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The SAP Ecosystem:

A Knowledge Perspective

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Abstract

This paper derives from a parent study titled, Co-operative ERP Lifecycle Knowledge Management [Gable et al, 1998]. The central goal of that study is to rationalise knowledge management activities of the three key players involved in ERP lifecycle support; namely the client, the vendor and the implementation partner or consultant. The consultant can play varied roles in a greater or lesser capacity across client ERP installations. It is posited in the parent study that the consultant's role (and the roles of all key players) should be driven by a carefully considered ERP lifecycle-wide knowledge sourcing strategy for the client. Understanding the ERP knowledge marketplace and related dynamics is of clear value to the development of such strategy. In this paper we tentatively explore the concepts of 'knowledge-sourcing' and 'knowledge strategy friction'. We further describe a preliminary attempt to instantiate these concepts through an exploratory, descriptive case study of the 'SAP services ecosystem'. A broader, related objective of the parent study is to test the power of a 'knowledge sourcing world-view' and the integrative potential and explanatory power of such a perspective, with particular emphasis on ERP marketplace dynamics.

Keywords
Knowledge management, enterprise resource planning, ERP, enterprise systems, consulting

1   INTRODUCTION

This paper represents a qualitative, descriptive and exploratory case study of the knowledge sourcing activities of consultants in relation to the ERP lifecycle. The context of the study is the SAP 'eco-system'. Data collection has primarily involved review of literature, discussions and interviews with practicing ERP consultants, discussion and interviews with vendor representatives from SAP, and reflection on the personal prior consulting experience of the authors with the packaged software marketplace. Much of the literature reviewed were proprietary industry reports (e.g. Gartner Groups, Yankee Group, Delta, etc.) which cannot be cited. Little academic literature specific to the subject under discussion is available.

1.1   ERP and the SAP ecosystem

A new class of packaged application software has emerged over the past decade, ostensibly consolidating under a single banner, a multi-billion dollar industry that includes SAP AG, the world's fourth largest software vendor, several other of the largest software firms and the world's largest management consulting organisations. Variously called enterprise resource planning systems (ERP), enterprise-wide systems, or simply enterprise systems, these comprehensive, packaged software solutions seek to integrate the complete range of a

business's processes and functions in order to present a holistic view of the business from a single information and IT architecture (Gable, Scott & Davenport, 1998; Klaus, Rosemann & Gable, 2000).

A range of influences, have encouraged the increasing uptake of ERP, which already account for a substantial portion of the world-installed base of application software. The world-wide market for enterprise application packages, exclusive of all related hardware and implementation costs, is expected to grow to $US52 billion by 2002 (AMR Research, 1997).

The term SAP Services Eco-system, first coined by the Gartner Group (1998), refers to the group of firms and professionals worldwide who derive their livelihood from the supply of SAP related products and services. Though discussion on the ecosystem could extend to other important players and relationships (e.g. SAP's hardware partners), the emphasis herein is on systems integration service partners of SAP whom we refer to as 'consultants'. We place particular emphasis on the large, regional and international consulting firms most often selected as 'implementation partner' by ERP clients.

The table following lists numbers of consultants employed on SAP related work by large (> 900 worldwide) and smaller SAP consulting firms (systems integrators) and SAP as at 1998.

	Americas		Europe		Rest		Total	
	#	%	#	%	#	%	#	%
Large Firms:	9610	41%	10200	43%	3780	16%	23590	66%
Small Firms:	3190	37%	4100	48%	1320	15%	8610	24%
SAP	1300	34%	2000	53%	500	13%	3800	11%
Grand Total:	14100	39%	16300	45%	5600	16%	36000	100%

SAP-related work contributes the largest proportion of total revenues for several of the world's major consulting companies. These companies have made substantial investments in their staff (fundamental SAP training for a new consultant costs $75,000), implementation methods and tools, industry software templates (pre-configured SAP) and related R&D and training facilities. SAP's large implementation partners seek means of enhancing their knowledge management strategies to further leverage their substantial ERP knowledge investment.

1.2   ERP Lifecycle Knowledge Management

Where an organisation does not have the requisite knowledge or internal capacity to manage through the 'resource spike' caused by initial ERP implementation, it must obtain this knowledge and capacity from external sources. Implementation resources are predominantly knowledge based. This knowledge may be sourced from a consulting firm (knowledge vendor) which acts in the capacity of implementation partner. Among other things, the role of the implementation partner can include project manager, decision-maker, arbitrator and knowledge facilitator.

Having engaged a suitable implementation partner, the client completes the implementation process, goes live with the ERP and moves into the post-implementation maintenance and upgrade cycle. At the end of the implementation phase, the consultant usually withdraws from the organisation.   Responsibility for managing the ERP falls back to the client. The continuing success of the ERP is then reliant the client's skill and knowledge in running, supporting, maintaining and upgrading the ERP. In order to keep the ERP 'live' and relevant, the client must either draw from their ERP capabilities gained during the implementation

period or seek expert support (knowledge) externally. Such external support is usually available from the vendor, the implementation partner and other third parties. This support can be very expensive.

It is proposed in the parent study that the need for post-implementation external support will to a great extent depend on the ERP knowledge transferred and developed during the implementation period. Other factors impacting post-implementation external support requirements might include key staff losses, major upgrades, major configuration changes, and changes to the business process models. The client, therefore, from the very outset needs to carefully consider from where, to what extent, and how they are going to source the knowledge required to ensure the ongoing vitality of their ERP. In other words they need to develop an ERP lifecycle-wide 'knowledge sourcing strategy'.

The three key players in the SAP ecosystem, the client, the vendor and the implementation partner stand to benefit from effective ERP knowledge management. The vendor, SAP, seeks to redress negative perceptions that SAP implementation duration and cost is difficult to manage and to improve client support and satisfaction. The consulting firms seek to streamline implementation and share in the savings with clients. Both SAP and consultants seek to increase the size of the ERP market through reduced costs and increased benefits to clients. The client will benefit through better-planned lifecycle management and more effective implementation outcomes. Also, to the extent that SAP and its partners can capture key knowledge during implementation, they will be well placed to further support clients throughout the ERP life cycle.

These differing but aligned objectives will drive the separate knowledge strategies of each of the three key players. Zack (1999) defines knowledge strategy, as balancing knowledge-based resources and capabilities with the knowledge required for providing products or services in ways superior to those of competitors. Zack further defines a firm as having an aggressive knowledge strategy when it closely integrates knowledge exploitation and exploration (innovation) using knowledge sources both internal and external to its organisational boundaries. In the SAP services ecosystem, when the business objectives of the three players either compete or overlap there is potential for the players' knowledge strategies to conflict. We call this 'knowledge strategy friction'. In order to understand knowledge strategy friction, one must examine the knowledge strategy of each player.

2 CONSULTANTS AND KNOWLEDGE MANAGEMENT

2.1 *Knowledge Management in Consulting Firms*

Knowledge can be tacit or explicit (Polyani 58, Nonaka and Takeuchi 1995). Explicit (or codified) knowledge can be transmitted in formal systematic language, is faster to transfer, thereby providing economic benefits from re-use. Tacit knowledge is more personal, difficult to communicate, rooted in action and experience and resides within the minds of people (Polyani, 58; Nonaka, 94). Tacit knowledge is slower to transfer and requires face-to-face or other rich communication mediums. Consulting firms explicate as much implementation experience as possible to provide more efficient implementation experiences for their clients and to improve the retention effectiveness and recall efficiency of their knowledge base.

The consulting sector, and in particular the larger firms, are amongst the most knowledge intensive. Being 'knowledge organisations', not surprisingly several of these firms are already highly active in knowledge management. In example, Ernst & Young spends 6% of revenues on knowledge management and measures the amount of knowledge it reuses in the form of

proposals, presentations and deliverables and the contributions of its knowledge repository to closing sales (Davenport, 1997). For some large consulting companies, SAP expertise and related knowledge management represents the largest investment they have ever made.

Consulting firms go to great lengths and expense to externalise ERP knowledge in order to achieve a comparative advantage and to leverage their costly people. In the early 90's, Ernst & Young initiated a knowledge strategy whereby it captures and leverages knowledge from consulting engagements. Centres were established to explicate consultants' knowledge into standard methodologies, and to record and refine experiences from consulting assignments (Davenport 1997).

PriceWaterhouseCoopers, KPMG and Arthur Andersen also adopted ERP knowledge explication strategies, using technologies such as Lotus Notes. In addition, tacit knowledge transfer is facilitated through telephone, e-mail access to experienced consultants, and the rise of specialised internal practice networks. This ability to source knowledge quickly within in the firm is a basis for the consultants' competitive advantage. Dash (1997 in Im & Hars 1998) defined knowledge management as "an attempt to put processes in place that capture and reuse an organisation's knowledge so it can be applied to generate revenue". The generation, codification, transfer and use of ERP implementation knowledge by large consulting firms conform to this particular definition.

Clients pay, not only for access to explicated knowledge, but also for access to the tacit knowledge held by the consultant's staff. Consulting firms attract good people with ERP knowledge away from clients by offering more money and more diverse or challenging experiences that makes them increasingly marketable. This valuable and scarce ERP knowledge can be leveraged across multiple implementations. In a marketplace where demand outstrips supply, it can be uneconomic for a client to retain this knowledge in-house to support a single ERP implementation.

Maister (1993) describes three different types of consulting practices: the expertise practice which employs considerable raw brain power to solve frontier (unique, bleeding edge, new) problems; the experience practice which has dealt with similar situations in previous assignments; and efficiency based firms which can demonstrate established procedures and systems to handle specific problems cost effectively. These three types of practice are not discrete but rather a spectrum along which consulting firms establish various aspects of their practice. Choo (1998) describes the same three types as background knowledge framework, practical know-how and rule-based procedures. The various consulting practices each emphasise differing knowledge management strategies. Two important knowledge services provided by consulting firms when implementing ERP systems are technical product knowledge and product related implementation procedural knowledge (methodologies) i.e. implementation project management.

While expert practices certainly play a role in ERP implementations such as providing zero-based re-engineering services, it is the experience and efficiency type practices that principally conduct ERP implementations. ERP experience, the knowledge of and practised skill in ERP implementations held tacitly by consultants is in short supply.

ERP implementation partners position themselves towards the experience / efficiency end of Maister's spectrum. Efficiency practices have traditionally based their competitive advantage on proprietary implementation methodologies. Clients of these consulting firms realise they must pay a significant premium for these firms' knowledge-base, as it is difficult and costly for consulting firms to capture, externalise and store this knowledge. Clients would not get the same value from capturing and explicating this ERP knowledge themselves because in

many cases it would only be used once. If, however, clients plan to roll out further ERP implementations (e.g. geographically or across divisions), a knowledge retention strategy is worthy of consideration.

2.2   How Consultants Store ERP Knowledge

Consultants have sought means of leveraging their knowledge by storing it in 'repositories' also call 'reservoirs' (Argote & Ingram, 2000) that can be drawn from in future. By storing knowledge, consulting firms can leverage their limited people resources, expedite projects and reduce the negative effects of 'knowledge drain.'

Four key means by which consultants have sought to store knowledge relating to ERP are: software templates, methodologies, configurable electronic knowledge repositories, and education & training materials (These categories of ERP knowledge store are tentative – further work of the study is aimed at rigorous classification of relevant knowledge stores).

Consultants use several techniques to guide client knowledge sourcing during an ERP implementation. It is important to note that the consulting team 'source' the various types of knowledge from their knowledge base of software templates, methodologies, configurable electronic knowledge repositories, and education & training materials. The consultants combine these explicated knowledge stores with their tacitly held experience reserves to guide the client's knowledge sourcing strategy.

2.3   Knowledge Sourcing and Consultants

Consulting firms can also be facilitators of clients' ERP knowledge creation and discovery. Their ability to help a firm implement an ERP stems not only from their technical expertise in the ERP system but also their ability to 'facilitate' the client's knowledge sourcing strategy. Consulting firms use techniques such as guided learning, formal training and knowledge creation activities to direct clients to the necessary knowledge required for a successful implementation. This guidance saves the client considerable time and effort in knowledge search costs.

Consulting firms, therefore, must develop a sophisticated knowledge sourcing strategy to support their efforts in facilitating their clients' knowledge sourcing activities in achieving an effective implementation outcome. Not only do they require sophisticated implementation knowledge repositories but also the expertise in applying these repositories to meet their clients' business objectives. To provide perceived value to the client, their knowledge sourcing capability in the ERP implementation knowledge domain must be superior to the client's capability. Consulting organisations employ software templates, methodologies, configurable electronic knowledge repositories, and education & training materials combined with sophisticated internal knowledge management to achieve this superiority.

3   APPLYING THE CONCEPTS – THE EXAMPLE OF ASAP

With the object of further assessing the robustness and value of a 'knowledge sourcing' view of the SAP ecosystem, we now turn to a quite specific development in the ecosystem over the past three years that has had dramatic effect. As previously stated, SAP is concerned about the high cost of implementation and in particular the effect of this high cost as they enter the SME market. ASAP (Accelerated SAP implementation methodology, as of this writing now called ValueSAP) is an internal response to this concern; a concerted effort to make an implementation methodology cheaply available to the marketplace in presumably an attempt to lower the cost of implementation expertise in the SAP marketplace.

While most very large organisations have already adopted ERP world-wide, increasingly small- and medium-sized enterprises (SMEs) too are finding it cost effective and a competitive necessity to follow suit. Marketplace developments, infrastructure technology improvements, and improvements in ERP itself are all encouraging the uptake of ERP by enterprises with revenues of less than $50 million. Globalisation and electronic commerce require closer integration between large and small enterprises. The availability of powerful microprocessor-based servers; scalable, full-function PC and network operating systems; and low-cost, back-office software make the necessary client/server architectures increasingly affordable.

In response to these developments and having saturated the larger organizations, ERP vendors are making it easier for SMEs to adopt their packages, primarily by simplifying and reducing the costs of implementation. In essence ERP vendors are reducing the amount of knowledge required (to be sourced) by the client. This can be achieved in varying degrees through turning off unneeded functionality, developing largely complete package templates (pre-configuring the software for particular markets or market-niches), turn-key solutions (packaging pre-configured ERP, database, operating system and network software; servers and workstations; and installation and implementation assistance for a fixed price), and outsourcing arrangements such as application service provision (ASP). For a detailed discussion of ERP ASP's see Bennett and Timbrell (2000). In effect the vendors are reducing the knowledge investment required to bring an ERP installation into existence. The ERP vendors are also seeking to influence third-party package software implementation services (consultants) in favor of their desired SME clientele. With implementation costs often far exceeding the costs of the package software and related hardware, it is in implementation that the greatest savings for SMEs are achievable.

ASAP has been embraced enthusiastically by a number of midsize Systems Integrators (SIs). It saves them the continuous investment in a proprietary methodology and gives some of them a short-term marketing advantage – e.g. 'We finished the first ASAP implementation in the utilities industry in less than 90 days.' That the common methodology reduces their differentiation against each other does not appear to bother many of these SIs. However, in spite of their overt support for the concept, ASAP does bother the larger SIs for two reasons. They do not want their differentiation diluted by a common methodology; and even though ASAP is not holistic at this stage, SAP has been encouraging clients to measure SI proposals against an ASAP template. Several SIs have said that SAP is underselling the implementation effort. As with everything, the truth is somewhere in the middle. SAP believes a number of large SIs spend too much time up front doing gap analysis and should, instead, accept that SAP is function-rich and spend the time learning and finding appropriate features within the product. Enterprises that want to implement SAP as is will find ASAP attractive, but they should supplement the product configuration steps the methodology covers with coverage for steps around the software for testing, data migration and other facets (Keller, 1998:42).

4   DISCUSSION

The advent of ASAP is by itself an extremely interesting development. ASAP embodies or explicates implementation process knowledge. By giving ASAP away along with related education and training, SAP are reducing the value of their implementation partners' investment in proprietary implementation methodologies by providing a strategically equivalent substitute. Consulting firms, therefore must compete by developing and employing alternative core capabilities (see Barney 1991).

4.1 Consultants and ASAP

An important question that all consultants and clients must face when developing their ERP knowledge sourcing strategy is 'what knowledge should be made explicit and what should remain tacit?' Factors that should influence this decision include:

- ✓ The future value of the knowledge
- ✓ Potential (feasibility) of explicating the knowledge
- ✓ Potential for retaining/losing the knowledge once explicated
- ✓ Cost of explicating the knowledge

The issue of what knowledge is sourced and how it is sourced by the client organisation (e.g. from consultants or SAP to the client) may often be a question of its form ie. tacit knowledge (slow and expensive) or explicated knowledge (cheaper and faster).

In an ERP knowledge management or knowledge sourcing strategy, one must account for the knowledge embodied in software 'templates'. In example, where a client is starting with vanilla SAP, they must source knowledge of 'best practice' business processes. Existing templates embody 'explicated' knowledge of a particular industry or niche.

Consultants would appear to have the most to lose from explicating ERP knowledge. The relative rarity of this knowledge is the basis of their (some would say high) economic rent gained from this knowledge. They will be less concerned with transferring their knowledge to clients (as opposed to transferring it directly to the physical system configuration) where they are comfortable that the knowledge will go no further than the client. To the extent that they feel there is risk of the knowledge either becoming 1) public domain, 2) more freely available to other clients, or 3) somehow accruing directly or indirectly to competitors (e.g. other implementation partners or perhaps SAP) … there will be a strong, and understandable reluctance to allow direct access to that knowledge. Also, to the extent it is believed that allowing direct access to the knowledge will cannibalise future services to the client, there again will exist 'knowledge strategy friction'.

4.2 The Consultants' Response

SAP strategies are impacting the options available to their large implementation partners giving rise to knowledge strategy friction. The Big5 and other of the large SIs have been the traditional source of implementation knowledge on ERP projects, and the advent of ASAP has reduced this advantage. Once proprietary knowledge becomes common knowledge its value is reduced. In order to sustain a long-term competitive advantage based on knowledge, the SIs have had to re-evaluate their knowledge base/knowledge products. Also, with the passing of the year 2000 and the saturation of large organisations, the large implementation partners, like the ERP vendors, are having to identify other sources of revenue.

The implicit, symbiotic relationship that has existed for several years now between SAP and the SIs, was essentially a Knowledge Supply agreement. The SIs implicitly promoted the supply/sale of SAP knowledge through the promotion of SAP. SAP in return promoted the sale of SI knowledge through the implementations. More recent moves by SAP (alternatively the lack of movement by the Big5) have upset the implicit knowledge supply relationship (SAP's move into services and templates and the giving away of knowledge previously largely proprietary to the Big5. SAP have essentially replicated knowledge previously owned by the SIs, and are now either selling it themselves or giving it away. They are selling it

(services, templates) for profit and giving it away (ASAP) to enhance their main product (software) and source of revenue.

Two directions the consulting companies are pursuing today, to some extent motivated by the sorts of threats being posed by SAP, are:

- specialisation/organisation around industries and niche markets
- rationalisation of client bases and longer term relationships

The large implementation partners can no longer market themselves as experts in general ERP implementation processes. Thus, they must find other means of differentiating themselves. Most are moving to develop industry foci, combining related industry expertise with ERP expertise.

The latter strategy may be in direct recognition of the growing importance of the Knowledge Base. Professor Bruce Avolio, Binghamton University, New York, in an interview conducted October 2000, suggested that within the next few years, GALLOP, the premiere American pollster, will become a large and significant international consulting company. He suggested that the two main assets GALLOP possess to make this possible are first, their credibility and perceived objectivity, and second, their massive accumulated knowledge base. Consulting companies 'rationalising' their client reservoir may in fact be saying to the clients they keep, that "we want to be your partners in the longer term. We want to work with you to build our knowledge base and we want your commitment to this endeavor. In return, you will have preferential access to the knowledge reservoir."

5 CONCLUSION

Thus we can see that a 'knowledge sourcing' view of the undulating SAP ecosystem is revealing, and can help to explain many of the dynamics being observed. To better manage their ERP lifecycle, clients need to adopt a lifecycle-wide knowledge sourcing strategy in order to grow their ERP beyond initial implementation. We have seen that consultants are providers and facilitators of knowledge during the implementation period. They provide technical expertise and also guide the sourcing and knowledge creation activities of the client that results in a working and relevant system.

In order to be competitive in the market and also to sustain their value proposition, consultants need to have both superior technical expertise and superior knowledge sourcing strategies to their clients. The advent of ASAP in the marketplace has altered the knowledge supply agreement and diluted some of the consultants' previous advantage giving rise to knowledge strategy friction. With ASAP the clients have easy access to both declarative and procedural SAP implementation knowledge equal to that of any inexperienced consultant. In Maister's framework, the consultants will have to move towards the experience practice, given that the knowledge underpinning the efficiency practice is now more freely available.

References are available from the authors on request.