Sharing Knowledge

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DBA

A how-to manual for professional practices based on evidence from organisations worldwide and practical experience at Aedas, Arup, Broadway Malyan, Buro Happold, Edward Cullinan Architects, Feilden Clegg Bradley, Penoyre & Prasad, Whitbybird and WSP

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This manual and the accompanying case studies are based on a two-year project called 'Spreading the Word', funded by the Department of Trade and Industry under its Partners in Innovation programme. The research was conducted by David Bartholomew Associates (DBA) with nine design practice partners:

Aedas

Arup

Broadway Malyan

Buro Happold

Edward Cullinan Architects

Feilden Clegg Bradley

Penoyre & Prasad

Whitbybird

WSP

The manual also draws on results from an earlier DTI-funded study of learning from experience carried out by DBA in collaboration with Amicus, BAA, the BP-Bovis Global Alliance, Buro Happold, Gardiner & Theobald, National Grid Transco and SecondSite Property.

For more information about these studies and advice on knowledge management email David Bartholomew at db@dba-insight.co.uk.

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Introduction

This manual is a distillation of what DBA and nine design practices — Aedas, Arup, Broadway Malyan, Buro Happold, Edward Cullinan Architects, Feilden Clegg Bradley, Penoyre & Prasad, Whitbybird, and WSP — learned about knowledge sharing in a 2 year collaboration from 2003-5, and of what the knowledge management literature has to say. It also draws on results from an earlier study DBA carried out with Amicus, BAA, the BP-Bovis Global Alliance, Buro Happold, Gardiner & Theobald, National Grid Transco and SecondSite Property. All the techniques described were tested by one or more of the project partners, and most have adopted them as standard practice. They work.

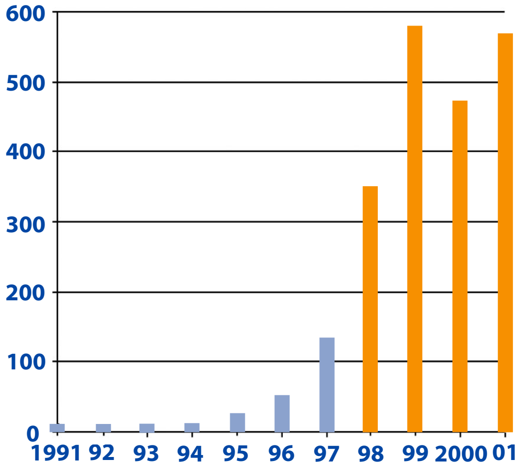
Design is a knowledge-based activity, and designers have always shared their knowledge with their immediate colleagues. But the intuitive methods used in small practices break down alarmingly quickly as they grow: one of the partners in this project found that simply dividing the office between two floors noticeably reduced communication. At the same time, increasingly sophisticated construction technology and demanding clients make knowledge sharing ever more vital. Other knowledge-intensive industries are already adopting a more systematic approach to learning from experience and sharing knowledge, and the evidence is overwhelming by now that this can bring dividends in technical capability, efficiency, customer satisfaction and reduced risk. In all but the smallest practices, it is time to follow their lead.

It was the realisation in the 1980s that knowledge was supplanting physical assets as the dominant basis of capital value and national wealth that started the current interest in knowledge and the possibility of creating more and using it better. 'Knowledge management' emerged as a new branch of management theory, and, starting with the more evidently knowledge-led industries like management consultancy, pharmaceuticals and IT, progressive companies were quick to take up the idea. Their experience fed back into research, and understanding of the processes by which knowledge is acquired, shared and used, and how they can be improved, grew rapidly.

Knowledge management may yet turn out to be a fad, doomed to follow magic bullets like Quality Circles, Total Quality Management and Business Process Re-engineering into oblivion. But this seems unlikely. It has already lasted longer than most of them, and the signs are that its future is simply to be absorbed into management good practice.

So why did a group of successful, well-managed practices feel the need to experiment with knowledge sharing techniques, instead of simply reading the books (and there are many, some of them excellent) and applying well-proven formulas? First, because published research and case studies focus overwhelmingly on large, often multinational, corporations, and it is by no means clear that what works for them is a good approach for a design practice with between 30 and a few thousand staff. And second, because the literature is so extensive and dense that it is difficult in a busy practice to find time to study it and work out what to do.

This manual and the accompanying case studies aim to fill some of the gap. The techniques described here are based on extensive research and experience accumulated in other industries, but adapted for and tested in a design practice context. And we have distilled out the essence: the basic rationale for the various techniques, evidence of their value, warnings about pitfalls, and enough practical detail to get started. We hope it helps.



Knowledge management publications

Number of published articles with 'knowledge management' in their titles, abstracts or descriptors listed in the Science Citation Index, Social Science Citation Index and ABI Inform

Based on *Knowledge Management - Another management fad?*, Ponzi and Koenig, Information Research vol 8, October 2002

Further Reading

Further reading (page 47) gives references for some of the many sources which contributed to the development of the thinking behind the Spreading the Word project and this manual, including most of those cited in the text. It also lists a selection of other books which offer interesting perspectives on learning and knowledge sharing, and additional evidence of how the various tools and techniques have worked in practice in other industries.

Part I: Foundations

1 Strategy

Design practices have more in common with each other than with drug companies and aircraft makers, but there is still a great deal of difference between an architectural cooperative of 40 (like Edward Cullinan Architects) and an engineering plc with 4600 staff operating from 110 offices worldwide (like WSP). One size in knowledge sharing does not fit all.

There are obvious practical differences — Cullinans' staff can meet round one table while most of WSP's will never see or speak to most of their colleagues — and subtler ones too. Research at Portsmouth School of Architecture has shown that architects and engineers typically have very different learning styles, with architects preferring to learn through direct personal experience, while engineers prefer abstract, broadly-applicable principles and established rules. Culture can vary considerably, too; some practices are more authoritarian and have more formal procedures than others, some are specialists while others are diverse, and so on. All these differences have implications for knowledge sharing.

The techniques discussed in this manual are those which seem to us most relevant in design practices, but not all will be appropriate for every practice. And the step-by-step 'recipes' we have given for some of them are not intended to be prescriptive: they are simply intended to help readers understand how the theoretical principles translate into practicalities, to stimulate thought, and to provide a starting point for experiment and for developing systems which suit a practice's individual needs.

Alongside the successes, there have been many failures in knowledge management. Many of these have been with complex, IT-based 'solutions' bought off-the-shelf at high cost. Often, they have been introduced much as an upgrade to a phone system would be, with no involvement from top management after the initial purchase decision and little consideration for the realities of how people work or what they might find helpful. The 'KM means IT' approach has now been largely rejected by knowledge management theorists and practitioners (if not by the software industry!), and the emphasis today is on people-centred techniques, understanding and meeting real business and knowledge needs, and fitting in with organisational culture. IT is invaluable, but it is a supporting actor, not the star.

Implementing people-centred knowledge management is not a simple purchase: it is a continuing journey with many pitfalls, and it needs to be directed by a considered strategy. Experience in other industries suggests that its most successful exponents have several factors in common:

- **Leadership**
  Visibly committed, engaged and sustained leadership from the top is vital. The detailed mechanics can be delegated, but it is up to partners or board members to walk the talk — to make their commitment visible in their personal behaviour and to follow up rhetoric with practical action.

- **Investment and priority**
  Knowledge management can be richly rewarding in the medium to long term, but some up-front investment is essential: initiatives need both substantial effort from senior staff and real expertise, if necessary bought-in. And they need to be given the priority appropriate to a strategic business initiative; allowing the merely urgent to displace them can fatally undermine the message about their importance.

A broad evidence base ...

This manual draws on practical experience from pilot trials carried out by all 9 of the architectural and engineering practices which participated in the Spreading the Word project. They represent a wide range of sizes and practice profiles:

	Staff	Offices
Aedas	950 (600 UK)	14 (9 in the UK)
Arup	7000 (3000 UK)	70 (19 UK)
BroadwayMalyan	430	10 (7 UK)
Buro Happold	950 (770 UK)	14 (6 UK)
Edward Cullinan Architects	39	1
Feilden Clegg Bradley	115	2
Penoyre & Prasad	62	1
Whitbybird	300	7 (6 UK)
WSP	5300 (1850 UK)	110 (24 UK)

Growing usage, modified rapture

Management consultants Bain run a major international survey every year to track the usage of 25 leading management tools, and satisfaction with them.

Usage of knowledge management more than doubled between 2000 and 2002 from 30 to over 60% of the firms surveyed — close to the mean for all the tools — and has remained at a similar level since. The most popular tool in 2003 was Strategic Planning (used by 89%); other popular tools included Benchmarking (84%), Customer Surveys and Customer Relationship Management (both 78%) and Core Competencies (74%). Some previously widely-touted tools are slipping out of use, including Total Quality Management and Re-engineering which are down from over 70% usage in the early 1990s to 57 and 54% respectively in 2003.

Satisfaction with knowledge management has remained fairly steady at around 3.5 on a 5-point scale (3.63 in 2003). However, this compares with a mean of nearly 3.85 and leaves knowledge management third from bottom of the satisfaction list in the 2003 survey, suggesting that many companies fail to get it right.

Strategy in practice

Many of the practices involved in Spreading the Word — notably Aedas, Buro Happold, Edward Cullinan Architects, Feilden Clegg Bradley, and Penoyre & Prasad — developed a new focus on knowledge during the project and (in most cases for the first time) took steps towards coherent strategies for knowledge management. **Edward Cullinan Architects** carried out a root-and-branch review of their knowledge and business strategies, and the relationship between them. This is described in detail in the ECA case study.

How can an expert consultant help?

It can be particularly helpful to consult an independent expert in the initial development and implementation of a knowledge sharing strategy, and later for specific tasks such as interviewing clients and making periodic 'health checks' on knowledge systems. These are different roles, and call for different approaches.

A consultant should never be commissioned simply to write a report recommending a strategy or setting out an implementation plan. In-house expertise will be needed to keep systems healthy and develop them in future, and working closely with an expert on developing the strategy and planning the practical details of implementation is one of the best ways for staff at all levels to develop it.

In roles such as interviewing and carrying out knowledge audits the value of consultants lies in their independence, so they *should* work on their own — but, again, they should discuss their results with in-house staff, not just present a report.

An independent expert can be helpful in:

- **working with the partners or board** when they set the over-arching knowledge strategy for the practice. An external adviser can contribute expert knowledge, help reduce misunderstanding, ensure that key issues are not overlooked, and generally help clear thinking — and be much more likely than colleagues to ask the challenging questions that always need to be asked.

- **providing extra effort at a senior level**. It can be very difficult to release enough of a director's, partner's or senior manager's time to think through the issues and lead knowledge initiatives effectively. An external adviser free of day-to-day business pressures can be an invaluable help, and less expensive in the long run — although top management will still need to be fully involved, and to give staff a moral lead, set an example and to authorise actions.

- **bringing insights** from work with other companies that cannot be learned from textbooks — especially in an industry like construction which is under-represented in published case studies.

- **tailoring standard approaches** to get the best out of them in the practice's particular circumstances. A textbook — or a manual like this — can only explain general principles and give examples, and every practice's aspirations, culture and existing systems are different. It takes knowledge and experience to adapt standard approaches appropriately.

- **discovering reality:** how staff *really* perceive the company's culture and management style, how well knowledge systems are *really* working and what clients *really* think about the practice's work. Efforts by staff are likely to produce misleading results, and these are tasks best done by somebody independent.

Used judiciously in roles like these, the cost of an independent expert should be amply repaid in extra business benefit.

■ Expertise and attention to detail

The basics of knowledge management are easy to understand, but (as the Bain survey shows) it is not easy to get the best out of it. One of the main reasons for disappointment is lack of adequate expertise in planning strategy and implementing systems. IT tools, procedures, management, culture and psychology interact in complex and subtle ways, and it takes considerable study and experience to understand them thoroughly and keep them all in mind. It is quite possible to develop a good system using documentary sources such as this manual as a starting point and gradually learning from experience. However, many firms have found it worth calling on help from an expert consultant to make the road to success easier, quicker and more certain.

■ Motivation

Knowledge sharing needs to be a pervasive activity, and its long-term success depends on people at both the top level and the grass roots wanting it to happen. Management push is needed to get it started, but only demand pull can sustain it. But top management and staff are motivated by different things: management by business benefits (particularly when, as in many design practices, they own the business), other staff by personal benefits such as more time to spend on the interesting parts of the job, professional recognition, or social rewards. Knowledge management systems need to deliver both.

■ Culture and practice

Knowledge sharing only succeeds when it is supported by other aspects of culture and management practice. There is no point telling people to share knowledge if (for example) they believe their authority depends on hoarding, if talking round the coffee machine is frowned on, if it is a matter of professional pride not to re-use an existing detail, or if being an active knowledge sharer (as giver or receiver) is ignored in annual appraisals. Knowledge managment initiatives need to be designed with a realistic understanding of the culture and practice in the organisation (which are often not what top management imagine them to be), and complementary change is often needed in other aspects of management.

■ Patience

It takes months, even a year or two, to get the practicalities right, for people to change their working habits, and for visible benefits to start flowing.

Clarify your business objectives

Alignment with business objectives is one of the keys to successful knowledge management: it needs to be driven by a clear view of what aspects of business performance it is intended to improve. Fuzzy objectives are confusing, and they encourage a scattergun approach which fires off ill-formed and under-resourced initiatives, overwhelms staff, and usually fails to make any real impact. Then disappointment turns to disillusionment, enthusiasm and budgets wither, and knowledge managment becomes just another discredited buzzword.

Business strategy is not an exact science, and there are many ways of thinking about it. One helpful framework was proposed by Michael Treacy and Fred Wiersema in their best-selling book 'The Discipline of Market Leaders'. Drawing on an analysis of over 40 companies, they suggested that the most successful companies achieve their success by being leaders in one of three 'value disciplines': operational excellence, product leadership and customer intimacy.

- **Operational excellence** is leadership in price and customer convenience achieved by minimising overhead, transaction and 'friction' costs and optimising business processes; the business payoff is market share. Firms like Dell, Amazon and Tesco work like this.

- **Product leadership** is based on the creation of a stream of state-of-the-art products and services by being creative, commercialising ideas quickly and relentlessly pursuing new solutions — if necessary, by making existing products obsolete. The payoff is premium pricing. Intel, Sony, Canon, and Nike exemplify this approach.

- **Customer intimacy** involves tailoring products and services to meet customers' needs better and better, and personalising offerings to help customers achieve *their* ambitions. The payoff is customer loyalty, which brings business stability, low sales costs and opportunities to develop new products and markets. Management consultants and financial advisers often use this approach, and there are notable examples in other industries as diverse as logistics, telecomms and computing.

Treacy and Wiersema suggest that the best companies excel in one discipline, and they are competitive — but not necessarily excellent — in the other two; only the most outstanding organisations are leaders in more than one. All three are feasible strategies for design practices.

Thinking deeply about a practice's value disciplines makes an excellent starting point for a knowledge strategy. Better knowledge management can raise performance in all three, whether the aim is to build on an existing strength or repair a weakness. And they call for different approaches to knowledge, both in the choice of tools and techniques and in the way they are implemented.

Operational excellence is based on doing routine things very efficiently, so the main objective of knowledge managment in this case is to develop excellent, standardised processes which are as simple and foolproof as possible. In design practice, this puts the emphasis on developing, codifying, sharing and improving best practice in both design details and business processes to minimise costs *and* to make the client's experience happy and trouble-free both pre- and post-construction.

Developing operational excellence requires rigorous, ongoing processes to discover what is working well and what less well — from the client's as well as the practice's point of view — and why; to spot mistakes, inefficiencies and successful innovations in individual projects; and to translate the lessons learned into process improvements. Techniques which can help do this include Hindsight reviews to analyse and understand project experience (involving contractor and client as well as the design team), in-depth client surveys carried out by independent interviewers, and benchmarking performance against other practices and industries.

Techniques and tools to share and codify lessons learned and to support project delivery include bespoke knowledge-rich IT systems which can provide timely prompts and checks throughout a project, standard documents and boiler-plate text ready to adapt case by case, CAD libraries, efficient document storage and retrieval, wikis, Learning Histories, and mentoring for new recruits.

Other frameworks for strategic thinking

Treacy and Wiersema's is only one of several business strategy models which have been applied to knowledge management. Another (which may be more familiar in construction) is the Balanced Scorecard.

In a knowledge management context, the Balanced Scorecard perspectives of Finance, Customers, Internal Processes and Learning and Growth translate into:

- **Financial perspective:** managing organisational knowledge and competence as resources with initiatives to codify knowledge of high business value, develop human knowledge resources (perhaps through mentoring, Foresight and Hindsight reviews and Communities of Practice), and develop tradeable Intellectual Property such as patents and databases.

- **Customer perspective:** learning about customers' aspirations and needs through market research, post-occupancy surveys and client interviews.

- **Internal process perspective:** using knowledge to increase internal efficiency, with initiatives to make information quickly and reliably available (using state-of-the-art electronic tools for managing documents, information and communications), connect people (with Yellow Pages), capture Best Practice (perhaps with Hindsight reviews), and support routine processes.

- **Learning and growth perspective:** initiatives to develop and encourage a 'learning culture', including such things as supportive staff appraisal metrics, workplace design which encourages informal interaction, Hindsight reviews and links to research.

The similarity to Treacy and Wiersema's value disciplines is unmistakable. In fact there are clear similarities between most of the business strategy models — which is why it does not really matter which one you choose. They are all just aids to thinking.

Value disciplines in practice

Several of the practices involved in Spreading the Word have elements in their knowledge management systems which focus on supporting one or other of Treacy & Wiersema's value disciplines. Examples include:

Operational excellence: Broadway Malyan's Business Process

Implemented in bespoke software, the Business Process tool gives project leaders a series of prompts, document templates and links to relevant knowledge base articles stage-by-stage through the progress of a project. It embodies the practice's accumulated knowledge about administrative procedures — both those required for legal and contractual reasons, and those it has evolved to further quality, client relationships and efficiency — and goes a long way towards ensuring that all jobs are run to a consistently high standard, while leaving project leaders free to do things differently when there is good reason. It helps staff, too, protecting them from oversights and making dull administrative tasks quicker and easier, releasing time for the interesting work.

The Business Process tool is described in detail in the Broadway Malyan case study.

Product Leadership: Aedas Studio

Aedas came into being in 2003 as the result of a succession of mergers over almost a decade. Inevitably, management attention was focused for a long time on the mergers and the successful integration of the practices, but by 2004 that process was complete enough for the focus to turn to design quality. To kick-start the process, inject new design thinking and give staff a clear signal of the new direction, Aedas created the new post of Design Director and a workspace in the London office, the Aedas Studio, specifically designed to encourage creativity and knowledge sharing. Among other features, this has a layout designed to encourage people to walk around and enable them to see what their colleagues are doing as they do so, a large magnetic wall for displaying work in progress, break-out spaces where design teams can gather for informal meetings, and a wireless network so that senior staff can move around freely.

The Studio is described in detail in the Aedas case study.

Customer Intimacy: Buro Happold's client interview programme

Buro Happold are conscious that their commercial success depends on satisfying their clients. But it is surprisingly difficult to discover what clients really think: unless a project has had serious difficulties, both client and design team have a natural inclination on completion to gloss over past irritations. To get at the unvarnished truth — whatever it is — Buro Happold have a continuing programme of client interviews carried out by an independent consultant. They find that clients will speak more frankly to an independent, and of course an independent has less incentive than a member of staff to accentuate the positive. The programme has given them insights that conventional close-out reports by staff members have never revealed.

Product leadership emphasises innovation, so there is less to gain from developing standard processes. The main aim of knowledge management in a product-leading company is to create conditions which encourage and support creativity, serendipity and lateral thinking. A rich and accessible resource of documented knowledge (from both internal and external sources) is important, but wide-ranging networks of personal contacts and — above all — talk and debate are even more so.

In design practice, useful tools and techniques include Yellow Pages to facilitate networking, high-level mentoring to boost design skills, Foresight reviews to explore new ways to design and build, wikis to encourage the widest possible participation in developing the corporate knowledge base, and workspace design to encourage serendipitous overhearing, casual conversation and the development of trust.

Customer intimacy demands that management and staff have a deep understanding of customers and earn their trust — in the case of design practices, not only of contractual clients but also of building occupants. The customer-intimate company looks far beyond the immediate objective of delivering a product that 'does what it says on the tin': it seeks to bring its capabilities to bear in achieving the customer's wider ends, and invents ways to do this more effectively than the customer realised was possible.

Famously, IBM prospered for 30 years without either a price advantage or leading-edge products by analysing what its customers wanted to achieve and offering bespoke combinations of hardware and software which would deliver the business capabilities they needed, and more. Instead of expecting customers to have the IT expertise needed to specify a system and simply taking orders for boxes, IBM expected them only to know their own businesses and sold them 'solutions' which wrapped the boxes in lucrative consultancy services. Equally famously, it failed to see that the standard desktop PC would offer enough capability for many purposes, and lost the new market to product-leaders like HP and operationally-excellent Dell; the customer-intimate company can no more afford to assume an unchanging world than any other. Today, IBM is successfully exploiting the complexities of IT-telecommunications convergence and prospering again.

Appropriate techniques for customer-intimate design practices include pre-project investigation of clients' business objectives, Foresight and Hindsight reviews involving both design team and (contractual and end-user) customers, post-project interviews with clients, and post-occupancy evaluation including occupant surveys. As well as building trust, involving customers in reviews and giving them the opportunity to express their opinions and feel they are influencing the future makes it possible to learn important lessons about their real needs that would otherwise be missed.

Post-project interviews are best carried out by independent consultants: feedback to staff is all too likely to be shaded by emotion (good or bad) and the unconscious wish to construct an acceptable memory and avoid compromising relationships. Misleading 'knowledge' can be worse than none at all.

Whatever the source, context is often crucial in sharing customer knowledge effectively, so techniques which can preserve this such as storytelling, Learning Histories and other forms of case study can be particularly useful.

Focus your effort

The concept of value disciplines is useful because it helps to clarify objectives and focus attention on what matters most — in an entire business, as Treacy and Wiersema advocate, or simply in knowledge management. But focus means choice: how do you choose which value discipline to pursue? What *are* your strengths and weaknesses, and is it better to reinforce a strength or repair a weakness? Useful pointers can be found in:

- **Self-image and aspiration**
  In owner-managed businesses like most design practices business strategy has to run with the grain of the owners' (and staff's) personal inclinations. If your real interest is practising design skills, product leadership is likely to be a more fruitful aspiration than operational excellence; if you really want to build a big business the opposite will be true. But strong interests tend to create weaknesses as well as strengths: the most innovative designers are not necessarily the best at project delivery, for example. A realistic understanding of aspirations — and any associated weaknesses — is one of the best starting points for deciding priorities in knowledge strategy.

- **Capabilities**
  An effective business strategy is also shaped by capabilities. People — and teams of people — are simply better at some things than others, and it is good policy to play to your strengths. In an established business, years of recruiting to meet current needs (and which will inevitably have favoured 'people like us') is likely to have developed a clear bias in one direction or another which can be difficult, expensive and risky to change. Knowledge initiatives can be used to reinforce these strengths, or — equally effectively — to repair the weaknesses. And when strategy *does* dictate a whole new direction for the business they can be powerful agents for change.

- **Public image**
  Public image can be a surprisingly accurate reflection of capability, though it tends to lag changes and has independent drivers of its own. If the realities of capability and public image conflict with aspiration, knowledge management can help convergence from both directions: in addition to their prime purpose of improving capability, demonstrably good processes for learning and sharing knowledge are already becoming a real marketing advantage with the more sophisticated clients.

- **Client base**
  Client base can be an important consideration in strategy. Repeat business is often the lowest risk and most profitable, but a specialist niche may offer only limited opportunities for growth. People will only pay a premium for product excellence if they recognise it, so a design practice which chooses this as its main value discipline needs sophisticated clients — and even then it may have to work hard to convince them that its innovations offer real benefits. Customer intimacy is only possible in a close and (at least potentially) long-term relationship, so it will not work with clients who habitually put every job out to tender. Inevitably, the majority of construction clients simply want to buy a necessary piece of hardware in the same way that they buy a desk or a PC — with the minimum possible cost, hassle and thought. The largest market will always be for operational excellence, and for a large practice this may inevitably be the dominant driver for strategy.

Sustainability

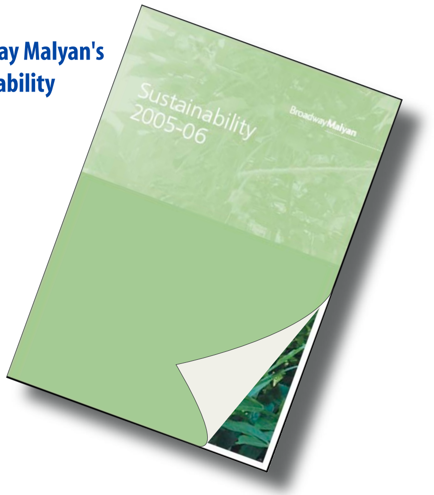
New customer aspirations and requirements create opportunities, and sustainability is no exception. A reputation for sustainable architecture can be a useful component in a strategy of product leadership, and it opens up possibilities for new services based on customer intimacy. Knowledge management can help greatly with either strategy.

As long as sustainable buildings remain a niche market it makes sense to have just a few deep experts in a practice and make their expertise and experience accessible to colleagues as and when necessary. This is better than giving everyone superficial training in the field which risks being quickly forgotten without opportunities to apply it in practice. Recent research in medical practice has shown that specialists in units with a high throughput of cases produce much better clinical results than generalists who see only one or two a year, and the same is likely to apply in design.

And when changes in regulations require universal changes in design and construction practice sharing lessons learned will help reduce the attendant crop of new problems more quickly, reducing costs and risk.

The same principles apply, of course, to other areas of specialist

Broadway Malyan's Sustainability Review



Useful definitions

Jargon can be helpful in complex subjects, and we use some later in this manual. We distinguish between **data, information and knowledge**, and talk about **tacit** and **explicit knowledge** and **codification**.

Codification simply means recording knowledge — writing it down in a technical manual or an intranet, capturing it in a video, or whatever — so that it can be shared without direct person-to-person conversation or practical demonstration.

There are no hard dividing lines between data, information and knowledge, but in a business context and broadly speaking:

- facts without context are **data**: lists of numbers, for example, or a statement like 'The bricks arrived on Monday'
- facts in a context which makes them meaningful are **information**: numbers in a profit-and-loss account, or 'The bricks which arrived on Monday should have arrived last Friday'
- **knowledge** is a set of information which is enough to be the basis for action: a profit-and-loss account *plus* enough information about a practice's business strategy and order book to decide whether to hire more staff, or a statement such as 'Bricks need to be ordered four days before they are needed'. Often, it includes an element of judgement which is missing from straightforward information.

In a nutshell, **knowledge tells you what to do**.

Data and information can exist in a computer, on a piece of paper or in someone's head (though humans are poor at remembering pure data — it takes context to make it memorable). Theorists argue about whether *knowledge* can ever exist outside a human head, and so whether it can really be codified. It is true that few written sources contain enough information to tell a reader with absolutely *no* other knowledge what to do — even instructions for assembling a flat-pack bookcase assume readers know how to use a screwdriver. Fortunately, similar professional training ensures that staff in a design practice share a great deal of basic knowledge which can be taken for granted.

The concepts of **tacit** and **explicit knowledge**, overlap too, and usage varies. Tacit is sometimes used simply as a synonym for 'not (yet) written down' and explicit as a synonym for '(already) written down', but a more useful distinction is to regard knowledge as:

- **tacit** when it can only exist in fully actionable form in somebody's head — how to swim, for example. Tacit knowledge is best shared by word of mouth or personal demonstration so that messages can be adapted to suit learners' existing level of knowledge, and learning often requires some direct personal experience as well. It can be worth codifying it as far as possible, though, to amplify word of mouth and provide a springboard for learning through experience.
- **explicit** if it *could* be conveyed well enough through an impersonal medium like a document for reading alone to be an adequate basis for action by the target readership.

Of course, operational excellence, product leadership and customer intimacy are interlinked, and knowledge initiatives can often help more than one. Some of the techniques which help product innovation, for example, can equally well help business process innovation and operational excellence. Nevertheless, it is undoubtedly helpful to think about them — and often to take action on them — separately. If analysis of a practice's business suggests that more than one value discipline would benefit from better knowledge management, they can be tackled one at a time.

Convince yourself of the benefits

Finally, clear business objectives and focus also help clarify the value of better knowledge management, and so how much it is worth investing in knowledge initiatives.

It is impossible to do conventional ROI calculations: many of the costs are hidden, and the benefits are too intangible and uncertain. In practice organisations today increasingly recognise knowledge management as a precondition for future success, and just do it. But investment decisions do not have to be based entirely on faith and hope: it is possible to put plausible bounds on the financial benefits of improved operational excellence, product leadership or customer intimacy.

All three translate into higher profits. For example, if profits are 10% of turnover, shaving 5% off costs by operational excellence — or achieving a 5% price premium through product leadership — will increase profitability by 50%. In other industries, a mere 5% increase in customer retention achieved by operational excellence has been found to increase profits by between 35 and 95% (it is not surprising that 'Customer Relationship Management' has become such a hot topic!) And without a clear strategy of customer intimacy IBM would not have grown into the giant it is today.

The profit potential of improvements in a design practice can be estimated by comparing, for example, the margins on prestige and routine projects or the cost of winning new projects from established and new clients, and then calculating the value of plausible changes in the mix.

The results can be surprising. In a 50-person practice a benefit of just 2% of turnover would repay an investment of up to one person-year of effort or its financial equivalent — perhaps a mixture of consultancy, IT systems and staff time — within 12 months. The best knowledge initiatives deliver far more.

Whatever business strategy is chosen, it is worth repeating that initiatives will only succeed if the underlying culture — in this context, people's innate sense of priorities and the forces which create it — works with rather than against knowledge activities. One of the commonest reasons for knowledge management initiatives failing is that people 'don't have the time', and that is simply a euphemism for believing 'I will be rewarded more for doing other things'. If that is what people feel, it is up to management at all levels to re-order staff priorities by changing both overt pressures such as personal appraisal criteria and time booking procedures, and the implicit messages conveyed by their own behaviour; that is an essential part of the investment. People must be in no doubt that knowledge sharing is expected, valued and rewarded.

2 Knowledge audit

Business objectives define where you want to go, but it is the realities of existing culture and practice which define the starting point for practical action. It is just as important to understand what there is to build on and what difficulties need to be overcome as to have a clear view of the objective.

The process of understanding the status quo is usually called knowledge audit. This is a specialised field in itself, and the discussion here can only be a brief summary.

Knowledge audit may address either or both of two very different things:

- **Knowledge systems:** the tools, techniques, procedures and habits through which knowledge is accumulated and shared in an organisation, how much they are used, and the organisational and cultural factors which influence their effectiveness.
- **Knowledge assets:** the actual knowledge and information in the organisation — what there is, where it is, and what business value it has.

An audit of **systems** reviews:

- the **formal mechanisms** — including libraries, information services, databases, intranets, search tools, groupware, project review procedures, training and mentoring programmes, and the tools and techniques discussed in this manual — and how they are perceived, used and valued.
- **organisational factors** such as geographical dispersion, management and workgroup structures, time booking systems, performance targets, staff appraisal metrics and reward systems, and how they appear to influence knowledge activities
- **cultural norms and values** such as whether staff typically keep personal libraries, how much they talk to nearby colleagues, whether they would phone a colleague they have never met to seek advice, and their beliefs about management's attitude to knowledge activities.

An audit of **assets** in a design practice would assess:

- what kinds of knowledge are most **critical to business success**
- what kinds and amounts of **codified** (written) **knowledge** are held in the various formal repositories such as libraries and databases
- what **tacit knowledge** (knowledge in people's heads) exists, where, and how accessible it is — essentially, who the key experts are, what their expertise is, how widely their expertise is known, and how well they share it with other people. This may involve the use of specialised tools such as Social Network Analysis.

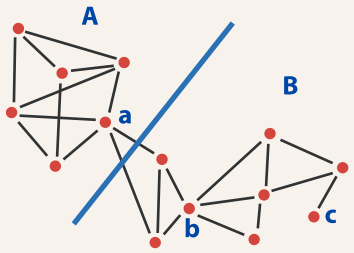
Audits reveal strengths and weakness, and they can be combined with the objectives-based analysis of needs to set priorities for initiatives and shape their details. Later, lighter audits — perhaps every other year — are an ideal way to monitor the health of an organisation's knowledge management.

Social Network Analysis

Social Network Analysis is a formal technique which can give unparallelled insight into where people turn for information and advice and how tacit knowledge actually flows between people, groups and offices — and reveal where they do *not* turn, and where knowledge is *failing* to flow.

It uses carefully-designed questionnaires to collect raw data and specialised (often computer-based) tools to analyse it and reveal patters of interaction.

In the artificial but realistic example below, it is clear even at a glance that contact between group A and group B is poor, and that it relies heavily on one or two people.



In this case, most people are reasonably well-connected. However, communication between the two groups depends entirely on two individuals a and b, and if *either* of them were absent it would be in danger of ceasing. Group B operates almost as two sub-groups, connected only by their common member b. Person b is well-connected, in frequent contact with five colleagues, in stark contrast with c, who has only one regular contact.

The implications depend on the two groups' roles, and people's individual expertise; if the groups do very different work the weak links between them may not matter, but if they work in similar fields it could be an important barrier to knowledge sharing. Person b may be richly connected because he or she is inexperienced, and seeks a lot of advice — or an expert overloaded with requests for help (a real SNA diagram uses arrows to show the predominant directions of knowledge flow).

Results like this can show where action to improve person-to-person communication would be particularly helpful, and suggest what form it should take. Depending on circumstances, this might be encouraging an isolated expert to be more helpful, recognising the contribution made by someone who is overloaded with requests for help and relieving him or her of some other work, putting people from two non-communicating groups together in a project team, or organising joint events where people can get to know each other.

Knowledge audit in practice

None of the practices involved in Spreading the Word carried out a comprehensive knowledge audit during the project, but **Whitbybird** took the first steps by reviewing what knowledge systems they had, and surveying staff by questionnaire to discover how much each of the four they judged most important are used, how effective they are perceived to be, and how they could be improved. Their survey is described in the Whitbybird case study.

Part 2: Tools and techniques

3 Foresight and Hindsight

Foresight and Hindsight are techniques both for creating knowledge and for sharing it. The discussion here focuses on their use for knowledge sharing; for a learning perspective — and for more detail on the practicalities of workshops — look at the *Learning from Experience* manual and case studies[1].

Few design processes are one-time events: most of the things designers do are variations on things they or others have done before. But (as Latham and Egan pointed out) wheels go on being re-invented, and mistakes repeated. That need not happen: a systematic approach to learning lessons from completed activities — Hindsight — and to taking existing knowledge into account in new ones — Foresight — can go a long way towards avoiding reinvention and repeated mistakes. It frees up time for creativity, too. The two techniques reinforce each other: lessons learned from Hindsight feed into Foresight, and Foresight helps make sure they are used.

Both Foresight and Hindsight focus on tacit knowledge: knowledge that exists only in people's heads, often subconsciously. As a society we invest heavily in knowledge that has been written down (codified knowledge): it is the basis for most of our formal education system, and still the mainstay of personal study. In contrast, we leave learning from the practical experience of doing a job largely to chance and we have few formal systems for sharing the lessons learned. And yet the most highly regarded knowledge is experiential: chief executives, market traders and footballers are paid for their experience, not their university degrees — because that is what creates the most business value, and because it is so hard to codify and share. As the CEO of Hewlett Packard famously remarked, "If HP knew what HP knows, we would be three times as profitable."

Foresight basics

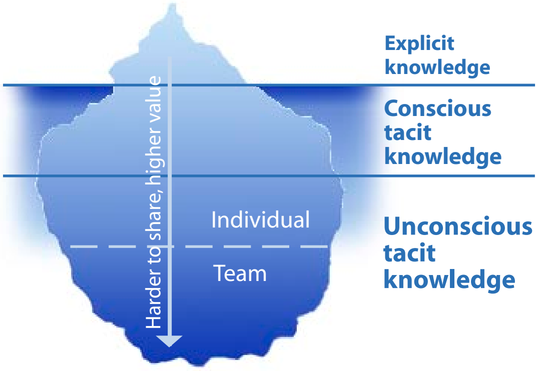
Foresight is simply a systematic process for seeking out relevant knowledge and bringing it to bear on new projects. It focuses on tacit knowledge because that is where the most of a practice's memory of previous wheels and old mistakes is stored — together with insights into how to make better wheels and avoid the mistakes — and because tacit knowledge is so often under-exploited. Equally importantly, Foresight provides a forum for interaction between fresh and experienced minds, and that can be intensely creative.

The Foresight process is based on loosely-structured discussion between a new design team and colleagues (and occasionally outsiders) who have directly relevant experience. A Foresight workshop typically involves 4-8 people and it can last from an hour to a day or more, depending on the scale of the project. It should be held right at the beginning of the project, before any decisions have been made which could fetter creativity.

The basic steps are:

- Decide on the **focus** for the workshop. It should concentrate (for example) on aspects of particular concern, or on which the team is inexperienced: the clearer its purpose and (within reason) the narrower its focus the more likely it is to be productive. 'Design', or even 'school design' are too broad; topics such as 'making natural ventilation work in a deep space' or 'cutting build time' are usually better.

- Decide on **objectives**. Do you want the workshop to produce an outline


Explicit knowledge
Conscious tacit knowledge
Unconscious tacit knowledge
Harder to share, higher value
Individual
Team

The knowledge iceberg

The business value of Foresight and Hindsight

BP credit Foresight and Hindsight (which they call 'Learn Before' and 'Learn After'), supported by an intranet where people and teams post useful information to share with everyone else, with enormous productivity gains and cost savings.

In two years, they cut the average time needed to drill a deepwater well from 100 to 42 days by using the US Army's After Action Review technique before, during and after every well to examine and share experience with their project partners and asking "What did we learn? How can we do it better next time?"

In 1998, they challenged their Alliance partnership with Bovis Lend Lease to reduce the build cost of retail petrol stations in Europe by 10%. Using Foresight techniques, the Alliance delivered $74 million of savings within a year and cut costs by 26% in two years.

Oil refineries require major refurbishments — 'Turnarounds' — which cost tens of millions of dollars every 4-5 years. In 1998, BP started a worldwide programme with the aim of becoming the industry leader in Turnarounds, and set up a structured programme of Hindsight reviews and knowledge sharing. Three of the first four Turnarounds in the programme achieved savings averaging $1 million each. The fourth saved nearly $10 million, beating its previous time by 9 days, cutting costs by 20% and increased the interval to the next one by 6 months.

BP find the same techniques work in everything they do. They have used them in business restructuring, improving chemical plant reliability and entry into new retail markets as well as in drilling wells, building petrol stations and refinery Turnarounds. And they have found that learning before, learning after and knowledge sharing do not just help make incremental improvements: they generate 'breakthrough thinking' that delivers step changes in business efficiency.

Overall, CEO Lord Browne estimated in 1997 that systematic learning and knowledge sharing had generated $4 billion worth of permanent improvements in the previous 5 years.

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[1] The Learning from Experience Manual and case studies are available from www.constructingexcellence.org.uk/resourcecentre/publications/toolkit.jsp?toolkitID=1

Keeping it in proportion

Foresight and Hindsight are not appropriate for every project. There is little value in Foresight when a project is straightforward and the design team experienced, or in Hindsight when a routine project has gone according to plan, with no good or bad surprises.

Foresight is most likely to be worthwhile when:

- a project presents unusual design, cost, time or client relationship challenges, and
- other members of the practice have more relevant experience than the design team.

Hindsight is most worthwhile when:

- a project has over- or under-run significantly in time or cost
- the design changed significantly more than usual between sketch and final design, or during construction
- more projects of a similar kind are in prospect.

In either case, the effort invested in a review should reflect its likely value.

It is worth developing rules of thumb to make it easy to decide project by project whether to carry out Foresight or Hindsight, and if so on what scale. A point scoring system is a good basis for this.

scheme, identify specific products or suppliers, or simply point you at relevant project files and exemplars?

- Decide on the **scale** of the workshop: should it be squeezed into a lunch time, take a whole afternoon, or spread over a couple of days? This will depend on the focus and objectives, and on factors such as the value of the project, how novel it is (for the project team), and the perceived risks. It is false economy to make Foresight workshops too short: it is important for people to have time to develop and articulate their thoughts and for interesting issues to be talked through, while breaks for reflection and socialising can make the discussion much more productive.

- Identify the **people** with the most relevant skills and experience. 'Yellow Pages' directories[1] are invaluable for this, but asking senior colleagues who have been with the practice for a long time can help too. (One of the disadvantages of too broad a focus is that it becomes difficult to narrow the choice.) Trust is vital to free discussion, so it is sometimes necessary to take personal compatibility into account, too.

- For all but the smallest Foresight workshops, choose an independent **facilitator**: it is very difficult for people engaged in a discussion to stand back and structure proceedings effectively, so facilitators should be neither a member of the design team nor expert in the chosen topics. Facilitation is a non-trivial skill; for important workshops, consider commissioning an external facilitator.

- Find a mutually convenient **date** and book a suitable **venue**, refreshments and facilities such as flip charts.

- **Brief** the participants on the project and the purpose of the workshop a few days in advance, to give them time to collect their thoughts.

- **Search** out books, project files, journals and photos which can illuminate the discussion: Foresight concentrates on tacit knowledge, but documentary evidence can make important contributions too.

- During the workshop, **structure** the discussion to make time for the issues in the team's mind to be articulated; other participants to describe their experience and offer their insights; the issues which emerge as most important to be debated in enough depth to give useful results (there may not be time to debate them all); and conclusions to be summed up and reviewed at the end. Maintaining the structure is one of the facilitator's main tasks.

- Most people like to take their own notes, but when discussion becomes intense it can be impossible to keep up. It is worthmaking a **recording** so that people can check back on points they missed. If possible, use a solid state or mini-disc recorder rather than tape, to make review easier.

Beyond Foresight basics

The reductions in wasted time, mistakes and risk, and the incremental improvements in design quality, that Foresight routinely achieves can give a good return on the time invested. It can, though, achieve much more.

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[1] Yellow Pages — directories containing information about staff, including their contact details, experience, interests, skills and other material — are discussed on page 28.

Psychiatrist (and cybernetics pioneer) W Ross Ashby suggested 40 years ago that a useful distinction could be made between what he called 'single-loop' and 'double-loop' learning. In recent years the idea has been developed by organisational learning guru Chris Argyris and others to become a key concept in knowledge management theory.

Single-loop learning seeks to make improvements within the boundaries of conventional thinking; double-loop learning challenges the conventional thinking and breaks through the boundaries to find radically better solutions outside. It is single-loop thinking, for example, to make offices more energy-efficient by using more efficient luminaires; it was double-loop thinking (some years ago!) to realise that energy demand could be reduced much more by designing for higher levels of daylight and using just enough electric light, under photocell control, to make up design illumination levels. And that in turn reduces the need for chillers . . .

Foresight workshops provide an ideal environment for double-loop thinking. The BP-Bovis Global Alliance's success in making radical reductions in the cost of BP's petrol stations is a good illustration of what can be done. In its first two years, the Alliance cut construction costs by 26%. During the Learning from Experience project in 2002, they carried out another Foresight exercise with a target of a further 25% cut — and achieved over 30%.

The Global Alliance's approach combined value engineering and Foresight techniques in a three-stage workshop process:

1. Reviewing **functional requirements** and information on **cost and performance** in previous projects, identifying **focus** areas where there appears to be scope for savings, and developing **criteria** for evaluating solutions. The Alliance brought information and expertise from all its teams worldwide into the process: in 2002, for example, their eventual solution included the use of a Portuguese company to supply and install the furniture and equipment in service station shops, with extensive prefabrication.

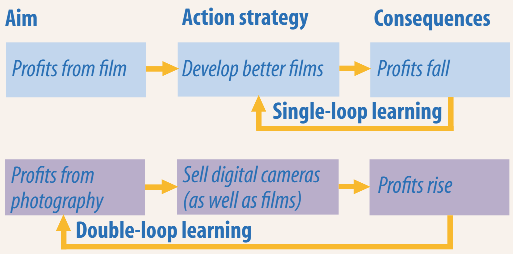
2. Looking more closely at the functional requirements of focus areas and **brainstorm** alternatives. In 2002, the Alliance team used two workshops for this. After the second, members of the team took on responsibility for working up detailed solutions for their various areas of speciality based on the ideas they liked best.

3. Reviewing the worked-up solutions and **evaluating** them on the criteria set in stage 1.

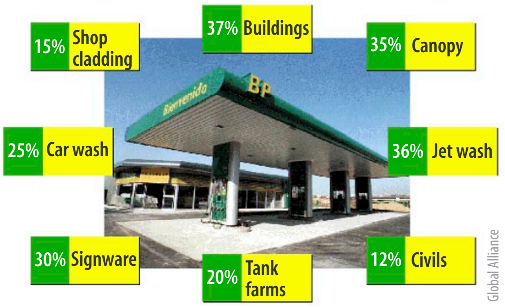
In the search for radical improvement, the Alliance stress the importance of focusing on functionality — what the system needs to do — rather than its physical nature as a way of detaching thinking from past solutions and stimulating creativity.

At root, the success of the Alliance's Foresight process is the result of making much more effective use of their corporate knowledge resources than a conventional design approach normally achieves. They stress the importance of supportive underlying conditions: a culture of learning and knowledge

Single- and double-loop learning



After decades of growth, companies like Kodak and Fuji have seen film sales and profits fall sharply in the past few years. A single-loop response would have been to do what they have always done in the past when their market share has slipped: develop better films, and cut prices. A double-loop response challenges the premise that the company makes its profits from film and opens up other possibilities, such as making digital cameras and personal photo printers — just what Kodak and Fuji have done.



Global Alliance

Cost savings in BP service stations 1996-98

Global Alliance

Foresight at BP-Bovis Global Alliance

sharing supported by visible commitment from management, appropriate incentives, and good processes. In Bovis Lend Lease, for example, other knowledge sharing processes include Communities of Practice[1] which pool the expertise of groups of experts in specific areas from around the globe; *i*Know, a database of research; written reports and knowledge networks across the organisation; and *i*Konnect, a service which uses facilitators based in London, Sydney and New York to find answers to questions by putting people in touch with expertise elsewhere in the company.

Hindsight principles

The value of looking back at completed work and learning lessons is self-evident, and most design practices intend to carry out post-project 'close-out' reviews. The common experience is that, in practice, they rarely happen, and when they do the reports are little read. Getting on with a new project is always more appealing than doing an unrewarding chore.

This is a missed opportunity: potentially valuable lessons are forgotten, not shared, or never learned. Experience in many other industries has shown that a well-designed Hindsight process *can* work, producing tangible increases in professional skills and process efficiency while being personally rewarding for the participants as well.

The shortcomings of conventional close-out reviews are not hard to find. People are reluctant to carry them out because they know they have never found much value in the review archive, so the effort seems futile. There are no other significant rewards, and sanctions for non-completion are often non-existent; when the exist, the obvious tactic is to do the minimum which will satisfy the bureaucracy.

The reports stay unread for a variety of reasons. With the emphasis on producing a piece of paper rather than on reflecting and learning lessons (which takes time), they rarely contain information of much value. They are not written with future readers in mind, and at worst, they are little more than ticked boxes and platitudes. Potentially, many of the most valuable insights would come from recognising mistakes and the possibility of improvement, but the psychological temptation to sanitise the story and create a comfortable memory is irresistible: confident assertion of success is rewarded much more than admission of shortcomings. Inevitably, the results are short of credibility, content and interest.

Hindsight systematically addresses the shortcomings of conventional close-out reviews. It costs more, but used selectively it is very much better value. There are two main differences in the process:

- Hindsight separates gathering the facts about what happened from extracting lessons and sharing results. This makes sure that each step receives due attention, helps develop good habits of reflection and learning, keeps the purpose of each activity clear, and is more effective all round.

- It is a a group effort, involving the principal actors in the project; ideally, these include outside collaborators such as clients and contractors, and key levels below management. Experience shows that many of the most valuable insights into the reasons for successes and difficulties come from juxtaposing multiple perspectives and understanding why they differ.

Foresight and Hindsight in practice

Several of the practices involved in Spreading the Word have started to use Hindsight reviews, or variants on them. Examples include:

Hindsight

Feilden Clegg Bradley and their client Queen Mary, University of London carried out two Hindsight reviews of the multi-phase Westfield Student Village project to learn lessons and ensure that they were shared across the whole team.

FCB organised the first, immediately after completion of the first two buildings, to capture lessons as early as possible. This was attended by 7 FCB staff — including the whole design team and senior partner Richard Feilden — and 7 other key people from the QMUL projects and accommodation management teams, the structural and building services engineers, and the quantity surveyors. As a direct result, several aspects of the contract framework, programming and design for phase 3 were changed, and QMUL were so impressed that they organised a second review a year later. Attended by a larger and more diverse group of people — including the contractor — and led by an independent facilitator, this led to further lessons being learned. The QMUL Project Director commented afterwards that he was "completely sold on Hindsight reviews", and he plans to use them on all his major projects in future.

The Hindsight reviews of Feilden Clegg Bradley's Westfield Student Village project at Queen Mary University of London is described in detail in the FCB case study.

Edward Cullinan Architects have also started to use Hindsight reviews, supplementing the Design Reviews (focusing on design) and Project Reviews (focusing on process) that they hold at each RIBA work stage. They are pleased with the results, too.

ECA's experience is described in the ECA case study.

Knowledge sharing workshops at Arup

Arup have started to use facilitated review workshops to stimulate activity in their Skills Networks (their name for Communities of Practice), and to help identify key technical reports, documents and best practice to include in the projects database and the Skills Network pages on their intranet.

The knowledge sharing workshops and some of the other techniques Arup use to help their Communities of Practice share knowledge are described in the Arup case study.

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[1] Communities of Practice are discussed on page 36.

Hindsight is often based on semi-structured discussion in a workshop — as in the classical 'After Action Review' — but it can also be based on individual interviews, or a mixture of the two. Group discussion can be more productive, with one speaker sparking ideas in others; it also helps develop networks and provides social rewards. Interviews, on the other hand, score by avoiding the difficulty of gathering busy people together in one place and time. They generally allow more input from each participant, and they can be particularly useful if there is a risk of strained relations inhibiting frank discussion. The overall cost of the two approaches is usually broadly similar.

Hindsight practice: workshops . . .

Hindsight workshops are quite different from conventional project management meetings or project reviews: their purpose is reflection and learning, not making decisions, persuading people, or self-justification, and the focus is on significant events and issues; routine events are ignored. Many organisations which use Hindsight reviews find it useful to have some formal 'rules of procedure'. Until everyone becomes familiar with the process, it is helpful for the workshop leader to start by reminding participants of the aims and structure of the event and the rules of procedure. It is important that participants should understand that:

- A Hindsight workshop is a candid, non-judgemental discussion of what went well and what went less well in a project, intended to help everyone present — and other colleagues — do better in the future. Contributions will not be individually attributed in any report, and nothing anybody says will be held against them in the future.

- Everybody's contribution is equally welcome and potentially valuable; everybody is encouraged to contribute, but nobody is obliged to do so.

- Contributions should focus on personal knowledge. Objective facts, personal perceptions of events (even if subsequently found to be factually inaccurate) and the thinking behind decisions are all equally important. Nobody should speak on another's behalf, and speculation about other people's perceptions should be avoided.

- It is normal for people's views of events to differ: the differences often reveal where performance could be improved. There should be no attempt to find out 'who was right': normally, all views are legitimate reflections of the circumstances of the original experience.

- Criticism must be avoided; equally, everyone should wear a 'tough skin' and avoid interpreting as criticism perspectives which happen to conflict with their own.

Preparation for a Hindsight workshop is broadly similar to preparation for a Foresight event, but there are important differences:

- The **objective** of a Hindsight workshop is simpler than in Foresight — to learn useful lessons — but the **focus** is more diffuse. Experience suggests that it is best to concentrate on notable events — unexpected successes or technical difficulties, and shortcomings such as serious cost or time over-runs. Defining the focus involves reviewing project records to identify

The After Action Review

The After Action Review process has its roots in US Army experiments with systematic learning in the early 1970s. By the mid 1980s AARs had become a standard feature of Army training at at all levels from the platoon upwards, and the Centre for Army Lessons Learned had been established to disseminate the lessons learned throughout the Army. In the following decade, it was recognised that the value of the AAR process extended far beyond training. The habit of conducting AARs after significant events spread into all levels of Army management, and 'before action' reviews began. Former Chief of Staff Gordon Sullivan called the AAR "the key to turning the corner and institutionalising organisational learning". His book *Hope is not a method — what business leaders can learn from America's Army* became a best seller, and in the past five years the process has been taken up widely in American industry and, in this country, by BP Amoco, the BP-Bovis Alliance and others.

The AAR is an 'all-in-one' approach designed to support quick learning by project participants. Most AARs are based on meeting of participants — from the most junior to the most senior — as immediately as possible after event. A leader guides discussion through review of what actually happened (as seen from the diverse perspectives of the various participants) to establish 'ground truth' and into comparison with doctrine, procedures and objectives, to lead to insights into how things could have been done better. Reviews of the largest events — such as the actions in Kosovo — are more formal, with extensive preparation and fewer of the participants involved.

Workshop Rules of Procedure

- Nobody is required to speak, but everyone is strongly encouraged to do so
- All participants have equal status during the workshop
- Everybody speaks only about their personal experience in the information gathering phase
- Everyone recognises that subjective truth can differ from person to person
- Nobody criticises anyone else — the focus is on past truth and future improvement
- Management guarantees no recriminations

critical issues like these, and may involve contacting key people to help identify significant events and issues.

- The appropriate **scale** of the exercise (of which the workshop may only be part) will depend on the importance of the notable events and the likely value of lessons in future projects.

- Hindsight exercises involve more than administrative arrangements and workshop facilitation: they also involve reviewing project records (as noted above) and making a useful record of lessons learned, and they may involve interviewing and off-line analysis of workshop and interview records as well. The **leader** may fill all these roles, or delegate some. Most — certainly workshop facilitation, interviewing, analysis and writing up — should be done by a person or people who are independent of the project under review (it is difficult to be detached about your own work), but familiar with the project and its business context, and experienced in the relevant skills. Not everyone has the right skills or personality, so workshop leaders and interviewers should be chosen with care. As in Foresight workshops, it can sometimes be helpful to call on an experienced external facilitator.

- Decide who to **invite** to participate.

- Arrange a **date, time, venue** and **facilities**. If it is impossible to get all the key people together, consider interviewing those who cannot attend, preferably before the workshop so that the facilitator can inject their viewpoint into the discusssion. It is more important than in a Foresight event to have an electronic recording, or at least comprehensive notes, because the objective is not just to inform a project team but to produce a document which can form part of the practice's knowledge base; this usually involves further analysis after the event, and verbatim quotations are often an invaluable part of the report.

- **Brief** any participants unfamiliar with review workshops on what workshops aim to do and how they work, including the 'rules of procedure', and ask them to refresh their memories of the project.

- Develop a **plan** for the discussion based on project chronology and/or notable events, and summarise these on slides or flip charts as a visible reference. When time is limited, immediate focus on the notable events identified in the initial review is perhaps the most productive approach, but when time allows a chronological structure can be better because it allows new notable events to emerge.

Classically, an After Action Review is divided into three main phases, taking around 25, 25 and 50% of the time respectively:

1. **What** happened?
2. **Why** did it happen?
3. **How** can we do better?

In practice, this cycle may be repeated several times, for example for each of the notable events.

In the phase 1, the objective is to establish what was *supposed* to happen and what actually *did* happen — what the US Army calls 'ground truth'. This provides a solid foundation for subsequent discussion, and gives participants a clear, shared view of the interaction of people and events in critical parts of the project. Project records should be available for reference.

The objective in phase 2 is to discover *why* significant events happened as they did. In-depth research carried out by Gabriel Szulanski with the American Productivity and Quality Center showed that one of the main barriers to the spread of best practice (perhaps the largest barrier in a design practice context) was what he called 'causal ambiguity': uncertainty or misunderstanding about the real reasons why something succeeded or failed. Causal ambiguity leads to ideas being (mis)applied in situations where they cannot work well, and it can easily lead to disillusionment with knowledge sharing and retreat into mental silos. Discovering root causes involves tracing events back to specific actions and their context — repeatedly asking 'Why?' until there are no more whys to be asked.

Phase 3 is where lessons are learned. The discussion should build on the results from phases 1 and 2 to identify where improvements can be make, and how. It is not necessary to work out the full detail; it is enough to leave clear pointers to where solutions lie.

. . . interviews

Interviews are chiefly exercises in information collection. They follow similar lines to workshops, but they can probe more deeply: project participants can reveal much more in a 40 minute interview than in a three hour workshop shared with a dozen others, they are less likely to be diverted from lines of thought, and as the undivided focus of attention they can be prompted more thoughtfully. They may also be less inhibited — but they will not have their thoughts sparked by other participants' contributions.

MIT pioneered the use of interviews in Hindsight exercises that they called 'Learning Histories'. They found that it is helpful for interviewers to work in pairs, with an internal interviewer able to recognise and ferret out critical details and an external interviewer free to ask naive questions and raise 'undiscussable' issues that the insider might avoid; this also eases the note-taking load and gives interviewers more time to think.

. . . and analysing results and sharing lessons learned

A Hindsight workshop can be an all-in-one activity, learning lessons and sharing them — if only among the participants — within the workshop itself. When interviews are used the different perspectives can only be compared and lessons extracted subsequently. And in either case, wide sharing of lessons learned requires thoughtful documentation.

Extracting lessons from interview records involves juxtaposing stories with each other and with project records to trace notable events back to their underlying causes. It may be necessary to refer back to interviewees to fill gaps as the analysis proceeds. The results often point directly to ways to avoid problems and do better in future, but with only one analyst involved rather than six or more workshop participants there is less scope for creative thinking.

Learning Histories

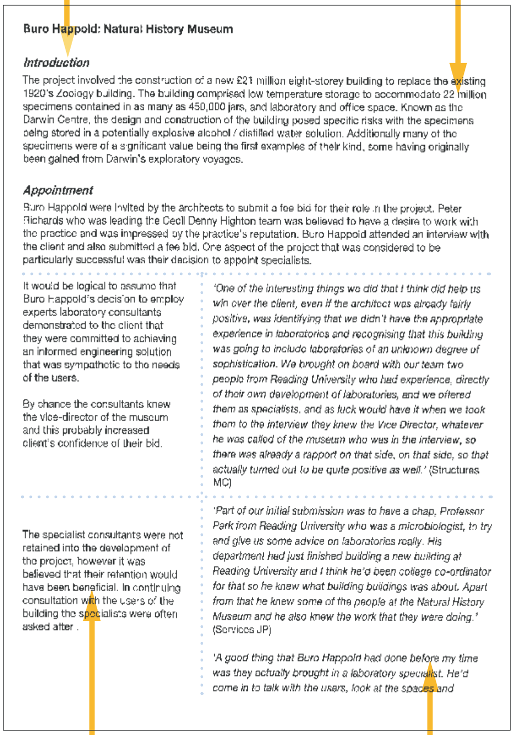
The Learning History process was developed by MIT's Center for Organizational Learning in the late 1980s from previous research on organisational learning, carried out in collaboration with the Ford Motor Co, Hewlett Packard, National Semiconductor, AT&T, Federal Express and others. The process was designed principally for use in one-off studies of major corporate events involving hundreds of people over several years: the case studies which have been published in most detail are the development of a new model car and a major corporate change programme in an international oil company. The MIT team had carried out over 15 Learning History projects by 1997.

As developed at MIT, Learning Histories probe more deeply than the AAR process and they are a better tool for learning from very complex, multi-party collaborations involving large numbers of people. They are normally carried out by a team with both 'insider' and 'outsider' members, whose different familiarity with the company culture bring complementary perspectives. Information is collected mostly in individual interviews, recorded verbatim. Interview records — supplemented by documentary information from company records — are then analysed to identify significant events during the project under study, issues and opportunities for improvement. The results are documented in a specially-designed, two column format (illustrated on the next page), which juxtaposes telling quotations from interviewees with the Learning Historian's commentary. They are disseminated through workshops where this 'Learning History' is discussed by key members of its target audience, and by circulating it more widely. Learning History exercises on the scale used by MIT are expensive — MIT have found that a large corporate-wide project can involve 150 interviews, take 30-60 person-days to conduct them, distill them and present the results in a Learning History report and workshops, and cost up to $500,000 — but the process can also be used on a much smaller scale, involving 2 or 3 days of interviews and a relatively short report, and elements of it can fruitfully be combined with an AAR-like approach.

Learning Histories have much more philosophical underpinning than AARs, which were developed as a pragmatic solution to a mangement problem. But their basic purpose is identical, and MIT's books and reports on Learning Histories offer many insights relevant to workshops and smaller Hindsight reviews.

The Learning History is organised in 'chapters' recounting particular episodes, each divided into 'segments' focussing on particular dilemmas, questions or anecdotes

The single-column prologue is based on notable facts and events that everyone agrees happened, and explains the business significance of the segment



Buro Happold: Natural History Museum

Introduction

The project involved the construction of a new £21 million eight-storey building to replace the existing 1920's Zoology building. The building comprised low temperature storage to accommodate 22 million specimens contained in as many as 450,000 jars, and laboratory and office space. Known as the Darwin Centre, the design and construction of the building posed specific risks with the specimens being stored in a potentially explosive alcohol / distilled water solution. Additionally many of the specimens were of a significant value being the first examples of their kind, some having originally been gained from Darwin's exploratory voyages.

Appointment

Buro Happold were invited by the architects to submit a fee bid for their role in the project. Peter Richards who was leading the Cecil Denny Highton team was believed to have a desire to work with the practice and was impressed by the practice's reputation. Buro Happold attended an interview with the client and also submitted a fee bid. One aspect of the project that was considered to be particularly successful was their decision to appoint specialists.

It would be logical to assume that Buro Happold's decision to employ experts laboratory consultants demonstrated to the client that they were committed to achieving an informed engineering solution that was sympathetic to the needs of the users.

By chance the consultants knew the vice-director of the museum and this probably increased client's confidence of their bid.

'One of the interesting things we did that I think did help us win over the client, even if the architect was already fairly positive, was identifying that we didn't have the appropriate experience in laboratories and recognising that this building was going to include laboratories of an unknown degree of sophistication. We brought on board with our team two people from Reading University who had experience, directly of their own development of laboratories, and we offered them as specialists, and as luck would have it when we took them to the interview they knew the Vice Director, whatever he was called of the museum who was in the interview, so there was already a rapport on that side, on that side, so that actually turned out to be quite positive as well.' (Structures MC)

The specialist consultants were not retained into the development of the project, however it was believed that their retention would have been beneficial. In continuing consultation with the users of the building the specialists were often asked after .

'Part of our initial submission was to have a chap, Professor Park from Reading University who was a microbiologist, to try and give us some advice on laboratories really. His department had just finished building a new building at Reading University and I think he'd been college co-ordinator for that so he knew what building buildings was about. Apart from that he knew some of the people at the Natural History Museum and he also knew the work that they were doing.' (Services JP)

'A good thing that Buro Happold had done before my time was they actually brought in a laboratory specialist. He'd come in to talk with the users, look at the spaces and

The left-hand column gives the learning historians' commentary, insights, questions, reflections and perspective to provoke readers into deeper thoughts

In the right-hand column, verbatim quotations from interviewees tell the story from their various points of view, identified only by their position. Research shows that stories are a particularly powerful medium for communicating insights and ideas: the context and the personal voice (which appear irrelevant at first glance) make them more understandable, memorable and credible than de-personalised 'bullet point' distillations.

The Learning History format in use at Buro Happold

Results from Hindsight can be shared in a variety of ways. At one extreme, it may be appropriate to incorporate lessons in formal procedure manuals. In other cases, it may be better to write them up as anecdotes and stories in a house magazine: research shows that personal stories often transmit knowledge more effectively than dry technical statements and bullet points. Lessons can all be documented together or separately, on their own or set in the context of the original project, and they can also be shared in talks and in dedicated knowledge-sharing workshops. This is a case for matching horses to courses: the medium (or media) and format(s) should be chosen in the light of factors such as the complexity of the lessons and the evidence for them, their potential importance, and how widely they are likely to be relevant in future work.

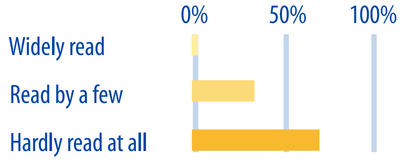
MIT found that knowledge-sharing workshops were the most effective way to convey lessons learned. They give participants an opportunity to engage actively with the lessons and the experience which gave rise to them, and to make them their own in a way that reading a report on their own or (even worse) listening passively to a presentation usually fails to do. Arup have found knowledge-sharing workshops valuable, too, for similar reasons. However, workshops are expensive unless the target audience is relatively small and geographically compact. And they do not remove the need for a documentary record: a suitable report can be helpful in focusing workshop discussions, and workshops need to be backed up by at least a simple report in a durable and accessible medium (such as a company intranet) to avoid undue reliance on memory and to pass messages on to staff who were unable to take part and others in the future.

MIT developed a special format for documenting their 'Learning History' reviews. These are divided into 'chapters' reviewing particular events, each introduced by a full-width column explaining the basic facts and their business significance. Below that, a narrow left-hand column gives the learning historian's commentary, reflections and insights, designed to provoke readers into deeper thoughts, and the right-hand column contains verbatim quotations from (anonymous) interviewees revealing their individual points of view. MIT found that the use of personal voices is a great help in making the History more understandable, memorable and credible, both for individual readers and in workshop discussions. Elements of this approach — which shares some of the characterstics of storytelling (discussed in the next chapter) — can be useful in other contexts.

4 Codifying knowledge

Codifying knowledge — writing it down — is the key to making it independent of individual people, to creating a collective and durable resource, and to assembling information which is too extensive or complex to be held in one person's head or communicated by word of mouth. It sounds obvious and simple to do, but in fact most practices struggle to share the knowledge their staff build up in everyday work. In a recent poll, 80% of practices said they carried out some kind of end-of-project reviews, but two thirds believe the reports are 'hardly read at all' and the remainder that they are only 'read by a few'; nobody thought review reports were 'widely read'. Many of the lessons learned in projects are simply forgotten. It is surprisingly difficult to document knowledge learned from experience in a way which makes it genuinely useful and easy to share.

Write-ups of design reviews, close-out reviews, internal seminars and so on are:



Results of a poll of the design practices involved in Spreading the Word

Detailed technical knowledge has always been documented: there is no real alternative to the kind of complex, highly structured, quantitative information in a British Standard, a set of drawings or a trade catalogue. But there are no widely accepted ways to codify the less formal knowledge which people have in their heads and share in conversation. Even information written down in personal notes and project records often means little without contextual knowledge and mental models which only exist in the writers' heads.

So codifying more tacit knowledge, more effectively, is essential, but difficult. And it can be expensive, too, to elicit knowedge, shape it into an effective text, and turn it into an attractive form and distribute it. There is an additional opportunity cost if people find it harder to absorb knowledge by reading than they would through conversation or direct experience. And it can be hard for them to find the information they want in a large collection of miscellaneous, ageing, documents, which are likely to fall quickly into disuse. But relying on people talking to each other has costs too, including experts' time repeating one-to-one explanations, and the consequences of their being unavailable when their knowledge is needed. All these costs grow with the size of the practice and the business value of the knowledge.

It is bad practice simply to mandate codification — for example in project close-out reports — without regard to *how* it is done: that is always wasteful and often ineffective. Without clearly understood business reasons and receptive 'customers' the costs can easily outweigh the benefits. The key to success is selectivity, choosing *what* knowledge to codify and *how* to codify it according to its value and its nature. The basic principles of choosing what to codify are simple (though the practice can be more difficult): knowledge is most worth documenting — writing it down for the first time, or assembling written and tacit fragments into a coherent form — when

- it has clear business value, for example because it enables people to design better, work more efficiently, or avoid risks, and
- many more people are likely to find it useful than actually possess it, or
- those who possess it are about to leave the practice.

It is harder to choose how; the rest of this chapter explains the main techniques.

Capturing knowledge from projects

Hindsight — and to a lesser extent Foresight — reviews are ideal opportunities to capture and codify knowledge. All the basic steps are inherent in the occasion:

Codify or just talk?

Sharing knowledge effectively in design practices needs *both* documented knowledge and face-to-face conversation — and both need to be supported by appropriate culture, procedures and tools.

But there is a choice to be made about the balance between codification and 'personalisation'. In a classic article, Hansen, Nohria and Tierney suggest that this should be based on business strategy. In research on management consultancies, they found that the leading firms tend to favour one or other of just two business strategies, and to match their approach to knowledge sharing to them:

- an emphasis on high-profit business based on offering 'creative, analytically rigorous advice on high-level problems' and bespoke solutions, and employing highly experienced staff — in Treacy and Wiersema's terms, a strategy of 'product leadership'. Firms like this (Hensen et al cite McKinsey and Bain) focus on expert mentoring, developing networks and linking people; their knowledge management systems are designed to facilitate high-level learning, conversations and the exchange of tacit knowledge, and they spend only 'moderately' on IT.

- an emphasis on large overall revenues based on offering offering 'high-quality , reliable and fast information systems', re-using standard solutions, and employing a high ratio of junior to senior staff — Treacy and Wiersema's 'operational excellence' strategy. This strategy leads firms such as Accenture and Ernst & Young to focus on developing knowledge bases of codified, re-usable knowledge and to invest heavily in IT systems to store, disseminate and make it readily acccessible.

identifying exactly the kind of notable events and issues which are worth documenting; gathering illustrative material; understanding causes; working out ways to do better; articulating all this in direct speech which readers can readily understand; and adding personal anecdotes which help bring the story to life.

Lessons learned from projects can be documented in several ways:

- by embodiment in new formal procedures or changes to existing ones
- in case studies published on the practice intranet (with links to appropriate places such as technical documentation, project pages and personal pages), or circulated electronically or in hard copy
- at more length in documents such as 'Learning Histories' which combine evidence, analysis and contextual material
- in other forms of story
- in a wiki, where lessons can be recorded alongside other information on similar topics (see next page)
- exceptionally, as video or audio recordings from which highlights can be extracted to enhance electronic documents such as case studies or Learning Histories; pictures really can be worth a thousand words.

Capturing knowledge from people

Organisations most often want to capture knowledge from individual people when their departure for another job, retirement or redundancy looms and it suddenly dawns that valuable — even crucial — knowledge will leave with them. This is really too late; people on the verge of leaving are often busy clearing up, losing interest, or (in the case of redundancy) resentful. Sharing knowledge can seem like an unwelcome chore, or even giving away a personal asset for no return. It is much better to involve all experienced staff in mentoring, Foresight and Hindsight reviews, Communities of Practice and other knowledge sharing activities as a matter of routine so that by the time they leave much of their knowledge has already been passed on.

When there is no alternative to capturing ('eliciting') knowledge from people quickly, the task should be approached systematically. There are several formal methodologies for doing this, but simple approaches can work well. Exhaustive 'brain dumps' are too time-consuming, and produce material in too unhelpful a form, to be often useful, so a good first step is to identify the expertise which is most likely to have future value, specific issues which should be addressed, and priorities, from conversation with the expert and colleagues (and when the expert is leaving, with his successor). If time allows it is useful to circulate this 'wish list' among colleagues to spark additional ideas. With the wish list as a prompt and project records to help jog memory the expert should be equipped either to write useful notes or to give fruitful interviews. Finally, the captured knowledge needs to be analysed and documented in a usable form such as one of those listed above.

MIT found in their Learning History interviews (a not dissimilar situation) that it was helpful to have two interviewers. Ideally they should have complementary skills — technical expertise and facilitation skills, for example — but in any event having two interviewers leaves one free to reflect and make notes while the other interacts. Interviews should always be recorded, to reduce the burden of note-taking, allow gaps to be filled, and provide verbatim quotations to use in documentation.

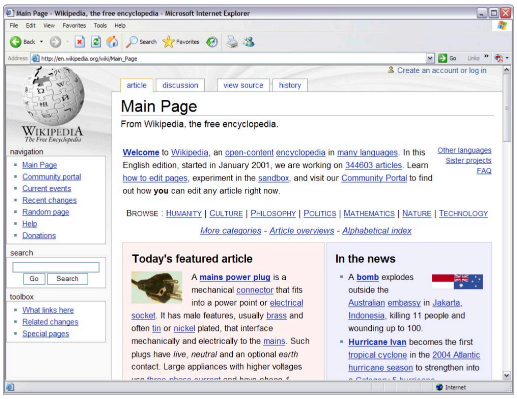
Wikis: web sites made by their users

Knowledge gained in activities such as Hindsight reviews and exit interviews is traditionally recorded in stand-alone documents of one kind or another. But stand-alone records have serious limitations:

- **Limited visibility:** the people who could benefit from them are often unaware that they exist unless they turn up in a document directory or a search hit list — and few designers seeking information in the course of a job are prepared to search (and then review multiple documents).
- **Fragmentation:** they normally contain a mixture of information on a range of topics, often in small scraps — a paragraph on site problems, a sentence on windows, a page on client relationships. This severely limits their value for practitioners who need, ideally, to have all the information relevant to the issue they are investigating collected together.
- **Lack of coherence:** stand-alone records are usually written without reference to other material on the topics they cover, so (the few) people who *are* prepared to collate information from multiple documents are likely to find duplication and contradictions.

The result is that case histories, interview records and other stand-alone documents are not good sources of just-in-time knowledge for busy practitioners, though they can have great value as educational resources. To be useful for day-to-day reference, new knowledge needs to be recorded in a way which makes it part of a visible and coherent knowledge asset, where it can easily be found. It has been almost impossible in the past to do this without a labour-intensive exercise in post-hoc review and consolidation — and of course that is still how reference documents such as British Standards are written. Wikis, invented by software engineers as team collaboration tools in the mid 1990s, provide a way. And they are equally good at recording the small scraps of knowledge which arise in everyday practice, and providing a user-friendly access framework for stand-alone documents. Not surprisingly, they are being taken up rapidly in other industries.

Wikis are discussed in depth, and there are larger screenshots, on page 32.



Main Page

From Wikipedia, the free encyclopedia.

Welcome to Wikipedia, an open-content encyclopedia in many languages. In this English edition, started in January 2001, we are working on 344603 articles. Learn how to edit pages, experiment in the sandbox, and visit our Community Portal to find out how **you** can edit any article right now.

BROWSE : HUMANITY | CULTURE | PHILOSOPHY | POLITICS | MATHEMATICS | NATURE | TECHNOLOGY

More categories - *Article overviews* - *Alphabetical index*

Today's featured article

A **mains power plug** is a mechanical connector that fits into a power point or electrical socket. It has male features, usually brass and often tin or nickel plated, that interface mechanically and electrically to the mains. Such plugs have *live*, *neutral* and an optional *earth* contact. Large appliances with higher voltages

In the news

- A **bomb** explodes outside the Australian embassy in Jakarta, Indonesia, killing 11 people and wounding up to 100.
- **Hurricane Ivan** becomes the first tropical cyclone in the 2004 Atlantic hurricane season to strengthen into

Home page of the Wikipedia

Wikipedia is a web-based encyclopedia powered by open source software, with content contributed by web users worldwide. In under 4 years, it has grown to 90 million words in over 340,000 articles, and receives nearly 10 million hits every day. *Anyone* is free to contribute.

Storytelling

With a clear focus on the *reader's* point of view, good writing style and document design, most technical knowledge can be communicated effectively in the impersonal, topic- and logic-based structures familiar from technical notes, journal articles, text books and web pages. But the conventional forms are not good at everything.

Steve Denning, newly responsible for developing knowledge management at the World Bank in 1996, found that logic and diagrams cut no ice with his colleagues: "Knowledge? We're a *bank*." And then, in casual conversation, he heard a story. In June 1995, a health worker in Kamana, Zambia logged on to the Centers for Disease Control web site in Atlanta and got the answer to a question on how to treat malaria. Denning started to use the story in his presentations to show the value of knowledge in developing countries, and found that it sparked interest in a way none of his rational arguments did. He has since developed storytelling into a sophisticated tool for communicating visionary ideas, and sharing knowledge has become a main plank in the World

The Pyramid Principle

Designers are often poor at communicating in writing. The academic paper style exemplifies many of the commoner bad habits: an inverted structure, leaving the most interesting material to the end; a morass of superfluous detail; constant interruption to cite unnecessary authorities ('it often rains in England [Bloggs, 1931]'); use of the passive voice ('x was done' instead of 'we did x'); de-personalisation; convoluted sentences; and, often, poor grammar and punctuation. Readers understand better — and understanding is the only true measure of communication — when material is organised with *their* interests in mind, and expressed more or less it would be in speech. Studies have shown that when history text books are re-written in the style of a news magazine students can recall up to three times as much information: structure and style make a real difference.

There are many guides to good writing. Two of the best for professional purposes are *The Pyramid Principle: Present your thinking so clearly that the ideas jump off the page and into the reader's mind* by writing coach Barbara Minto (FT-Prentice Hall, 2002), and the *Economist Style Guide*. The *Economist Style Guide* is available in print and, free, on the web at www.economist.com/research/StyleGuide/index.cfm. Oxford University Press's AskOxford at www.askoxford.com is another good free resource.

The importance of prior knowledge

Authors of any documents which aim to share knowledge, including stories, need to think carefully about what prior knowledge their readers can be assumed to have and the context in which they work. It is a frequent criticism of construction case studies, for example, that they lack the detail and contextual information readers need in order for them to be of practical use.

Gabriel Szulanski, now Professor of Strategy at leading business school INSEAD, carried out a landmark study of knowledge sharing based on a highly detailed study of 12 American firms. He found that many firms struggle to share best practice and other knowledge, and identified four main barriers. In decreasing order of importance, these are:

- The prior level of related knowledge, which he called 'absorptive capacity'. In Szulanski's words, 'A recipient that lacks absorptive capacity will be less likely to recognize the value of new knowledge, less likely to re-create that knowledge and less likely to apply it successfully.'

- Poor understanding and explanation of the reasons a practice worked in its original context; Szulanski called this 'causal ambiguity'. He found that people often fail to identify the factors which are crucial to success, typically because they do not belong to the group of factors which are unthinkingly *assumed* to be critical; technical experts, for example, tend to discount human factors. Even if they do understand the success factors, authors may exclude some from their explanation because they think they are politically unacceptable.

- The pre-existing relationship between source and recipient. Szulanski found that knowledge transfer often fails because a writer does not understand readers' circumstances in enough detail to know what they will find useful and what they will need to have explained; a close working relationship in the past makes communication much easier. Szulanski called the lack of this background of shared experience, common language and asssumptions 'arduous relationship'.

- Recipient motivation — which most managers expected to be the most important barrier — did prove to be a factor, but a much less important one than the others.

Bank's strategy for reducing poverty and raising living standards.

Storytelling has been emerging slowly as a topic for research and a tool for business for 30 years, and interest has snowballed since the late 1990s. It is in danger of being oversold at the moment, but there is no doubt that it can be a useful technique.

We all use stories everyday in conversation, even in a professional context: they the most natural vehicle for explaining many of our ideas, and they work well for both teller and listener. What has changed recently is an appreciation that they can be equally valuable in professional documents. Reseach has shown that stories are particularly good at:

- engaging interest
- igniting action
- sparking imagination and creativity
- making high-level ideas and abstract concepts more meaningful
- sharing knowledge in which context is crucial
- promoting norms, values and culture change
- evoking emotion
- increasing confidence.

They are also unusually memorable: many of our personal memories are encapsulated in stories, and storytellers in pre-literate societies are credited with remembering histories and myths of amazing length.

The Managing Director of management consultants Arthur D Little has suggested that stories 'may prove to be the single most powerful technique in business organizations where personal choice must be the centerpiece in making change happen'. They inspire, and they help develop competence in action rather than simply knowledge of facts.

The key features of successful stories appear to be that:

- they are about the situations in which recognisable people find themselves, what they do and why; they put action in a personal context
- they are told from the point of view of a single protagonist
- one thing leads to the next, and they have a beginning, a middle and an end: that makes them memorable (one of the classic techniques for memorising a speech is to associate each part with a walk round a familiar route)
- they include an element of surprise
- they have a positive ending
- they evoke vivid image
- they are brief, focusing on the essence of an idea
- they ring (and ideally are) true
- often, they use analogy and metaphor, leaving hearers/readers to make connections with their own situation — active engagement which makes the implications more memorable than they would be if presented ready-formed.

Storytelling missionaries insist on the importance of crafting stories with great care and polishing them with practice. This no doubt the ideal, but the evidence suggests that the main elements — a protagonist, a focus on action, brevity — are enough to make a story communicate more vividly and memorably than impersonal abstractions. The popular media invariably use 'human interest' anecdotes to help explain science and technology; MIT stress the importance of verbatim quotations in their Learning History format; and Harvard Business School bases its MBA teaching entirely on discussion of case studies.

Stories are potentially important tools in the knowledge codifier's toolkit. They can be particularly helpful in managing expansion and change, and the prominence of case studies — which are first cousins to stories — in design literature suggests that design practice is a promising area for them.

Exploiting existing documents

The mass of project documents which exist in any design office *should* be a knowledge asset. But when professionals write things down in the ordinary course of work they usually do so with their own purposes in mind, and as an appendage to all their other knowledge. The value of isolated working documents is limited, even if they are shared over an intranet — especially when volumes build up and searches start to produce forbidding numbers of hits. It can be greatly increased by identifying situations in which ready-codified knowledge would be useful to other people, imagining what they would need to know, linking fragments together, re-interpreting and distilling when necessary, adding links to experts, and filling gaps by codifying key tacit knowledge to create a coherent, shareable, actionable 'knowledge assets' — real 'know-*how*'.

This can be well worth doing. Communities of Practice (where they exist) often contain the best people to do it: they have the expertise and authority, they can share the work to make it less of a chore, and they are well placed to act as guardians of the knowledge, reviewing it and refreshing it from time to time. Novice members of a community can contribute, too, by helping the experts understand the user's perspective.

However, the process demands significant amounts of expert effort, so in practice it is only an economic option for high-value knowledge. This may change to some degree with the emergence of intelligent search software which can analyse the meaning of text and find relevant documents without human intervention. One of the best-known of these systems today is Autonomy: this has a range of impressive capabilities, including analysing the words in a document a user is writing and offering a continuously-updated list of relevant material from the corporate knowledge base. At the moment Autonomy and systems like it are too expensive for all but the largest design practices, but the technology will inevitably become more affordable in the future.

Data mining

Records of knowledge transactions such as email, intranet searches, file accesses and help-desk requests reveal what knowledge people look for, what they find, and who knows what. Analysis can provide rich insights, showing which documents are valuable and which simply clutter up the system, where there are gaps, and from whom it would be most useful to capture tacit knowledge.

Email analysis calls for expensive, specialised software, but some other transactions can be analysed effectively and at much lower cost by hand. Sets of Frequently Asked Questions, for example, are a good way to make key information more accessible, and they can be compiled manually from records of help-desk requests and intranet searches.

Building a knowledge asset

In their book *Learning to Fly* (which is about knowledge management at BP), Chris Collison and Geoff Parcell use an example from the US Army to show the value of knowledge assets.

A colonel was called in at 8 o'clock on a Saturday morning to take control of an army unit sent to support local services in the aftermath of a hurricane. He had no experience of this, or any other kind of civil tasks, so he logged into the Army's Center for Army Lessons Learned website from his laptop and typed in: 'What does the Army know about hurricane clean-up?'.

Within four hours he had:

- details of how troops had been used in the last three hurricanes where the army had been asked for support
- estimates of the required budget and comparisons with out-turns
- the ten questions he should expect to be asked by CNN news when he arrived at the scene
- a list of every state and federal agency he would need to coordinate with, the name of a contact in each, and contact details for an army liaison officer currently working with each agency
- set up an advisory team to help him.

Not many designers are likely to be dropped into such a critical and unfamiliar situation at such short notice, but even in a construction context the potential value of knowledge assets which bring together key information like this is obvious.

Codifying knowledge in practice

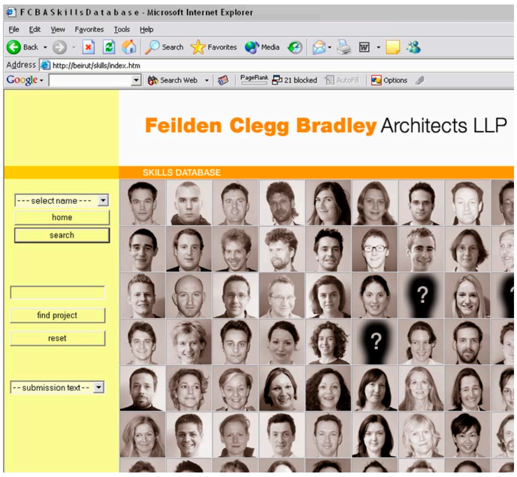
Examples of codification techniques in the case studies include:

Feilden Clegg Bradley's wiki Knowledge Base
FCB's new wiki Knowledge Base is designed to make it easy for everyone to record new knowledge as it arises, and find it quickly when they need it. FCB decided to use wikis software because it suits their traditionally collaborative, inclusive approach to knowledge better than more conventional solutions, it enabled them to integrate existing information resources into the new Knowledge Base, it is flexible and technically powerful, and is highly affordable — a winning combination.

Storytelling at Arup
Arup have started to use storytelling to meet a perceived need for a less formal vehicle for sharing knowledge, particularly in contentious areas where experiences needs to be shared between small groups (contract disputes, for example) and in areas where agreement on best practices is not yet well established. They expect it to become a key technique for knowledge sharing in communities.

FCB's wiki Knowledge Base and Arup's use of storytelling are described in more detail in the FCB and Arup case studies.

5 Yellow Pages


FCBA Skills Database - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
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Favorites
Media
Address http://beirut/skills/index.htm
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The aim of Yellow Pages is to connect people, so it is important for them to have a human face. This is the home page of Feilden Clegg's, with portraits of all the staff as clickable links to their personal pages. A drop-down list of names and a search box provide alternative ways in.

Survey after survey has shown that when designers want information their first instinct is to ask a colleague, not to search for a document. It often works. But in a practice of more than a few people, how do you know who can give you the best answer? With many colleagues, many projects, two or more offices and new people joining it is impossible to know what projects everybody has worked on and what special expertise they have; much of the practice's collective knowledge is simply beyond your ken. And the social ecology of knowledge is surprisingly fragile: Edward Cullinan Architects found that even working on two floors instead of one noticeably reduced knowledge sharing. A bigger firm can be more like a collection of knowledge villages than the vibrant city it should be. This is very wasteful: McKinsey's global survey on knowledge management in 40 major companies across the world found that the quality of systems for identifying 'who knows what' was a strong predictor of business performance.

It is tempting to think that the knowledge people carry in their heads can be made accessible to everyone by writing it down. Some can, and codification is a vital part of a balanced knowledge sharing strategy. But some of the most valuable is either inherently difficult to capture (how to lead a team, for example) or unreasonably expensive to document and keep up to date. Even when it *can* be documented, knowledge is often more easily and effectively transferred in conversation — asking someone who knows saves the effort of finding the right sources, searching through them, weeding out irrelevancies and translating from the general case to the particular, and the to-and-fro of conversation guards against misunderstanding. As McKinsey say in their report, 'personal contact is the key'.

One of the best tools for overcoming the limitations of personal acquaintance is an electronic 'Yellow Pages' directory of people and their knowledge. This is a simple idea which needs thoughtful implementation to succeed.

Basics

Yellow Pages are essentially a database which record summary information about people and their work in searchable form and makes it accessible at every desk. The contents and presentation vary. Successful systems are typically accessed through web pages, and contain ingredients such as:

- name
- photograph
- job title and business unit
- location, phone number and email address (linked either to a pop-up web mail form or a standard email client)
- qualifications and main areas of expertise (selected from a pre-defined list)
- free-text areas where people can describe their professional and — if they choose — personal interests in their own words
- membership of Communities of Practice and other networks and bodies
- links to the pages on projects worked on
- lists of useful external contacts
- links to favourite web pages (internal and external)
- a link to a printable CV
- a password-protected link to an editable version of the page
- date of last update.

Users can normally search on any combination of fields.

Yellow Pages only deliver value when they are in wide and frequent use. That only happens if people find them attractive, easy to use — both when putting data in and when getting it out — and above all rewarding. And that in turn means they need to be a rich and up-to-date source of contacts, and support the social aspects of conversation as well as provide factual information.

The IT infrastructure — templates for the web pages, and the database and search engine behind them — have to be set up as a practice-wide facility, but it is impracticable to have the content entered and maintained centrally: content ownership needs to be devolved to the individuals concerned, and given a strong management lead.

Beyond basics

BP Amoco set up their Yellow Pages system (called *Connect*) in 1997 to facilitate and encourage interaction between former BP and Amoco staff following their merger, and replace a mixed bag of local 'who's who?' directories. They started by studying how other firms like Microsoft, Glaxo Wellcome, Schlumberger and Proctor & Gamble had addressed the problem of connecting people, and planned their approach carefully. They:

- kept the design and operation of the system out of the reach of IT and HR professionals who might use it to pursue agendas which would compromise its central objective of connecting people. The only people authorised to enter and change data are page owners themselves.
- made creation of a personal page voluntary
- designed data entry pages to require no knowledge of web technicalities and elicit key information painlessly with minimum constraint (using encouraging prompts such as 'What are you currently working on?', 'What areas have you worked on in the past?', 'What subjects might you like to be contacted about?' and 'What do you enjoy doing?')
- encouraged people to include information about personal interests, and use photographs more interesting than passport mug shots — holiday snaps, for example
- persuaded the Chief Executive to create a personal page, complete with sections on his hobbies and interests
- rolled the system out first as a pilot in a relatively small part of the organisation whose management was keen, to test the design and technology and to show others what Yellow Pages would be like and could do
- promoted the system energetically, using a group of volunteer 'champions', marketing initiatives ranging from technical talks to jokey competitions, success stories sent in by appreciative users, and personal touches like thank-you emails and *Connect* pens sent to the authors of the first thousand pages.

After four years, a third of BP Amoco's 100,000 staff had created personal pages on *Connect*. The company has come to regard the system as a major business asset and it has been the inspiration for many subsequent systems in other firms.

Yellow Pages in practice

Several of the practices involved in Spreading the Word are developing their existing skills databases — which have often had disappointing usage — into fully-fledged Yellow Pages which serve people's real needs better.

Feilden Clegg Bradley

Feilden Clegg Bradley's Yellow Pages takes advantage of their much smaller staff numbers (around 100 to Arup's 7000) to take the 'human face' design even further: the home page is made up of staff portraits, each a clickable link to that person's page (see screenshot, previous page). It also has a conventional drop-down list of names and a search box. The personal pages link to relevant entries in the personnel, project and slide databases, and contain a variety of information about skills and experience. In addition to its obvious uses, FCB have given their Yellow Pages a key role in personnel management, using it to target CPD and select 'topic champions' — people nominated as prime contacts for technical advice. They also plan to make it a key reference in annual reviews.

Feilden Clegg Bradley's Yellow Pages are described in detail in the FCB case study.

Broadway Malyan

Broadway Malyan's Yellow Pages, still under development, will be even more sophisticated, tightly integrated with their other management tools and knowledge resources.

Each personal page — 'My Page' — will include:

- a summary of key and specialist skills
- contact details
- links to current and recent projects
- 'My contribution'
- CPD records
- 'Skills I can offer'
- 'My knowledge'
- 'More about me'
- tools to generate a CV and appraisal report, request a business card, and report a datbase error
- a link to 'My timesheet'.

Broadway Malyan's plansare described in more detail in the Broadway Malyan case study.

The keys to the success of *Connect* are its connectivity and psychological sophistication — a major step forward from the impersonal, stand-alone 'skills databases' and CV repositories that many firms still rely on. The primacy given to the users' point of view, the care over details of design and implementation, the emphasis on personal ownership, voluntariness and trust, and the encouragement to include personal information — both to facilitate professional communications and to offer other social rewards ('Are there any other dinghy sailors around here?') —have been crucial in persuading people to populate the database in the first place, and in making it a tool of continuing value. Without this personal dimension, and its links to other intranet resources and email, *Connect* would probably never have gained the critical mass needed to make it a useful knowledge resource.

One of their strengths of Yellow Pages is that they connect people not just to *more* people, but to people who, by virtue of geographic or professional distance, are *different*. Thirty years ago, American academic Mark Gravonetter published a paper on 'The Strength of Weak Ties' which suggested that information from people outside a person's immediate circle can be particularly valuable because it is more likely to be novel. Subsequent research has confirmed the theory, with evidence from a variety of fields including job hunting, the diffusion of ideas, and technical advice.

Other research has demonstrated that knowledge transfer is improved by mutual trust: when we trust people we are more likely to ask them questions, they are more likely to answer helpfully, and we are more likely to believe them. Mutual knowledge is an important factor in trust, and the professional and personal information in Yellow Pages can make a critical difference. It is obviously helpful to know something about a source's professional qualifications and experience, but personal details help too. Even professional conversations are facilitated by small talk; it is easier to cold-call someone when you know something more about them than just their 'skills', and they are more likely (and able) to reply helpfully if they can call up a web page within seconds which tells them something about you. People recognise this: when someone in BP decided to add the URL of their personal page to their email signature the habit rapidly spread round the company.

The value of Yellow Pages increases when they are connected into other parts of the knowledge network. For example, different people search for information in different ways, so it becomes more accessible when it can be reached by different routes and linking personal pages to project pages (and vice versa) enhances both by creating alternative paths. Signing technical documents with a personal-page URL as well as the author's name helps readers to assess their credibility, reducing the need to police contributions to the corporate knowledge base and making it easier for junior staff to contribute. Analysis of Yellow Pages usage patterns can help identify recurring issues for inclusion in 'Frequently Asked Question' databases, and 'gurus' whose knowledge is particularly valued.

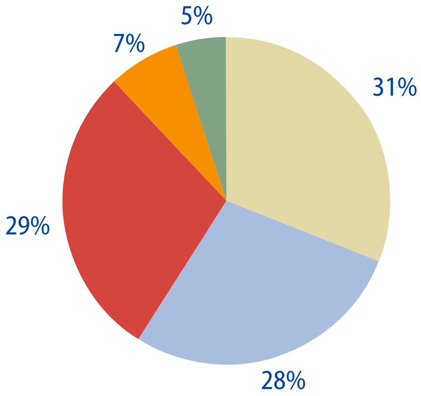
Phillips Yellow Pages system (with 13,000 personal pages in 1992) is reinforced by a number of experienced and widely-connected 'gatekeepers' who have volunteered to ensure responses to questions in specific fields. Enquirers can click a 'Walt the Snow Owl' icon and post a query, which the system automatically forwards to appropriate gatekeepers, who respond or arrange for someone else to do so. In the same spirit, staff at Texas Instruments can put ‘information wanted’ adverts on their personal pages.

And Yellow Pages can be extended usefully beyond individual, current staff. At BP Amoco, people leaving the company can ‘bequeath’ their personal page to a colleague to keep live as a fragment of the corporate memory and a continuing point of contact. IBM creates ‘personal’ pages for Communities of Practice and project teams. Others have invited important suppliers and other external collaborators to have entries in their Yellow Pages.

But Yellow Pages do not always work: they may fail to develop critical mass, or atrophy after a year or two because people stop updating their pages. The commonest cause appears to be lack of motivation: it can be difficult to persuade busy people to invest time now for unknown rewards later. And the rewards from Yellow Pages are uneven; some people find them very valuable, while others hardly use them. Compulsion, or having administrative staff create people’s pages for them, are rarely good solutions. However, some steps can be taken to reduce the effort needed to create and update pages. Basic administrative information *can* usefully be put in by administrative staff, removing the most tedious part of the process and leaving less for people to add themselves. And the addition of links to some other parts of the knowledge system, such as project pages, can be automated.

Partial alternatives to Yellow Pages are emerging in the form of software which scans electronic traffic such as email and knowledge base searches and uses tools like neural nets to locate interest and expertise. These are already being taken up by large corporations, but in design practices their high cost and need for a large volume of communications traffic to reveal useful patterns looks likely to limit their value — and the lack of a personal element is a major disadvantage.

The responses to a question in **whitbybird's knowledge audit** shows why Yellow Pages promise to be more successful than conventional skills databases:



What do you most use the Who’s Who for?

31%	phone numbers
28%	staff photos
29%	role & responsibility
7%	skills
5%	other

6 Wikis

As we have noted, stand-alone documents recording lessons learned in activities like Hindsight reviews are valuable principally as educational tools; their limited visibility, fragmentation and lack of coherence limit their usefulness as just-in-time resources for everyday design work and project management. Wikis offer a way to overcome the limitations of the traditional stand-alone document, allowing lessons learned in reviews, exit interviews and even day-to-day practice to become part of a visible, unified and coherent knowledge resource which can support practitioners effectively.

Even if they make no systematic attempt to document lessons learned, many practices maintain a 'knowledge base' of core reference material; these vary from collections of standard details to extensive series of technical reference guides. But producing knowledge bases is usually regarded as a job for acknowledged experts, and it can be very difficult for them to find the time. As a result, development and maintenance are often spasmodic activities, leading to long revision cycles and gaps in coverage. The process is also expensive, and no guarantee of excellence. Knowledge base content can be more a re-working of text-book material with a practice-specific gloss than a systematic attempt to collate accumulated lessons learned — especially when they are not well-documented in the first place — and relying on a few experts risks missing out on other people's specialist knowledge and unique experience. This can be a valuable resource — even 'acknowledged experts' probably know less about some issues than other colleagues.

Notable wiki users

Wikis are already widely used in other industries. Users of one of the most popular open source packages, TWiki, include:

Amazon.com
AT&T
Boeing
CNN
Compaq
Disney
Ericson
FedEx
Ford Motor Co
General Motors
IBM
Intel
Lockheed-Martin
Matsushita
NASA
New York Times
Nokia
Philips
SAP
Siemens
Sun
Texas Instruments
US Government
Xerox

Basics

Wikis neatly sidestep most of the problems which arise with conventional approaches to 'knowledge bases' and the documenting of lessons learned.

They are web sites in which users — usually but not necessarily *all* users — can edit existing content or add new text, images, pages, internal and external links and attached documents at any time, with no need for special software or IT expertise. They provide a framework within which new information — whether substantial or fragmentary — can be integrated seamlessly into previously-existing material, act as a portal into other resources such as Yellow Pages, and share out the development effort. Together, these features make it relatively easy to create and maintain a rich, user-friendly and up-to-date repository for a practice's codified knowledge.

Wikis were first developed by software engineers in the mid 1990s as team collaboration tools. Since then, they have spread widely and found a range of new applications. Today, they are being used for:

- **collaboration** and **general communication**, replacing tools such as discussion forums, bulletin boards, broadcast emails, and even Lotus Notes
- **web publishing** in situations where quick development and avoidance of the need for expertise in HTML and conventional web development tools are more valuable than sophisticated graphic design and technical features, such as company intranets, newsletters and short-life conference web sites
- **knowledge bases**, most impressively in the Wikipedia, a free web encyclopedia at www.wikipedia.org produced entirely by volunteer contributors which has grown to over 500,000 articles in 4 years.

Wikis in practice

Feilden Clegg Bradley's wiki Knowledge Base

FCB's new wiki Knowledge Base is based on the open-source TWiki package. It has 6 main topic headings — Buildings, Materials, Environment, Practice, IT Technical and FCBa Community — each of which is further divided into sub-topics, (General, Concrete, Masonry and so on in the Materials section, for example) with several individual pages in each sub-topic (such as InSitu and PreCast within Concrete).

They have used the same wiki software to create the main home page for the practice intranet. This links to the Skills, Project, Image and Certificate databases and a variety of other resources and administrative tools such as practice procedures, timesheets and external sites such as well as to the Knowledge Base itself.

FCB's wiki Knowledge Base is described in detail in the FCB case study.

Edward Cullinan Architects

ECA have also adopted wiki software for their knowledge base. Their knowledge strategy is described in the ECA case study.

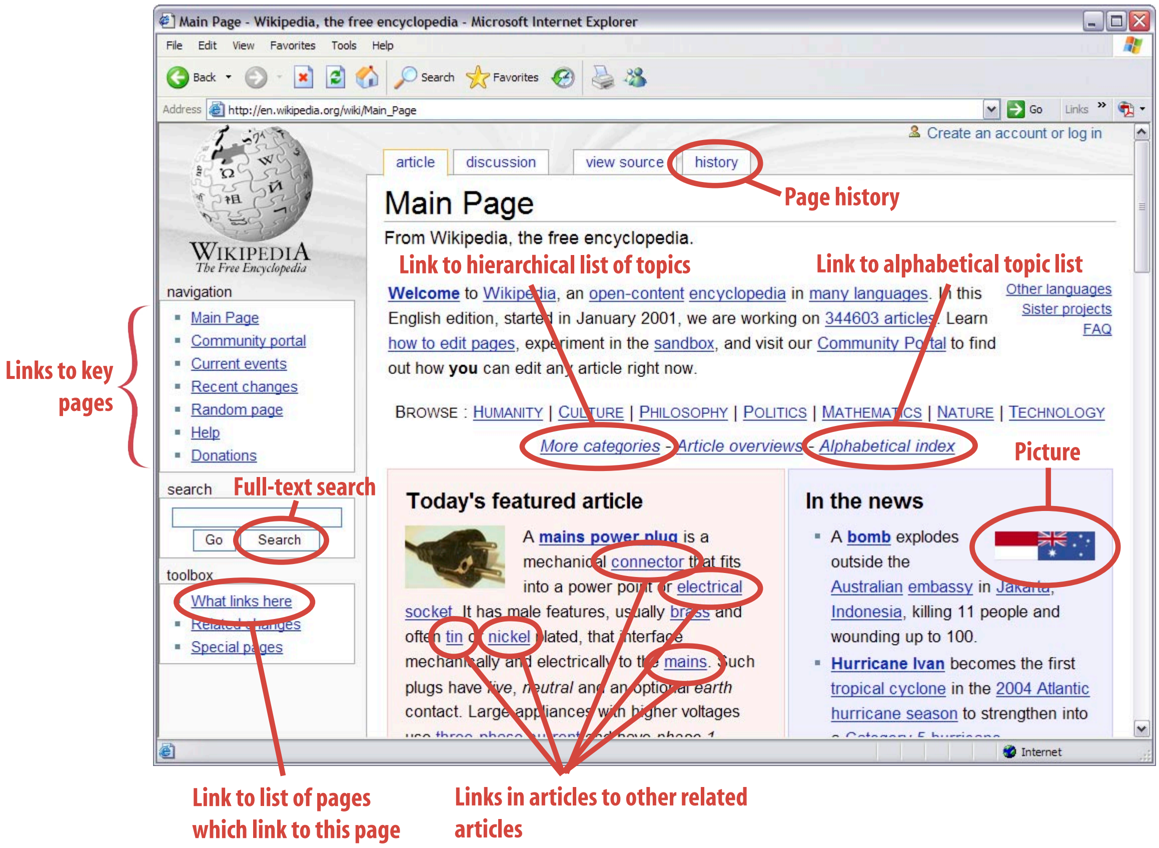
Aedas

Aedas have implemented a system with the main features of a wiki, such as in-browser content editing, in bespoke software as a part of their integrated Management Information System.

Wiki software shares a number of common technical features:

- Documents can be *created* as well as read in any web browser
- Simple editing and formatting needs only simple syntax; full HTML can also be used anywhere if users wish
- New pages are created and linked automatically on demand
- Links to stand-alone files and external web sites can be included
- All changes are signed by their author, stored, and can be reversed
- Pages are stored as HTML in a database running on a web server, controlled by a CGI (Common Gateway Interface) script
- No client-side installs are needed
- Most of the software is open source, so there are no licence fees
- The software can be changed and extended to tailor capabilities to local requirements.

Beyond the generic features, wiki software packages all have different details, and some are more appropriate for design practice than others. MediaWiki, the package used for the Wikipedia, includes most of the most useful capabilities. The home page of the Wikipedia, below, illustrates the basic features which appear on most wiki pages, including a navigation and search bar and extensive cross-referencing using internal links:


Main Page - Wikipedia, the free encyclopedia - Microsoft Internet Explorer
File
Edit
View
Favorites
Tools
Help
Back
Search
Favorites
Address
http://en.wikipedia.org/wiki/Main_Page
Go
Links
Create an account or log in
article
discussion
view source
history
WIKIPEDIA
The Free Encyclopedia
navigation
Main Page
Community portal
Current events
Recent changes
Random page
Help
Donations
search
Go
Search
toolbox
What links here
Related changes
Special pages
Internet

Main Page

From Wikipedia, the free encyclopedia.

Welcome to Wikipedia, an open-content encyclopedia in many languages. In this English edition, started in January 2001, we are working on 344603 articles. Learn how to edit pages, experiment in the sandbox, and visit our Community Portal to find out how you can edit any article right now.

Other languages
Sister projects
FAQ

BROWSE : HUMANITY | CULTURE | PHILOSOPHY | POLITICS | MATHEMATICS | NATURE | TECHNOLOGY

More categories - Article overviews - Alphabetical index

Today's featured article

A **mains power plug** is a mechanical connector that fits into a power point or electrical socket. It has male features, usually brass and often tin or nickel plated, that interface mechanically and electrically to the mains. Such plugs have *live*, *neutral* and an optional *earth* contact. Large appliances with higher voltages

In the news

- A **bomb** explodes outside the Australian embassy in Jakarta, Indonesia, killing 11 people and wounding up to 100.
- **Hurricane Ivan** becomes the first tropical cyclone in the 2004 Atlantic hurricane season to strengthen into

Page history

Link to hierarchical list of topics

Link to alphabetical topic list

Links to key pages

Full-text search

Picture

Link to list of pages which link to this page

Links in articles to other related articles

Many of these features can be found on conventional web and intranet sites; what sets wikis apart is the facility for any user with appropriate permissions to amend their content and structure. Inevitably, this leads to fears about anarchy and quality. The success of the Wikipedia — which can be changed

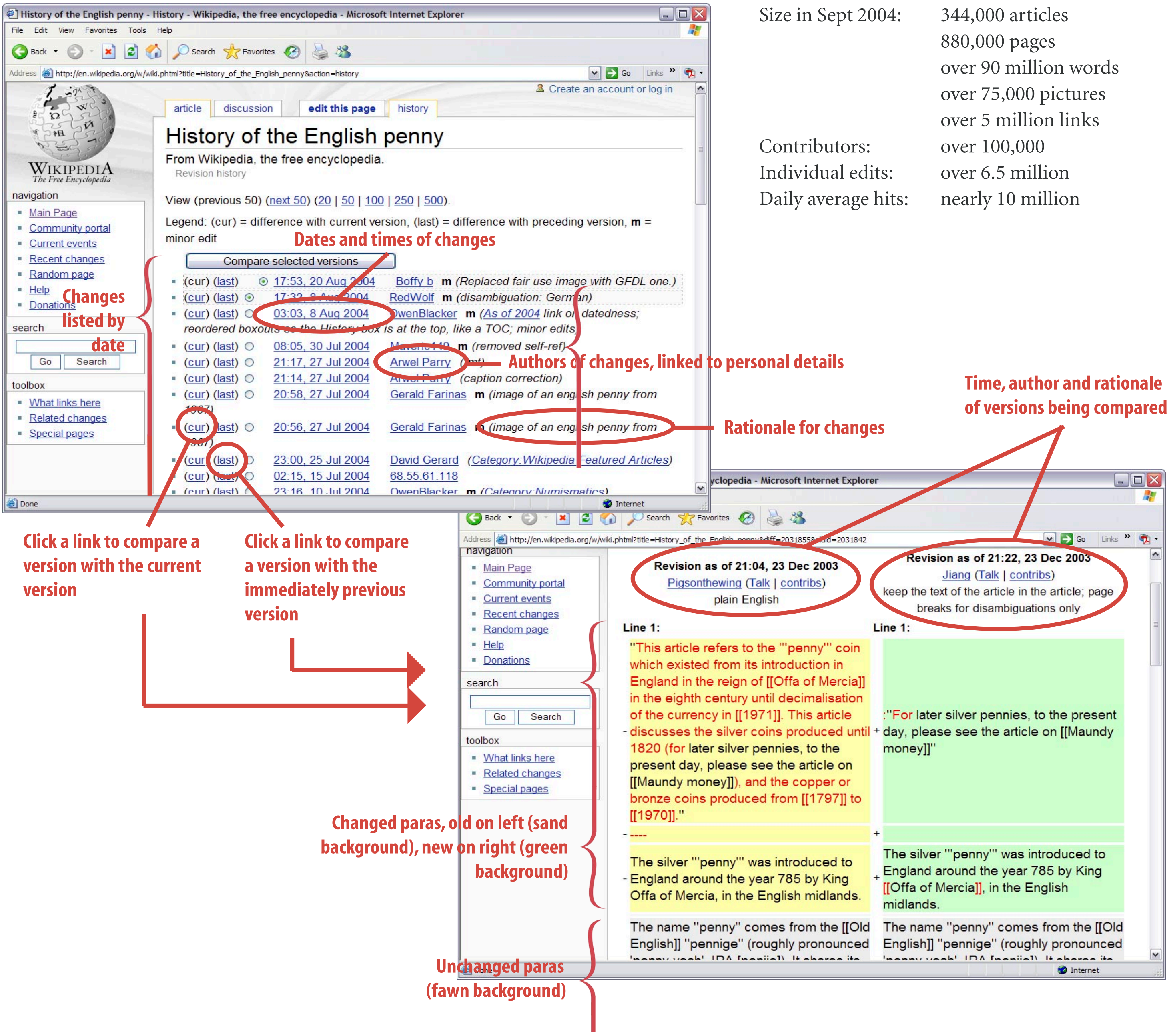
The Wisdom of Crowds

Research from the 1920s onwards (summarised in James Surowiecki's *The Wisdom of Crowds*, Little Brown, 2004) has shown repeatedly that the average estimates of matters of fact made by a group of people are more consistently accurate than estimates made by any of its individual members. It is not clear whether this 'wisdom of crowds' applies to professional judgements, but it is undoubtedly good psychology to give as many staff as possible the opportunity to contribute to a knowledge base.

freely by *anyone* who has web access, with no prior checking or accreditation — is convincing evidence that anarchy is a negligible risk. This is because wiki software includes powerful features to encourage good behaviour and allow damage to be repaired: there is social pressure to be constructive because changes are traceable to their authors, and they can all be reviewed and reversed at any time. The history and version comparison (or 'diff') pages for one article in the Wikipedia, illustrated below, show how this works. And in a design practice context traceability to authors allows doubtful users to assess the standing of information on exactly the same basis as when they ask a colleague — a less bureaucratic approach than formal validation, but one which has stood the test of time.

Another fear is that free, open source will not be scalable and robust enough to rely on in a corporate environment. Again, the Wikipedia proves otherwise:

Started:	January 2001
Size in Sept 2004:	344,000 articles
	880,000 pages
	over 90 million words
	over 75,000 pictures
	over 5 million links
Contributors:	over 100,000
Individual edits:	over 6.5 million
Daily average hits:	nearly 10 million


History of the English penny - History - Wikipedia, the free encyclopedia - Microsoft Internet Explorer
File
Edit
View
Favorites
Tools
Help
Back
Search
Favorites
Address http://en.wikipedia.org/w/wiki.phtml?title=History_of_the_English_penny&action=history
Go
Links
Create an account or log in
article
discussion
edit this page
history
WIKIPEDIA
The Free Encyclopedia
navigation
Main Page
Community portal
Current events
Recent changes
Random page
Help
Donations
search
Go
Search
toolbox
What links here
Related changes
Special pages
Done
Internet

History of the English penny

From Wikipedia, the free encyclopedia.
Revision history

View (previous 50) (next 50) (20 | 50 | 100 | 250 | 500).

Legend: (cur) = difference with current version, (last) = difference with preceding version, m = minor edit

Compare selected versions

- (cur) (last) ● 17:53, 20 Aug 2004 Boffy b m (Replaced fair use image with GFDL one.)
- (cur) (last) ● 17:32, 8 Aug 2004 RedWolf m (disambiguation: German)
- (cur) (last) ○ 03:03, 8 Aug 2004 OwenBlacker m (As of 2004 link on datedness; reordered boxouts so the History box is at the top, like a TOC; minor edits)
- (cur) (last) ○ 08:05, 30 Jul 2004 Maveric149 m (removed self-ref)
- (cur) (last) ○ 21:17, 27 Jul 2004 Arwel Parry (fmt)
- (cur) (last) ○ 21:14, 27 Jul 2004 Arwel Parry (caption correction)
- (cur) (last) ○ 20:58, 27 Jul 2004 Gerald Farinas m (image of an english penny from 1907)
- (cur) (last) ○ 20:56, 27 Jul 2004 Gerald Farinas m (image of an english penny from 1907)
- (cur) (last) ○ 23:00, 25 Jul 2004 David Gerard (Category:Wikipedia Featured Articles)
- (cur) (last) ○ 02:15, 15 Jul 2004 68.55.61.118
- (cur) (last) ○ 23:16, 10 Jul 2004 OwenBlacker m (Category:Numismatics)

...yclopedia - Microsoft Internet Explorer
Back
Search
Favorites
Address http://en.wikipedia.org/w/wiki.phtml?title=History_of_the_English_penny&diff=2031855&oldid=2031842
Go
Links
navigation
Main Page
Community portal
Current events
Recent changes
Random page
Help
Donations
search
Go
Search
toolbox
What links here
Related changes
Special pages
Internet

Revision as of 21:04, 23 Dec 2003 Pigsonthewing (Talk | contribs) plain English		Revision as of 21:22, 23 Dec 2003 Jiang (Talk | contribs) keep the text of the article in the article; page breaks for disambiguations only	
Line 1:		Line 1:	
-	"This article refers to the '''penny''' coin which existed from its introduction in England in the reign of [[Offa of Mercia]] in the eighth century until decimalisation of the currency in [[1971]]. This article discusses the silver coins produced until 1820 (for later silver pennies, to the present day, please see the article on [[Maundy money]]), and the copper or bronze coins produced from [[1797]] to [[1970]]."	+	:"For later silver pennies, to the present day, please see the article on [[Maundy money]]"
-	----	+	
-	The silver '''penny''' was introduced to England around the year 785 by King Offa of Mercia, in the English midlands.	+	The silver '''penny''' was introduced to England around the year 785 by King [[Offa of Mercia]], in the English midlands.
	The name "penny" comes from the [[Old English]] "pennige" (roughly pronounced		The name "penny" comes from the [[Old English]] "pennige" (roughly pronounced

Dates and times of changes

Changes listed by date

Authors of changes, linked to personal details

Rationale for changes

Time, author and rationale of versions being compared

Click a link to compare a version with the current version

Click a link to compare a version with the immediately previous version

Changed paras, old on left (sand background), new on right (green background)

Unchanged paras (fawn background)

Beyond basics

Feilden Clegg's experience in Spreading the Word (described in detail in the FCB case study) confirms that setting up a wiki is technically straightforward: one of their junior architects with an interest in IT installed and configured it in a few days. But, as with all the IT tools useful in knowledge management, there is more to a successful wiki than software which works. There are several things to think about and do.

What is the wiki for? It can be anything that a conventional web site can be (and more), playing a variety of roles from pure knowledge base to the foundation for a practice's entire intranet at one extreme and a short-life collaboration tool for a single project at the other — or all of these. The larger its role, the more thought needs to be given to its relationship to other knowledge management tools and procedures, to the creation of an initial structure to guide its future development, to user permissions, and to creating some formal responsibilties for management and maintenance.

Connections to other knowledge sharing activities and software systems can add enormously to a wiki's value. If it is basically a knowledge base built on the personal knowledge of experts in the practice and lessons learned from Foresight and Hindsight reviews and everybody's day-to-day experience, articles will be greatly enriched by hotlinks to appropriate records in a project database and in Yellow Pages. Project records can show the context in which the lessons were learned, or simply provide illustrative examples, while links to personal Yellow Pages provide important evidence on the standing of the articles. And Communities of Practice can be both important contributors — using the wiki as their principal publishing channel — and 'moderators', taking responsibility for keeping an eye on articles within their areas of interest and rolling back unhelpful contributions.

While there is great strength in the flexibility and adaptability of a wiki (and no real risk of anarchy) it is wise to launch it with a basic framework of topic headings and page templates in place, and to seed it with enough contributions to make it useful from the start and set the style for future contributions.

It will also need to be launched with demonstrations to its prospective users and some training in the syntax used to make contributions. This can conveniently be done in a lunchtime session of an hour or so. If there is too little material in the wiki to show off its potential, examples from the web (such as Wikipedia) can be used to supplement the in-house material. The launch event needs to be backed up with reference pages in the wiki itself, and it should be followed up by a planned series of interesting additions and reminders over six months or more to keep the system in people's minds and encourage use. It may be possible to use the wiki itself for this: some wiki software allows users to request email alerts when pages they are interested in are changed.

Finally, the wiki will need some ongoing management and maintenance. A manager is needed to continue to nurture the wiki by encouraging use and ensuring constructive links with other knowledge sharing activities, to set access permissions, and to resolve any disputes among users. And in addition to technical moderators it is usual to appoint a webmaster to deal with technical problems and keep an eye on the system as a whole.

Personal wikis and blogs

In the knowledge manager's ideal world all codified knowledge is kept in the corporate knowledge base, accessible to everyone and used by everyone. But in the real world we all keep private stores of material we find useful and do not want (or cannot be bothered) to put into 'the system' where it would harder to find, might get deleted, might be misused. *Personal* wikis can be a good home for material like this. Once wiki software is in place, it makes sense to let people create private, password-protected wikis for their own purposes — and if that makes them more adept at using wikis they are more likely to use the corporate system too.

Weblogs, usually shortened to 'blogs', are an alternative and increasingly popular form of easily updated web (or intranet) site. As their name implies they are basically diaries or journals with a page-to-a-day site structure (blog software normally provides a calendar for navigation), but they are often used as knowledge repositories as well. Their corporate uses are limited, and in a practice context personal wikis are probably a better basis for personal knowledge stores; anything blog software can do, wiki software can do too.

Medicine and law students are required to keep records of their work experience, partly to demonstrate what they have done and partly as a basis for reflective learning. The second of these purposes could make the use of informal diaries useful learning tools for architects and engineers, too, and blogs look like being an ideal medium for them.

Summary: key strengths of wikis

- Collaborative development of a knowledge base, tapping into everyone's learning and spreading the effort
- Quick, incremental additions, from a single sentence to a major article, all in context
- Robust content control with minimal 'big brother' bureaucracy and overhead cost
- Quick access to information through multiple routes — topic directory, alphabetic index, full-text search, and multiple cross-linking within the wiki and between it and outside
- Encourages contributions, use and ownership from everyone
- Complements other knolwedge management tools and resources — Yellow Pages, project databases, other intranet and web resources, Communities of Practice etc
- Also valuable as a general web publishing tool and team collaboration tool
- Well proven, cheap to acquire, maintain and use, based on common data standards (so unlikely to become obsolete and avoids lock-in to single vendor), extensible

7 Communities of Practice

Since interest in knowledge management broadened out from a narrow focus on facilitating access to codified knowledge — electronic document management writ large — Communities of Practice (CoPs) have emerged as one of the most researched and widely praised techniques for knowledge sharing.

Professional services firms today are highly task-focused and time-pressured, giving staff much less opportunity to network than they had 20 years ago. Design practices have extra handicaps, working as they do largely in short-life teams which change from project to project, often divided (even in modest-sized practices) between two or more offices, and sometimes with staff away on site for weeks or months. All this tends to inhibit the informal sharing of knowledge across the practice and leave people with special interests professionally isolated.

Matrix management was developed to resolve a similar tension between professional (or organisational) identity and the operational requirements of multi-disciplinary work. In the matrix organisation, everybody has two formal reporting lines, typically to a business unit or a professional group, and to a project team. But matrix structures have high overheads, and they can create as many new tensions and problems as they solve; they do little for the people working in them.

Communities of Practice can serve the same end, but better. They give people stable intellectual 'homes' which support knowledge, competence and innovation with minimal overheads and without competing with delivery-focused management, and they adapt organically and flexibly to the individual's and the organisation's changing interests and needs. New CoPs can form as new issues emerge (nanotechnology or renewable energy, perhaps), and old ones close when they become common knowledge, without disrupting formal organisational structures. People can join or leave CoPs — one or several — as their professional interests change, and participate as learners or experts, occasionally or often. And CoPs harness enthusiasm and foster networks and trust in a way that formal structures never do: a volunteer is worth several pressed men.

They help fill the gaps between people's personal networks, formal groups set up to carry out specific organisational tasks, and the professional institutions.

From the organisation's point of view, CoPs can:

- **improve business performance**, by giving people quick answers to questions, creating arenas for problem solving, bringing multiple perspectives into problem-solving and decision-making (and so producing better solutions), strengthening QA, and facilitating co-ordination and synergy across teams and offices.

- **develop organisational capability**, by guarding professional standards, promoting mutual understanding and shared values, building trust, developing knowledge assets, creating seed-beds for innovation, connecting the practice to external networks, and making its commitment to knowledge development visible to clients.

From community members' point of view, CoPs can:

Communities of Practice in practice

Arup Skills Networks

Among the practices involved in Spreading the Word, only Arup have well-developed Communities of Practice, their 'Skills Networks', though several others have groups with some of the charactieristics of CoPs. This is not surprising: CoPs are most obviously valuable in large, physically dispersed organisations, and where — as in engineering — there are a number of specialist and relatively well-defined skills. A critical mass of members is needed to keep a community alive, and that is impossible in an organisation which is too small, or where people do not have a long-term, focused, interests. Even in an organisation like Arup, continuing effort is needed to keep communities fresh, lively. and productive. Recently, they have been exploring ways to do this, and to make the Skills Networks more supportive of the business, using storytelling and workshops.

Arup have found stories valuable as a less formal vehicle to codify and share knowledge, particularly where there is no consensus on best practice, and where intangibles and context are central — in handling contract disputes and in architects' expectations of visual concrete, for example. And they have found that facilitated workshops are an ideal way to develop and share stories and extract key messages, as well as to support the development of more formal knowledge resources.

Arup's recent work to strengthen their Skills Networks is described in the Arup case study.

- **improve the experience of work**, giving access to expertise and confidence in one's solutions, helping meet professional challenges, and providing contacts and social structures.

- **foster professional development**, by providing forums for developing skills and expertise, networks for keeping abreast of the field, and opportunities to contribute visibly to the organisation and enhance professional reputation.

Personal benefits and enthusiasm are the real drivers for CoPs. The benefits to members with special expertise and interests, and to junior staff and new joiners, are different, but they can be equally valuable. And though the psychological commitment implied in joining encourages active participation, most of the 'work' is typically done by an enthusisatic minority, while other members simply use the network, learn, and contribute occasionally. CoPs can benefit non-members, too, even if they do not formally publish knowledge resources: research has shown that they can be important sources of knowledge for people with a passing interest who simply dip into documents and forum discussions on CoP web sites, without joining (though that need not preclude a community having private space, too). Diverse membership and participation strengthens a community.

CoPs are all about people: Arup Structural Skills Network members by the Thames

But personal interests are not enough. A dynamic Community of Practice also needs a clear connection to the practice's corporate aims and aspirations, so a degree of light-touch management involvement and oversight can pay dividends.

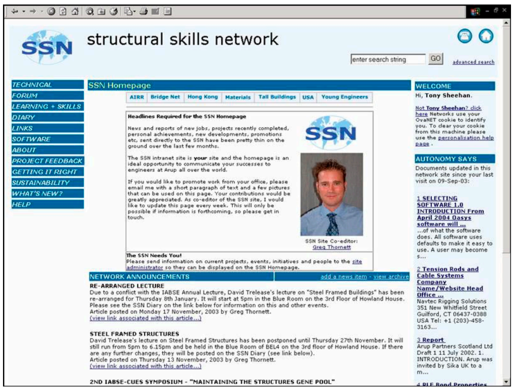
There is a mass of case study evidence that Communities of Practice can work very well in organisations with hundreds or thousands of professional staff, but little work has been done on their success in smaller organisations like the typical design practice. Clearly, they have no role in a one-man band, and probably none in a practice of ten. It is not yet known what size and other circumstances are needed to make them viable, and whether small size has any implications for their organisation. For the moment, CoPs are an experimental option for practices with fewer than 1-200 staff.

Basics

Typical CoPs:

- exist outside the formal organisational structure, but are recognised and empowered by the organisation
- cut across organisational boundaries
- have a diverse membership
- are self-organising
- have voluntary membership and participation, open to everyone
- inhabit virtual space for most purposes, communicating through phones, email, a community web site and discussion forum
- meet physically from time to time — important cement for the social fabric.

Many CoPs exist solely to provide a supportive professional network for their members, but they may also act as mentors, and become guardians of professional expertise and important originators of knowledge assets.



Headlines Required for the SSN Homepage

News and reports of new jobs, projects recently completed, personal achievements, new developments, promotions etc, sent directly to the SSN have been pretty thin on the ground over the last few months.

The SSN intranet site is **your** site and the homepage is an ideal opportunity to communicate your successes to engineers at Arup all over the world.

If you would like to promote work from your office, please email me with a short paragraph of text and a few pictures that can be used on this page. Your contributions would be greatly appreciated. As co-editor of the SSN site, I would like to update this page every week. This will only be possible if information is forthcoming, so please get in touch.

SSN Site Co-editor:
Greg Thornett

The SSN Needs You!
Please send information on current projects, events, initiatives and people to the site administrator so they can be displayed on the SSN Homepage.

RE-ARRANGED LECTURE
Due to a conflict with the IABSE Annual Lecture, David Trelease's lecture on "Steel Framed Buildings" has been re-arranged for Thursday 8th January. It will start at 5pm in the Blue Room on the 3rd Floor of Howland House. Please see the SSN Diary on the link below for information on this and other events.
Article posted on Monday 17 November, 2003 by Greg Thornett.
(view link associated with this article...)

STEEL FRAMED STRUCTURES
David Trelease's lecture on Steel Framed Structures has been postponed until Thursday 27th November. It will still run from 5pm to 6.15pm and be held in the Blue Room of BEL4 on the 3rd floor of Howland House. If there are any further changes, they will be posted on the SSN Diary (see link below).
Article posted on Thursday 13 November, 2003 by Greg Thornett.
(view link associated with this article...)

2ND IABSE-CUES SYMPOSIUM - "MAINTAINING THE STRUCTURES GENE POOL"

Hi, **Tony Sheehan**.

Not Tony Sheehan? click here Networks use your OvaNET cookie to identify you. To clear your cookie from this machine please use the personalisation help page .

Documents updated in this network site since your last visit on 09-Sep-03:

1 **SELECTING SOFTWARE 1.0 INTRODUCTION From April 2004 Oasys software will ...**
...of what the software does. All software uses defaults to make it easy to use. A user may become s...

2 **Tension Rods and Cable Systems Company Name/Website Head Office ...**
Navtec Rigging Solutions 351 New Whitfield Street Guilford, CT 06437-0388 USA Tel: +1 (203)-458-3163...

3 **Report**
Arup Partners Scotland Ltd Draft 1 11 July 2002. 1. INTRODUCTION. Arup was invited by Sika UK to a m...

4 **RLE Bond Properties**

Arup's Structural Skills Network home page

The firm's only contribution is to encourage their emergence and support them with facilities such as meeting rooms, intranet space and IT support, and sometimes a modest time budget for a co-ordinator.

Communities need a degree of housekeeping. They need a default point of contact for new members and for people seeking answers to urgent questions (a human 'Yellow Pages'), someone to keep web pages up to date and interface with IT staff to fix problems and make improvements, a moderator in the discussion forum, and an enthusiast to encourage and help organise collaborative activities and physical meetings. In many CoPs, these tasks are all taken on by a co-ordinator who volunteers for a limited period, but they can be shared out.

Communities may also have a 'mentor' who acts as the community's professional leader, and a senior management sponsor who symbolises the practice's support, ensures that it gets the resources it needs to function effectively, and helps keep it connected to business realities.

Some commentators suggest that CoPs should have Terms of Reference which spell out, in simple terms, their technical domain, their objectives, and the basic elements of their modus operandi.

New CoPs may come into being spontaneously in an organisation where others already exist and the concept is familiar, but the first one or two at least are likely to need a positive lead from management. The consensus is that they succeed best when they are built on a nucleus of existing interest, networking and expertise, so the first step in creating a community is to identify this. IBM have developed an 'Organisational Network Analysis' technique — a form of Social Network Analysis — to reveal the people who are regarded as (helpful) experts, and how knowledge flows. This involves asking a reasonable sample of people (IBM suggest 50-100, so in most design practices, everyone) some simple questions about a specific domain: 'Who do you go to for expert advice on X?', 'Who do you talk to normally?', and 'Who do you telephone on Friday night when you have a big problem with X?' The answers can be plotted as a 'spider's web' of connections, which shows who is interested in X and, usually, who are the recognised experts, and who are the people with the best networks, to whom others turn as human 'Yellow Pages' or 'knowledge brokers'.

When a domain of real interest, and the potential members and leaders of a community, have been identified, management can start the ball rolling by discussing the prospects for a CoP with the key people, making sure they understand the CoP concept, giving them startup time budgets, offering physical and IT facilities, advertising the proposal throughout the practice and making their support clear. A kick-off event over lunch, or even at an external venue, and an intellectual challenge such as a request to develop some knowledge assets, can help. If there is enough enthusiasm to go ahead, management can retreat to a role of visible but quiet support.

CoPs work because they go with the grain of people's natural inclinations: they are essentially natural networks, fertilised by encouragement and modest resources. There are some pitfalls — they may simply fail to thrive, and a few become exclusive, imperialistic and reactionary — but the evidence suggests that they are a good risk; if they do fail, little is lost. They are certainly worth serious consideration in design practice.

8 Mentoring

Mentoring — giving people a more senior 'coach' to keep a friendly eye on them, who they can watch in action, and to whom they can turn freely for advice and help — is a traditional technique for passing on both elementary knowledge about 'the way we do things round here' and high-level professional and management skills. Traditional craft apprenticeships relied on mentoring, and today it is widely used to help newcomers into organisations, and to develop high-flyers earmarked for top jobs. Superficially these could hardly be more different situations, but they share a crucial common factor: the knowledge being passed on is deeply tacit. It is equally impossible to develop an understanding of the culture of an organisation or the skills involved in cutting a fine dovetail or inspiring a team just by reading a procedure manual or listening to a lecture.

Knowledge management experts have recognised for years that the most valuable knowledge is tacit, and can only be passed on effectively by personal contact. This can be encouraged and facilitated by workspace design, workshops, Yellow Pages and Communities of Practice, but the contact they promote inevitably tends to be ad hoc and fragmented. The sustained contact necessary to pass on subtleties such as culture and the complexities of high level expertise is often better provided by mentoring.

What is the mentor for?

Mentoring can serve several different purposes, and they each call for different mentors and approaches. Perhaps the most important are:

- making **newcomers** feel at home, answering basic questions about office routine and elementary practice, and transmitting the culture. A mentor only a year or two senior is likely to be best at this, but a practice's core values, and an awareness of business issues, are often best inculcated by a partner or director. It can be worth giving newcomers two or more mentors, in parallel or in sequence.

- passing on **high-level professional skills** to staff with enough experience to absorb it. This calls for a senior mentor. It is a long-established practice in architecture, where it is a common for young architects to be allocated a senior 'uncle' or 'aunt' until they have passed their Part 3 exams (as at Edward Cullinan Architects, for example), often policy for a senior partner to be personally involved in every job (as at Penoyre & Prasad) and there may be a designated design director (as at Aedas). 'Shadowing' can be a useful variant on mentoring in this role.

- **preparing staff** for new and unfamiliar roles, particularly at senior levels.

- **retaining expertise** when people leave, especially when they have unusual skills or particularly long or senior experience. Most firms are acutely aware of the loss of expertise and corporate capability which can occur when senior staff depart. The files and the contributions to intranet pages stay, but the most valuable knowledge walks out of the door — convincing evidence for the importance of tacit knowledge, if any is needed. The only way to reduce the loss — and only if the departure can be predicted — is a planned programme of knowledge transfer beforehand, and mentoring can be one of the most effective techniques for this. Debriefing interviews can be useful, too, but it is difficult for either interviewer or interviewee to

Mentoring in practice

Several of the practices involved in Spreading the Word have used mentoring for years as a way of introducing new staff into the organisation, but only Aedas has applied mentoring principles to higher-level tacit knowledge.

Aedas Design Director

After several years in which Aedas have had to focus their main management attention on the practicalities of merging four practices into one integrated business, they are now able to think more strategically again and they have made improving design quality their first priority. Recognising that high-level design skills are largely tacit, they created a new post of Design Director to lead the process and created the Aedas Studio to provide a supportive environment for it.

The Design Director's role is to lead by example and act as a mentor for architects working in the Studio, working with them every day and using the jobs going through the office as vehicles for developing their design skills. A key part of the vision behind the initiative is that the architects in the Studio should have the free access to and sustained contact with him. Aedas believe this will generate substantially greater benefits than spreading his time across their 9 offices where he could only be a relatively remote and occasional influence — a conviction which is a key part of the rationale for mentoring. They plan that architects from the other Aedas offices will come to work in the Studio for specific jobs so that they can also benefit from process.

There is more detailed information on the role of the Design Director, and on the Studio, in the Aedas case study.

anticipate the full range of knowledge that could usefully be transferred, difficult to compress the process into the limited time typically allocated, and impossible to transfer the more deeply tacit knowledge through written interview records. Acting as a mentor — perhaps to several slightly less experienced staff — can be a much better way for people to pass on their expertise before changing job, leaving a practice or retiring.

Whatever the aims, mentoring programmes and the choice of mentors should always be informed by realistic consideration of the learners' viewpoint. Mentoring newcomers needs particular care, both because some of it will be done by staff who are relatively inexperienced themselves, and because the learners are unlikely to be assertive in shaping the experience. It is worth interviewing several joiners after 6 or 12 months to find out what kind of help newcomers most value — 'several', because individual learning styles vary widely, and a mentoring programme needs to accommodate this.

The success of mentoring always depends on the quality of the human relationship. Mentors need to welcome all questions (however trivial they seem), be accessible even when busy, have the patience to repeat explanations, be happy to share their knowledge, and have the communicative skill to do so. Not everyone makes a good mentor. And, since personal rapport depends on the fit between personalities and cognitive styles, mismatches can happen: both sides should feel free (and know who) to ask for a change where the context allows it.

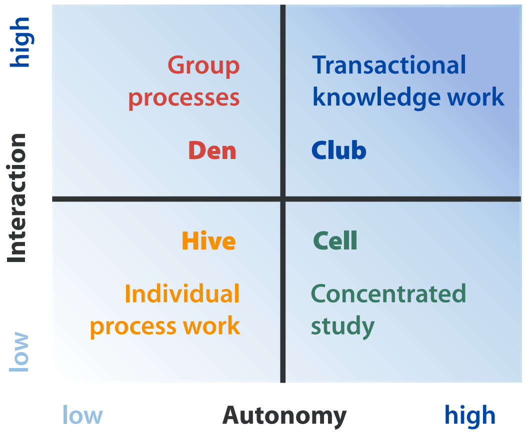
Inevitably, good mentoring takes time. Mentors' other responsibilities may need to be reduced to make space for it, and their effort should be recognised in staff appraisals. New mentors need to be briefed, and given opportunities to learn from more experienced mentors. And mentoring programmes need ongoing oversight from senior management to ensure that they remain effective and worthwhile.

Some firms combine traditional mentoring with formal management responsibilities, involving mentors in tasks such as staff appraisal — but there is a real danger with this arrangement that the formal responsibilities may undermine the trust needed for effective mentoring.

Finally, the alternatives and synergies with other knowledge activities should be considered. Communities of Practice can act as effective (if less personal) mentors, offering more professional expertise, a wider range of contacts and greater accessibility than any single person, and giving newcomers better opportunities to feed their own special expertise into the practice knowledge base. They are, though, likely to be less good than individual mentors at passing on office basics and the intangibles of culture and business awareness. Mentoring has comparable overlaps with other techniques for knowledge sharing and professional development; ideally, they should be considered together and programmes designed to be mutually supportive.

9 Workspace design

There have been attempts for at least 80 years to discover whether the physical environment affects work performance, and to improve performance by changing workspace design. Results have been erratic. Hawthorne's work in the 1920s suggested that the environment had little effect, Hertzberg's (1960s) that it was a 'hygiene factor' which could degrade performance but not improve it, more recent work that a good environment might raise productivity by as much as 50%. A CABE report this year suggests that workplace design can affect performance by 5% for individuals and 11% for teams. 1950s regimented compartments (too isolating) gave way to 1960s Burolandschaft (too public), 1980s 'universal planning' brought back identikit cells, and in the 1990s complexity returned in 'alternative officing' and Duffy's 'dens', 'clubs', 'hives' and 'cells'.



Work patterns and space (Duffy, 1997)

With hindsight, some of the reasons for this uncertainty are clear. Both research projects and design solutions tended until relatively recently to focus on one issue at a time, forgetting others which we now know to be (at least in aggregate) equally important. Without a multi-disciplinary and multi-factorial understanding of the issues, the context-specificity of research results has often been forgotten. There must be suspicion that some performance improvements attributed to design changes were really the result of management attention, just as attention from a doctor has been found to improve patients' condition without any actual therapy. And the nature of work, the tools we use, the structure and culture of organisations, and personal expectations have all changed radically since the 1920s, especially in the past 20 or so years.

There is widespread agreement today that workspaces *do* matter, and that one of their most important effects is their influence on social interaction and knowledge sharing. They are also complex, dynamic systems in which practical, personal and social needs, physical substance, symbolism and culture (and no doubt other factors) react on each other in an endless dance.

The key to business success today, suggests management theorist Richard Pascale, is to 'surf the edge of chaos': the narrow margin between the well-regulated order which makes for efficiency at doing familiar things and the anarchic freedom which responds most creatively to new challenges. Workplaces which are good for knowledge sharing surf the edge between the privacy needed for concentrated, individual work and the sociability which maximises casual interaction. But because of the complexity and subtlety of the workplace-people dynamic, a design that works well for one organisation can be a flop for another. Of all the knowledge sharing techniques discussed in this manual, workspace design is the one about which it is least possible to give clear advice.

Some evidence . . .

'Facts' are hard to come by in this field, but there is broad consensus that:

- people want — and need — to be private one minute, sociable the next. Layouts which deny choice are unpopular and reduce productivity: too much privacy reduces casual interaction; too little causes distraction.
- people have a deep need to personalise their workspace, to mark territory and create a home.
- shared social spaces are most used if they are near where people routinely walk; isolated spaces tend not to be used.

Workspace design in practice

The Aedas Studio

Aedas created their Studio as the focus for their new emphasis on design quality. It has a variety of features designed to encourage creativity and knowledge sharing, including new workbenches round which people can walk freely and see what their colleagues are doing, a large magnetic pin-up wall for displaying work in progress (the yellow wall in the lower photo, next page), break-out spaces for informal meetings, and a wireless network to allow senior staff to move around.

Buro Happold's refit of 17 Newman Street

Buro Happold's refit of 17 Newman Street has the same basic layout as the Aedas Studio, with parallel rows of workbenches and pin-up walls, but with interesting features of its own. Most of the workbenches are unusually high (1050mm, compared with the usual 725mm), with chairs to match, so that seated and standing people can talk with their heads at a similar level. Staff have personal storage trolleys which can be moved around to facilitate working in flexible groups. And there are large layout tables where people can gather around drawings.

Edward Cullinan Architects

Edward Cullinan Architects plan to reorganise their office on similar basic lines, with the same intention of making it easier for people to see what their colleagues are doing and encouraging casual conversation. To encourage walking around, they plan to position 'magnets' such as printers at the ends of the office rather than in the 'logical' position at the centre.

A further advantage of the new layout for ECA — as it is for Buro Happold — is that it enables more staff to be accommodated in the same space without crowding. At ECA, this will avoid the need to split staff between two offices and help retain the coherence and sense of community they prize.

The Aedas Studio, 17 Newman Street and ECA's plans are described in detail in the Aedas, Buro Happold and ECA case studies respectively.

- workspace design only facilitates knowledge sharing when the culture legitimises informal interaction; if casual socialising is frowned on good layout cannot compensate

- 'magnet places' where people naturally meet (such as coffee machines) can be good places to encourage interaction with features such as thought-provoking displays and white boards.

Decade-long research by Thomas Allen and others at MIT into the work of product development engineers found that:

- 80% of their ideas arose from face-to-face contact; it is difficult to discuss anything complex or abstract by phone or email

- they were four times as likely to communicate with someone 6 feet away than someone 60 feet away — and people working more than 75 feet apart hardly ever spoke

- frequency of communication also depended on the extent to which people shared a common base of knowledge, the rate at which their knowledge base was developing, the size of their organisational unit, and the degree of interdependence in their work.

Allen suggested that distance might be less of a barrier in disciplines where people read more (he cited chemists), and in cultures where people are less averse than Americans to walking.

Research at the Bartlett School of Architecture suggests that 80% of all work-related conversations are sparked by one person passing another's desk.

Researchers at BT found that:

- two people working on different floors had only a 1% chance of meeting on a given day

- 50% of office workers regularly emailed colleagues who were only 10 feet away.

Researchers at the University of Michigan found in a pilot project at Ford Motor Company that software development time was cut by two-thirds when the client, manager and programmers worked in one room, instead of being scattered around the company and communicating only in formal meetings or by phone or email.

Surveys of office workers by US office furniture manufacturer Steelcase found that:

- people's paper management preferences varied — roughly equal proportions in their survey were 'neat freaks', 'pilers' or 'filers', and smaller numbers 'packrats' or 'slobs'

- 85% or Americans personalised their offices, and of those who do 68% say it improves their attitude at work; the most popular personalisations are photographs (69%), radios or other music players (50%), paintings or posters (47%) and flowers or plants (42%)

- many office workers found their lighting inadequate: 56% say it gives them tired eyes, 30% headaches and 21% dry eyes. Only minorities found the overall level too dim or bright; what people most wanted was freedom from glare and the opportunity to adjust their own lighting levels.

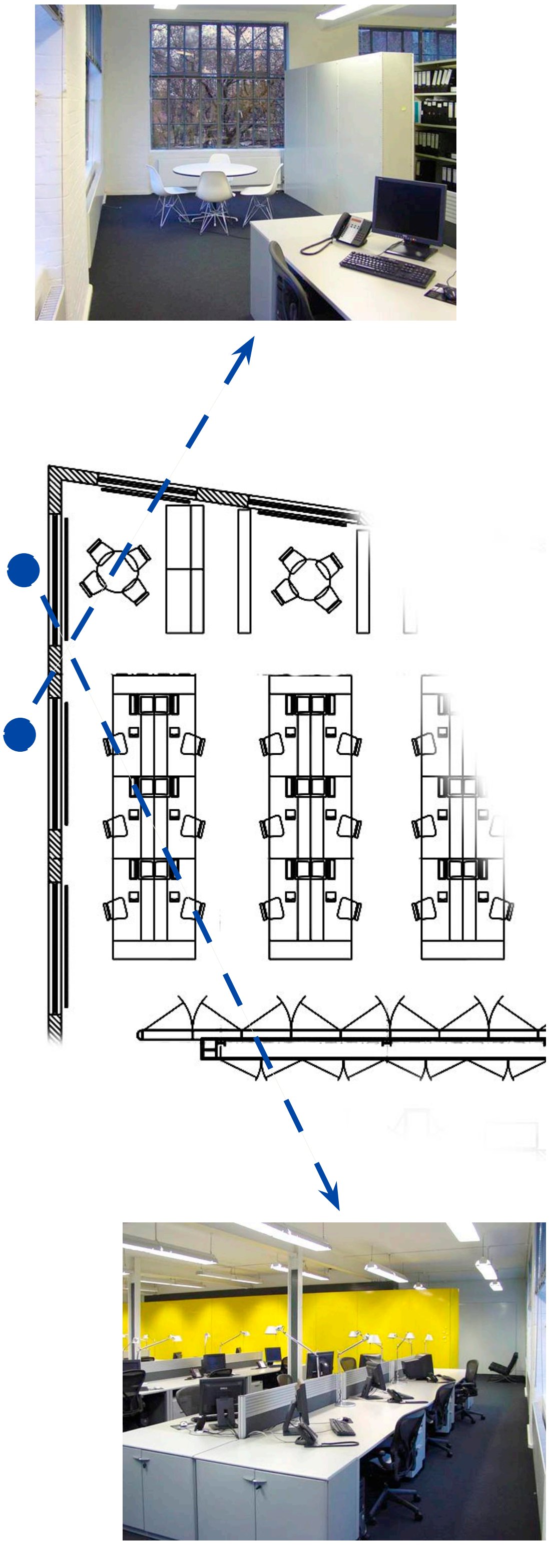
. . . and some implications

Evidence from these and other experimental studies, and the more philosophical analysis offered by writers such as Francis Duffy of DEGW, suggests that desirable features for design offices include:

- Grouping people whose work is most likely to benefit from sharing knowledge near to each other.
- Arranging individual workstations on through routes, to make casual contact possible as people walk from one place to another.
- Designing workstations so that people:
  - can easily talk to both adjacent colleagues and passers by
  - will not be distracted by other people's phones or conversations (but limited overhearing can spark fruitful contact)
  - can see who is approaching
  - can choose to be private or sociable, and easily indicate whether they are open to interruption or not
  - have the flexibility to work in different ways from their neighbours without conflict
  - can adjust their lighting and posture to suit task and mood
  - can personalise, and even reconfigure, their work place.
- Providing areas where people can choose to go to work as a team for a few minutes, hours or days ('dens'), with suitable surfaces, network access points, flip charts and whiteboards.
- Providing easily-accessible — but not too public — areas where people can have casual meetings ('clubs').
- Making 'magnet places' attractive and provide facilities to stimulate and encourage conversation.
- Good acoustics, to reduce tiring distraction and facilitate conversation.
- Consulting people to discover their functional needs and personal preferences in detail before re-designing their workplace.
- Leadership which makes the culture match the symbolism and opportunities of collaborative, social offices.

Most of these basic principles have been well documented for a decade, but they are still honoured more in the breach than in the observance — even in design offices. And they only scratch the surface: it is clear that there are many more subtle effects at work, most of which are incompletely understood. Nevertheless, they are a start.

The Aedas Studio



The case studies

This manual is not a recipe book: knowledge sharing cannot be reduced to a set of instructions which, followed mechanically, can be relied on to work. But experimentation in a wide variety of industries and organisations over the past decade has shown that the majority of needs can be met using a relatively small repertoire of basic tools and techniques, adapted to suit local circumstances of work, business aims, culture, size, geography, history, capability and finance. The nine case studies which accompany this manual show how this has been done in the design practices which took part in the Spreading the Word project — Aedas, Arup, Broadway Malyan, Buro Happold, Edward Cullinan Architects, Feilden Clegg Bradley, Penoyre & Prasad, Whitbybird and WSP.

These nine practices are highly varied: architects and engineers, from 30 staff working in a single space to 7000 in 70 offices around the world, design-led to process-led, managerially centralised to managerially dispersed, beginners to highly experienced in knowledge management, with IT skills varying from amateur to professional, and so on. Their knowledge systems are equally varied, in the tools and techniques used and in the details of how they have been implemented. The case studies describe in detail how the nine practices have translated the basic principles and techniques into concrete reality, and they discuss what has shaped recent developments in their knowledge systems, the problems they encountered, and how well they have succeeded. Their experience is a rich source of inspiration and practical tips.

Several additional, broad conclusions emerge when the experience of the nine practices is viewed together — most echoing experience in other industries. They include:

■ Leadership

Leaders need to lead: partners/directors need to be both fully committed to *and* visibly engaged in knowledge management to get the best from it. They are the only people who have a sufficiently clear and realistic view of business objectives to align knowledge systems fully with them, and who can ensure that appropriate resources are allocated to knowledge initiatives. They are the only people with a wide enough span of authority to make knowledge a pervasive consideration in management — to ensure, for example, that staff appraisals and time budgets support knowledge initiatives, and that effort is not diverted to apparently urgent but fundamentally less important work. And their involvement must be visible because people follow the lead top management set with their actions, not their words.

■ The business case

Knowledge management as such does not need cost-benefit analysis: it is becoming a pre-condition for business success. Anyway, it is possible to implement all the basic types of knowledge system at a cost easily affordable in the smallest practice: the IT elements can be implemented using open source (free) software such as TWiki or low-cost commercial packages such as FileMaker, knowledge sharing events can be held at lunchtimes to keep down staff costs, and so on. But this is not the best approach for every situation: some practices, for example, invest in all-staff awaydays where people can share knowledge away from the pressures of the office, and some commission bespoke software because they judge that this can offer valuable benefits which are beyond the scope of low cost solutions. It may well be appropriate to assess the business case for specific, relatively costly, investments like this.

Aedas

- Management Information System
- Studio

Arup

- Linking CoP activity to business
- Storytelling
- Knowledge sharing workshops

Broadway Malyan

- Business Process
- Yellow Pages
- Contact database
- Induction process

Buro Happold

- Workspace design

Edward Cullinan Architects

- Knowledge strategy

Feilden Clegg Bradley

- Hindsight review
- Yellow Pages
- Wiki Knowledge Base

Penoyre & Prasad

- Knowledge Bank

whitbybird

- Knowledge Audit

WSP

- Technical Coordinator Workshops

- **Preparation**
  Don't rush in: it can take months of thought and discussion to understand knowledge management and what it implies for a design practice, to shape an approach that suits individual circumstances, and to set individual initiatives off in the best possible direction.

- **Patience**
  Don't expect to see benefits too soon: implementing new procedures and IT systems is only a start, and it can take many months for people to learn how to use them, see their value, and develop new working habits, and longer still for benefits to become visible. Some initiatives may disappoint, and need to be reviewed, re-designed and restarted. Until they have proved themselves and become part of the culture, knowledge systems need to be given strong support from visible leadership, publicity, active evangelism, and complementary policies in other aspects of management. And some of this needs to continue as an ongoing part of the knowledge system.

- **Scale**
  Different sizes of practice need different mixes of tools and techniques. Formal systems for *codifying* (writing down) lessons learned, and for making all *codified* knowledge as easily accessible as possible, are valuable in every size of practice. We forget things, we cannot ask colleagues when they are out of the office or they have left the practice (and they can forget, too), and we all waste time searching for material which is not where we thought it was. On the other hand, formal systems for *tacit* (person-to-person) knowledge sharing are largely superfluous for a few people working in a single office; they only start to become worthwhile when numbers grow. Beyond two dozen or so staff, the benefits grow rapidly with size, and new options develop. With more than a hundred or so staff, techniques such as Communities of Practice start to become viable, and significant investments in bespoke software can start to make sense. As practices grow and disperse, good knowledge systems become increasingly crucial : without them, a large practice is really little more than a collection of small ones, and it loses much of the competitive advantage its size could bring.

- **IT**
  People are always more important than IT. The most valuable knowledge is usually tacit, and can only be shared directly person-to-person; routine and trivial knowledge is often more effectively shared person-to-person, too. Much of this can be achieved without IT, for example by mentoring, in Foresight and Hindsight reviews, and by good design of the workplace. But IT does have two indispensable roles: connecting people — through Yellow Pages and by supporting Communities of Practice, for example — and enabling codified knowledge to be stored in ways which make it easy both to put new knowledge in and to access the knowledge which is already there.

- **Expertise**
  Knowledge management isn't easy and common sense isn't enough to make a success of it: knowledge and experience are as indispensible in this field as in any other aspect of professional practice and management. They can only be acquired by study, trial and error, or working with an expert. With the time of senior staff at a premium, study and trial and error are usually more expensive than they look, and expert help can be invaluable.

Further reading

Free web resources

There are too many good knowledge management resources on the web to list here (as well as even more which are second-rate or worse). Good ones include:

KnowledgeBoard at **www.knowledgeboard.com**, a 'self-moderating global community thinking and collaborating on subjects around (but not limited to) Knowledge Management and Innovation in the worlds of business and academia'. EU-funded (and based in Bristol), KnowledgeBoard offers a library of several thousand articles for beginners, case studies, presentations and academic papers, a variety of discussion forums and other resources.

BRINT at **www.brint.com**, a US-based web portal which links to a wide range of resources on knowledge management and other business tools and techniques.

The Learning History Research Project at **http://ccs.mit.edu/lh/**: detailed information about MIT's work on Learning Histories amd how to use them.

Learning from Experience at **www.constructingexcellence.org.uk/resourcecentre/publications/toolkit.jsp?toolkitID=1**: the Learning from Experience Manual and case studies from Spreading the Word's predecessor project.

Wiki information and software is available from several sources. Wikipedia, which is perhaps the best easily-accessible example of a wiki, is at **http://en.wikipedia.org/wiki/Main_Page**. The Wikipedia iteself includes an extensive list of wiki software at **http://en.wikipedia.org/wiki/List_of_wiki_software**, with links to pages in which they are described in detail, and further links from those to sources of downloadable documentation and code where available. The TWiki package that Feilden Clegg Bradley use — which was specifically designed for business intranets — is available from **http://twiki.org/**.

Usable Buildings at **www.usablebuildings.co.uk**. The website of the Usable Buildings Trust, an independent charity which 'promotes better buildings through the more effective use of feedback'. Only peripherally concerned with knowledge management, the Trust's focus is more on product than process — on learning from the performance of completed buildings ('Post Occupancy Evaluation') rather than from within the design and construction process. The site gives free access to a large collection of very good articles and other material, and to the 'Feedback Portfolio of Techniques', an interactive tool designed to inform construction professionals about feedback techniques and understand when they can most appropriately be used.

The impact of office design on business performance, CABE, May 2005, available from **www.cabe.org.uk/publications/**. Based on research by DEGW, the Center for Building Performance and Diagnostics at Carnegie Mellon University and Arup, this recent report only deals in passing with knowledge sharing (in its terms, 'communication'), but it provides a valuable broader perspective,

Books and journal articles

There are also numerous books on the subject. Like web resources, these are variable in scope and quality. Some of the best are:

Strategy:

Knowledge Unplugged: The McKinsey & Company global survey on knowledge management, Jurgen Kluge, Wolfram Stein and Thomas Licht, Palgrave, 2001. Persuasive evidence for the business benefits of KM, and a good read.

Knowledge Management: A state of the art guide, Paul Gamble and John Blackwell, Kogan Page, 2001. One of the best general discussions of knowledge management, wide-ranging, coherent and down-to-earth, albeit concerned more with principles than practicalities. Unusually, this is a British book (Paul Gamble is a professor at Surrey) and the case studies are on (large) British and European companies.

Enabling Knowledge Creation: How to unlock the mystery of tacit knowledge and release the power of innovation, Georg von Krogh, Kazuo Ichijo and Ikujiro Nonaka, Oxford University Press, 2000. One of the classic texts, interesting as general background. It is concerned more with principles than specific techniques, and with large companies and mixed workforces.

The Discipline of Market Leaders, Michael Treacy and Fred Wiersema, Basic Books, 1995.

The Knowing-Doing Gap: How smart companies turn knowledge into action, Jeffrey Pfeffer and Robert I Sutton, Harvard Business School Press, 2000. Discusses the problem that the top management in many companies know what they should do but fail to do it.

Common Knowledge: How companies thrive by sharing what they know, Nancy M Dixon, Harvard Business School Press, 2000. Discusses knowledge sharing in five different situations: when the same team repeats the same task in a new context ('serial transfer'), transferring knowledge from one team to another doing a similar job in a similar context ('near transfer'), transferring tacit knowledge about 'non-routine' tasks between teams ('far transfer'), sharing very complex knowledge between teams ('strategic transfer'), and transferring explicit knowledge about an uncommon, specialist task ('expert transfer').

Sticky Knowledge: Barriers to knowing in the firm, Gabriel Szulanski. Reports the results of Szulanski’s detailed investigation of the causes of ‘stickiness’ — essentially failure to share and replicate good practice — in a number of major US corporations. The research was carried out in conjunction with the American Quality & Productivity Center. Solid and persuasive, but strictly a research report, not a practical guide.

If Only We Knew What We Know: The transfer of internal knowledge and best practice, Carla O'Dell and C Jackson Grayson, The Free Press, 1998. An non-academic overview of knowledge sharing from the President and Chairman of the American Productivity and Quality Centre. Rather dominated by lists: 'the four enablers of transfer', 'four pre-requisites of success' and so on. Draws extrensively on ideas from *The Discipline of Market Leaders* and *Sticky Knowledge*.

The Hidden Power of Social Networks: Understanding how work really gets done in organisations, Rob Cross and Andrew Parker, Harvard Business School Press, 2004.

Unleashing the Power of Learning: an interview with British Petroleum's John Browne, Harvard Business Review, Mar 1999 or reprint number 97507. This can be ordered in hard copy or bought as a pdf download from Harvard Business School Publishing's web site, **www.hbsp.harvard.edu**.

What's Your Strategy for Managing Knowledge?, Morten T Hansen, Nitin Nohria and Thomas Tierney, Harvard Business Review, Sept-Oct 1997 or reprint number 99206. Available as above.

Tools and techniques:

Learning in Action: A guide to putting the learning organisation to work, David A Garvin, Harvard Business School Press, 2000. A good general discussion of the learning process, specific tools and techniques, and the rationale for them.

Hope is Not a Method, Gordon R Sullivan and Michael V Harper, Broadway, 1997. The story of the US Army's transformation since the end of the Cold War, including its development and use of After Action Reviews.

Car Launch: The human side of managing change, George Roth and Art Kleiner, Oxford University Press, 2000. A detailed and readable case study on MIT Sloan School's 'Learning Histories' technique and its use to learn lessons from the development and launch of a new car model.

Oil Change: Perspectives on corporate transformation, George Roth and Art Kleiner, Oxford University Press, 2000. Another detailed case study on the 'Learning Histories', this time used in the very different context of a corporate change programme in a major international oil company.

Learning to Fly: Practical lessons from one of the world's leading knowledge companies, Chris Collison and Geoff Parcell, Capstone, 2001. A detailed, down-to-earth and readable description of BP Amoco's KM systems and the thinking behind them written in a breezy journalistic style by two of their creators.

The Springboard: How storytelling ignites action in knowledge-era organisations, Stephen Denning, Butterworth Heinemann, 2001. Tells the story of how Stephen Denning lit on storytelling as a knowledge management tool while working at the World Bank, and discusses the theory and practice in detail — probably too much detail for non-specialists.

Cultivating Communities of Practice, Etienne Wenger, Richard McDermott and William Snyder, Harvard Business School Press, 2002. Comprehensive, authoritative and readable, albeit with some bias towards managing rather than simply encouraging CoPs — an approach some other authors advise strongly against.

Continuity Management: Preserving corporate knowledge and productivity when employees leave, Hamilton Beazley, Jeremiah Boenisch and David Harden, Wiley, 2002. A detailed discussion of some of the issues raised briefly in the ssection on Mentoring.

About DBA

DBA is a consultancy specialising in the innovation process, from policy and research & innovation programme planning to knowledge management and practical implementation in industry. Founded in 1992, its clients include government departments, public bodies, research organisations and commercial companies. DBA has carried out several major projects on knowledge management in construction, and worked with many of the leading bodies and companies in the industry.

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