

Monitoring progress

Users	Site engineers & planners
Location	On site & site office
Solutions	Several
User benefits	Medium
Org, benefits	High
Implementation	Medium



Process description

Planning software is used to complete a forecast of future works on a project; the project programme. This is then used to produce weekly progress sheets providing details of the activities to be carried out that week, the expected progress and a column for the actual progress to be filled in. These are provided to the relevant site engineers. At the end of the time period (normally weekly) each site engineer uses visual inspection/numerical methods to report back on a percentage complete by completing and returning their progress sheet. These are then compared with the set weekly targets taking into consideration problems, exceptions and progress. The project programme is then updated accordingly.

Background

Monitoring progress on a project is key to be able to ensure work is completed on time and that the overall progress made on the project is going according to plan. Penalties for the failure to complete on time will usually result in having to pay liquidated and ascertained damages (LADs), and this could be sufficiently large to wipe out any potential profit that the Contractor may have expected to make from the entire project.

Informal reporting on progress will be necessary on a daily basis or more formally on a weekly or monthly basis; this depends heavily on the work being undertaken. Currently this process is heavily paper-based, and relies on the site engineers returning their progress sheets at the designated time.

The information required is collected in many different locations on site and provided by several site engineers. This is then collated to provide a report on the project's progress as a whole. Progress is discussed at weekly meetings and any issues that require addressing will be raised.

It is important that progress information is circulated to the entire project team including architect and

consultants as they may be able to provide ideas for getting the project back on track.

Current Issues

The following issues have been raised for this process:

- The process of reporting on progress is highly repetitive and laborious; therefore the quality of the information inserted will suffer.
- Progress reports often rely on the subjective assessment of percentage complete by the site engineer.
- The collation of data from several different sources is time-consuming a prone to data entry mistakes.
- Formal reporting on progress only occurs periodically; therefore potential problems are often not spotted before they occur.
- Data transfer is often carried out manually between the progress reports which are produced in excel and the project programme produced using planning software.

Mobile solutions

This process can be addressed in two stages. The first stage will simply provide a form on a PDA for data capture electronically at the point-of-activity. The second stage will integrate this further into the back end-systems.

PDA form for capturing progress made

A form could be created for use on the PDA to enable the site engineer to capture progress made whilst he is out on site. This could be distributed over the network such that each time the site engineer collects his/her PDA it is pre-loaded with the week's progress form.

Once the form is completed it could either be synchronised when the site engineer gets back to the site office or it could be synchronised via WLAN or GPRS whilst out in the field. Due to the nature of the data collected it is not thought necessary to provide progress data on more than a daily basis, hence synchronisation would be sufficient.

The data can then be fed into a progress database which would collate the data from each site engineer. This would enable the project progress report to be generated automatically.

Integrating with back-end systems

The difficulty with producing the form for the PDA would be that the content of the form would change on a weekly basis according to the project programme.

Greater benefits would be gained from enabling the forms to be automatically generated from the project programme. The data collected could then be fed straight back in to update the project programme.

Alternatively, relevant programme information could be distributed such that the site engineer can see each programme activity and simply select the completed tasks e.g. they could tick completed "drainage run from A to B" and automatically the materials usage is calculated. Linear activities could use GPS to show the distance completed but this may need to be supplemented by GPRS and Inertial Navigation data to obtain a desired accuracy of position.

Benefits of mobilisation

Capturing progress information directly in the field provides contemporaneous information, eliminating errors typing up information from handwritten notes or from memory. It also allows the site engineer to spend more time out on site undertaking work that enables the project to be completed on time and on budget.

Providing an easy way for site engineers to capture the information may lead to the information being collected on a more regular basis. This increased feedback could help in the early identification and troubleshooting of many problems, thus avoiding unnecessary escalation of issues on site.

Slippage alerts could be generated automatically and emailed to people who need to know and can provide remedial measures.

The correlation of the progress information is automated, monthly progress reports can be generated at the touch of a button, and the information can be manipulated and displayed easily. Many potential error prone manual paper processes are skipped, saving worker time and resources.

The project team will have access to more timely and accurate programme information and will be able to move from trying to understand what has happened to figuring out what to do about it.

Ease of implementation

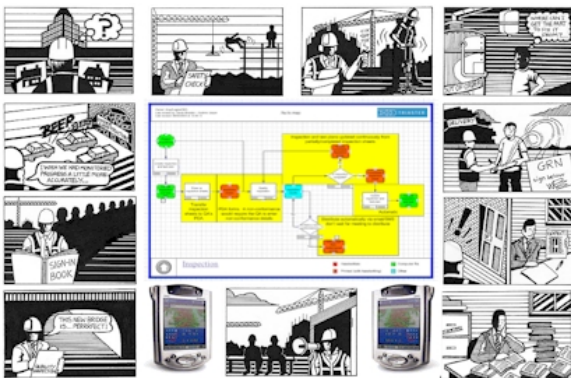
The provision of a PDA form for the collection of progress information is relatively simple and there are many packages available that can be used to create the form. Initially this form could have the same appearance as the current paper forms thus providing the user with a familiar interface.

Primavera, a major provider of project management software offer a solution called Mobile Manager, which provides programme information through a PDA. Although this alleviates the issue of linking progress information back into the project programme it provides a more complex interface which may be less readily understood and hence used. It also relies on Primavera being used for creating the project programme, which may not always be the case.

Process improvement through the introduction of Mobile IT

Accompanies To-Be map
As-Is map
Narrative

Available from www.comitproject.org.uk



Summary

The construction industry's drive towards utilising IT to enhance communication both within a company and between clients, consultants, suppliers, subcontractors and contractors has, to date, ignored the need to deliver information effectively to mobile personnel e.g. whilst on site or attending a client meeting.

The advent of suitable devices and software solutions will go some way to correct this. However, simply because the technology is now available we should not be indiscriminate in choosing the processes to apply it to.

This report documents the activities undertaken to better understand which construction processes would derive most benefit from the application of mobile information and communication technologies.

Introduction

An initial review of existing research and applications of mobile IT in construction was undertaken; The Current Status of Mobile IT. You can download this report from www.comitproject.org.uk.

The COMIT community, 30 representatives from the construction and technology industries, were then presented with a list, derived from previous research, of processes that Mobile IT could improve.

Ten processes were chosen to look at in detail in order to determine which processes would benefit from the introduction of Mobile IT. These were:

- Drawing distribution and usage
- Monitoring progress
- Monitoring health and safety on site
- Quality inspections
- Task allocation
- Goods received notes
- Site design problem resolution
- Site diaries
- Onsite accounting of operatives/visitors
- Maintenance inspections

In addition, one of the partners requested that monitoring of hazardous activities was also researched as new legislation, recently introduced by the HSE, has brought about a new requirement to monitor and record this process.

Generating the process maps

Process maps were produced to show how the processes occur currently; the "As-Is" maps.

Companies from within the COMIT community and relevant external contacts were asked to provide any material they had relating to each process; this included project procedures, existing forms, and QA documentation. This was supplemented with a literature review of research carried out in this area.

Material was received from 25 companies including most of the major contractors. This was then used to produce generic "As-Is" process maps for each of the 11 processes.

Using the "As-Is" process maps, activities were identified which could be improved through the use of Mobile IT. These areas are annotated and highlighted in yellow on the maps.

Five of the COMIT companies attended a workshop to ratify the "As-Is" process maps and the areas highlighted for improvement.

Once the "As-Is" maps were finalised these were taken as a basis for the "To-Be" process maps which illustrate how the processes could be enhanced using Mobile IT.

Through the use of Mobile IT, data can be collected electronically at the point-of-activity. This results in many of the highlighted activities being automated, thus reducing substantially the time spent producing reports and transferring information.

Additionally the quality of information collected and hence produced is increased due to the lack re-keying and data entry errors.

The narratives

A narrative has been produced to accompany each set of process maps. This provides an overview of the process, the issues that are present with the current approach, ideas for mobile solutions, details of the benefits that they bring and an assessment of how easy the solutions would be to implement.

These have also been ratified by the COMIT community.

Mobilisation "scores"

A subjective assessment has been made of the how widely relevant solutions are available today, the benefits to the end-user, the benefits to the organisation and the ease of implementation.

These "scores" (red, orange, green) are given at the top of each process narrative to provide information at a glance and help you to decide which processes should be considered for the implementation of Mobile IT.

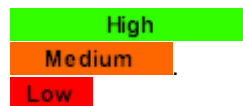
Solutions

An assessment of available solutions is made in accordance with how many solutions are available, their affordability, and are they in current use in the construction industry and/or will they require customisation to suit the particular process under consideration. The scores given are:



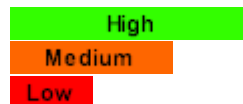
User benefits

For any mobile solution to succeed it must deliver benefits that are directly apparent and of value to the end-user. This will encourage the adoption of the solution and hence help to deliver the organisational benefits. The scores given are:



Org. benefits

The user benefits will result in benefits to the organisation. In addition benefits will be derived through the collection of more accurate information, the reduction of information transfer time and the ability to search and utilise the electronic information subsequently. The scores given are:



Implementation

The ease of implementation is assessed in accordance with whether the solutions are already in use on construction or similar industries, the readiness of the users to take up the technology and the current extent of electronic information in the process. Hence a judgement can be made on the length of time and the effort that would be involved in the implementation. The scores given are:

