directory). During this period this site is still used to download documentation and a stable actor-network is created, but the network delivers a much lower level of functionality than was hoped, and delivers a different resource to what was originally envisaged by the global network. In late 2003, monies are pledged to redevelop and rebrand the service (J). Thus the global network is re-engaged and ready to restart the process.

Table 1: the turning points of AMOL project trajectory analysed in terms of local and global networks.

Significant Milestone	Enrolled Network Actors	Non-Enrolled Network Actors	Network Implications
(A) HCC forms a working group (OLWG) to deliver a website product.	<p>Global Network:</p> <ul style="list-style-type: none"> HCC representing major museums. Federal and State Governments as the main funding bodies. Internet / Web as delivery mechanism. <p>Local network:</p> <ul style="list-style-type: none"> OLWG containing museum production staff. 	<p>Local Network (blocked):</p> <ul style="list-style-type: none"> At this point the local network of small and regional museums are not involved – the local network is very much at a planning and conception stage. 	<ul style="list-style-type: none"> At this point totally driven by the global network, with the local network being “invented” to deliver this outcome.
(B) OLWG nominate the National Museum of Australia (NMA) to develop the AMIS Pilot.	<p>Global Network:</p> <ul style="list-style-type: none"> OLWG becomes a proxy for HCC and becomes a global, governing network. Web standards and web infrastructures actively enrolled, though very unstable. <p>Local Network:</p> <ul style="list-style-type: none"> NMA forges personal working relationships with select regional museums and mobilises them to contribute and become involved. 	<p>Global Network (partially blocked):</p> <ul style="list-style-type: none"> ZM39.50 is not yet implemented. Major museums not (yet) heavily involved outside OLWG representation. Web access / uptake not large. <p>Local Networks (partially blocked)</p> <ul style="list-style-type: none"> Access to smaller museums restricted, not all are involved. 	<ul style="list-style-type: none"> The global governing network is moved to the OLWG, which shapes the actions of the local network, driven by a few actors at the NMA. Web access is not large (particularly in regions), meaning the infrastructure network inhibits access and participation.
(C) NMA wins tender to develop AMOL, releases a pilot website. Smaller	<p>Global Network:</p> <ul style="list-style-type: none"> OLWG / HCC drives agenda for redevelopment. Recognises the importance of 	<p>Global Network (partially blocked):</p> <ul style="list-style-type: none"> Major museums (outside the NMA) are not actively 	<ul style="list-style-type: none"> The local networks are becoming increasingly local and regional, with relationships between the actors who develop the

Significant Milestone	Enrolled Network Actors	Non-Enrolled Network Actors	Network Implications
<p>museums intimately involved, regionalisation of infrastructure occurs.</p>	<p>resources outside the collection and directory and introduces new, valuable elements (eg forum, documentation).</p> <p>Local Network:</p> <ul style="list-style-type: none"> • Technical infrastructure becomes a local network, with regionalisation of support and physical infrastructure. • The mechanism for publishing to AMOL inscribes and shapes what can be published. • Smaller, regional museums become a heavier focus. • The local network built on personal relationships becomes very strong. 	<p>enrolled, except via representation on the OLWG. Though they are beginning to be more active.</p> <ul style="list-style-type: none"> • www access still limited. <p>Local Network (partially blocked):</p> <ul style="list-style-type: none"> • Major state museums still not heavily enrolled into the local network level, still mostly in a governing rather than participatory role. • Data integration model still not resolved. 	<p>infrastructure and the regional content suppliers most important.</p> <ul style="list-style-type: none"> • The technical network is quite weak, particularly in terms of access, meaning that personal relationships between actors become increasingly important, with little governance or formal rules created.
<p>(D) Powerhouse Museum wins tender to redevelop AMOL</p>	<p>Global Network:</p> <ul style="list-style-type: none"> • OLWG / HCC decide redevelopment is best translated with a new supplier. • A member of HCC is allocated full time to govern the network and impart her vision on development. <p>Local Network:</p> <ul style="list-style-type: none"> • Now consists of state museum representatives and the local suppliers. 	<p>Global Network (partially blocked)</p> <ul style="list-style-type: none"> • www access <p>Local network (partially blocked)</p> <ul style="list-style-type: none"> • Data integration. 	<ul style="list-style-type: none"> • Communication between the global network governance and local network producer reaches an Obligatory Passage Point, with stabilisation of the network in both the global and local spaces. Underlying problems with system can be mitigated by the heavy mobilisation of local actors, and translation of the governing vision. • Communication between global vision, and local translation is strong.
<p>(E) AMOL wins significant awards and many museums around the country are now involved.</p>	<p>Global Network:</p> <ul style="list-style-type: none"> • Take heavy pride and ownership to keep revising their vision. <p>Local Network:</p> <ul style="list-style-type: none"> • Increasing momentum of more small organisations being involved makes both representatives of large museums and the small agencies increasingly involved. • Problems with data currency begins to make the other functions of the network – such as providing documentation and discussion forums, increasingly important and enables greater communication between regional museums, thus strengthening the local networks 		<p>Global networks are seeing “return” on their investment.</p> <ul style="list-style-type: none"> • Despite achievements and the development of stable actor-network across the country, underlying doubts about integrated data and financial stability mean that certain global actors begin to become less mobilised into the actor-network.
<p>(F) AMOL abandons ZM39.50 standard and there is</p>	<p>Local Network:</p> <ul style="list-style-type: none"> • Starts looking for new ways to address data currency issues. 	<p>Global network (blocked):</p> <ul style="list-style-type: none"> • There is now no clear governing vision about how to integrate the data. 	<ul style="list-style-type: none"> • The underlying problem of data integration does not have any immediate solutions present, the Open Archive Initiative is flagged as an

Significant Milestone	Enrolled Network Actors	Non-Enrolled Network Actors	Network Implications
significant focus on the long-term viability of the project			alternative, but never seriously mobilised.
(G) AMOL furthers focuses on regions and develops a 3-year strategic plan to attract operational funding.	Global Network: <ul style="list-style-type: none"> Attempt to redefine the network through new strategic plan. 	Global network (partially blocked): <ul style="list-style-type: none"> Records indicate growing scepticism at the WA Museum – showing increasing tensions between the networks. Recognition of problems with the ongoing financial sustainability. 	<ul style="list-style-type: none"> A strategic plan is developed which is mostly informed by the local networks requirements, possibly at the expense of acknowledging the role of the global actors. A disconnect between the global and local networks is noticed.
(H) Central project managers / leaders leave their positions.	Local Network: <ul style="list-style-type: none"> AMOL as an information resource with extensive documentation about museology is continued to be increasingly used by small and regional museums (shown by increasing visitor stats). The local network stabilises around certain functionalities of the actor-network. 	Global network (blocked): <ul style="list-style-type: none"> With the degradation of the local network, in WA, the global network also degrades without the support of the local actors. Local network (blocked): <ul style="list-style-type: none"> In Western Australia, the local network is built upon personal networks. With the departure of staff, these relationships and the strength of the networks also degrades. 	<ul style="list-style-type: none"> The Western Australian experience shows that with the departure of local actors who have enrolled many large and small actors into their network (executives at state museums; as well as volunteers and directors at small, local museums), the networks begin to unravel without their presence. The underlying problem of unclear data publishing and data integration exacerbates these problems.
(I) DiscoverNet launched to broaden appeal; soon after independent review of AMOL is performed by Deakin University and submitted to the HCC.	Global Network: <ul style="list-style-type: none"> Initiative to build a new resource targeted at a new, younger audience in an attempt to enrol new actors. 	Global Network (partially blocked): <ul style="list-style-type: none"> As DiscoverNet fails to engage new audiences, the global network becomes less engaged, and the network's focus is diluted. Serious problems with the ongoing financial sustainability and governance are not being resolved at a global level. Local Network (partially blocked): <ul style="list-style-type: none"> Technology was not effective at creating an engaging network. 	<ul style="list-style-type: none"> Upon the DiscoverNet failing to reinvigorate the over-arching actor-network, the global network becomes less involved, and the local network becomes less mobilised. The network has also become over-extended – trying to fulfil to goals of numerous actors. A stable actor-network is achieved, but at a far-reduced level to what was originally envisaged by the original global network. The lower-stable network level continues to exist, awaiting either a redevelopment or the actor-network being dissolved.
(J) Site is reviewed, a complete redevelopment is advised.	Global + Local Network: <ul style="list-style-type: none"> A new global and local network will need to be created to support the next generation of this project. 		<ul style="list-style-type: none"> The final review does have positive things to say about the achievements of AMOL, and about the value this service offers to the museum community – particularly to regional museums. A pledge to redevelop the resource does reignite interest at a global level.

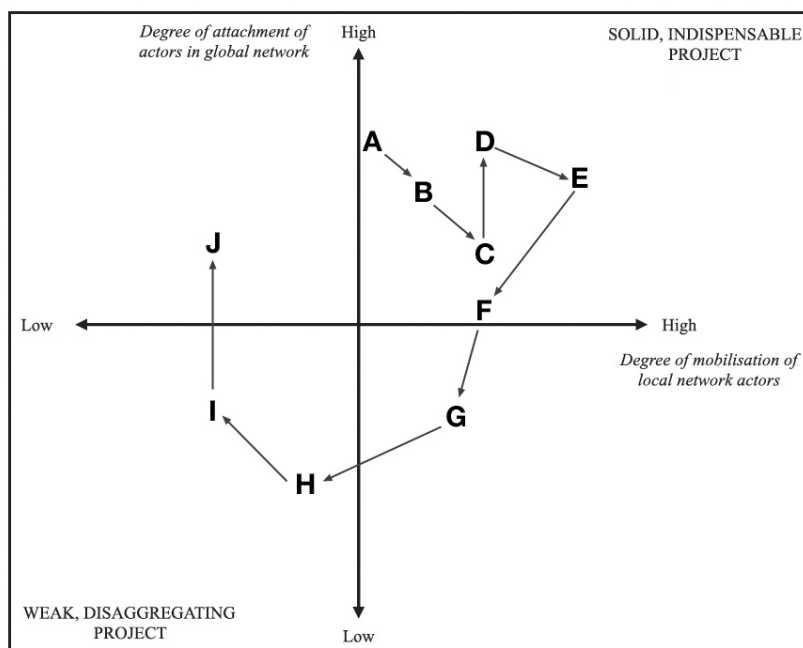


Figure 1: Matrix of Global and Local network involvement.

Project Trajectory

As can be seen from figure 2, the trajectory of the AMOL project is far from linear and in the course of the ten years it was studied takes on several incarnations, serving the interests of both global and local actors. The global and local networks are most stable when the vision is strong and there is agreement regarding the project benefits at both the global and local levels of analysis. Disaggregation from the global vision is precipitated by the failure to agree upon and adopt a suitable data exchange standard. The ZM39.50 standard is a key actor in the trajectory of the AMOL project and is inscribed with the interests of the OLVG which was driving the initiative from the start. The initial success and acceptance of the project by local networks was to some extent responsible for the broadening of the scope of the project to encompass collection management. It was this broadening of the scope that subsequently conflicted with ZM39.50 leading to the detachment from the global network. From this point, the primary vision of the integration of museum collections is sidelined and local network interests gain prominence. As a project which partially fulfilled the needs of local network members, AMOL was able to continue until prominent actors who played central roles in managing the project left these positions and there was continued disintegration of the links with the global network (G)-(H). The final failed attempt to reinvigorate the local network (I) led to a complete rethinking and redevelopment of the project at the global level (J).

CONCLUSION

In this paper we have explored the dynamics of integration of information systems across jurisdictions. By using principles drawn from Actor-Network Theory, we have been able to explore how various actors have influenced the trajectory of the project. The case study of AMOL from 1993 – 2003 shows that although stable relationships can be forged between the global and local networks and the global network’s vision can be translated into a functional, sustainable actor-network, underlying technical inscriptions, and the role of individual actors central to the network can undermine the stability, and quickly reverse earlier gains. The benefits derived from the project were not those espoused in the original vision but rather the true value of the resource turned out being providing resources that were not initially envisaged.

As with any case study, the findings in this case are likely to be idiosyncratic and not all integration projects will follow a similar trajectory. However, it is also unlikely that any national data integration initiative will follow a truly linear trajectory toward the common vision and that the interests of a variety of social and technical actors will negotiate how integration occurs and the nature of the stabilised network. The challenge in managing such projects lies with being able to identify actors (both human and non-human) and ensuring that their interests are aligned and stabilised over time.

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