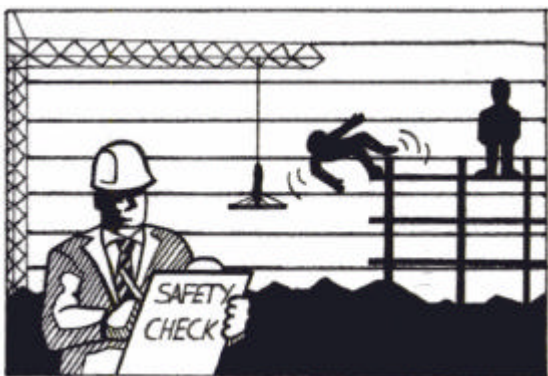


## Health and safety

<b>Users</b>	Health and safety staff
<b>Location</b>	On site
<b>Solutions</b>	Several
<b>User benefits</b>	Medium
<b>Org. benefits</b>	High
<b>Implementation</b>	Medium



## Process description

Health and safety legislation impacts on all businesses through a range of coordinated Health and Safety Regulations enacted under the Health and Safety at Work etc Act 1974. Health and safety audits and inspections are undertaken periodically. Audits are conducted to ensure that adequate systems have been put in place to monitor and ensure health and safety on site. These are normally conducted by someone from head office. Inspections are undertaken to observe if there are any potential hazards on site and if so, ensure that these are remedied swiftly. Health and safety training is given in response to common hazards to avoid on construction sites and an ongoing programme of toolbox talks is conducted to ensure everyone is well educated.

## Background

The problem of efficient monitoring of Health and Safety affects the construction industry as a whole, UK statistics show that on average one person is killed every third working day, and each day thirty people suffer major injuries.

A range of regulations directly relates to the management and maintenance of premises and work equipment. All require a risk assessment approach to health and safety management, implemented through management procedures, audits, training and provision of information.

The primary sub processes are; setting up procedures, spotting hazards, allocating hazards to be remedied, remedying hazards, producing reports to understand trends on site and developing training programmes to address these issues.

There are many people involved in this process as health and safety on site is everyone's responsibility. Due to the statutory nature of this process there are also many checks on checks to be made.

Bonuses are now dependent on site safety scores and zero accidents on many sites.

## Current issues

The following issues have been raised for this process:

- Currently the procedures for monitoring Health and Safety on site are often defined on a project-by-project basis and at most on a company-by-company basis. This provides little opportunity for the effective monitoring of trends and sharing of best practice, in order to address these issues proactively rather than reactively.
- Reoccurring hazards can be remedied when spotted, but these are often not reported and hence an overarching view of the health and safety on site cannot be reached.
- Current procedures can operate well purely as a reactive system, but they involve much data replication and provide little opportunity for monitoring trends effectively without significant human input and data manipulation.
- Health and safety auditors and inspectors spend too much of their time filing paperwork and not actually out on site ensuring the safety of the workers.

### **Mobile solutions**

There are three distinct areas in this process that mobile technologies can be used to address; the collection of audit/inspection data the field, notification hazards to be remedied and retrieving the training records of operatives.

#### ***Collection of audit/inspection data the field***

A simple form can be used on a PDA to replace the paper checklist. This enables the collection of structured data. Regularly used fields can be automatically completed such as date, time, project name, auditor/inspector details.

Digital photographs could be taken and associated with the checklist items, thus providing further information.

Free text fields would still be required, but these could be supported by having some of the frequently used words/phrases listed so that they can be selected easily rather than typed each time.

Data can be synchronised in the field using WLAN or GPRS thus enabling the corrective actions to be allocated immediately.

It may be beneficial to RFID tag items that are regularly inspected so that they can be easily relocated e.g. truck with cracked windscreen.

Once the data is collected electronically it can be fed into a database which could generate standard reports and keep track of the corrective actions that have been requested and if they have been carried out.

#### ***Notification hazards to be remedied***

Once the information is collected in an electronic format and hazard owners are assigned to remedy each hazard, automatic alerts can be sent out via SMS for email. The person remedying the hazard can then SMS back to the system once the hazard is resolved. Hazards will need to be resolved within a specified time period and prompting and escalation of the action can be automated.

### ***Retrieving the training records of operatives***

Everyone on site could be issued with an ID card. When they attend a training session they would be required to swipe their card which would then update a centrally held training record database to show their attendance. Site engineers and foremen could be provided with a PDA application which they can then use either to access the central database or to read the operatives ID card in order to obtain their training details.

### **Benefits of mobilisation**

With the vast amounts of information to be considered in auditing a medium/large construction sites, the use of Mobile IT has the ability to concentrate and focus the user on the immediate health and safety tasks that are required on site. The use of a PDA form would allow the health and safety staff to be prompted with specific areas of concern.

Collection of the information at the point of activity eliminates transcription and re-keying errors and saves valuable time and effort.

Additional information required (e.g. the latest regulations for scaffolding) can be accessed if required whilst out in the field in order to check more detailed requirements.

Provision of standard forms for the collection of audit/inspection information enables data to be collected in a more structured way and hence to be compared at various levels; sub-contractor, project, region, main contractor, and pan industry. This could provide an indication of trends occurring that need to be addressed and provides benchmarking information.

### **Ease of implementation**

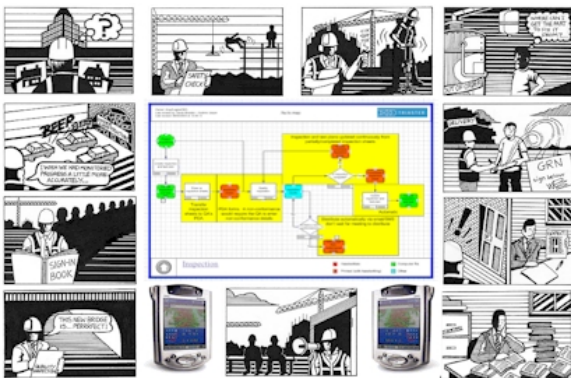
There are several PDA based software packages available that address health and safety. These provide varying levels of work flow integration with back end systems.

Health and safety is a heavily regulated area and so the use of standard forms should be more readily accepted.

## Process improvement through the introduction of Mobile IT

**Accompanies** To-Be map  
As-Is map  
Narrative

**Available from** [www.comitproject.org.uk](http://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](http://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.

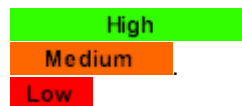
**Solutions**

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:



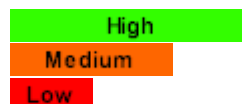
**User benefits**

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:

