



Site Diary, 2018

Electronic Contemporaneous Record Capture on Site

Process	Site data collection / engineer's diary
Users	Site Engineers / Managers
Hardware	Android / iOS tablets, phones & PC
Technology	Mobile Application
Software	Script & Go Site Diary
Location	Various Costain sites



Business Problem:

An important part of a Site Engineer's job is keeping track of progress & issues on site. Traditionally this is done by recording a daily diary on paper. Increasingly it is written up in electronic form but usually in the office at the end of the day based on recollection & handwritten notes that were taken on site. This is a time consuming & error prone method that is hard to integrate with other evidence such as photographs.

Business Solution:

Site Diary provides a way of recording information on site electronically & then seamlessly integrating this with other evidence such as photographs, location & weather information. This provides a clear audit trail & improves the quality & detail of the information that can be recorded on site.

Background

Costain is a main contractor and employs a lot of engineers on site. An important part of a site engineer's job is accurately recording the what, when, how and why of events on site. This is not just an important part of the daily management of site activities, it also provides a vital historic record in the case of any disputes that might arise.

Traditional methods of recording such information are time consuming and prone to error and are hard to correlate with other sources of evidence – particularly electronic evidence such as photographs.

For this reason a number of years ago Costain (along with COMIT) was involved in an EU funded project that looked at how to develop cloud-based mobile data management solutions for a number of different scenarios.

Known as Mobicloud one of scenarios the project considered was the collection of data on site by

engineers. With the help of Costain this led to the development of a mobile application called Site Diary that addressed a number of the issues.

Site Diary was the only commercially viable application to come out of the Mobicloud project. Other applications for rail, city transit and mobile workers failed to gain traction.

In 2016 Script & Go acquired the early form of Site Diary and set about making it a more marketable product. They have improved its functionality and made it significantly more user-friendly. The current version of Site Diary is a mature, reliable solution for the electronic capture of contemporaneous records on a construction site.

Paper-based Site Diaries

Traditionally site engineers make notes and sketches on paper during the day and then write them up each night in the form of a diary. These diaries are signed



by the engineer and usually reviewed and signed by a manager. For a lot of engineers this is still the norm. This process is highly prone to error for a number of reasons.

The time that an engineer needs to make the most detailed notes is the time that they are at their busiest – i.e. when they are dealing with an important event or issue on site. Inevitably this leads to some important details about events not being recorded *at the time that they occurred*. Instead the engineer will often find themselves relying on their memory of events at a later point in time when they finally have the opportunity to make a record.

Furthermore, during a busy day (and most days are busy) an engineer may make a lot of notes. Ideally these should be written up in the form of the site diary at the end of each day. However, inevitably this does not always happen. Due to other demands on their time and long working days (often in excess of 12 hours) engineers can end up writing more than one days' entry at a time – or even an entire week of entries on a Friday night when site operations have paused for the weekend.

This is problematic because much of the legal value of an engineer's site diary comes from it being a *contemporaneous* record – i.e. a record that was made *at or close to the time the events occurred*. Much of what a site engineer records is routine and mundane, but occasionally if a dispute occurs then the site diary may be produced in court as evidence. In this situation it can be vital that the record is as detailed, accurate and contemporaneous as possible and can be demonstrated to be such. This can be difficult to do with a paper-based system.

There are also practical problems with using paper on site. More than one engineer has had to deal with attempting to interpret their notes from a sodden notebook at the end of the day. Rain, wind, cold hands and gloves all make it less likely that notes will be taken on site at the place and time that the events being recorded have occurred.

With the advent of digital cameras an additional problem with paper-based site diaries emerged. How can you link a written account to supporting evidence, especially when such evidence is electronic? Photographs can be an extremely valuable source of information, particularly in the

case of disputes. However, proving when and where a photograph was taken and associating it with a particular entry in a site diary can be difficult – particularly if a lot of photographs are taken.

Typically a folder would be created on a server somewhere and all the photographs taken by the engineer would be dumped into that folder. If the engineer had the time they might possibly be organised by week or day, but that would be rare. There would be no way of directly associating a photograph with a particular entry in a paper-based site diary. A diary might make reference to a photograph but finding that particular photograph months or possibly years later would be very difficult.

As site diary's began to be written up in an electronic format, such as word, the situation did not improve much. While it is possible to embed photographs into a word document this creates additional work for the engineer. Also, if procedures require a wet signature then the document has to be printed and this immediately leads to quality problems with printing images. The engineer might include a link or reference to a photograph on the server but again, this is hard to maintain in the longer term. Servers move and files, including images, get archived and can no longer be easily located.

The Solution

Making the whole site diary process electronic is one way of addressing these problems. For this reason in 2012 Costain and COMIT got involved in the EU funded MobiCloud project. The aim of this project was to develop a platform to support mobile applications that could capture and display data stored on cloud-based servers in near real-time.

While a large part of the MobiCloud project concentrated on the technical issues involved in creating the platform (security, scalability, support for multiple operating systems, device management etc.) Costain were involved in developing an example application – Site Diary.

The aim of Site Diary was to allow engineers to record most of what they needed for their site diaries electronically, on site, at the time and location of the relevant events by using a tablet or mobile phone. Where for practical reasons not all details could be recorded, the record could then be augmented when



back in the office – either by using the phone or tablet or via a web application on a PC.

Importantly, all of the information relating to the diary entries is stored in the same place – in a secure cloud-based repository. Photographs, for example, can be taken with the mobile device itself and linked explicitly with the appropriate record.

This delivers another major benefit – a clear electronic audit trail that can authenticate whether records were made contemporaneously or not. When and where each entry was made is an intrinsic part of the electronic record and is highly immune to tampering. Where GPS coverage is available records can be located to within a few metres.

Where network coverage is available – either 3G, 4G or a local wireless network – then information is recorded and uploaded to the cloud in close to real time. Where network coverage is unavailable then the entries are stored locally and uploaded as soon as a connection is available. This allows the system to be used underground and in other poor reception areas and even deliberately off-line when operating in hazardous areas where intrinsically safe devices with no radio capability are required.

Information from other online sources can also be incorporated into the records. For example, the prevailing weather conditions are automatically linked to each entry courtesy of the Met Office online services. Engineers can also access entries that have been recorded by other engineers on the site.

In addition to the basic need for recording diary entries Site Diary also includes basic site management functions – such as the ability to record/track the plant and labour in use on site.

These functions have been enhanced by Script & Go beyond those initially developed by the MobiCloud. They now include a timesheet facility and the ability to record additional detail against each report in the form of a “tag” that can be used for health and safety and other process tracking.

Implementation

Site Diary was initially deployed on site by key site engineers who were directly involved in specifying it. The developmental model adopted by the MobiCloud project was Agile, which involves frequent updates

based on user feedback. By the end of the MobiCloud project Site Diary had been used on a number of Costain projects by several dozen site engineers and managers and had proved itself to be a useful tool. However, it still had some limitations and issues, particularly in terms of ease of use.

The MobiCloud consortium dissolved at the end of the project in 2015. At that point Site Diary was the only commercially viable application to have come out of the project – a testament to the dedicated effort by Costain. For a time the head of the project, Appear Networks, continued to host Site Diary for Costain. Appear then sold their interest in Site Diary to Script & Go in 2016.

Since then Script & Go have developed Site Diary further, both improving its user-friendliness and adding further functionality such as time sheets. It is now a mature Site Diary solution and is being used on sites across the world, including in the USA, Australia and Malta. It is also being used in the UK by a number of companies other than Costain.

Post-solution Business Process

An engineer using the Site Diary application typically carries a tablet computer with him at all times. It is used for referencing information, making brief or detailed notes and for taking photographs of issues, progress and site activity. In particular it is used for recording subcontractor activity and the duration and cause of any delays.

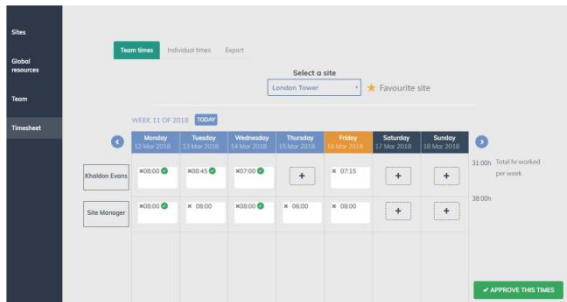


Site Diary allows real-time recording on site



The original Site Diary was used on Apple devices, but the preferred operating system now is Android. Although Site Diary can be (and sometimes is) used on a mobile phone, engineers usually prefer the larger screen of a tablet computer. Various sized devices have been used but those which are small enough to fit into the large trouser pocket of standard PPE (about A5 size) are the most popular.

The tablets used are ordinary consumer-grade devices – although cases are used to provide some additional protection from knocks and rain. The hardware is managed internally by the IT department at Costain but updates to the Site Diary application itself are automatic and managed by Script & Go.



The Web App is used to access Site Diary on a PC

The records on Site Diary can also be accessed via a Web Application from a PC. However, most engineers prefer working directly on the tablet computer (even when in the office) as the Web App is more often used by managers for administering the system – for example adding users.

The Web Application is also sometimes used by managers and by engineers to download data into excel format. This is most commonly done to print the records out for use in meetings. Otherwise there is no paper involved in the process.

Managers still review completed records at intervals but this is mainly to help ensure that new engineers are familiar with the Site Diary process. Typically for the first month of using it engineer's entries will be checked on a regular basis to ensure they are sufficiently detailed. After that random checks are used as part of a quality assurance process.

As with all mobile devices used on site there are concerns about potential health and safety issues – particularly those due to the user of a mobile device becoming unaware of their surroundings.

Different sites deal with this issue in different ways but the overall strategy of Costain is to treat mobile devices as another construction tool. All tool use is subject to Risk Assessments and Method Statements and those responsible for sites are required to put in place appropriate control measures to ensure safety.

Where deemed necessary this may involve creating "safe areas" outside of which certain operations (such as using a mobile device) are not permitted.

However, this can unnecessarily restrict the use of valuable tools like Site Diary and there has been a shift away from this approach. The use of mobile devices is still strictly controlled and only allowed for specific purposes, but with appropriate training and oversight they can be safely used more widely.

Benefits

The primary benefits that Costain gets from using Site Diary are:

- Engineers claim to save between 1 and 2 hours per day compared to paper-based methods
- Records are more accurate & detailed
- Time and location is recorded automatically
- Photographs are permanently linked with the relevant diary entries
- Diary entries are available almost instantly
- No information is "lost" over time. All data is stored securely in the cloud
- Accessing records & sharing information between team members is easier
- Finding relevant entries & information at a later date is quicker & more reliable
- There is less scope for argument about how contemporaneous the records are if they ever have to be relied on in court

Site Diary is popular among site engineers at Costain and its use is rapidly spreading across the company.

Issues & Development

Although it is an extremely useful tool, there is still scope for improvement with both the hardware and software of Site Diary.



Hardware

- The screen can be difficult to see in bright sunlight, particularly on larger screen devices
- It can be difficult to use while wearing gloves, even ones with touch-screen finger tips

These issues are likely to diminish as hardware continues to improve. Previous problems with using devices on site such as battery life, connectivity and local storage are no longer issues.

Software

- Data entry is by typing which can be slow at times, although it depends a lot on the dexterity and experience of the user
- There is no facility for directly recording video clips & associating them with a diary entry

Script & Go are continuing to develop Site Diary. Improvements in the pipeline include voice and handwriting recognition to make data entry easier.



Being able to take photographs with the device & instantly associate them with a diary entry is extremely useful.

Return on Investment

As with most IT application that have multiple “soft” benefits (like quality & accuracy) it can be difficult to calculate accurate ROI periods. However, Site Diary appears to offer significant time savings of between 1 and 2 hours per day per engineer.

The cost saving from this saving in time is not simple to calculate accurately, since it also depends on the infrastructure necessary to support the use of Site Diary - such as the mobile devices being used, internal IT support, training etc. However, it does provide a rough guide to the likely ROI.

At the time of writing the salary of a site engineer typically starts at £22k and may rise to £55k or more with seniority and experience. However, there is a predominance of younger engineers working on site.

Taking £30k as a representative salary means that Site Diary would save between £250 and £500 per month per engineer (assuming that the time saved is used for productive work elsewhere).

Currently Site Diary is priced at £10.52 (12 euros) per month per user. Even allowing for the cost of a suitable mobile device and training, ROI is therefore likely to be less than 4 months.

More Information

To find out more about Site Diary please visit: <https://www.mobilesitediary.com>

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