

THE ELEGAL PROJECT: SPECIFYING LEGAL TERMS OF CONTRACT IN ICT ENVIRONMENT

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SUMMARY: *Advances in information and communication technologies (ICT) should assist with the coordination of “virtual enterprises” – the type of arrangement often formed to execute large-scale engineering and construction projects. However, a range of legal issues is emerging which threaten to reduce the benefits available from such technologies, in particular, the lack of a solid contractual basis to govern the electronic exchange of information.*

This paper presents a view on these issues, including the application of ICTs to construction and typical contractual relationships within the industry, before introducing the eLEGAL project. eLEGAL (IST-1999-20570) is a European cooperative research and development project, which is focusing on legal conditions and contracts regarding the use of ICT in project business. It aims to define a framework for specifying legal conditions and contracts to enable a legally admissible use of ICT in project business, leading to more trust and hence, improved business relationships.

The organisation of the project and the planned deliverables are described, followed by brief results from the project’s review of current contractual practices and legal frameworks and their relevance to ICTs.

KEYWORDS: *Construction, Contracts, eLEGAL, ICT, IT, Legal issues, Virtual Enterprise.*

1. INTRODUCTION

1.1. Virtual Enterprises and the Construction Industry

Advances in information and communication technologies (ICTs) are giving rise to inter-networked, “Smart” organisations that are virtual in concept, highly flexible, and rely on these network technologies – Virtual Enterprises (VEs). A number of European research projects have investigated various aspects of these VEs, including reviews of enablers for these strategic business alliances (VIVE, <http://www.vive-ig.net/index.html>) and the lifecycle processes involved (ALIVE, 2001a).

The BIDSAYER project (<http://www.vive-ig.net/projects/bidsaver/index.html>) seeks to develop a framework to provide a support environment for the ‘Business Integrators’ – parties that manage the formation and operation of Virtual Enterprises. This work includes a legal framework for the regulation of relationships throughout the life cycle of the Virtual Enterprise, including the aim, form and duration of the Virtual Enterprise and applicable laws, project management rules and procedures, obligations and liability, etc. However, this work will not specifically cover the application of ICTs in a contractually valid manner, although the exchange and processing of information within a Virtual Enterprise will be examined.

The MARVIN Project (<http://research.dnv.com/marvin/summary.html>) has also investigated arrangements for virtual enterprises, or in their words, virtual organisations. MARVIN concentrates on improving services to the maritime industry, including a legal framework for the operation of VEs (Clemens and Ralf, 2000). The ALIVE project has also proceeded to examine legal issues related to Virtual Enterprises (ALIVE, 2001b), but again this work considers VEs in general, rather than specifically in the area of construction. As a working group, ALIVE will identify and study issues, whereas eLEGAL will be developing solutions – potentially addressing issues raised by ALIVE if appropriate. ALIVE also concentrates heavily on the nature of a VE rather than its operation in terms of the types of communication found in the construction industry.

The eLEGAL project has adopted a definition for ‘Virtual Enterprises’ (VEs):

‘a temporary form of business collaboration, employing ICTs as fundamental enablers, built upon strategic business alliances around new business opportunities, then dissolving once the business objectives have been achieved.’ (eLEGAL 2001).

Although numerous definitions for the term can be found, varying in approach or scope, an important aspect of a VE is its use of ICT. These tools act as an enabler for the group of (often geographically dispersed) organisations, allowing them to communicate and coordinate their work. Examples of such “virtual enterprises” are those formed to execute construction projects and large scale engineering projects.

1.2. Construction and ICTs

The construction industry, and the large-scale engineering (LSE) sector, have been applying information technology (IT) to their businesses for many years. In the early days of computing, large machines were used for structural analysis and finite element calculations. Industry specific systems were developed to enable estimating and tendering and accounting to be computerised. The advent of desktop PCs allowed the construction industry to provide such services at a local level, but generally in isolation. Integration of systems was targeted as a major development, but suffered from the massive overheads imposed by the solutions and the diverse range of hardware, software and data formats involved.

The application of IT to construction continued, with varying degrees of success, including the widespread use of email, both as a means of communication in its own right, and as a transfer mechanism for drawings and documents. However, the convergence of information technology and communications technology, leading to the term information and communication technology (ICT), promises to have a major impact on the organisations involved and their business processes, with the Internet being the prime example.

The Internet was initially utilised as a static publishing medium, but recent developments have enabled a rapid increase in the provision of dynamic services. In particular, the establishment of Intranets and Extranets for projects will have a significant impact on the construction industry. Numerous academic journals are already exploring the value of sharing and exchanging information across ‘the net’ through the development and testing of advanced tools such as ‘web-based IFC systems’ (IFC = Industry Foundation Classes) (Faraj et al., 2000), ‘Internet-based collaboration tools’ (Nidamarthi et al., 2001) and ‘3D collaborative viewing tools’ (Kim et al., 2001).

Of more immediate relevance to the construction industry is the proliferation of services being offered on-line. These range from construction portals – offering construction materials from several suppliers, cost advice and tools, etc., – to web-based collaborative project management systems. Examples of these services include the Building Information Warehouse [www.thebiw.co.uk], BuildOnline.com [www.build-online.com] and Build.com [www.build.com].

1.3. The Legal Implication of ICTs in Construction

However, all of the applications of ICT listed above, in addition to the widespread use of email, CAD (Computer Aided Design) files, etc., have legal implications, both for the provider of the information and the recipient. For example, the Internet provides easier access to project information – but who should be responsible for this information, particularly when it is re-used by other parties in a project? In addition, who should be liable if

important project information is not available at a critical moment in a project, following technical problems with an Internet server?

At a more fundamental level, the use of email is already common, but its application to construction communications is often still 'informal' in nature. For example, the contents of an email will often be repeated as part of an official project letter or instruction to confirm the message – thereby resulting in a duplication of work.

This duplication of effort, and the inherent time and resource cost to a construction project, is also reflected in many other communications on construction projects. This renders ICT to be an extra cost to the industry, rather than an enabler for improvement, innovation and cost reduction through rationalisation of processes. To fully realise the benefits from ICTs, they must be applied in a way that supports a project and its communications – and, more specifically – in a *legally admissible* manner.

The ECLIP II project (<http://www.jura.uni-muenster.de/eclip/>) is considering a subset of this area, concentrating on the regulatory frameworks for e-commerce in the European Union, and in particular, assisting RTD (Research and Technological Development) projects. ECLIP II has also examined alternative dispute resolution, an area being studied by the E-Arbitration-T project. E-Arbitration-T (<http://www.e-global.es/arbitration>) is developing a framework for dispute resolution aimed at SMEs (Small and Medium sized Enterprises). This includes addressing the legal issues and developing an intelligent infrastructure to manage an electronic, distributed dispute resolution process (Gouimenou, 2001).

1.4. Contractual Relationships in Construction

In simple supply chain types of business relationships, such as those between a main contractor and a number of its sub-contractors, information flows generally coincide with business contracts. For example, the contractor has formed a contract with its structural steelwork contractor, which in turn has formed a contract with the structural steelwork supplier. This should enable the clear definition of roles and responsibilities, in terms of both what data should be shared/exchanged, when, and by what means.

However, even this type of arrangement has problems when expanded to include other trades and areas of a project, with the main contractor having to act as a clearing-house for communications, with its inherent delays and associated costs (Thorpe et al., 1998). As projects and design processes become more complex, the need for direct communications between these supply chain partners is also increased, but no direct contractual relationship between these parties is available to manage this interaction. For example, the structural steelwork contractor is increasingly working on the design of a steel frame, but has no direct responsibility to the building services contractor, who is trying to prepare a design for ductwork accommodating the steel frame. Outside of the main contractor's supply chain this is also a problem, as illustrated in Figure 1.

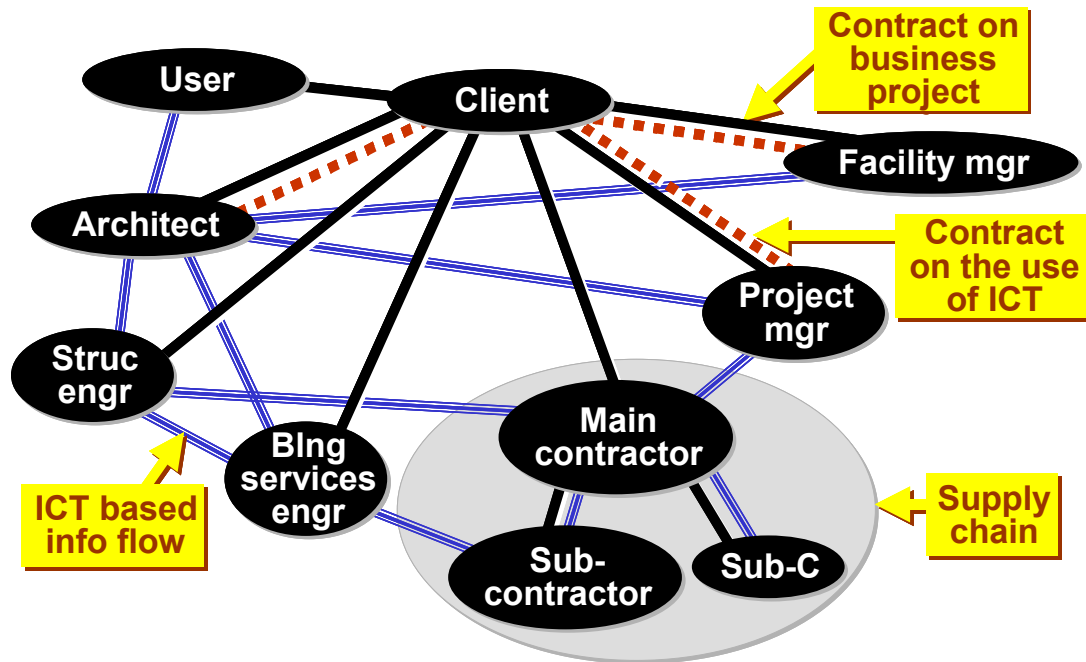


FIG. 1: Mismatch between contracts and flows of information in a VE

This is typical of the situation in a VE: The business contracts (shown with solid lines) are between actors who often have very little mutual communication, such as the client and the main contractor – most communications to the contractor would go through an agent or project manager. The main information flows (shown with multiple lines) are between actors who are not contractually linked, as shown in Figure 1. This diagram highlights the current lack of contractual support for the use of ICTs in VEs – the motivation behind the eLEGAL Project, as described below.

2. THE ELEGAL PROJECT

2.1. Proposal

To address the duplication of effort and data that results from sending hard copies of documents that were previously transmitted electronically, as frequently occurs with current applications of ICTs to construction projects (as described in the introduction above), the ‘eLEGAL’ project was proposed. The main aim of eLEGAL is to:

‘define a framework for specifying legal conditions and contracts to enable a legally admissible (exclusive) use of ICT in project business’.

In this way, all parties involved in the VEs, including SMEs (Small and Medium sized Enterprises), will be confident that there is a legal framework regulating their new ways of working leading to more trust and hence, improved business relationships.

It is envisaged that this legal framework will be prepared specifically for each project, using the eLEGAL suite of tools, as described below.

2.2. Objectives and Deliverables

In order to enable a legally admissible (exclusive) use of ICT in project business, the eLEGAL project will prepare the following main deliverables:

- User requirements for legal support in construction projects;
- Library of re-usable clauses and model contracts;
- Contract configuration and negotiation tools;
- Simulated contract negotiation game; and
- Recommendations to standardisation bodies.

eLEGAL commenced by defining industrial requirements for ICT based legal support, taking the construction industry as a pilot for other industries. It will define the legal basis for contracts on ICT use in the virtual enterprise, accommodating variations for the different participating countries, including the varied contractual arrangements, procurement models and ICT support needs of European industry (specifically the UK, Finland, Germany and Italy). These variations will also be reflected in the *electronic library of clauses* that will be built. The dependencies between these clauses and between clauses and ICT solutions will then be established.

This will form the knowledge base of the ‘*contract configuration tools*’ – software that will be developed in order to produce model contracts for different forms of virtual enterprises in construction projects. Additionally, these contracts can be easily negotiated by using a “*virtual negotiation room*” on the Internet, in which different parties of the virtual enterprise (working together on a construction project) who want to form an ICT contract, are automatically guided while being linked together via the Internet. This approach will help to accommodate the various factors that influence the application of ICTs to VEs, such as: client – type and experience; project – size, scope and nature; VE parties – number, location, technological capabilities; etc. This arrangement of tools is illustrated in Figure 2.

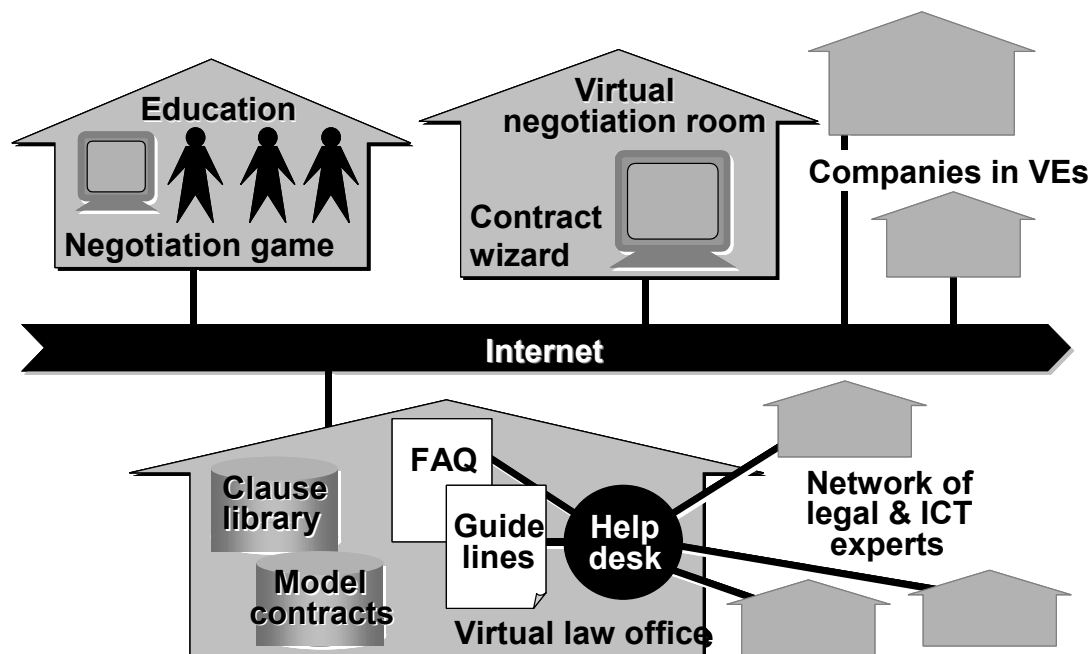


FIG. 2: The eLEGAL 'Applications Suite'

Hence, the main result of eLEGAL will be contract negotiation tools, sold or accessible at a low price level, to improve project business relationships within virtual enterprises in construction projects and which will lead to more trust and reduced number of disputes.

eLEGAL will also establish a help desk for enquiries on the use of the developed tools, and re-package them as a simulated contract negotiation game. This will help in education, training and raising awareness on legal aspects of ICT usage within and between virtual enterprises. Recommendations to standardisation bodies such as IAI-IFC, ISO-STEP, CIS, WIPO and those bodies involved with the development of the various XML standards will also result.

2.3. The eLEGAL Work Structure

This section of the paper describes the eLEGAL work package (WP) framework employed to deliver the eLEGAL Applications Suite and enable the definition of a framework for specifying legal conditions and contracts to enable a legally admissible (exclusive) use of ICT in project business.

The eLEGAL project has developed a framework of seven work packages, as shown in Figure 3.

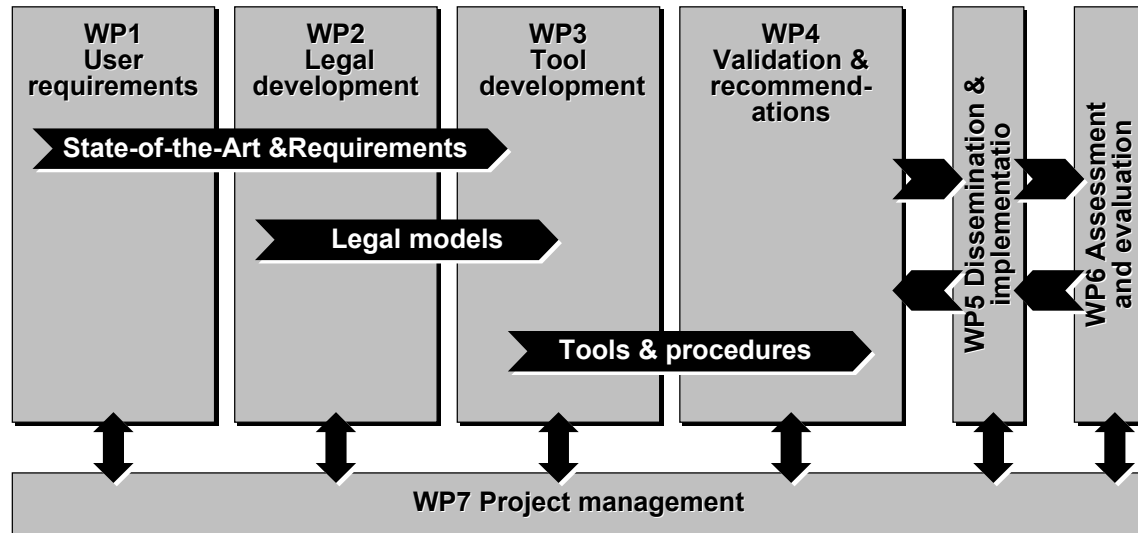


FIG. 3: eLEGAL Work Package Structure

WP1 considers User Requirements. A state-of-the-art survey has been undertaken. This considered current contractual practice by reviewing existing contracts and general conditions used in the construction industry in the four European Union (EU) countries involved. It also examined current and emerging ICT support for VEs in construction, related RTD (Research and Technological Development), standards and models.

A conceptual framework is also being developed, which will describe the various aspects of Virtual Enterprises/Smart Organisations, with particular attention to construction projects. The result of this work is expected to contribute to the general understanding of the problems and provide the basis of a roadmap for further research. The framework will be published as a glossary of terms and a formal information model.

The two activities described above, combined with additional industry-based research, will facilitate the capture of industrial requirements for legal support for ICT in VEs. This work, in the form of a Requirement Specification, will provide the foundations for the legal and software tools developments in work packages two and three respectively.

WP2 will provide Legal Developments. Contract conditions and clause data will be collected from the four participating countries to establish a reusable 'clause library'. The library will supply clause samples for which interdependencies can be developed, hence providing contract configuration logic to satisfy the identified user requirements from work package one. This logic will provide the basis for the software support tools developed in work package three.

Definition of model contracts will then be undertaken. These will provide examples of good legal (and ICT) practice for some typical business conditions in the construction industry. In addition, legal solutions for AEC-objects (AEC = Architecture, Engineering and Construction), such as those included in STEP (Standard for Exchange of Product Model Data) or IFCs, will also be identified, enabling recommendations for standardisation to be made.

WP3 will enable Tool development. The library of clauses and contract logic defined in work package two will enable the definition of a specification for the eLEGAL software tools. From this specification, a tool for defining appropriate ICT environments in a (construction) virtual enterprise/project based business will be constructed. This will enable consideration and accommodation of project circumstances, existing ICT infrastructure of VE members, different countries involved, national regulations, etc. in project ICT environments.

This tool will itself be linked to the 'contract configuration & negotiation tools'. A "Contract Wizard" will enable the drafting of ICT contracts for virtual enterprises, using the library of clauses and contract logic previously defined. This will lead to the specification of a multi user interactive "Virtual Negotiation Room". The tools will also be re-packaged into a learning tool, a "Contract Negotiation Game".

The final task in work package three is to update existing platforms to accommodate the use of modern ICT equipment. This will include incorporating new features such as asymmetric digital signatures, objects, other kinds of documents, and integrated servers or other devices for the purpose of legal evidence.

WP4 covers Validation and Recommendations. Testing and validation will be undertaken via simulated contract negotiations and real life pilot projects. Guidelines will be prepared on the legal aspects of ICT, with contributions being made to standardisation. The eLEGAL project may address a number of standards organisations in several different areas. For example, the investigation into the legal aspects surrounding AEC-objects may well lead to recommendations to the IAI community regarding the ownership, responsibility and application of the related data contained in objects. The project will also consider the potential impact of implementing an ICT contract in parallel with a construction contract. The organisations that draft and manage these contracts may be another target for recommendations resulting from the eLEGAL project. A strategy for the deployment of the eLEGAL legal support tools in the construction industry will also be defined, along with suggestions for other industry sectors.

WP5 facilitates Dissemination and Implementation. This work package includes: the organisation of workshops; publishing of electronic newsletters; a public web site; the establishment of an eLEGAL helpdesk; public presentations; and promotion of proposed business processes and commercial results etc. A 'Reference Group' of industry experts and solicitors in construction IT is also being assembled.

WP6 ensures adequate Assessment and Evaluation of the work. Performance metrics have been defined, permitting the on-going assessment of project progress towards the objectives.

WP7 ensures efficient Project Management. It includes administration, the technical coordination of the work and preparation of project reviews. The consortium undertaking this work is described in section 2.4.

2.4. eLEGAL Consortium

The eLEGAL project (IST-1999-20570) started in November 2000, with 24 months duration. eLEGAL is funded by the European Commission under the IST (Information Society Technologies) programme of Framework 5 and industry. The total estimated effort is 125 person-months, being allocated to six Principal Contractors, two Assistant Contractors and one sub-contractor. The consortium comprises members from a wide range of industry sectors, to enable a holistic approach to the provision of legal support for ICTs in VEs. The composition of the consortium is shown in Table 1.

TABLE 1: eLEGAL Project Consortium Members

Academic/Research	Loughborough University (UK)	VTT (Fi)	
Engineering	Fortum Engineering (Fi)	ENeF (Fi)	Geodeco (It)
Legal	Masons Solicitors (UK)	OTT (De)	
Software/Technology	Ponton Software Technology (De)	SEIB-ITC (De)	

3. THE STATE-OF-THE-ART ASSESSMENT

This section of the paper briefly reviews the results of a survey of the State-of-the-art undertaken to provide a foundation for the on-going research and development on the eLEGAL Project. This review covered the state-of-the-art in contractual practices, emerging ICT support, related research and standards for information sharing in VEs. It therefore covered a wide range of issues relating to the legal aspects of applying Information and Communication Technologies to Virtual Enterprises.

3.1. ICT Clauses in Contracts

A study was undertaken in each of the four countries participating in the eLEGAL Project. This gathered examples of existing clauses and legal cases concerning the special field of Information and Communication Technology (ICT) in Finland, Germany, Italy and the UK.

The analysis of some 3000 pages of German construction contracts for large, technically advanced projects found few references to ICT's. Where mentioned, these references were typically the specification of a particular type of CAD software, for example 'AutoCAD 14 or later to be used' on a specific project, or that 'data has to be valid, secure, well organised and properly managed'. Even so, the underlying message was that the only method for achieving legal admissibility up to now is the use of a hand-written signature on a paper hardcopy.

The position appears to be similar in Finland, if not a little further behind. A survey of leading organisations that make model contracts for construction projects found no clauses relating to ICTs, and no legal cases involving ICTs were found in the Finnish Supreme Court.

In Italy, the situation is similar to that in Germany. Where ICTs are mentioned in a contract the reference will be limited to specifying a drawing exchange format or a textual file format (such as a pdf file).

This is further reinforced by findings from the UK study, which analysed a typical UK construction contract, the JCT'98 contract (JCT, 1998). This suite of contracts, one of the most widely used in UK construction, makes no explicit reference to information technology or even, for example, email. However, findings of the study suggest that the structure of the contract does not prohibit its adaptation to cover the application of ICTs, rather a number of amendments would be required to identify and define communications in electronic format instead of 'in writing'.

In summary, the study revealed that official documents (such as correspondence, drawings, specifications and raw data) are formally submitted solely on paper. The use of ICT seems to be only intended to speed up the transmission process, but effectively has no legal validity. However, the legislation to support technology may exist, but may not have been adopted by the construction industry within its contractual practices, and hence, the use of ICTs is not necessarily legally valid in current conditions. Therefore, the project team undertook a review of European ICT-related Legislation, as described below.

3.2. ICT related legislation across Europe

The Regulatory Frameworks of the countries in which partners in a Virtual Enterprise operate will influence the behaviour of the industry. These influences therefore have to be considered in the eLEGAL Project, so a review of the national regulatory frameworks was undertaken. These frameworks include such elements as 'Construction Law', 'Computer Law', Data Protection Legislation, Competition Law, Health and Safety and Employment Legislation.

Although these national laws provide a background to the operation of the industry and the formulation of current contracts, and may influence the eLEGAL Project, the EU Directive [ECD 1999/93/EC] on eCommerce will have a more direct effect on the use of ICTs in construction. The Directive covers the electronic provision of 'any service normally provided for remuneration, at a distance'. This includes on-line access to information and professional services, requires service providers to supply customers and authorities with specific business information, and will demand the removal of all barriers to on-line electronic contracts by member countries.

Another important area of ICT support for all businesses is electronic signature legislation (European Commission, 1999). This EU Directive has to be implemented in each of the member countries, and it appears that the status of legislation concerning electronic signatures is quite advanced in many countries. In fact, the formulation that an electronic signature be equal to a handwritten one is already present in German, Italian and UK law.

This legislation, and the clauses that will be developed by the eLEGAL project, will serve to support the electronic exchange and sharing of data, and specifically, for such distributed teams as found in construction projects, online support for the construction industry.

3.3. Business Models for online construction

The State-of-the-art Assessment considered how internet technologies could be applied to the construction industry, and in particular the legal considerations for this type of arrangement.

An increasingly popular method for providing online services is the use of an Application Service Provider (ASP). These ASPs set up and manage services on behalf of clients, providing facilities and functionality for other project participants. The study concluded that these arrangements should also be governed by contracts, both between the ASP and the client, and between the ASP and the other parties on the project. These contracts need to cover 'Service Level Agreements', Licencing Agreements, Intellectual Property Rights, and should generally promote the use of electronic communications technologies for project data exchange and sharing.

A number of organisations already offer online services to the construction industry, providing several different types of service to fulfil the industry's requirements for distributed and remote collaboration. The main components of these services include: information systems, directories and catalogues, pricing and estimating systems and collaboration and project management support.

3.4. ICT Support for VEs

These online services, like many aspects of the construction industry, require the application of appropriate technology to support their operation. The eLEGAL project therefore undertook a review of current and emerging ICT support for VEs as part of the State-of-the-art Assessment.

This review identified the potential for certain technologies, such as the Java platform suite, to provide the basic components for facilitating enterprise applications, such as ERP (Enterprise Resource Planning) systems, linking the user with electronic data repositories. However, a simpler approach, such as those offered by Portals, also offer significant benefits for the construction industry.

Great benefits for VEs may also result from Peer-to-peer (P2P) networking. P2P networks enable two or more computers to share their resources, such as processing power, across a network. The use of P2P for sharing music files (Napster) has been a major event, but the ability to dynamically integrate and coordinate an enterprises systems will be a significant advance for VEs.

A powerful data standard that will become increasingly important for construction is XML (eXtensible Mark-up Language). XML, like HTML (Hypertext Mark-up Language), is a markup language, but it separates a document's structure from its content, allowing automatic processing of the whole document. aecXML (aec = architecture, engineering and construction) may well become the transport mechanism by which much of the industry's information can flow seamlessly between all of the ICT tools and applications employed on an AEC project. XML standards also exist for online contracting, such as ebXML (e-business XML).

Although data is a vital component of the AEC industry and its communications, human communications still have a part to play. The study suggested that conferencing technology should become increasingly important with the growth of distributed VEs, and offers many tools and facilities to assist with communications. However, implementation is currently limited, with few demonstrated successes, so careful application of these technologies should be made in order to yield significant benefits for the industry.

Another emerging technology that should benefit the construction industry is the Wireless Application Protocol (WAP). WAP is used to access services and information through wireless devices such as mobile phones, personal digital assistants, etc. This technology may well have an important role in the construction industry, where sites can stretch over several kilometres, or be far away from fixed line services.

4. CONCLUSIONS

Information and Communication Tools (ICTs) are increasingly acting as enablers for the coordination of “virtual enterprises”, such as those groups of companies that are formed to execute construction projects and large scale engineering projects. However, these applications of ICT have legal implications, and it has generally been common practice to provide a signed hard copy of any message or instruction, thereby duplicating effort for all parties. Therefore, to fully realise the benefits from ICTs, they must be applied in a way that supports a project and its communications – and, more specifically – in a legally admissible manner.

This current lack of contractual support for the use of ICTs in VEs was the motivation behind the eLEGAL Project. The eLEGAL Project aims to define a framework for specifying legal conditions and contracts to enable a legally admissible (exclusive) use of ICT in project business.

A State-of-the-art Assessment was undertaken to explore how, if any, legal provision was made for ICTs in contracts, and to consider the application of ICTs, and in particular remote Internet services, to construction projects. The study revealed very few references to ICT's in contracts. Where mentioned, these references were typically the specification of a particular type of CAD software, for example ‘AutoCAD 14 or later to be used’ on a specific project. One of the most common UK building contracts (JCT'98) makes no explicit reference to information technology or even, for example, email.

The underlying message was that the only method for achieving legal admissibility used up to now is the placing of a hand-written signature on a paper hardcopy. This position should change, particularly with recent EU legislation in the area of electronic communications. For example, the EU Directive on eCommerce covers the electronic provision of ‘any service normally provided for remuneration, at a distance’. For the construction industry, this will include professional services, such as consultancy, and as the Directive demands the removal of barriers to on-line contracts, it should allow organisations to undertake business electronically throughout the EU member countries. Another example is the formulation that an electronic signature be equal to a handwritten one, which is already present in German, Italian and UK law.

However, the eLEGAL Project State-of-the-art Assessment suggests that although the Internet is rapidly transforming the way we communicate, educate, and buy and sell goods and services, current contractual practice seems to preserve the traditional methods for achieving legal admissibility in business. It revealed that official documents (such as correspondence, drawings, specifications and raw data) are formally submitted solely on paper. The use of ICT seems to be only intended to speed up the transmission process, but effectively has no legal validity. The legislation to support technology may exist, but may not have been adopted by the construction industry within its contractual practices, and hence, the use of ICTs is not necessarily legally valid in current conditions. The clauses that will be developed by the eLEGAL project should serve to support this legislation, and hence the electronic exchange and sharing of data. In addition, they will assist distributed teams, such as those found in construction projects, by enabling online support for the construction industry.

Therefore, the eLEGAL framework for specifying legal conditions and contracts to enable a legally admissible (exclusive) use of ICT in project business will be essential for the full exploitation of ICTs in the construction industry. The eLEGAL Project will provide contract negotiation tools, sold or accessible at a low price level, to improve project business relationships within virtual enterprises in construction projects, which will lead to more trust and a reduced number of disputes.

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