

# Collaboration in Construction: Legal and Contractual Issues in ICT Applications

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## Summary

The construction industry is a project-based business bringing together many different organisations to complete a desired goal. The strategic use of Information and Communication Technologies (ICT) has enabled this goal to be completed more effectively. Two issues require addressing, the technology itself and the implementation factors of the technology. Such implementation factors should consider, among other factors, the legal and contractual issues associated with the use of ICT, training requirements and its effects on the organisational culture. To date the legal and contractual issues have not been extensively covered, and it is recognised that the technologies have not been properly covered by any recognised legal and contractual practices. This in turn is threatening to inhibit the growth and prosperity of the use of the technology on construction projects. This paper discusses these legal and contractual issues and describes methods and tools that can be used to enable the growth of technology to be used in a legal and contractually valid environment.

## 1 Collaboration in Construction

One of the main reasons for using information and communication technologies in the construction industry is to increase the efficiency and accuracy of communications through collaborative systems. The use of ICT in a business such as construction is a good example where smart organisations are commonly used for any number of different projects. This paper uses the construction industry as an example to highlight whether the legal and contractual challenges of using ICT in collaborative systems have been addressed in IST funded projects of the EU. Communications generally operate without contractual support, resulting in a number of potentially serious legal implications – such as validity of contract notices, ownership of data and intellectual property rights.

Effective use of collaborative systems is vital in the construction industry because of the large number of project participants, often being geographically dispersed. Studies have highlighted the problems inherent in construction communications. These include inappropriate modes of communication, (i.e. document formats, insufficient infrastructure etc), organisational frameworks that restrict intra-organisational communications and adversarial contractual relationships which inhibit inter-organisational communications. Information technologies – or information and communication technologies – as they are now referred to have been applied in the construction domain for many years in an attempt to improve communications through more efficient information transfer. These technologies were initially intended to speed up the transfer of data, and possibly provide ‘reusable’ data to avoid rekeying.

The introduction of information and communication technologies is not easy. The implementation of new systems produces problems, ranging from technical limitations to cultural and social issues. These problems have limited both the uptake of the technology and their effectiveness. Many of these barriers have been addressed through the definition of

standards, recognition of training requirements and change management processes, with varying degrees of success. Further work is needed in many of these areas, but a new focus has emerged as a result of the changing use of information and communication technologies, the legal and contractual issues surrounding their provision and application.

This paper reflects on the collaborative working technologies being applied in RTD activities of the EU RTD sector. The impact of the legal and contractual issues on these RTD developments is discussed, and future needs also described. The findings are primarily taken from the EU funded research projects eLEGAL, ICCI and ALIVE, with other supporting information also being used.

## **2 Legal and contractual issues affecting ICT in construction**

The legal issues arising out of the use of ICT in construction are many (eLEGAL 2001), (Välikangas and Puttonen 2002) & (eLEGAL 2003). The following sections will describe some of the main issues that managers of ICT need to be aware of, to enable the successful use of ICT in a legal and contractually valid manner in their projects. The issues have been deduced from research carried out by a number of RTD projects, some sponsored by national funding bodies and others from the EU.

### **2.1 Validity of Contract Notices**

The collaborative nature of construction and engineering projects is reflected in the standard forms of contract, for example the use of the JCT suite of contracts in the UK is prevalent on construction projects. (JCT 1998) By examining standard construction contracts in several EU countries including Finland, France, Germany, Italy, the Netherlands, Slovenia and the UK it was determined that these contracts typically contain obligations on the parties to communicate with one another by serving and receiving specific formal notices (eLEGAL 2001, ICCI 2002). In order to be contractually valid (and therefore effective) some of these notices are required to be served 'in writing', but in UK law it is still unclear whether an email, or the posting of data to a project website, satisfies the requirement that something be 'in writing' (eLEGAL 2001). As a minimum, it will be necessary to introduce clauses into contracts which provide that any communication, be it of a notice, certificate or programme, etc., may be made electronically and which provide that the term 'writing' includes electronic communication. (eLEGAL 2001)

### **2.2 Legal Admissibility**

In the EU construction sector any kind of document has the potential to be legally admissible. A document for the purposes of the law of evidence is very widely defined as 'anything in which information of any description is recorded'. Therefore potentially any type of electronic communication will be legally admissible in the event of a dispute (Goodwin 2001). Legal admissibility should not be confused with contractual validity. If a document is legally admissible this means that it will be admitted in evidence, i.e. it will be permitted for it to be put before a court for its consideration. The rules on admissibility are a matter of law and it is not open to the parties to a contract to specify what will and will not be admissible. That is a matter for the court to decide. However, it is open to parties to specify requirements for contractual validity, such as the requirement that a notice be in writing (Tesei et al. 2001).

The issue here is really one of good practice. Any party wishing to rely on any document, whether electronic or not, can increase the weight likely to be given to such a document by a court of law through demonstrating good practice in its creation and storage.

### **2.3 Agreements with Technology Suppliers**

Depending on the level of the technology employed on a project, the technology provider will play a vital role in its success. Where the use of technology is extensive (for example where a

third party provides the design, maintenance and hosting of an on-line project collaboration tool, usually an 'Application Service Provider' (ASP)) the performance of the other members of the project team will greatly depend on the performance of that technology supplier (Välikangas and Puttonen 2002).

Therefore, careful attention needs to be given to the question of who is liable for any failure on the part of the technology supplier, as this will inevitably have a knock-on effect on the performance of other members of a project team (Jungemann-Dorner 2002).

Agreements with technology suppliers need to be carefully drafted to ensure that such liability is properly identified and allocated appropriately.

## **2.4 Agreements between Project Team Members in relation to the use of Technology**

The use of new technology changes the way in which project team members communicate. Therefore, there may be a need to formalise the way in which this communication takes place (eLEGAL 2001). This may range from simply having an agreed project-wide e-mail protocol to providing addenda and amendments to main contracts and designers' appointment contracts to regulate the use of other kinds of ICT (Shum 2002). On larger projects there could even be a contract specifically written for the use of ICT. This contract could be the ICT contract that was developed by the eLEGAL project (eLEGAL 2002).

## **2.5 Ownership of and access to Data**

With the increasing use of web-based project collaboration, increasing amounts of data will be held centrally on project servers, which may be hosted by a third party. It is important to address who is entitled to have access to this data – not just project communications, i.e. correspondence, drawings, etc., but also to 'meta-data' which is 'data about data' and which can provide information about any project team member's access to, and use of, the project information (Shelbourn et al. 2002). Where there is extensive use of ICT on a project this issue can and should be addressed in the contracts between the various project participants (eLEGAL 2002).

## **2.6 Intellectual Property Rights (IPRs)**

For Architectural, Engineering and Construction businesses copyright is the most important IPR protected by law. In the UK, like many other EU countries no formality such as registration is needed in order for copyright to arise, it is automatically created along with the material itself, e.g. architectural drawing, a model or even the building itself.

In the UK the Copyright Designs and Patents Act 1988 (CDPA) gives the owner of the copyright in a work exclusive rights in relation to it including the right to copy it and adapt it. Section 17(2) of the Act states that copying means reproducing the work in any material form including storing the work by electronic means. The implications for project team members using ICT are clear – downloading copyright material is a potential infringement.

However, by providing designs for use on a project it is likely that designers will be granting an implied licence to members of the project team to use them for the purposes of the project. Furthermore, the designer's appointment will usually deal with this explicitly and contain provisions about copyright in the designer's designs. Typically, the copyright vests in the designer, but the employer is granted a licence to use the design in connection with the project in question (ALIVE 2002).

With Design and Build (turnkey) Contracts, contractors' designs are typically owned by the contractor, with the employer having a licence to use them for the purposes of a project. In cases

where the contractor does not carry out the design (i.e. an architect does so on behalf of the employer), the contractor is not allowed to use the designs for any purposes other than the completion of the works (ALIVE 2002).

Designers have expressed concerns about the effect that the Internet and especially on-line project collaboration tools will have on their copyright in their designs. In the EU, the same legal protection is afforded to those seeking to prevent unlawful copying electronically as in the paper world, but the ease with which unlawful copies can be made is dramatically increased when material is made available electronically (ALIVE 2002).

The increased use of electronic transmission of copyright material therefore increases the problem of detection of misuse and enforcement, rather than introducing any novel legal issues.

## **2.7 Data Protection**

EU legislation has meant that the way in which an individual's data can be collected and processed is now regulated by statute. This legislation includes: The common law duty of confidentiality; The Human Rights Act 1998; The Data Protection Act 1998; and The Freedom of Information Act (Guardian, ePUBLIC 2003).

The use of ICT on a construction project will often involve the processing of an individual's personal data, for example, the collection of databases of individuals contact details. With few exceptions, the permission of such individuals must be received before their personal data can be processed. Systems need to be put in place to ensure that any necessary permissions are gained from individuals whose data is to be processed, and to ensure that adequate security is provided in relation to this data (Data Protection Act 1998).

## **3 Methods and tools to enable legal and contractual validity**

To enable many of the legal and contractual barriers for ICT use in construction projects, research sponsored by the EU has produced a number of simple to use tools to enable project based businesses to realise legal and contractual validity of ICT in their projects.

The main track of much of this research is to provide project based businesses (mainly in the construction sector) with a framework for specifying legal conditions and contracts to enable a legally admissible (exclusive) use of ICT in their projects. (eLEGAL 2001a)

The results of the research have provided a clause library, a collection of clauses to support the application of ICTs to business processes, including provisions for different types of projects and the variations in national legal and regulatory frameworks across Europe. The clause library provides the knowledge base to a contract configuration tool. This is software that is able to produce ICT contracts for different forms of project based business for construction projects in particular. The various parties defining and negotiating the ICT contract can do so in a collaborative environment known as a 'virtual negotiation room' (VNR). The VNR allows a user of the contract configuration software to download the latest version of the contract, edit it and return it to the VNR over the Internet. The VNR also requires the user to digitally sign each submission to avoid any chance of argument over who sent what and when it was sent.

These type of tools have been developed to help project based businesses in their day-to-day activities. GEODECO, (an Italian Geotechnical engineering company) has used these types of tools as part of their collaboration platform (also provided from EU funded research). The combination of the legal and contractual compliance tools with their collaboration platform has meant that setting up and running virtual organisations (VOs) to tackle a business problem has become much easier (Merz and Mangini 2002). A graphical representation of a typical VO is shown in figure 1.

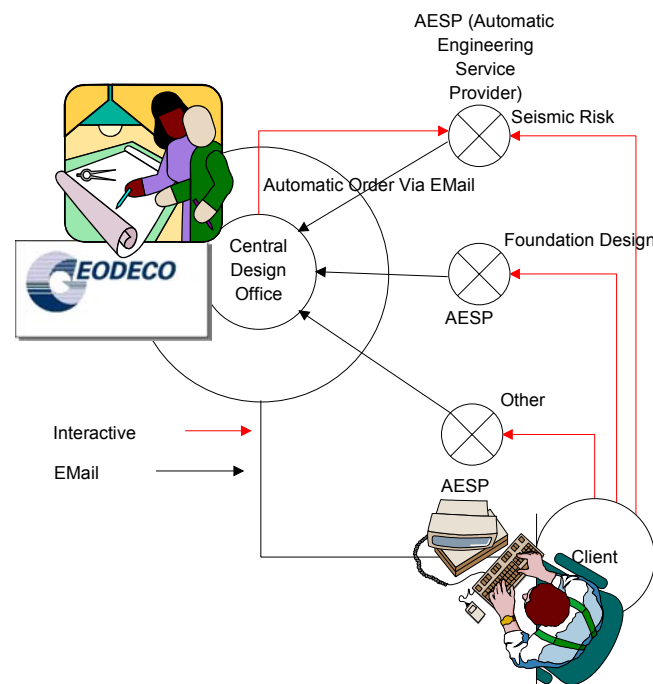


Figure 1: GEODECO's use of the eLEGAL tools for online contracting (Merz and Mangini 2002)

A typical scenario would involve a user inputting coordinates of a site (by clicking on an interactive GIS map) where they wish to build a structure, and inputting all available information about the soil characteristics and the structure typology. The GEODECO system provides, free of charge, results of a simplified analysis which is useful to establish the real need for a more sophisticated analysis that will be performed off-line through human intervention by experts in the field. Traditionally, a standard contract adapted to the needs of the specific project would be sent to the client for signature. The client would then sign it and send it back to the design office at GEODECO. This process is now facilitated electronically by using the contract configuration and VNR tools described above. By using these tools it is possible for the two parties to negotiate and digitally sign every clause of a consulting contract, and still ensuring that remote consulting activities do not differ from traditional 'contact-based' consulting. Digital signatures on the relevant documents, also ensure the necessary tracking and consequent liability from the consultant's side. All contractual issues are finalised using these types of tools in a very short time, which is crucial for services which may be required at very short notice.

#### 4 Are the legal and contractual issues being implemented in IST RTD activities

Having described how legal and contractual validity for transactions using ICT on construction projects can be achieved using the tools and methods described in section 3, the question to now consider is: are these or similar tools being implemented in RTD activities in the construction domain.

Research has focused on analysing and synthesising the results of EU and National research projects providing collaborative working technologies to all project stakeholders on construction projects. A more targeted study has determined whether 8 key legal and contractual issues are being considered in RTD tools and software. The 8 key issues are:

- Electronic / digital signatures – these allow a recipient of a piece of information to know when the information arrived and who has sent it, and to check whether the information has been changed since it was sent;
- Digital notaries – these provide a time stamping service, proving the existence of a piece of information at a particular time. These are often used in conjunction with an electronic / digital signature;
- ICT contracts – these describe the ICT use and supporting environment in which all parties involved in a project must comply with to enable the effective use of ICT;
- ASP contract – these are contracts between an ASP and a client, and the ASP and the other stakeholders involved within a project. The ASP sets up and manages services on behalf of the client, providing facilities and functionality for all project participants;
- End user licences – these are determined by the ASP and the end users of the ASP's services. They typically contain information on permitted use of the ASP's services by the end users, a method of granting access to the services, training for users, IPR and confidentiality conditions, and limits on liability;
- IPR issues of information – this describes the rights to the information contained within the project for the different stakeholders involved within the project. Many different levels of rights to access will exist that must be managed by the ICT contained within the project;
- AEC objects – the increased use of 'object' technology within construction projects has raised a number of legal and contractual issues. These include ownership, access, change rights, accuracy and management of these objects; and
- Legal infrastructure – the legal and contractual issues highlighted above need an infrastructure associated with them to enable them to be achieved. This issue measures how much the ICCI member projects have contributed to an infrastructure.

To determine at what level each of these legal and contractual issues has been integrated into RTD developments a number of projects have been recognised as appropriate for this purpose. There are 7 EU funded and 2 national funded projects for consideration. Each of the projects was given a score of between 0 and 4 for their recognition and use of the legal and contractual aspects in their developments. The scoring levels were:

- 4    deployed in the industry / commercial context
- 3    prototyped / RTD demonstrator
- 2    made a contribution to the research area – formal models etc
- 1    studied / conceptually considered
- 0    not addressed

A matrix was devised to show the legal and contractual issues along the top with the 9 projects down the side. The individual scores are shown in the central cells of the matrix. The matrix results are shown in Figure 2, with more detailed information on the matrix available in ICCI (2003). The implications of the results can be summarised as:

- The AEC objects issue was the first in the list of resources dedicated to it by the projects, as this was the issue that had the highest total scores in the matrix;
- There were tools and methods that had been 'deployed in the industry / commercial context' in 3 of the issues, electronic signatures, ICT contracts, and ASP contracts. In the ASP contracts issue there were three different deployments from three different projects studied;

- Although the legal infrastructure issue was ranked second in the results, along with ASP contracts, there was no deployment in the industry / commercial context scores, with only a single prototype / RTD demonstrator being developed by of the projects. This is immediately an issue that requires further study;

	Electronic signatures	Digital notaries	ICT contracts	ASP contracts	End-user licences	IPR issues of info	AEC objects	Legal infrastructure
<b>eLEGAL</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>iCSS</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>
<b>ToCEE</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>
<b>OSMOS</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>eCONSTRUCT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>
<b>DIVERCITY</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>
<b>ISTforCE</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>GLOBEMEN</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>eCOGNOS</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>2</b>

Figure 2: Matrix showing the areas where the legal and contractual issues have or have not been addressed in the projects associated with the ICCI project

- Towards the end of the results came the ICT contracts and IPR issues of information issues. They were ranked 5<sup>th</sup> equal. However in the ICT contracts there is an industrial deployment from one of the projects and 3 RTD demonstrators / prototypes, so although not many projects addressed this issue, those that did developed technology that can be readily used by the industry;
- The issue of the use of end user licences was ranked 7<sup>th</sup> in the results, but there was an RTD / prototype made available by one of the projects;
- The digital notaries issue was the one with the least score, but again there was an RTD / demonstrator available for organisations that wish to begin to trial its use in their day-to-day workings with electronic transactions;

To clarify, the results have shown that there is a commercial product available for the use of electronic signatures, ICT contracts, or ASP contracts directly from the projects studied in this exercise. There are prototypes available for users to test and possibly integrate into their day-to-day working in all of the other legal and contractual issues studied. The number of projects that carried out research into each of the legal and contractual issues differed significantly. For example the area of legal AEC objects although researched by all projects, does not have commercially available tools to use to overcome the legal barriers to the wider uptake of AEC objects (ICCI 2003). However, it should be noted that even though there are commercial products available for all of the legal and contractual issues researched, the development of a complete legal framework to enable the use of ICT on construction projects has yet to be fully realised. This is one of a number of areas that requires further research. These areas are discussed in the next section.

## 5 Future RTD activities for legal and contractual issues

The acceptance of the legal accountability of electronic transactions is an area where all stakeholders of the project have to be in agreement. Having transactions that a user has trust and confidence in the use of ICT for electric transactions will be a real benefit to the project. This can in turn lead to increased quality and profitability of the finished product. Assessing and fully addressing the IPR, security, privacy, and ownership implications of electronic data will have to be defined in contractual aspects of the project. Figure 3 shows a graphical representation of the different activities needed at different timescales to enable full legal and contractual governance for ICT and collaborative working.

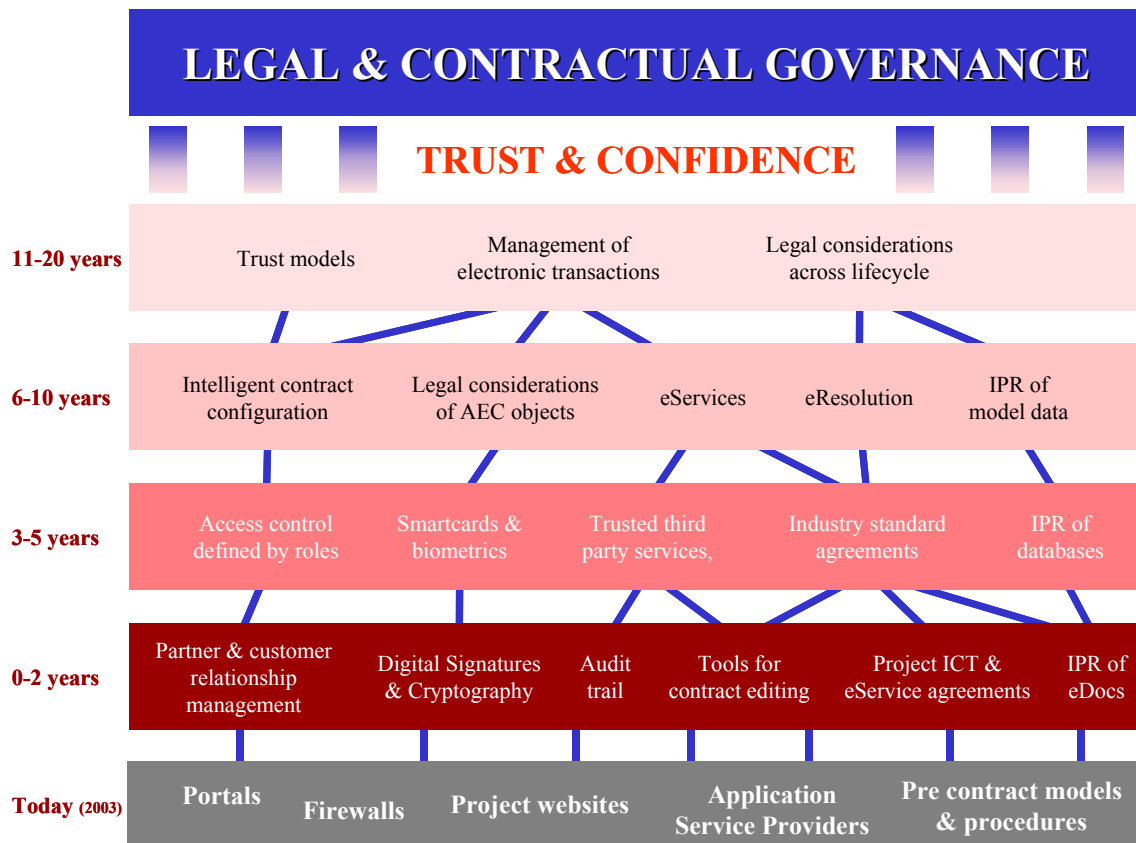


Figure 3: Roadmap of legal and contractual governance for ICT in collaborative working

The development of comprehensive online smart contract configuration tools to enable the editing of contracts from the negotiation to the final process of digitally signing the contract will play a major part in addressing the IPR, security, etc issues. These tools should also provide support for assigning and defining contractual liabilities, including the liabilities of the partners in relation to the accessibility of electronic data as part of these contract definition tools.

It is widely acknowledged that object-model based ICT will be the flavour of future ICT developments for the construction industry, (ROADCON, 2003) however, the legal issues of using these '*objects*', i.e. their specification in the ICT contract for example, still needs to be further researched to be fully understood. Such legal issues would include the ownership of the object, stakeholders who have the rights to view, manipulate or delete the objects.

Virtual identity management is the next progression to allow document validation, in such a way that it is possible to guarantee the author identity of a document. This ensures that no changes have been carried out to the original when they should not have been. The



identification and clarification of the benefits of addressing the legal and contractual aspects of using the digital signature and notary technology in any country is also a big challenge for future research.

Digital rights management (DRM) systems that restrict the use of digital files in order to protect the interests of copyright holders are also needed. DRM technologies should be developed to control file access (number of views, length of views), altering, sharing, copying, printing, and saving. These technologies may be developed to be contained within the operating system, program software, or in the actual hardware of a device.

Trust models need to be used to assign different levels of trust to different stakeholders within the project dependent upon the nature of the transaction taking place between the stakeholders using the ICT. Transaction monitors should be used to monitor the flow of electronic information and documentation to ensure that they meet the pre-defined levels of legal validity, e.g. it conforms to the terms of the clauses set out in the ICT contract, the level of security, e.g. the level of digital signature required, and the amount of trust from the party that has sent the information.

## **6 Conclusions**

A barrier to the strategic use of this ICT on construction projects was identified as being the legal and contractual issues by the eLEGAL project. Studies identified that the legal and contractual use of ICT was not considered in traditional construction contracts in a number of EU countries. A brief summary of the legal and contractual issues that require studying to enable the strategic use of ICT to continue has been described. Solutions developed by the eLEGAL project that include tools to enable the online negotiation and signing of contracts by stakeholders in a construction project, with no legal experience have been described.

Research into the use of these tools has also been discussed. The results show that solutions (some of them being commercial products, but many being RTD demonstrators / prototypes) are available to the industry to enable the legal and contractual issues identified to no longer be a barrier for certain aspects of ICT use on construction projects.

From the conclusions of these results a number of new research areas have been identified. These include the development of complete legal infrastructure that incorporates virtual identity management, transaction monitors and trust models as new research areas to compliment the ones already identified and described in this paper.

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