Software Process Improvement
Case Study

★SPIRE★

Ireland No. 006 (English)   **November 1998**

__Overview__ - WesternConnect is an IT and Telecommunications consultancy company based in Northern Ireland. The organisation is currently in the process of further developing its services, in particular in the area of interactive multimedia and high quality Web Site development.

The purpose of this project was to introduce a set of procedures which would provide for more accurate costing, monitoring, recording, evaluation and quality control of the processes involved in the development of a Web Site.

With the increasing need to meet their key business objectives of increasing profit and meeting time and resource budgets, procedures of this nature have become essential elements of the company's development.

The project has had a high impact on the organisation's performance, with a much more structured development process now in place, enabling projects to be completed within time and resource constraints. Many lessons have been learned, in particular in the areas of planning and communication. By extracting the correct requirements from the client during the initial phases of a project, and by processing this information in a structured way, the development team have become increasingly focused in their activities, therefore increasing the efficiency of software development throughout the entire project life cycle.

WESTERNCONNECT

The Organisation and its Environment

WesternConnect is a relatively new privately owned company which was established in 1992. It is an independent technology and telecommunications based company providing services in the area of consultancy, project management and software development. Based in Derry City, the company currently employs 11 staff - 3 senior management and 8 software developers.

The organisation serves both the private and the public sectors with clients ranging from small local businesses to international blue chip companies. At present 75% of the company business is derived from export markets.

Software development activities include multi-national applications development, database applications development and telecommunications product development.

WesternConnect's management services include project management, technical event management, and seminar and awareness programme development. Other services provided by WesternConnect address the internet and new technology - development of internet strategies, web site development, internet access, deployment of ISDN including video-conferencing, digital telephony, and high speed data transfer. Specialist sectors include education and training, publishing and CAD.
WesternConnect had identified a business need to increase its capability in the area of web site development. It was an area which had not proved cost effective to implement.

The company was aware that effective procedures were required in order to increase profitability in this area.

WesternConnect had already gained a good reputation for providing a high quality service, but unfortunately this had been achieved at a financial loss to the company due to over engineering of software applications and an inability to determine when "enough quality" had been achieved. Although the company strongly endorses the concept of high quality in its products and services, the absence of a formal quality system had hampered its ability to consistently deliver systems on time and within budget. These were the issues that led to the company's participation in the SPIRE project.

The results of the original staff attitude survey (a score of 5.43) showed that the company had a general awareness of the potential benefits of Software Process Improvement (SPI) particularly in the areas of effective development scheduling and improved quality of software to customers. However one aspect, which proved less convincing to some staff, was the potential business benefit in financial terms, either through increased profits or reduced costs.

The overall Bootcheck assessment highlighted the need for a framework of procedures to be put in place and identified the following project objectives:

- To research and define the processes involved in the development of a software product from the agreement of shared expectations, through costing the job, sign-off of deliverables, record keeping, monitoring progress and quality, to final client sign-off.

- To design a set of guidelines and procedures which would allow these improvements to take place with minimal negative impact on the software development process itself.

- To test the suitability of these guidelines and procedures by applying them to a real software development project.

- To measure the effectiveness of these guidelines and procedures by comparing output, time spent, budget compliance, documentation and product quality with projects conducted prior to the introduction of the new procedures.

The company had already implemented procedures to address key development areas such as requirements analysis and customer business needs analysis. However with the existing practice there was a heavy reliance on senior management input which had led to difficulties in developing other business areas to their full potential.

WesternConnect's development environment enables the company to maintain a high level of customer satisfaction, primarily through the skills and experience of its staff. In order to maintain its reputation with customers and to introduce more discipline and control into its software development process, it was recommended that the Improvement Project should focus on defining and implementing an appropriate process for Project Management, particularly in the area of Web Site Development projects. This included relevant procedures for the key lifecycle activities of costing and estimating, internal review of deliverables and project monitoring and control.

The company has established an ambitious three year business plan that aims to ensure that 90% of projects are completed within time and budgetary constraints and to boost profits to 30% of turnover. By introducing the procedures developed under the SPIRE Project, it is hoped that these goals can be achieved.

The Improvement Project

The project was undertaken in four main phases:

- Analysis of current practice
- Design of new processes
- Implementation of these processes
- Process Evaluation

The analysis of current practice took place over a number of months and was based on the development of a Web Site for a major Telecommunications event.

Many of the usual problems were identified e.g.

- Tasks not completed within the agreed timescales
- Deadlines not met
- Lack of communication between project team
- No version control, and
- Only senior management quality control.

The outcome was a very high quality Web Site which received excellent reviews but which once again proved expensive in terms of the resources and costs required to develop it.

To address these problem areas, two members of staff were appointed on a full-time basis for 3 weeks to develop new procedures for Web Site development. The Managing Director set aside time to quality check the new procedures at various stages and to guide the developers in the right direction. The new procedures followed strict guidelines to ensure that future projects were properly monitored, documented and completed within time/budget.

Key elements to be taken into account included:

- Staff involvement
- Information gathering
- Project planning/management
- Quality control
- Regular client contact
- Regular project meetings
- Naming conventions
- Version control
- Filing systems

All of these elements were thoroughly investigated. The basic principles of Basic Software Engineering and SSADM were employed to help produce a flowchart of the main processes involved in the development of a Web Site. These processes were then documented individually and a number of forms were developed for use in monitoring projects.

As a result of these efforts, the following improvements have been made:

- Procedures have been developed for identifying the requirements for the Web Site.

- A central paper file has been set up by the administration department to hold all correspondence, research documents etc. relating to the project and an electronic file is maintained on the company's server -

this provides a central library for documents, code, graphics etc. which are relevant to a project.

- Regular meetings are held between the project development team and progress reports are filled out on a weekly basis.

- The use of Test Reports has been introduced into the testing process.

- Fault logs are now produced with details of all errors identified.

- Client sign-off's are now obtained for project deliverables.

When a Web Site development project has been accepted, the most vital step is to extract the system requirements from the client. In order to define the Web Site, the following critical tasks need to be carried out:

- Specify a reason for developing the Web Site
- Define the target audience
- Determine user requirements
- Decide on Intranet, Internet or both
- Set measurable goals

All of this information should be clearly defined from the start of the project.

As one Internet developer said:

"Constructing web pages is getting easier all the time as new web-building products become available. However, some aspects of building a high quality Web Site (e.g. defining its purpose and audience, establishing its goals) cannot be automated. These elements are critical in the development of a successful Web Site."

The initial procedures were accepted by the Managing Director, before Ray Mallon, one of WesternConnect's web site developers applied them to a new project which involved the development of an Intranet/Internet site for a local college.

As the procedures were further developed and forms for monitoring the project etc. were produced they were applied to the new project.

Ray said *"In outlining the development processes a reference was provided not only to aid development but also to identify milestones and responsibilities critical to progress.*
I found the implementation of the new processes very useful in identifying the stages of software development, leading to the adoption of a more structured and modular approach."

Ray Mallon (left) discusses new procedures with Jim Coyle, Project Manager

Jim Coyle, Team Leader and Project Manager of the project, said *"The implementation of the processes developed under SPIRE made my job slightly easier in terms of monitoring and controlling the Web site development and contributed immensely to the project being completed within the given budget and timescales."*

Unfortunately, due to various human factors, some of the procedures were not tested as thoroughly as was first hoped. The original project manager left the organisation and the project was passed on to another manager, Paula Truffitt. Resourcing the project proved difficult, as everyone was tied up on a major project which was about to go live. In addition, it was not possible to contact the original mentor who was assigned to the project.

Having carried out some research into current Web development practise and having identified a project which could be completed within the SPIRE deadlines, Paula Truffitt attended a project workshop in July. This proved to be very useful as she was allocated another mentor to provide assistance with the project. In addition, another member of staff was allocated to the project on a full time basis and all other members of staff involved in Web development were available on an ad hoc basis.

All members of staff involved in Web development were trained in the use of the new guidelines. In addition, assistance was provided in the use of the guidelines.

The Results

The major project goals were achieved throughout the course of the project. However, the period over which the use of the procedures was to be evaluated was reduced to a much shorter timescale than was originally proposed. The actual time spent completing the project was as scheduled but the actual implementation period was reduced from six months to three months due to various organisational factors.

Unfortunately this meant that the procedures developed were applied to a slightly smaller Web site development project than had been originally planned. However the principles remain the same and the procedures should prove effective regardless of the size of the web site under development.

The procedures have now been fully implemented and are being followed by every member of staff involved in Web site development projects.

As a result of these new procedures:

- One major project has been completed within time and budget constraints.
- Better communication, and an improvement in reporting and filing procedures have led to increased output and more effective time management as development staff spend less time tracking information and more time carrying out software development activities.
- An improvement in reporting procedures provides visibility to both management and staff on the status of each project.

Initially, the new procedures were found to be time consuming. However, before long people began to realise the benefits, when they were able to account for their development time, any problems or issues they had to deal with and find all the required information so easily accessible.

The new staff attitude ratings showed an increase of 2.6. The staff assessed had noticed a marked improvement in project control and management.

Lessons Learned

Many key lessons have been learned through the development of these procedures. The most prominent issue was the lack of co-ordination in the development of a Web site which led to mismanagement of time and overdue, over budget projects.

Development staff realised that these new procedures were for their own benefit as constant monitoring and controlling by the Project Manager allowed each team member to know exactly what was expected from them and the use of project forms allowed them to track their progress and continually compare it to the original project plan.

Everyone realised that a little more time spent initially analysing the clients needs led to a lot less time being spent defining the Web site.

Plans for the future

WesternConnect hopes to take these procedures a step further by developing a full Quality System, addressing all areas of the software life cycle, and including appropriate change control facilities.

All of these initiatives will hopefully take WesternConnect along the path to ISO9001 Certification.