
Construction Collaboration Technologies

The extranet evolution

Paul Wilkinson



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Construction Collaboration Technologies

The construction industry is not as sleepy as it sometimes thought to be. Project collaboration systems (sometimes also called 'project portals' or 'project extranets') are becoming recognised at the start of the twenty-first century as a powerful tool for the development and management of complex projects. They centre on the effective and efficient use of web-based software and are designed to suit a wide range of users.

What are construction collaboration technologies? How do they work? Why have these applications become important now? How do they fit with partnering and other current industry developments? Is web-based software desirable, secure and economic? What things should we look out for when choosing a system or a provider, and what are the technical requirements? What are the costs and benefits? And how might the systems be used in the future? The answers are here.

Paul Wilkinson is one of the sector's leading analysts and is well placed to present an authoritative overview with up-to-date practical information and advice.

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Contents

| | |
|---|-----------|
| <i>List of figures</i> | ix |
| <i>List of tables</i> | xi |
| <i>Foreword</i> | xiii |
| <i>Preface</i> | xv |
| <i>Acknowledgements</i> | xix |
| | |
| 1 Defining collaboration | 1 |
| 1.1 <i>What is collaboration?</i> | 2 |
| 1.2 <i>Defining collaboration technology</i> | 4 |
| 1.3 <i>Defining construction collaboration technologies</i> | 5 |
| 1.4 <i>Using the technology non-collaboratively</i> | 9 |
| 1.5 <i>Chapter summary and plan of Chapters 2–10</i> | 10 |
| | |
| 2 The convergence of culture and technology | 12 |
| 2.1 <i>From partnering to collaborative working</i> | 12 |
| 2.2 <i>The growing use of IT</i> | 19 |
| 2.3 <i>The convergence of culture and technology</i> | 29 |
| 2.4 <i>Chapter summary</i> | 30 |
| | |
| 3 The construction collaboration providers | 32 |
| 3.1 <i>Understanding the providers' roots</i> | 33 |
| 3.2 <i>History, management and financial status of technology providers</i> | 38 |
| 3.3 <i>Charging structure</i> | 42 |
| 3.4 <i>The UK construction collaboration technology market</i> | 45 |
| 3.5 <i>Chapter summary</i> | 48 |
| | |
| 4 Hosting construction collaboration technologies | 49 |
| 4.1 <i>Traditional software delivery</i> | 49 |
| 4.2 <i>Traditional IT support</i> | 51 |

| | | |
|----------|--|------------|
| 4.3 | <i>Hosting construction collaboration: the do-it-yourself (DIY) approach</i> | 51 |
| 4.4 | <i>The emergence of 'software as a service'</i> | 52 |
| 4.5 | <i>Benefits of using 'wave two' ASPs</i> | 54 |
| 4.6 | <i>Traditional software or ASP: other considerations</i> | 57 |
| 4.7 | <i>Minimum quality of service (QoS) considerations</i> | 58 |
| 4.8 | <i>The external hosting options</i> | 59 |
| 4.9 | <i>A hosting data centre</i> | 61 |
| 4.10 | <i>Investing in security</i> | 62 |
| 4.11 | <i>Financial security of hosting providers</i> | 63 |
| 4.12 | <i>Chapter summary</i> | 64 |
| 5 | Features and functionality of construction collaboration technology | 65 |
| 5.1 | <i>Organisation features</i> | 68 |
| 5.2 | <i>Communication features</i> | 72 |
| 5.3 | <i>Management features</i> | 77 |
| 5.4 | <i>Sharing, viewing and working with CAD-based drawings</i> | 80 |
| 5.5 | <i>Construction collaboration technology options</i> | 88 |
| 5.6 | <i>Ease of use</i> | 92 |
| 5.7 | <i>Support services</i> | 93 |
| 5.8 | <i>Chapter summary</i> | 94 |
| 6 | Connecting to a construction collaboration service | 95 |
| 6.1 | <i>The growth of broadband</i> | 96 |
| 6.2 | <i>Low bandwidth or not?</i> | 97 |
| 6.3 | <i>Internet connection via a company or site network</i> | 99 |
| 6.4 | <i>Internet connection for remote users</i> | 103 |
| 6.5 | <i>Operating systems</i> | 104 |
| 6.6 | <i>Browser support</i> | 105 |
| 6.7 | <i>Chapter summary</i> | 106 |
| 7 | Legal issues relating to construction collaboration technology | 107 |
| 7.1 | <i>Legal status of electronic communications</i> | 108 |
| 7.2 | <i>Legal relationships with the software vendor</i> | 110 |
| 7.3 | <i>Service interruption or unforeseen termination</i> | 115 |
| 7.4 | <i>Discovery and the document audit trail</i> | 119 |
| 7.5 | <i>Freedom of information</i> | 119 |
| 7.6 | <i>Ownership of data and copyright</i> | 120 |
| 7.7 | <i>Archives</i> | 121 |
| 7.8 | <i>Chapter summary</i> | 122 |

| | | |
|-----------|---|------------|
| 8 | Human aspects of collaboration technology | 123 |
| 8.1 | <i>Resistance to collaborative working</i> | 124 |
| 8.2 | <i>Resistance to collaboration technologies</i> | 129 |
| 8.3 | <i>Managing the human/technology issues</i> | 131 |
| 8.4 | <i>People, processes and technologies</i> | 147 |
| 8.5 | <i>Chapter summary</i> | 148 |
| 9 | Benefits of using construction collaboration technologies | 149 |
| 9.1 | <i>Tangible benefits</i> | 150 |
| 9.2 | <i>Intangible benefits</i> | 151 |
| 9.3 | <i>The disadvantages of using construction collaboration technologies</i> | 153 |
| 9.4 | <i>The technologies' short track record</i> | 154 |
| 9.5 | <i>Independent research</i> | 157 |
| 9.6 | <i>Vendor case studies</i> | 161 |
| 9.7 | <i>Calculating an ROI</i> | 163 |
| 9.8 | <i>Chapter summary</i> | 166 |
| 10 | Where next for construction collaboration technologies? | 169 |
| 10.1 | <i>Trends in collaborative working</i> | 170 |
| 10.2 | <i>Market rationalisation</i> | 172 |
| 10.3 | <i>The continued rise of the ASP?</i> | 174 |
| 10.4 | <i>New collaboration technologies</i> | 175 |
| 10.5 | <i>Increasingly mobile connectivity</i> | 180 |
| 10.6 | <i>New regulatory pressures</i> | 182 |
| 10.7 | <i>Changing individual working patterns</i> | 183 |
| 10.8 | <i>The extranet evolution</i> | 184 |
| 10.9 | <i>Chapter summary</i> | 186 |
| | <i>Glossary</i> | 188 |
| | <i>Notes</i> | 193 |
| | <i>Bibliography</i> | 205 |
| | <i>Index</i> | 210 |

Figures

| | | |
|------|---|-----|
| 1.1 | Traditional project team communications | 8 |
| 1.2 | Project team communications using construction collaboration technologies | 8 |
| 2.1 | The product life cycle | 29 |
| 3.1 | The construction collaboration technologies hype cycle | 47 |
| 5.1 | Sample page from CICA survey (2003) | 67 |
| 5.2 | Example of customised user log-in page | 69 |
| 5.3 | Example of project team user directory (1) | 70 |
| 5.4 | Example of project team user directory (2) | 71 |
| 5.5 | Example of document audit trail | 73 |
| 5.6 | Example of project inbox (1) | 75 |
| 5.7 | Example of project inbox (2) | 76 |
| 5.8 | Example of project diary | 79 |
| 5.9 | Example of drawing review and markup (1) | 86 |
| 5.10 | Example of drawing review and markup (2) | 87 |
| 5.11 | Example of drawing review and markup (3) | 88 |
| 5.12 | Example of extranet-based Health and Safety File | 90 |
| 6.1 | Growth in the UK broadband subscribers since June 2002 | 97 |
| 6.2 | ASP and customer connectivity responsibilities | 98 |
| 6.3 | Internet gateway configuration for large organisation | 100 |
| 6.4 | Internet gateway configuration for small organisation | 101 |

Tables

| | | |
|-----|---|-----|
| 2.1 | Number of users of collaboration systems, March 2003 | 28 |
| 4.1 | Packaged software, migrated client/server applications and BSP offerings | 54 |
| 6.1 | Recommended connections for different numbers of users | 99 |
| 8.1 | Structural comparison of aerospace and AEC industries | 128 |
| 8.2 | Barriers to technology investment | 133 |
| 8.3 | Boosting technology investment | 133 |
| 8.4 | Obstacles to technology implementation | 133 |
| 9.1 | Example extract from ProCE benefits framework | 159 |
| 9.2 | Summary of overall ProCE case study results | 160 |
| 9.3 | The UK construction project – a real life ROI example | 165 |
| 9.4 | The UK construction project – an ASP customer ROI model | 167 |

Foreword

The UK construction industry has come a long way since my report, 'Constructing the Team', was published in 1994 and the subsequent Egan process since 1998. Many of these reports' recommendations have been implemented, and numerous client, contractor, consultant and supplier organisations have begun to adopt more integrated, collaborative styles of working. This is now also a headline target for the Strategic Forum for Construction. However, there is still a long way to go.

This gradual but, I believe, irreversible shift towards partnering-type approaches to project delivery contrasts greatly with the enthusiastic adoption of mobile working and internet technologies within parts of the industry. In 1994, only about one in a hundred construction businesses had an internet connection. Today, many of us now use email, websites, laptops and mobile telephones almost without a second thought.

Internet technologies have been effectively employed to support collaborative working. Over the past five years, construction collaboration technologies have moved from being an industry novelty towards almost routine deployment by some organisations on medium-to-large projects. But this market is still maturing and has not yet reached the stage when most professionals will have sufficient knowledge to make informed decisions. Anyone working on, or aspiring to work on, major projects will increasingly need to be familiar with these systems and the pros and cons of their use. There is still much to do to involve specialist and trade sub-contractors in this whole approach.

I first became aware of construction collaboration technologies in the late 1990s. In 2000, I agreed to become deputy chairman of BIW Technologies and met the company's head of corporate communications, Paul Wilkinson. I have since seen Paul expand his role to become involved with the sector's own trade association, the Network of Construction Collaboration Technology Providers. He also set himself a major challenge: to write the industry's first comprehensive and authoritative guide to the technologies.

Paul has risen to this challenge very well. This is a timely and stimulating book, aimed at industry participants wanting to know more about the construction collaboration technology market in the United Kingdom. Industry customers, their advisors, professionals from technician level practitioners at the project work-face up to board-level decision-makers, and students looking to enter the industry, will all find this book enormously informative and interesting. It answers many of the questions commonly asked about the technologies. It includes real-life examples to illustrate its key points, features several case studies, and has a useful glossary.

Paul has drawn on his insider's knowledge and experience and those of many others, both in the United Kingdom and in other markets, ranging from industry practitioners to academics. Chapters in this book describe the emergence of the technologies and the early development of the UK market. He gives a detailed description of the principal generic features of the various systems, debates the pros and cons of externally hosting and looks at connectivity issues. However, the book is certainly not IT-focused and will be a valuable help to the non-technically minded.

Paul has expanded on his previously published work on the legal issues associated with collaboration technologies. His chapter on human issues influencing technology adoption is particularly apposite. It emphasises that successful deployment of such systems is much more about people and processes than managing 'bits and bytes'. He assesses evidence of the benefits of using the systems, and he concludes by looking at what the future might hold.

As the twenty-first century proceeds, we will certainly see further integration of IT into working practices in the UK construction industry. It will become part of our normal everyday routine. In the meantime, clients need to insist on collaborative working in order to deliver their projects on a team-working basis and in a non-confrontational manner which strips out non-value-adding activities. By using IT to support more progressive approaches, we can encourage an increasingly large proportion of the industry to change for the better. The ultimate beneficiaries will be clients and the country as a whole.

Sir Michael Latham
January 2005

Preface

Why write this book?

As the twentieth century drew to a close, investors, company executives, entrepreneurs and journalists were all hugely enthusiastic and optimistic about the potential of the internet. There was talk of a ‘dot.com boom’, and the architecture, engineering and construction (AEC) market was not immune from this obsession. From the late 1990s until about mid-2000, the UK construction-related trade press published numerous e-commerce stories – towards the end, it seemed that hardly a month passed without a new construction portal or e-marketplace being launched.

In 2000, however, the dot.com bubble burst, and many of the ambitious new AEC e-businesses quickly disappeared. But not all of them. Interest in a subset of e-commerce technologies – internet-based collaboration (or ‘c-commerce’) systems – began to grow. IT analysts such as the Gartner Group, business process re-engineering gurus including Michael Hammer (2001) and James Champy (2002), and major software vendors such as Microsoft all felt this was a sector due for significant growth. Within the AEC industry, collaboration technologies had begun to attract some overdue attention, first in the United States, and then in other countries. In the UK market, a handful of new start-ups, plus some existing technology businesses, began to offer internet-based software applications that allowed construction project teams to share drawings and documents electronically.

With the internet increasingly an established part of many construction businesses’ communications, many professionals were interested in using such collaboration technologies, but were – quite understandably, following the hype surrounding web-based trading exchanges and other ill-starred ventures – nervous about taking the plunge. It was, perhaps, easy to justify investing time and money in more mainstream, locally managed AEC applications such as computer-aided design (CAD), project management and cost estimating, which improved individual productivity. But it was less easy to justify investments in new types of applications, from often previously unknown technology businesses, that, in many instances, were not even hosted by any member of the project team.

It was – and to some extent still is – a substantial market education challenge. Vendors such as 4Projects, BIW and Business Collaborator had to build a generic awareness of construction collaboration technologies and convince industry clients and their project teams that they offered significant advantages over existing communication methods (a task made slightly easier given the increased stress placed

on ‘partnering’ or ‘collaborative working’ over the 10 years or so since the Latham Report). Only then could they start to respond to the more detailed questions typically asked by prospective customers and end-users seeking to differentiate between the competing vendors and their systems. By early 2005, the market education process was continuing; according to one survey (IT Construction Forum 2004), more than half of all projects were still managed using more conventional communication channels such as email, fax and post.

Helping to fill the information gap and to push the collaborative working message, several UK trade associations and membership organisations (e.g. the Construction Industry Computing Association, Construct IT, the Institution of Civil Engineers and the Royal Institution of Chartered Surveyors, to name a handful) have produced reports, guides and case studies offering an introduction to, or independent guidance on, the technologies and the principal providers. Some of these documents are also available online, and – as one might expect for web-based technologies – several websites offer further information and support (e.g. Emap’s Construction Plus guide to Project Extranets, the IT Construction Forum, and – launched in December 2003 – the Network of Construction Collaboration Technology Providers). A steady stream of conferences, seminars and exhibitions are also either wholly or partly devoted to the selection, utilisation and benefits of the technologies.

These guides, reports and case studies, websites, and conferences and other events – augmented by the flashy websites, glossy marketing literature and glib product demonstrations of the vendors themselves – provide prospective and existing customers and users with lots of useful information (and some, unfortunately, that is less useful). However, it is an onerous task to draw all this information together, let alone sort, interpret and analyse it so that one can make informed and fully reasoned decisions. This is what prompted this book.

This book draws together much of the available relevant information to provide a comprehensive and independent guide to the technologies. Drawing on some ten years’ experience of researching and writing about the construction industry and IT, including five spent as part of the team at BIW Technologies, I aim to help answer some of the most frequently asked questions relating to construction collaboration technologies. Each of the following chapters is devoted to discussion of a key question (Who hosts the systems? How do we connect to them? What are the legal issues? What are the benefits? etc.). These questions are outlined at the end of the first chapter; depending on their needs, readers can either dip into the relevant chapters or read the whole book to get a complete overview of the sector. To further help the reader, each chapter starts with a few outlining bullet points, and the key issues are summarised at its conclusion. A glossary is also included to explain some of the technical terms, and the bibliography provides numerous references for readers wanting to examine subjects in greater detail.

As a whole, this book concentrates mainly on the AEC industry in the United Kingdom. I make no apologies for this. I expect most readers will want to learn and understand more about the technologies available in and appropriate to their home market. There would be little point in me trying to produce a detailed global account when few UK-based technology vendors yet have truly international operations (at least with respect to their collaboration offerings), and most vendors in other countries have similarly focused on their own home markets. I have therefore

concentrated on describing the development, providers, infrastructure, legal issues, etc., that relate to the UK AEC industry. But where relevant, this book also draws on information from other markets – mainly, but not exclusively, from the United States (incidentally, there must surely be scope for a similar book covering the American AEC market). And some issues – for example, choosing a vendor, technology features, hosting, connectivity, people issues, benefits, etc. – are quite generic, and non-UK readers will hopefully find much information of interest and value to them.

Paul Wilkinson
January 2005

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Numerous friends, colleagues and acquaintances have contributed to my understanding of the UK construction collaboration technologies sector over the past few years.

I would particularly like to thank all my colleagues at BIW. In particular BIW chief executive Colin Smith has supported this project from the beginning, helping me develop key ideas and, drawing on 20 years experience in construction IT, providing invaluable feedback on early drafts of the text. I am also grateful to BIW deputy chairman Sir Michael Latham for writing the foreword. In my frequent dealings with them, Andrew Boaden, Bill Flind, Steve Cooper, Narinder Sangha, Brandon Parkes, Suzie Ballard, Guy Hussey, Danny Polaine, Duncan Kneller, Asif Sharif, Lisa Gledhill, Ed Boxall, Chris Stebbings, Richard Parker, John Osborne, Aneel Khanna, Matthew Ottaway, Nick Sansome, Simon Price and George Stevenson have all been very helpful, as have the guys from BIW's Nottingham office, notably Chris Aldridge, Mitul Sudra, Shailet and Mita Patel, and Adam Sliwinski.

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As well as BIW, several of the other construction collaboration technology vendors have also contributed to this book. I would like to thank: Duncan Mactear of 4Projects, Sanjeev Shah and Steve Crompton at Business Collaborator, Francis Newman at Cadweb, Franco Iannaccone of Causeway, and Graham Howarth and Jeremy Sainter at Sarcophagus. Special thanks to 4Projects, BIW Technologies, Business Collaborator, Cadweb, Causeway and Sarcophagus for permission to reproduce the screenshots shown in Chapter 5. And thanks also to Bill Healy and Tim Broyd at CIRIA, managers of the Network of Construction Collaboration Technology Providers (NCCTP), the umbrella group for the above mentioned organisations.

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I have also undoubtedly benefited from countless conversations with individuals at industry events across the United Kingdom, and I acknowledge that the roots of some of my arguments may well lie in some of those discussions. However, having condensed these perspectives and masses of other data into the following ten chapters, any errors or omissions are, of course, entirely my responsibility.

Last but not least, I must thank my wife Helen and two children Frankie and Gus for providing love, support and sometimes much-needed diversion throughout the writing of this book.

Paul Wilkinson
January 2005

Defining collaboration

This chapter:

- briefly describes the development of Internet-based collaborative applications specific to the UK architecture, engineering and construction (AEC) industry;
- refines an AEC-specific definition of ‘construction collaboration technologies’;
- outlines the subjects covered in the remainder of the book, helping readers to quickly find the topics that interest them.

In the early years of the twenty-first century it is increasingly difficult to imagine working without the internet.¹ Yet only a decade earlier, the World Wide Web (WWW) was still in its infancy and ‘spam’ was a proprietary meat-based product celebrated by the *Monty Python* television comedy team. Today, almost every sizeable organisation has its own website. And email, with its ability to support attachments from numerous other software programs, has become almost ubiquitous for day-to-day written communication; indeed, it has also become a victim of its own success – spawning a steady flow of newspaper articles about viruses, security lapses and ‘email overload’.

Since the late 1990s, the explosive growth of the internet coupled with the development of better telecommunications links has also provided a platform for many new types of information technology (IT).² Most notably for the purposes of this book, there has been a surge in demand for applications that allow groups of people to collaborate with each other. For the highly information-dependent and cost-conscious AEC industry, where projects are routinely delivered by relatively short-lived, multi-disciplinary, multi-company, multi-location groups of people, the opportunity to use IT to send and receive large volumes of project data over longer distances more quickly and cheaply was too good to miss.³ Around the world, software businesses recognised the opportunity and began to develop applications to capitalise on the growing AEC demand for more efficient team communication.

This book focuses on a particular group of applications sometimes described as, among other things, ‘extranets’. This chapter discusses the terminology and attempts

to develop a more appropriate alternative description. It proposes a term used by the leading UK vendors themselves – ‘construction collaboration technologies’ – and relates its definition to the overall development of collaborative working practices within the AEC industry.

This book is also focused primarily on the AEC industry in the United Kingdom. While there have been similar developments in other parts of the world, most notably in the USA but also in mainland Europe, Australasia, Canada, Israel and South Africa (to name a few), the fragmented nature of the international AEC industry, the relative immaturity of most of the software businesses involved, and their initial focus on developing products and services to serve their domestic markets, have so far largely precluded any of the vendors from marketing their products and services globally.⁴ This will change, of course, as the technology becomes more widely accepted, as vendors mature, consolidate and expand, etc.; UK experience will also be influential in the adoption of the technology in other national markets, particularly those whose AEC project delivery methods follow UK models (the same also applies in reverse, of course: for example, one Australian-based vendor has opened a UK office).

This concentration on the United Kingdom will also, it is hoped, reflect the experiences and interests of the many thousands of UK construction professionals who want to understand more about the technology available to them and how to adopt and use it most effectively. To help meet this thirst for knowledge, industry writers and academics have produced a steady stream of magazine articles, reports, product surveys, briefings, ‘how to’ guides and case studies over the past four or five years, but no single publication has attempted to draw all this information together. This book seeks to fill that gap.

Moving on from this chapter’s generic definition of the technology, Chapter 2 resolves why collaboration and its supporting technologies have become important now. By the end of 2004, well over 100,000 UK industry professionals had used one or more of the leading systems, and this user community was expected to continue growing for some years. Subsequent chapters are therefore intended to help readers understand, and make informed decisions about, the technology and the relative merits of the various vendors and their services. The benefits (and costs) of using the technology are illustrated by case studies, while pragmatic considerations such as the legal implications, connectivity requirements and training needs are also covered. The book concludes by looking at how collaborative technology might develop in the future.

1.1 What is collaboration?

At the start of the twenty-first century, new internet-based collaboration – or c-commerce – technologies were widely viewed as a major growth sector by IT analysts such as the Butler, IDC, Forrester and Gartner groups and by business process re-engineering gurus such as Michael Hammer (2001) and James Champy (2002).

They recognised that for many corporations, their greatest asset is their ‘knowledge capital’ (‘the value generating asset of a business that includes know-how, ideas, databases and goodwill’ – Davis 2003), and the key challenge is to maximise this asset’s value while effectively controlling the management of this information. Most knowledge workers tend to work with others to complete tasks, collaborating internally with fellow employees, and/or externally with customers, suppliers, etc. Collaboration

takes place at multiple levels, from small peer groups with immediate colleagues to multi-disciplinary project teams, from company-wide activities with members drawn from different grades of the organisation's hierarchy to those that extend beyond the enterprise to become inter-enterprise collaboration. In short, collaboration takes many forms and is required in just about every business process.

To collaborate, says the Oxford English Dictionary, is to 'work jointly (with) esp. at literary or artistic production' (and, perhaps particularly appropriate to the often-adversarial atmosphere of traditional construction projects, it adds: 'to co-operate with the enemy'). This is to look at the term as it applies culturally, but it has in recent years – as we shall see – also gained a technology dimension.

If one looks at the cultural use of the term, some management writers have focused on the creative element. Schrage (1990), for example, defines collaboration as: 'the process of shared creation: two or more individuals with complementary skills interacting to create a shared understanding that none had previously possessed or could have come to on their own'.

As this definition suggests, successful collaboration is a process of value creation that cannot be achieved through traditional, often hierarchical structures. However the vital communication takes place – whether face-to-face or virtual – it tends to require the giving and receiving of feedback in an atmosphere of mutual trust and respect between all the interested participants, each specialist in their own fields. This feedback will often result in reassessment of an initial idea, and as the collaborators develop a shared sense of what they are trying to achieve, the outputs can be greater than the sum of all individuals' expertise and knowledge inputs.

In an AEC context, Kalay (1999) defines collaboration as: 'the agreement among specialists to share their abilities in a particular process, to achieve the larger objectives of the project as a whole, as defined by a client, a community, or society at large'.

It is perhaps worth emphasising, too, that true collaboration requires participants to set aside any self-interest or belief that, by their professional background, training, role or project responsibility, they are somehow superior to other members of the team. In the construction context, this was underlined by the UK Strategic Forum for Construction in its *Integration Toolkit* (2003):

By accepting that there is nothing individuals can do which cannot be done better by a team, collaboration automatically becomes the highest value which can only be reached by truly listening to other people and adding their valuable contribution.

(Integrated project team (IPT) workbook, section 5.5)

For the purposes of this book, we can absorb these points into a definition of collaboration:

A creative *process* undertaken by two or more interested individuals, sharing their collective skills, expertise, understanding and knowledge (*information*) in an atmosphere of openness, honesty, trust and mutual respect, to jointly deliver the best solution that meets their common goal.

Of course, this may be somewhat utopian. There will be many instances when what purports to be team collaboration is, in fact, simply a group of individuals going