

## 40 HOW DO SMALL AND MEDIUM-SIZED CONSULTANCY PRACTICES PERCEIVE INFORMATION TECHNOLOGY IN THE NEW ECONOMY?

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### ***Abstract***

*This paper presents the perceptions of IT by small and medium-sized consultancy practices in the construction industry as it enters the 21<sup>st</sup> century, captured through five workshops organised by the authors. The aim was to bring together those responsible for IT within these organisations and to provide a forum for networking, sharing experiences, and learning from organisations that were already reaping the benefits of implementing and using IT effectively. Presentations were made on the potential future uses of IT supported by case studies from leading consultancy practices. The ensuing lengthy discussions revealed participants' perceptions and concerns. The details of the demographics of the workshops attendees and the subjects of greatest concern during the discussions are presented.*

**Keywords:** *Information Technology, SME, Workshop, IT strategy, Central project model, Internet, E-commerce, Portals, Information exchange standards.*



## **INTRODUCTION**

Information Technology (IT) is very much an enabler, and there are many perceived benefits from its successful implementation within an organisation, including time savings, reduced waste, better information exchange, and even cost savings. However, the rapid changes taking place in this area are potentially problematic for the many small businesses involved in what is essentially a very fragmented construction industry. Five recent workshops, held at South Bank University in collaboration with the UK Construction Industry Council, the Department of the Environment, Transport and Regions, and the Information Technology Construction Best Practice programme, aimed to deal with this issue, and to solicit the opinions of those most closely involved.

Attendees were invited from a number of professions, including engineers, architects, building surveyors, and quantity surveyors, all of whom were from consultancy practices which can be considered to be small and medium-sized enterprises (SME) within the construction industry. The IT knowledge of the attendees varied from novices who realised their computing skills were lacking, to IT managers and directors whose knowledge of systems and support issues was considerable. Presentations were made on the future of IT within the construction industry, and by professionals with considerable experience of implementing IT strategies in construction organisations. The ensuing discussions covered many areas of concern, including: the problems and difficulties associated with implementing a successful IT strategy within a construction SME; the merits and flaws of moving away from document-driven models to a data-repository-driven central project model; the potential for E-commerce and the use of the Internet within construction; the rise of construction web portals, and the use of web-based collaboration; problems and concerns associated with interoperability and standards within the construction software domain; and the role of other technologies, such as virtual reality, within the industry. Details of the demographics of the workshops attendees are presented, and the subjects of greatest concern during the discussions are presented. The paper aims to provide a snapshot of the IT concerns of SMEs in the construction industry as it enters the 21<sup>st</sup> century.

## **THE WORKSHOPS AND ATTENDEES**

Each workshop was designed to commence with a presentation that raised participant's awareness of the anticipated developments in Information Technology in the future and the need to have effective IT strategies in place to operate effectively in the new economy. This was followed by presentations of practical experience on implementation of effective IT strategies linked to organisation business plans from leading consultancy practices. This was then followed by an open discussion which allowed participants to ask questions of the speaker and hear other delegate's issues and concerns and provide an opportunity to learn and share their experiences.

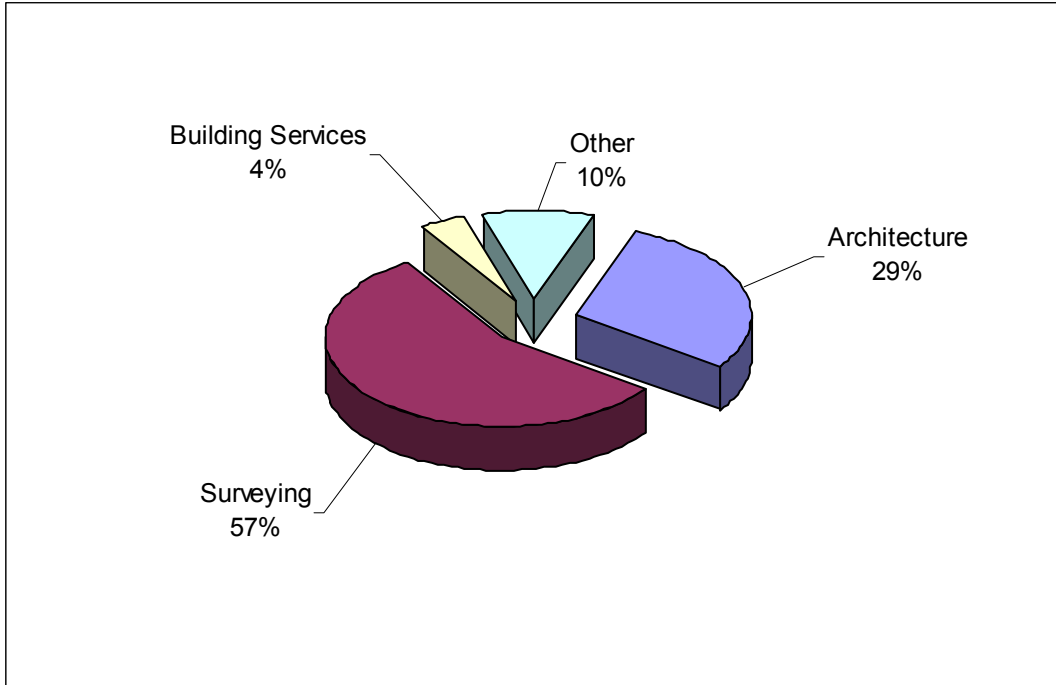
The workshops were planned on the basis of attracting on average about 10-12 participants per workshop. A mail shot was sent out to 990 architects, 1829 Quantity and Building Surveyors, 135 Civil Engineers, and 46 Building Services Engineers. A total of 48 individuals attended the workshops, including six speakers. The attendees consisted of 27 surveyors, 14 architects, 2 building services engineers, and 5 other individuals from various disciplines including management and multi-disciplinary consultancies and professional bodies. The percentages of

participants from each discipline are depicted in Figure 1. The attendees were mainly surveyors and architects reflecting the proportions of the target sample.

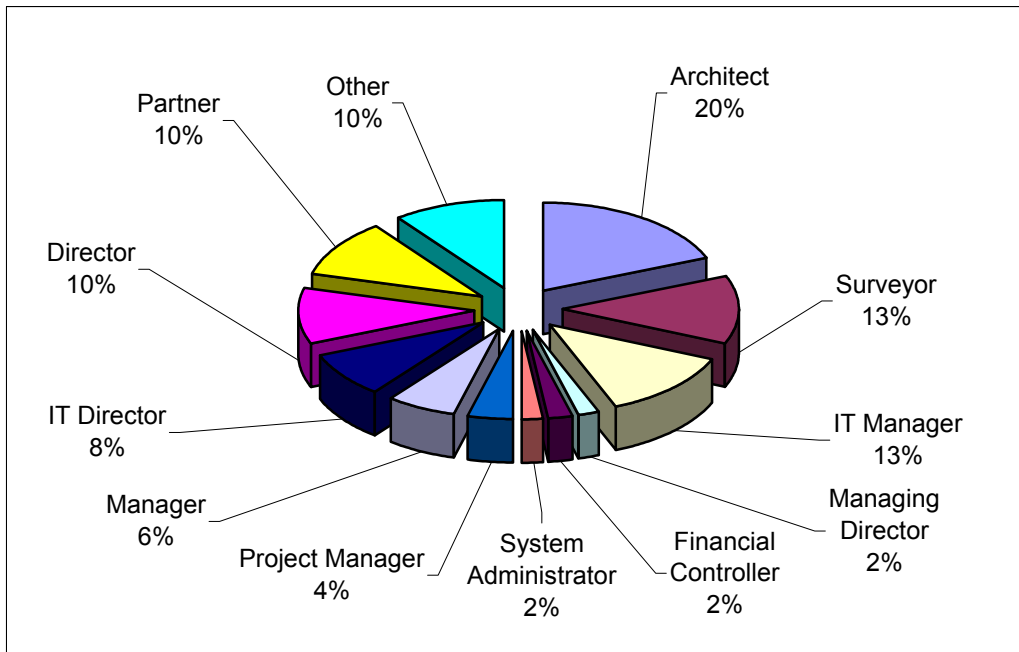
The vast majority of the attendees were from small-medium sized construction businesses. Figure 2 shows the breakdown of the attendees by job title, whereas Figure 3 shows the breakdown of attendees by job type. As can be seen from Figure 2, there is a considerable spread in the type of attendees based on their job title. However, when grouped by job type as in Figure 3, the bigger picture can be seen. More than half the attendees (52%) were managers, directors, or partners. This suggests that the workshops were well attended by those at senior levels within small-medium sized construction organisations. Of the attendees, almost 20% described themselves as IT professionals within their organisations (mostly IT managers and directors). This means that over 80% of the attendees were not solely dealing with IT as their main job function. This reflects the nature of the responsibility for IT within small to medium-sized consultancy practices, where practitioners take on the responsibility for IT in addition to their main job function.

Examining the business types of the attendees as shown in Figure 1, it is clear that the vast majority, over 85%, were from architectural and surveying practices (building surveying and quantity surveying practices were both represented). Of these, it was interesting to note the proportion of attendees from each type of practice based on their job title in Figure 2. Of the 14 representatives from architectural practices, 64% described themselves as architects, whereas only 22% of the 27 surveying representatives described themselves as surveyors. In fact almost three times this number, 63%, of those who were representing surveyors described themselves as managers, directors, or partners. The likely explanation for this is that the majority of architectural practices seemed to be small, whereas the surveying practice seemed to be relatively larger.

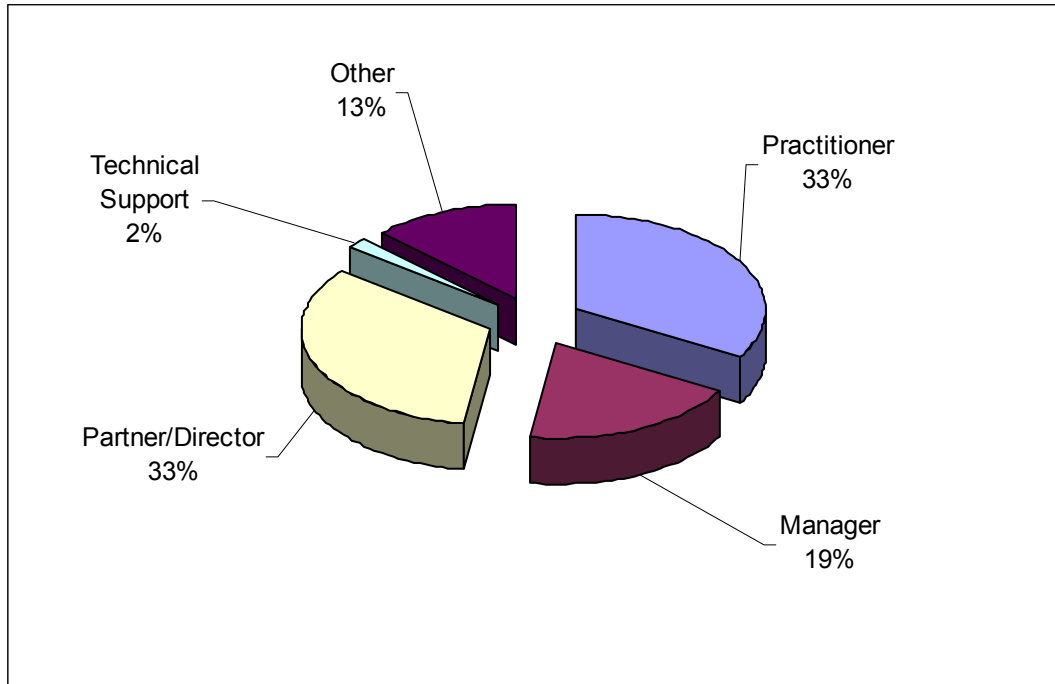
Overall, the workshops were well attended by many different types of construction personnel representing a range of small-medium sized construction organisations. Many of the attendees were non-IT personnel, and the number of senior figures within these organisations that attended is reassuring in that the IT needs of construction SMEs is considered to be very important by those involved.



**Figure 1. Individuals by Business Type**



**Figure 2. Individuals by Job Title**



**Figure 3. Individuals by Job Type**

## THE PRESENTATIONS

Each workshop was designed to commence with a presentation that raised participant's awareness of the anticipated developments in Information Technology in the future and the need to have effective IT strategies in place to operate effectively in the new economy. This was followed by case study presentations of practical experiences on implementation of effective IT strategies linked to business plans from leading consultancy practices. This was then followed by an open discussion, which allowed participants to ask questions of the speaker and hear other delegate's issues and concerns and provide an opportunity to learn and share their experiences.

An abridged version of the "ConstructIT for Business" Vision 2005-2010 presentation [1] was prepared and presented at the start of each workshop. The intension was to give attendees an indication of possible future scenarios of the potential use of IT throughout a project life-cycle in the future as a background to subsequent presentations and discussions. The vision presentation was predicated on the underlying theme of the need for a central project model that facilitated the co-ordination, exchange, and sharing of project information from a single point amongst the disparate project participants that characterise the construction industry. Other key elements of the presentation were the use of Internet for project collaboration and virtual reality for construction product and process simulation and visualisation throughout the project life-cycle.

The case studies were designed to give attendees the opportunity to learn from consultancy practices that had implemented an IT strategy and to share experiences both good and bad. Case study presentations on the innovative use of IT were also solicited to add variety to the presentations. A strategy presentation was given at each workshop. The fourth and fifth

workshops each benefited from an additional presentation on the innovative use of Virtual Reality and project Extranets respectively.

## **THE DISCUSSIONS**

The Vision 2005-2010 presentation and the case study presentations from speakers from leading consultancy practices provided an excellent basis for very stimulating discussion and knowledge sharing. The content of the discussions have been split into a number of core areas that seemed to be of most interest, and comments made regarding each of these areas are detailed below.

## **CENTRAL PROJECT MODEL**

The presentation made regarding the future direction of IT within the construction industry was generally well received. A number of comments were made on the idea of moving towards a central project model and away from a document-driven model.

The primary concern was one of control of the model itself – if the model for a given project is based on a single database then who manages it, where is it located etc.? This was thought to be a fundamental issue. Trust was also felt to be one of the key issues with the central project model, particularly with respect to data access. It was felt that a single person or organisation trusted by all other parties should control the data. Paper trails for access to the key information were felt to be essential. Perhaps the greatest drawback was that of change. It was pointed out that industry would not change overnight, especially in the small-medium enterprise (SME) sector. The fragmentation of professions together with the large number of small practices presented an immense challenge for use of such a model. It was widely considered that the model is aimed at large projects, at least initially, though there was a comment that the model could be seen as a toolbox – some tools will not be used on all projects, and all may be uneconomic on some projects. It was also thought that reticence to change is cultural rather than technical.

Another part of the problem is with the industry – most buildings are essentially prototypes, and there is little ‘manufacturing’ taking place within the industry. However, it was felt that greater use of such a model might increase repeatability, and reduce the need for prototyping. Five to ten years was thought to be very optimistic for widespread acceptance of the model. This was reiterated due to the large number of small practices that are involved in the industry.

It was felt that one of the ultimate goals of the project model is integration across the entire supply chain. The model is lifecycle based – the information is there for the full lifecycle of a building, and this would benefit facility managers. Additionally, the model would be useful for document archiving, which would benefit knowledge management.

## **IMPLEMENTING AN IT STRATEGY**

A successful IT strategy [2] is one which is driven by the needs of the business. IT is thought of as an enabler, which can be used to support business strategy and should be driven by business strategy. For businesses implementing an IT strategy, there is a need to agree business and technical strategies. It was felt that good IT strategies stretch beyond the offices, and out onto

sites themselves (or at least permit this to be done with relative ease.) Cost and support were considered to be issues here though. It was felt that large projects would require 1-2 people looking after site IT systems and data management alone.

With respect to implementing an IT strategy, comments were made on the cost constraints for SMEs, due to low margins and economies of scale which provide greater benefit to the larger organisations. Additionally, the fragmentation of the industry coupled with the large number of SMEs caused concern to some attendees, who felt that access to IT may be difficult for some organisations. This was countered by the argument that access is cheap – a £500 PC can provide Internet access and run almost all industry-standard software.

Standardised architectures, systems, and protocols provide a stable base within a good IT strategy. However, these were felt to concentrate on immediate needs, and that future changes were seen as being more problematic. This was agreed, with the corollary that IT is a very dynamic domain with many rapid changes, and that future changes are difficult to predict. Having a stable base would make future change easier, even if it did not help in terms of predictability. Finally, comments were made that it is very difficult to directly attribute cost savings to IT. Savings were more obvious in other ways, such as time, waste, information exchange, etc.

## **E-COMMERCE/THE INTERNET**

Some comments were made which suggested that construction industry use of the WWW was poor. These seemed to be towards the extreme of opinions though. Most attendees agreed that many construction organisations had web-sites, even if their use was not technologically innovative. A web presence was seen as important, particularly with the advent of construction portals and web-based collaboration (see below.) E-commerce was considered to be a lesser issue due to the nature of the industry.

Perhaps of greater importance at a practical level, web-based technologies were seen as being very important, as they avoid the need for multiple installs, maintenance is easy, the standards are mature and accepted, and everyone understands the interface. For document management purposes, making it web-based was seen to be very effective, as this avoids problems with standards and issue conflicts. Browsers are available freely, and everyone knows how they work. Additionally, deployment was considered to be much easier with web-browsers.

Bandwidth was also an issue, but it was widely acknowledged that this is getting bigger and cheaper, and will get much better with time.

## **CONSTRUCTION PORTALS/WEB-BASED COLLABORATION**

There was much debate on construction web-portals and web-based collaboration. Some of this was positive, some was negative, and there were even some contradictions, though this is not surprising considering it is still a relatively new technology.

It was widely acknowledged that portals are currently just document management systems. Using them, it is easy to view project documents online, but gaining access to more fundamental

information quickly and easily is impossible (this development is related to the central project model discussed previously). It was acknowledged that electronic document transfer could be problematic given the current culture – there was an example of one contractor who was unhappy to receive drawings and designs on a CD-ROM only i.e. no physical copies.

One issue regarding this type of working was cost. As one attendee stated, portals were considered to be expensive, but there was a feeling that there “*is a need to be in there.*” Another attendee found that the client expects savings made to pay for this (i.e. the client will not pay any more.) It was suggested by some that the cost of hosting can be paid for in reduced paperwork alone, while others thought that current use of document management systems resulted in too much paperwork! It would appear that there is some hype surrounding the use of portals, particularly their ability to handle large projects with very large quantities of documents. Scalability was seen as a big problem by some. Contrary to this, one or two others felt that the industry was “almost there” in terms of collaboration, but it was considered difficult to set up sites with the same levels of IT as an office.

Symbiosis of relationships between all parties was considered to be important. Use of collaborative techniques might change the traditional approach to design and build (e.g. the role of architects may change, as they will not solely control the design process). It was felt that the whole design and build process would become more dynamic, if greater access to project documents became commonplace.

Clients were considered to be very influential for web-base collaboration. One attendee claimed that clients were pushing for greater use of IT in this way. Clients also define what they want, and therefore essentially control the way information is dealt with (e.g. if they specify they want physical drawings, they get them!). However, counter to this was the suggestion that clients (particularly major ones) like technological innovations such as VR. It was strongly felt that collaboration should be all-inclusive, especially for the client. Overall, the construction industry was felt to be slow to respond to major changes in practice – there are still many cultural issues to be faced.

## **INTEROPERABILITY/STANDARDS**

This was a considerable subject for discussion at each workshop. Standards were required at a number of levels, including: software for a given project; information interchange within similar software packages; and standards for use of a given software package. Compatibility and standards were felt to be very important at all levels – these were considered to be very important to avoid continual re-investment. This was felt to be a key issue. Problems were also evident with information sharing – there are many disciplines working together on projects, with different platforms, formats, etc. being used.

It would appear that standards are occasionally set for software used on larger projects, particularly when there are many people involved in a project and as part of the supply chain. A large project which involves many SMEs will tend to standardise software use (such as CAD tools) around those which the majority of the SMEs use (change is much more difficult/expensive in such organisations). This is more of a nod towards practicality and cost than towards an overall move towards standardisation as a rule.



For information interchange, at a very practical level there was considered to be great dissatisfaction at the lack of standards for file interchange within the CAD community. CAD drawings were considered to be useless in terms of data capture without agreed protocols. These need to be set and implemented. It was argued that there is a pull towards *de facto* standardisation, due to many SMEs buying off-the-shelf software, but given the divisive nature of the CAD business with no single player controlling the market this wasn't too popular. Interoperability standards don't exist, and it was considered by a number of attendees that they never would – the CAD companies set the standards on their own. There is the argument that it may be necessary to force a set of standards irrespective of the views of the software providers. However, this requires the majority of the big players in the industry to do this given the significant purchasing power and hence the clout to force change. However, comments were made to the effect that the industry is opposed to major changes, due to backwards compatibility issues.

It was also felt that there is a need to set drawing protocols for use within a particular CAD package. Problems were felt by some to exist even within a single CAD package due to a lack of common standards for drawing layout. The corollary to this was that there are also problems getting humans to follow set protocols, even in the cases where organisation have written and agreed protocols internally.

Finally, linking back to the single project model described earlier, XML was considered to be a very important standard for information interchange by one attendee. It was interesting to note that interoperability and standards for information interchange were considered to be an important issue for many, but the link between this and the concept of the single project model (which would solve many of the problems) was not obvious to some.

## **FUTURE TECHNOLOGIES**

Very little was mentioned of other technologies, or the possibility of future technologies, but virtual reality (VR) proved to be quite popular, possibly due to its coverage in two of the presentations.

It was suggested that VR might affect the way groups approach the design/build process - things would become more dynamic, as the design would appear to be more 'real'. VR seemed to be very popular for walkthroughs, and for spotting potential conflicts within a design (e.g. service routing.) It seemed that some clients like VR walkthroughs, and are willing to pay for them in many cases.

## **SUMMARY AND CONCLUSIONS**

The perceptions and concerns of IT by small and medium-sized consultancy practices in the construction industry as it enters the 21<sup>st</sup> century, were captured through five workshops organised by the authors and presented in this paper. The IT knowledge of the workshop attendees varied from novices working in small practices who wanted to improve their knowledge of IT, to IT managers and directors whose technical knowledge of IT systems and support issues was very high and wanted to keep abreast with emerging advances and

opportunities. Each workshop was designed to commence with a presentation that raised participant's awareness of the anticipated developments in Information Technology in the future and the need to have effective IT strategies in place to operate effectively in the new economy. This was followed by presentations of practical experience on implementation of effective IT strategies linked to organisation business plans from leading consultancy practices. This was then followed by an open discussion which allowed participants to ask questions of the speaker and hear other delegate's issues and concerns and provide an opportunity to learn and share their experiences.

The vision presentation set the scene and gave participants the chance to anticipate their future IT needs and the implications on their IT strategy. The discussions indicated that most practices were concerned with strategy, organisation, people and cultural issues. There was also a lot of interest on the potential of the Internet for e-business and in particular project collaboration with the consequent implications for standards for information exchange.

Information Technology was generally perceived as something which was necessary – even vital – to the success of organisations. However, many felt that they were being forced to deal with issues which shouldn't exist ideally (such as the lack of computer-aided drawing (CAD) standards, and the multiple vendors in the CAD software market). Also, some felt that they were being pushed down IT routes they wouldn't have previously considered due to the requirements of clients. Indeed, a number of attendees felt that something which was sold as being greatly beneficial to many organisations seemed to consume vast quantities of resources in some cases, yet there was still very much a feeling of a need to embrace IT.

There was general agreement amongst workshops attendees that they would have to adopt effective IT strategies in order to participate effectively in the new economy. Most realised that implementing an effective IT strategy was not straightforward, particularly, as they were constantly being overwhelmed with information from consultants selling solutions and salesmen selling systems, none of which suited their business needs. This is not surprising as IT is a significant investment to small and medium –sized organisations and IT champions within such organisations were faced with the difficult task of convincing senior partners of the business benefits before making an investment. All agreed that what they needed was an impartial source of advice and guidance on best practice derived from the real life experiences of other organisations. The workshops provided such a forum for learning and exchanging best practices, and there was general support for future workshops.

### ***ACKNOWLEDGEMENTS***

The encouragement, advice, and support given by Sheila Hoile (CIC/TOPIC – Project Leader) in organising and delivering the workshops successfully is gratefully acknowledge. The workshops would not have been successful without the active participation of the speakers and attendees whose contribution is gratefully acknowledged. This work was undertaken for the Construction Industry Council (CIC) and funded by the Department of the Environment, Transport and the Regions (DETR), CIC/TOPIC, South Bank University, Professional Construction Skills (PCS), and EPIC Group Plc. under the IT Construction Best Practice Programme. The authors take full responsibility of the views and interpretations expressed in this paper and these should not in any way be attributed to any of the individuals or organisations associated with the work.

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