

# Organizational learning in an EIA agency

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*IAIA10 Transitioning to the Green Economy*, 30th Annual Conference of the International Association for Impact Assessment, 6-11 April 2010, Geneva, Switzerland

## Abstract

Government agencies in charge of managing the EIA process play a key role in fostering EIA effectiveness through knowledge management (KM) initiatives. In performing their tasks, these agencies create, share and apply knowledge and can learn from experience, arguably leading to better-informed decision-making. An evaluation of (KM) initiatives by a leading EIA agency in Western Australia was conducted based on document review, interviews and questionnaires. Knowledge repositories were mapped and their perceived usefulness for officials in charge of performing tasks of the EIA process were surveyed. Both information technology-based organizational memory systems and social networks are in use in the agency. In line with other studies, it was found that staff shows a preference for obtaining information from other people rather than from documents. However, as social networks are subject to decay as a consequence of staff turnover (a problem in the agency), other repositories are essential to retain memory. The case showed that the agency has been adopting a number of measures conducive to manage the organization's ability to learn, store and use collective knowledge in support of its core activities. Some of the solutions adopted could be valuable to EIA agencies in other jurisdictions.

## 1. Introduction

There are two basic organizational models for governments to implement environmental impact assessment (EIA) legal requirements:

- a centralized agency (hereafter EIA agency) responsible for managing the EIA process and for carrying out all or most tasks, often resulting in an environmental permit or approval; or
- a competent decision-making authority who must observe EIA requirements and demonstrate that they have been fulfilled, delivering the appropriate permits.

EIA agencies manage the EIA process in a particular jurisdiction, enforce legal requirements for assessing proposals and make them operational by designing and implementing a series of procedures. In performing their work, EIA agencies can (i) accumulate information and knowledge; and (ii) learn from experience.

Although there is a large consensus in the managerial literature that knowledge resides within individuals (Argyris and Schön, 1996; Sanchez, 2001), it is widely accepted that organizations may not only hold knowledge but also create it. An EIA agency, like many organizations, cannot solely rely on the knowledge embedded in individuals, as “the content of social networks are subject to decay as a consequence of turnover” (Argote, 1999). Knowledge management (KM) initiatives can enhance collective organizational skills and competencies in EIA agencies. Possible advantages of KM include: (i) reducing the organizational costs of repeatedly developing solutions (Szulanski, 1996); (ii) identifying and replicating best practices (Olivera, 2000); and (iii) buffering an organization from the disruptive effect of staff turnover (Argote et al., 2003).

The literature provides several KM frameworks. Generally speaking, five core knowledge activities are the basis for designing and understanding KM implicit approaches or explicit strategies:

identification, creation, storage, share and use. The organizational memory (i.e. the means by which an organization stores knowledge for future use) is an essential component of KM. Functions of organization memory include: (i) support to problem-solving; (ii) support to decision-making and (iii) maintenance of routine behaviours, norms and shared interpretations (Olivera, 2000). A general term for the storage places is repositories.

Summarizing the key aspects of KM in EIA agencies it can be said that:

- EIA agency staff use both their personal knowledge and experience and the organization's knowledge accumulated over the years;
- staff in EIA agencies are knowledge workers (Davenport, 2005) who perform judgement-oriented work "highly reliant on individual expertise and experience";
- part of this organization's knowledge is codified and stored in an organizational memory, being captured in repositories;
- an organization's memory can decay or be partially lost if not properly managed; and
- an EIA agency creates knowledge – if not properly captured and stored, such knowledge can not be retrieved and used to improve practice and effectiveness.

## 2. Objectives and methods

The research aimed at identifying key elements of KM for improving EIA practice in EIA agencies, asking to what extent could KM initiatives contribute to enhance EIA effectiveness in a particular jurisdiction. Departing from a case study featuring a leading EIA agency (Wood, 1994, 2003), we intended to derive possible lessons that could be applied to or adapted by similar agencies in other jurisdictions. Data was collected through document review, interviews, questionnaires and direct observations. The EIA agency operating in Western Australia is used as a case study, specifically the Office of the Environmental Protection Authority (OEPA). The focus of the research was in documenting KM initiatives and reflecting on how this might relate to improving EIA practice; we did not attempt to verify the perceived changes to the effectiveness of EIA claimed by study participants.

## 3. Results and findings

### 3.1 Staff profile

In 2009, the OEPA staff was composed of 43 technical personnel directly involved in the core EIA tasks<sup>1</sup>. In addition, the OEPA is staffed with five administrative officers and five specialists in geographical information systems. Eighteen questionnaires were returned, out of 40 potential respondents (i.e. technical staff except the director and his assistants). As of October 2009, 30% of the staff had been working at OEPA for less than two years, 17% between two and five years, 25% between five and ten years and 28% for more than ten years. Staff turnover was seen as a problem in the period 2002-2008, when about 20% of the staff left every year, obliging the organization to hire new graduates and to provide training.

### 3.2 Knowledge repositories

Table 1 shows the 16 knowledge repositories identified and provides a synthetic explanation of the contents of each type. Some inevitable overlapping exists. Some repositories were prepared in order to assist the organization's clients, whereas others are primarily intended for internal use.

### 3.3 Initiatives related to knowledge management and organizational learning

Notwithstanding that the OEPA has not implemented any formal KM program, several internal management initiatives relevant as enablers of organizational learning were identified: (1) quality

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<sup>1</sup> Legal responsibility for most EIA functions and processes lies with the five member Environmental Protection Authority (EPA). The EPA is a statutorily independent Board that provides advice to the Minister for the Environment who is responsible for EIA approval decision-making. The OEPA staff are government employees but are directed in their work tasks according to the EIA responsibilities of the EPA.

assurance, (2) spatial information management, (3) records management, (4) mentoring, (5) training, (6) preparing and publishing guidance.

**Table 1 - OEPA Knowledge repositories and their main features**

	TYPE / NAME	DESCRIPTION
1	Geographical information system	Contains several layers featuring “environmental values” (such as wetlands, threatened/priority ecological communities), zones covered by EPA environmental protection policies, position statements and guidance statements, public drinking water supply areas, a record of proposals referred to EPA and other spatial information; the OEPA internal GIS started in 1994 and has been evolving since; an Intranet interface is available to project officers
2	Record of proposals referred	Every new proposal is received by GIS staff, its location and main features are entered into the system; a project officer receives a “proximity analysis” map or aerial photo showing the environmental values known at certain distances from the proposed site and other proposals previously referred to the EPA for screening
3	Officers Manual	A compilation of internal procedures, templates and guidance – commenced 1991 as printed manual, now electronic documents
4	EPA Central Information System	EPACIS – A database of assessments, including proponent details, decisions made and timelines, from referrals (screening) to issue of Ministerial Statement (approval and conditions)
5	Total Records Information System	TRIM – A system for electronic document management, storing documents, e-mails and scanned documents received by OEPA
6	Templates	Models of documents and letters relative to all aspects of the EIA process; several dozen templates are available in the Intranet
7	Files	Physical files containing all documents relative to every EIA; active files are maintained at the office for quick retrieval
8	Key environmental factors	a comprehensive checklist of valued ecosystem components grouped under four categories (biophysical, pollution management and social surroundings); <i>critical environmental assets</i> is a term introduced in 2006 to describe factors of foremost importance, whereas <i>high value assets</i> designates other environmental assets that require a high level of protection
9	Guidelines for environmental review documents	Guidance for proponents to assist the preparation of environmental impact documents (namely Public Environmental Review and Environmental Review and Management Programme). During EIA, project officers check the proponent’s document against these generic guidelines and the environmental scoping document
10	Environmental Protection Policies	EPPs – Legally binding policies to protect environmental values in certain areas or State-wide – since 1992, nine have been enacted
11	EPA Position Statements	Establish EPA views on some matters of environmental importance – since 1999, nine Position Statements established
12	Guidance Statements	Issued by the EPA to assist proponents, and the public generally, to understand the minimum requirements for protection of elements of the environment that the EPA expects to be met during the assessment process – 56 have been issued (as of October 2009), but some are no longer in use and have been withdrawn
13	EPA Reports (formerly bulletins)	The main output of the review process; feature recommendations of the EPA to the Minister for the Environment; since the beginning of EIA in 1974 to August 2009, 1334 reports published
14	State of the Environment Report	First report published in 1992. The most recent edition (2007) covers 34 “environmental issues” outlining current conditions (with indicators), pressures, current and suggested responses
15	Staff meetings	Formal meetings to deal with ongoing assessments or referrals
16	Senior staff	Some officers have more than 30 years of EIA experience; senior staff can play a significant role in sharing knowledge as they are officially designated as mentors for new staff

(sources: compiled from the EPA website ([www.epa.wa.gov.au](http://www.epa.wa.gov.au)) and internal documents)

A quality assurance program for EIA started in the mid-1990s leading to improved efficiency through elimination of “unnecessary steps and duplication”. An internal manual was issued, containing, among other elements, detailed procedures for EIA tasks, a template for internal procedures, a document control protocol, and standardizing terminology.

A geographical information system (GIS) was established in the late 1990s. At the beginning, EPA used spatial information essentially to check presence or absence of environmental values (also known in the EIA literature as “valued ecosystem components”). Examples are “declared rare flora” and “threatened ecological communities”. Currently, OEPA has a dedicated GIS group that not only maintains and updates information on environmental values but also performs a “proximity analysis” for every proposal referred to EPA. Such an analysis means producing a map featuring the new proposal, former proposals and environmental values at varied distances from the proposed development, thus providing project officers with a quick overview of the spatial context. The group also systematically captures the boundaries of all proposals referred to EPA in a spatial dataset.

The OEPA adopted a records management system to ensure file and document tracking, as well as a database of ongoing and past assessments including proponent details, decisions made and timelines. Both systems are on the Intranet (i.e. internal electronic network) and are subject to improvements and upgrades. The OEPA also maintains files containing a hard copy of all relevant documents for every assessment which are usually consulted by project officers.

The effects of staff turnover are dealt with by adopting an array of measures. Learning assistance for new staff includes an introductory course, an active mentoring program and ongoing short-courses as necessary.

Publishing guidance directed at external EIA stakeholders has been used by the EPA since the State EIA system was formalized in 1974. These have been updated or expanded on several occasions, typically following amendment to the legislation. Since the late 1990s, a new kind of guidance started being published, focusing on recommendations for consultants and proponents to undertake in their EIA tasks. Guidance has been issued on several aspects of EIA practice, such as conducting terrestrial flora surveys, designing environmental offsets for proposals that impact on biodiversity, sampling of short range endemic invertebrates, criteria for protection of benthic habitat. We call this type of guidance substantive, as it is essentially different from procedural guidance intended at explaining details of a particular EIA system.

### **3.4 Use of knowledge stored in organizational memory**

Findings related to access and use of collective knowledge for performing the EIA tasks at the OEPA were obtained from the questionnaire. Out of 16 knowledge repositories (Table 1), respondents most often access previous EPA reports and the organization’s hard files, alongside the sources which provide personal interaction. The least accessed sources are the GIS Viewer and the State of the Environment Report (SOE). It appears that sources that feature real cases or solutions are used most often relative to those that provide generic guidance.

### **3.5 Usefulness and accessibility of knowledge stored in organizational memory**

Nine statements related to usefulness and accessibility of knowledge repositories were included in the questionnaire. Respondents were asked to declare their agreement with these statements using a five level scale. The results showed (1) an ample agreement (72%) that Guidance Statements usefully condense EPA knowledge for use in EIA; (2) most respondents disagreed with the statements that they may prefer obtaining information from other people rather than from documents; (3) the level of disagreement with the statement that issues addressed by OEPA staff are typically so specific such that internal knowledge sources are not useful (72%) reinforces the finding that repositories are perceived as useful by staff.

Respondents were also asked to rank the effectiveness of each knowledge repository in providing access to the organization’s stored knowledge. Fourteen out of the sixteen repositories were ranked as effective or very effective, with only two ranked as ineffective or not used (GIS Viewer

and the SOE Report). Senior staff is the source that returned the most “very effective” ratings (65%). The sources returning the higher percentages of “very effective” or “effective” were the EPA Reports and the internal meetings (both at 100%), followed by senior staff (94%) and the Officers Manual and templates (89%).

## **4. Discussion**

### **4.1 Coverage, usefulness and access to knowledge repositories**

The “capture and dissemination of socially constructed knowledge” is one particular aspect of KM in the public sector (Riege and Lindsay, 2006, p. 27). In Western Australia, the OEPA has been fulfilling this task and contributing to capturing and disseminating relevant knowledge for decision-making. However, we noted some areas for enhancement of the KM system.

For example, the treatment of cumulative impacts is very limited, as the GIS only keep information on the location of previous proposals, but does not include data generated by the respective environmental assessment. Thus, if an officer would like to retrieve information on an existing proposal in order to better understand the cumulative impacts, it would be necessary to review the files relative to that particular undertaking; a time consuming task incompatible with the project analysis timelines. These timelines are a significant constraint on project officers, as the EPA is committed to deliver its recommendations to the Minister in a relatively short period in order to respond to the constant criticism from proponents that the EIA process is too long.

### **4.2 Knowledge management initiatives**

Although there has never been any formal knowledge management initiative in the EPA, several actions have contributed to organizational learning. An Australian agency in charge of promoting good practices in the public service noted that: “While many organizations may not use the term ‘knowledge management’ to describe their activities in this area, many relevant activities are undertaken to enhance organizational learning, improve service delivery, and build capabilities and flexibility” (Agimo, 2004). Our study found evidence of significant KM by the OEPA.

### **4.3 Beyond performing internal tasks**

Despite achievements in KM, there are underexplored learning opportunities that could enhance EIA practice, the most prominent being that data and information gathered in the follow-up phase are not processed into meaningful knowledge for future assessments by the OEPA. Audit and compliance reports are filed with the staff responsible for the ongoing regulation of implemented projects but then seemingly are forgotten. Consultants who prepare such reports and the proponents can learn from them and potentially, such learning can be reflected in upcoming environmental assessment documents prepared by these consultants and proponents. However, there is no systematic or structured way of conveying learning to the OEPA or sharing such learning with other stakeholders.

Harnessing this knowledge would provide opportunities for double-loop learning (Argyris and Schön, 1996). At present information derived from project follow-up in EIA practice in WA is not properly captured and stored, thus not used to create new knowledge and to improve practice and effectiveness.

We surmise that having useful and accessible KM initiatives within the OEPA will positively contribute to the effectiveness of EIA practice. However with the exception of the perceived utility of Guidance Statements, which have been verified in separate study of EIA consultants working in the state (Waldeck et al 2003), there is no empirical data available to prove this is the case.

## **5. Conclusions**

Knowledge management is an important aspect of EIA practice. Government EIA agencies that create, share and use knowledge can learn from experience. Well designed/maintained knowledge

repositories are essential to foster effective organizational memory in support of EIA effectiveness. Electronic, hard copy and personal sources of knowledge are all important. The KM actions of an EIA agency can contribute to improved efficiencies and effectiveness of EIA performance by assisting both internal staff and external stakeholders alike. Through capture of knowledge and ability to subsequently access this information and the lessons learned (e.g. arising from EIA follow-up) practice should be continually evolving and maturing. This ongoing organisational learning by EIA agencies also enables the creation of new knowledge to further guide and enhance future EIA performance. We suggest that government EIA agencies can enhance the effectiveness of EIA practice through well organised and administered KM initiatives.

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