The Virtual Office
Applied Knowledge Management in a
Collaborative Environment

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> A virtual team with strong ownership and high motivation can achieve business goals which historically, have only been attainable by large multinational companies.

Abstract

Advanced communications networks and software have removed the traditional barriers of time and space to allow business to be performed electronically by people in different geographies, time zones and organisations. Virtual working (people working together apart) enables people to communicate and collaborate without the need to physically come together. Flare operates in the international oil industry using a virtual office in an open culture, operating within a defined framework.

Customised tools allow knowledge, information and data (KID) to be exchanged both within the company and with external interfaces such as clients, suppliers and partners as part of everyday work processes. With the appropriate processes and tools, knowledge can be effectively exchanged and re-used in the virtual environment. Flare has already seen the direct business benefits of leveraging its knowledge assets to create new business opportunities. In addition, virtual working offers financial and operational benefits to organisations and workers, through increased flexibility, reduced overhead costs and cycle times.

Operating in the niche between traditional management and technical consulting, Flare Consultants provide independent business information consulting to the international oil and gas exploration & production industry. The company consists of a core team of six consultants, four based in the South East of England and two in North America. It was decided that a physical office was both costly and un-necessary due to the nature of the work so all consultants work from their homes.

In order to work this way, a business infrastructure was required to support a number of geographical locations to enable Flare to communicate and collaborate with each other, clients, partners and suppliers regardless of physical location and time zone.

Methodology

A number of processes were carried out in order to deliver the required outcome of a virtual office environment:

Operating framework

The company has minimal physical assets; the assets of value are a combination of tacit and explicit knowledge. An operating framework was developed which placed an emphasis on exchanging knowledge as part of everyday work processes rather than discrete knowledge management initiatives (**Fig.1.**).
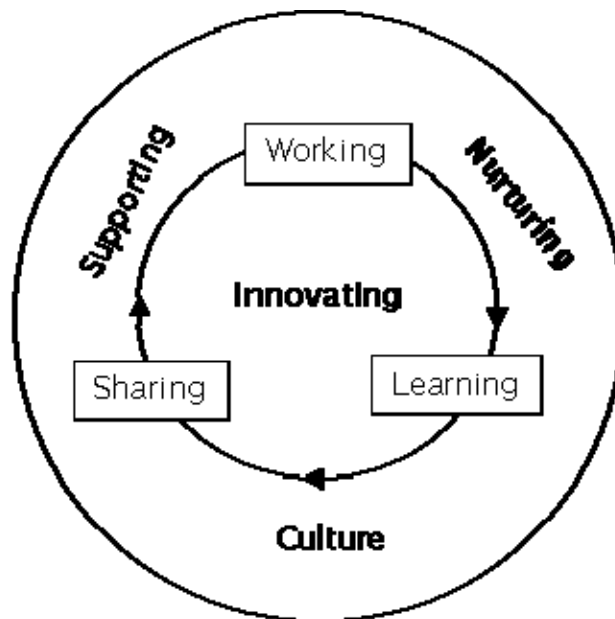

Fig.1. Operational framework

Working

The company operates as a virtual team bringing in the necessary expertise as required, disbanding and reforming virtual projects when necessary. The virtual teams include internal consultants, clients, partners and suppliers. This dynamically reconfigurable environment is essential to the success of the business.

Learning and sharing

Clearly defined and owned processes ensure the project team uses existing knowledge prior to a project, learns while doing the project and abstracts the

value - defined 'final products' on completion. This information and knowledge is then shared with the company as a whole through a variety of mechanisms discussed later.

Culture

Company culture is arguably the most important aspect in terms of exchanging knowledge and creating a successful business environment. Flare has defined four main principles within its culture:

- Open – freedom of expression
- Ownership – responsibility for actions
- Low risk – not afraid to try new things
- High trust – depend on each other

It was identified that unless this culture could be achieved, knowledge exchange and overall company performance would never reach its full potential.

Definition of Final Products

Flare's key assets are knowledge based not physical. In order to preserve and protect these knowledge assets, it was necessary to define and *publish* the 'final products' of value from business processes in order that they could be preserved in a form for re-use by others. Flare had learnt from its clients who had often struggled in the past because they did not know the 'what', 'how' or 'where' with respect to publishing the value created from a project. A project-published architecture underpins the way KID is managed within Flare.

A Navigational map for KID

In order to manage both the project KID (creative, innovative "hot") and corporate KID (learning, preserving, "cold"), it was recognised that a navigational map was required. While complex searching (conceptual, linguistic etc.) helps the serendipitous approach and general browsing, it has been found, as in the case of the Internet, not to be a substitute for effective tagging or indexing. These two methods complement not replace each other. The navigational map consisted of organising both project and corporate KID to enable access through 6 views:

- KID Type
- Function/Discipline
- Business Process
- Process Stage/Time
- Ownership/People
- Geographical

Process definition, scheduling, control and tracking

One of the challenges faced by Flare, was to ensure published 'final products' and KID in general, was recorded correctly in the navigational map. It was also observed that many organisations had undergone vigorous business process mapping exercises and with the exception of finance ERP systems, for the most part had failed to "bring these processes to life". Web based process tracking tools were developed to ensure KID was published at various stages of a business process into the navigational map with the necessary metadata required (**Fig.2.)**
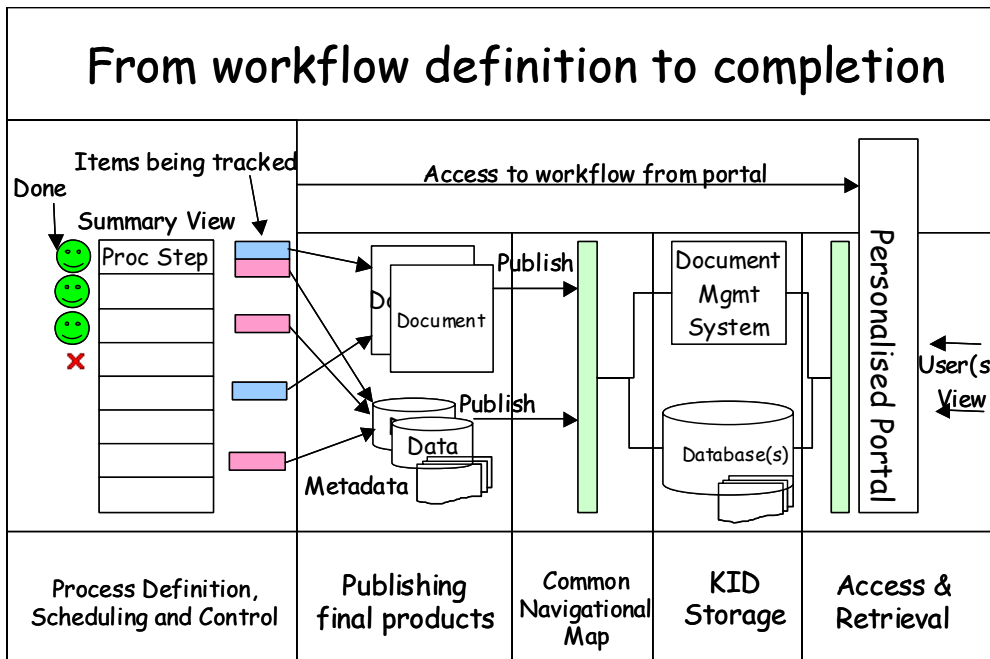

Fig.2. How process tools ensure final products are preserved

For many of Flare's clients, these process tools and ideas have been very useful to balance and reconcile the opposing business needs and tensions of *control* and *empowerment*.

Releasing the synergy within a large international oil company whilst giving autonomy to the business units is an issue that many CEO's and CIO's face. This is becoming increasingly important as the industry consolidates through mergers and acquisitions.

Business Areas

The business functions of the company were broken down using functional decomposition diagrams (FDD) into broad categories defining the main business activities. These functions were:

- Administration – (running the business)
- Consulting Business – (project engagements)
- Business development – (sales & marketing)

Customised tools were developed to support each of these areas virtually and currently reside on a server in Aberdeen, although the location is irrelevant. The different areas are shown in (**Fig.3**.).
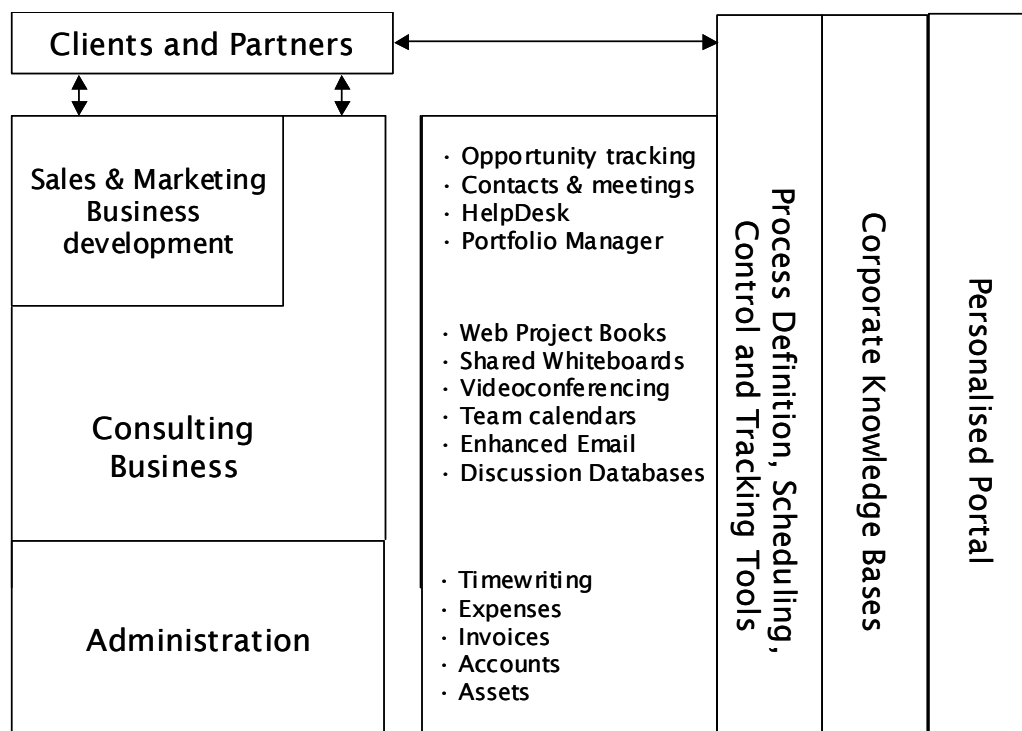

Fig.3. – Business functions and tools

The tools were developed with consideration of the following principles:

- Ease of use – the tools have been coded with 'business rules' to allow ease of use and integrity checking. For example, business expenses can be entered in any currency and using exchange rates from the Internet, automatically converted to the billing currency for that contract.
- Integration – The tools share the same information removing duplication of effort and reducing the likelihood of human error. For example, invoices are

automatically created from information in the contracts, time-writing and expenses systems.

- Internet enabled– to enable easy exchange and access of information in any location and by external partners, suppliers and clients.

Results

A number of situations both internally and externally are presented to illustrate how the tools were used:

Flare examples

"Hot" Web project books

Project books are used to record all the information during the life of a project. These may be for individual client projects, or a particular area of research. They may contain presentations, papers, reports, meeting notes, applications, web pages and multimedia. Consultants within Flare can view all information, with specific items viewed by external parties e.g. clients. These have been found to be exceptionally useful for sharing KID with people in different time zones and geographical locations, without clogging up their email systems with large files.

"Cold" Knowledge base

The knowledge base is an abstraction of the 'final products' from a project. In addition, lessons learnt reviews and other information such as curriculum vitae and industry articles can be added. The information is indexed according to a corporate navigational map enabling several 'views'. Full text searching of all attachments and information is possible. This has proved to be a very valuable reference source to re-use material and share with clients. Over time it has become apparent that certain KID has a currency, beyond which it is no longer useful and should be removed from 'immediate memory'.

Current developments include *knowbots,* which push information to people. This takes the form of screen saver, which is automatically created each week from the knowledgebase. These screensavers are copied to individuals desktops when their email is collected. The content may include quotes, tips, solutions or a particular best practice.

Contacts and meetings (customer relationship management)

All business contacts and meetings are linked to create an audit trail enabling people to view a complete history of company visits and conversations. Automatic workflow sends emails to relevant people after contact has been made with a company or person they have an interest in, based on their user profile in the system. This has been proved to be very useful, extracting key client information from the typical email overload of information.

Opportunity tracking

The opportunity-tracking tool enables the effective management of business opportunities through their lifecycle. All opportunities have owners, a chance of success and other supporting information. The contacts and meetings information is shared with this tool. Further development includes the addition of generic portfolio management tools to view risk/reward criteria for opportunities. Workflow automatically emails each owner the current list of his/her opportunities at the end of each month. These can then be updated to ensure currency of information is maintained.

Although initially useful, this tool is no longer used as it was felt little business value was added by updating it. This is probably due to the small number of consultants within the organisation.

Video-conferencing and shared whiteboards

All consultants in Flare have laptop computers, web cameras and high-speed communications in their homes. Although video-conferencing and chat rooms are used to a certain extent, it was found that these tools provided the least value in the virtual office environment. This was due to a combination of immature technology, poor ease of use, limited bandwidth and power of the ordinary telephone. It was found however, that shared whiteboards often made a useful complement to a teleconference for drawing concepts and explaining ideas. In particular, the British Telecom 3-way calling from ordinary phones, enabling piggy backing of calls has provided significant value to team members.

Client examples

The following examples illustrate how Flare has worked with clients using the Internet as an enabler to virtual working.

Sharing information

A project for client A (an international oil company) consisted of interviewing approximately thirty-five staff in a short timeframe. The project sponsor was travelling but wished to keep track of the project and individual interviews. An interview database was presented securely over the Internet enabling the client to view and search interviews by department, function and person. The client was guaranteed the latest information from any location in the world allowing a great deal of working flexibility.

A joint industry project for client B (oil industry standards organisation) involved technically managing a project with twelve oil and service company participants distributed in a number of geographies. A project book was presented securely

over the Internet enabling the sharing of meeting notes and presentations to keep all participants up to date with project progress.

Communicating and collaborating

A project for client C (international integrated oil company) involved the supervision of a number of projects in another geography. A customised project book was made available over the Internet, enabling reports to be reviewed by several people by 'checking-in' and 'checking-out' documents. This also enabled an audit trail to be built up of document revisions. In addition, a structured database was made available over the Internet so all projects could be updated by the client at each stage in the project lifecycle, supporting virtual project supervision.

A project for client D (international petroleum research consultancy) involved the development of an Internet enabled question and answer knowledgebase around their recent software development initiative. Questions and corresponding answers on a range of topics from sales and marketing to technology could be exchanged between different functions regardless of geography.

A project for client E (an oil industry service company in partnership with the government) involved the moderation of discussion groups to support knowledge communities within their company. An Internet discussion database was presented securely over the Internet allowing the exchange of ideas and thoughts along specific threads. This proved most useful when outside parties were able to post questions and replies to enable external ideas and thoughts to be passed onto the service company.

e-business (B2B)

A project for client F (a large multinational oil company) involved prototyping the thinking and ideas behind the way Flare manages KID applied to the process of drilling an oil & gas well, which typically costs anywhere from $3-60million. The resultant web based software, called *Wave*, was released live at the end of the year 2000 for the drilling of 2 wells in the Norwegian part of the continental shelf, to enable both client staff, joint venture partners and a variety of external service companies to exchange information during and after well drilling.

Through the use of views, exception reporting and process control, *Wave* ensured that "final products" produced as the result of a number of business processes around the drilling of the well were preserved in a form for re-use.

Such was the success of the initiative, a spin off company was created to further develop and market the software for collaboration in the oil industry. A pilot of the software is currently taking place with a second client in North America.

Conclusions

What was learnt

A framework for working virtually is essential. Many of the processes, which exist informally in a physical environment, need to be formalised in a virtual one as the potential for tasks to get done by chance is significantly reduced. The virtual team must, however, be quick to modify or discard those processes which are not generating business value. Clear ownership, roles and responsibilities are required in order for this to happen. Once an open environment for knowledge exchange is created and relevant supporting tools in place, knowledge can be exchanged and re-used as part of everyday work processes in a virtual environment.

It was observed that email/discussion tools are useful for sharing information and making decisions with team members in different time zones and working commitments. It also allowed people to read the thread of the conversation and join in at later stages. It was recognised that it is difficult, if not impossible, to convey all the nuances and subtleties required for effective communication. The appropriate use of telephones, video-conferencing and face-to-face meetings are therefore essential.

Technology is still relatively immature in several areas although there have been significant advances in the past twelve months. It is the author's opinion that many of the technological barriers will be removed over the next few years leaving cultural change as the main obstacle to virtual working.

Socially, *outcome* based virtual working can provide enormous flexibility to enable people to mix work and home life in a more sensible manner than the *process* based '9-5' working. It can also dramatically increase productivity due to the limited interruptions at home, as opposed to office working. However, it can take some time to adjust to working from home because of the lack of interaction with people.

In Flare's experience it was deemed essential to physically meet at least twice a year to ensure the team functions effectively and any serious issues are handled face to face. Flare brainstorms and innovates at physical meetings, the "numbers and reports" or routine matters are discussed electronically.

Business benefits

A virtual office can bring improved financial performance by reducing travel, expenses and minimising overhead administration costs. Project teams can be dynamically reconfigured providing exceptional working flexibility.

Quick and easy access to the latest information provides a good base for decision-making, reducing overall business risk. The subsequent effective management of knowledge for re-use improves efficiency, supports innovation and can deliver optimum business outcomes.

Paul H. Cleverley

Following several years as a successful geophysical interpreter for the oil and gas industry, Paul has subsequently worked with senior oil industry executives to develop and communicate business information strategies for a number of international oil companies. He is the author of several papers on knowledge, information and data (KID) management and has recently focused on the implications of business-to-business (b2b) e-commerce on the upstream oil industry. Paul has degrees in both Geology and Computer Science, is a Fellow of the Geological Society (FGS) and a Registered Chartered Geologist (CGeol).