Preface

Virtual teams are gathering increasing pace in industry and academia. In general, practice in both areas has moved beyond early experimentation toward maturity. Perhaps surprising is that such experimentation dates back 20 years with a mature knowledge base evident, at least in the past 10. As editors, our own experiences with virtual teams—as students, teachers, researchers, and practitioners-believe this long lifespan. With maturity comes an expectation of increased performance which, arguably, has not been realized. At the very least, dialogue in the community should encompass value-adding characteristics of the virtual teams approach as opposed to merely addressing challenges and constraints of virtual work. Most work to date has stalled on problems and a mostly defensive, reactive approach to virtual teams. In this book (in Chapter I, although departing from a problem focused stance), we focus on added value—specifically creativity—therefore linking virtual teams to proactive choice. The ultimate aim should be performance levels beyond conventional collocated working practices. In theory, due to the possibility of pooling a large diverse knowledge base, virtual creativity could be greater than collocated creativity. In practice this is often not the case. No longer should virtual teams be considered new or suboptimal methods of working. They now constitute standard practice and the value which they add should be greatly increased.

This is a book for those involved in working with or managing (creative) virtual teams, or indeed anyone involved in the active pursuit of co-creation or innovation in the modern enterprise. There are two factors at play here—first, most, if not all collaborative work these days includes some element of virtual work and second, for innovation in an increasingly demanding environment, creativity, higher creativity is a critical element. Of course, it is not the whole story for innovation but if innovation is the destination, creativity can be viewed as the journey, or at least the first critical steps on that journey.

Higher Creativity for Virtual Teams: Developing Platforms for Co-Creation presents insights gained by leading professionals from the practice, research, and consulting side of the virtual team, design, new product development, and creativity fields. This book should be useful to a variety of constituents who are interested in the interrelationships between virtual working environments and creative performance, including managers who need innovation as a key factor for organizational success, leaders wishing to develop the creativity within their organizations, IT experts, researchers, consultants, and practitioners. Each audience may have different levels of interest in the support tools, practical experiences, and empirical data presented in this book.

So what is a virtual team? On a simple level, it is a team that is separated physically and uses information and communication technologies (ICTs) to connect and complete the team’s task. This physical separation is a function of time and place—virtual teams do not occupy the same place at the same time. Further, separation may be a mix of geographical, organizational, or temporal distance while the term virtual has become the de facto standard for the community; other terms include distributed, dispersed, and global. Additionally, the term virtual is sometimes used to denote the nonpermanent nature of a team—for us, virtual teams need not be temporary although the virtual space is highly dynamic. Little time is spent on definitions and explanations in the remainder of the book, focusing instead on experiences, insights and solutions. We spend just enough on definition and context so as to uncover the true needs of co-creation platforms for real creative performance improvement.

The increased growth of virtual teams practice can be attributed on the main to advances in ICTs and the globalization of industry and markets. Technological advancement has been important, yet development has
been facilitated by several other factors that have improved performance, including better work processes and increased understanding and awareness of how to operate in the virtual space. The turbulent environment in which we live and work today provides the operating context for the normalization of virtual teams. The concepts of the extended enterprise and the Open Source movement, among others, show that work can be highly collaborative, potentially large-scale, and without boundaries. The Global Innovation Outlook 2.0 from IBM (2006) envisages the future of the enterprise where boundaries continue to disappear, facilitating fluid, contract knowledge work between people, the majority of whom may not be affiliated to any particular organization. This resonates strongly with classic views on the emergence of knowledge workers (Drucker, 1969). Peter Drucker was the first to envision the pervasiveness of virtual organizations in which the true value of the knowledge worker is exploited. The recent emergence of open innovation (Chesborough, 2003), shows that such historical views are in the here and now and impact heavily on business success. The most valuable implementation of this concept to date comes from Procter & Gamble, whose ‘Connect & Develop’ business model has already reaped significant returns (Huston & Sakkab, 2006). This shows a possible common future in industry—one that is highly collaborative, very large-scale, and without boundaries.

Yet the author of the open innovation term has also criticized the virtual team model (Chesborough & Teece, 1996), arguing that it cannot be implemented for each and every business case. This may be partly attributed to the date of publication (and state of virtual work at that time), but also disappointment with the resultant performance levels of most virtual endeavors—suboptimal levels that we believe have persisted to this day. Our vision therefore is to re-ignite the virtual team’s movement, which has perhaps suffered in recent years through, among other things, a realization that technology cannot replicate exactly the collocated space.

In this context it is time to analyze how to achieve high levels of creative performance. Only a few researchers have focused on how a virtual team can use creativity to perform better or build a really creative virtual environment. This is despite the fact that, “80 per cent of managers rated creativity as one of the most important elements in corporate success, yet less than 5 per cent of organizations actually put this emphasis into practice” (Walton, 2003, p. 143). Today, it is broadly accepted that the key to organizational success lies in developing intellectual capital and acquiring a new set of thinking: the creativity to produce an idea and the innovation to translate the idea into a novel result (Roffe, 1999). Explaining the meaning of creativity is not straightforward, there are many definitions of the term. So, for the purpose of this book we will understand creativity as the shortest way to search for unconventional wisdom and to produce ideas. This unconventional wisdom through the generation and use of creative knowledge is the key to building sustainable competitive advantage.

Why then should creativity be related to virtual teams? As stated, the virtual team’s movement should move away from a defensive stance—problem-centric, to a value-adding one. Although a large body of work exists on virtual teams there is relatively little that deals with creativity. When one considers the opportunities provided by virtual teams, to truly exploit different knowledge sets and diversity, then the pursuit of creativity is well matched to virtual teams. A greater dialogue on creativity is certainly required—and increasingly critical in a world which demands innovation. In this new world, creativity is rapidly emerging as one of the main differentiating factors for success. As such, virtual teams can be hardwired to innovation objectives. Showing the increasing focus on creativity for business success, many top business schools are busily introducing new creative based curricula in response to industry requests for better prepared managers (Nussbaum, Berner, & Brady, 2005). Such a call from industry is partly in response to the difficulties they face in achieving continuous, systematic and sustainable innovation. Recent reports have talked about an ‘innovation drought’ (Mullaney, 2006) and there is no doubt that innovation is getting harder. Cox (2005) reports on the Innovation Survey from PricewaterhouseCoopers, which states that top innovators generate over 75% of revenue from products not in existence five years ago. He states that the ability to innovate, in turn, depends on the availability and exploitation of creative skills.

The work of Cox was delivered within the context of a recent push on creativity by the UK Government. Recognizing the role of creativity in delivering better business performance the Cox Review of Creativity in Business and economics analysis by the Department of Trade & Industry linking creativity, design and business performance (DTI, 2005) were published. Demonstrating commitment to creativity at the very top of Government, the Chancellor of the Exchequer, Gordon Brown notes the challenge as “not just to encourage creative
industries, our priority is to encourage all industries to be creative.” In this technological age and to take advantage of the distributed knowledge base it is clear that virtual teams will play a key role in helping to deliver the higher creativity necessary for innovation and business performance.

Given such challenges, we aim to help develop platforms for co-creation. As shown by policy development of the British Government creativity is viewed as a strategic element for innovative co-creation and increased business performance. What do we mean by co-creation? Co-creation is an existing term, with roots in the business community (von Hippel 1994, 2005; Prahalad & Ramaswamy, 2004). On a basic level therefore, we aim to connect virtual teams to business, or at least have a clearer view on value creation. The ‘creation’ process is about the design and development of products and services—about innovating in an era of increasing constraints and problems. And of course, in virtual work this creation is not done in isolation but with a large input from internal and external stakeholders—dispersed colleagues, customers, and other collaborators with a wide range of skills and personalities, and from a wide degree of functions and cultures. As an existing term co-creation focuses on the involvement of customers in the innovation process—but we do not restrict our definition in this way. The key for us is that the virtual team process is open and collaborative—which will of course involve customers, but not exclusively, nor for each and every occasion. The virtual platform offers opportunities for innovative work, innovative co-creation that is, as noted above, highly collaborative, potentially very large-scale, and without boundaries.

Platforms are not reserved for the tools section of this book, which details three virtual environments in addition to other methods and technology. We have a holistic view of co-creation platforms that includes an understanding of challenges, experiences, and possible solutions. Culture, organization, and the wider ecosystem—indeed elements described in detail from the authors which comprise this book—are important constituents. Platforms are in essence a basis for extending virtual work, of creating powerful networks of highly dispersed, diverse people in highly dynamic structures. This vision will result in highly creative, innovative work, leading to top business performance. This is the future, yet as shown by Procter & Gamble, it is also the present—and so those who wish to form the next generation of business leaders should pay heed to the logic.

Co-creation platforms go hand in hand with creative virtual teams. We aim to exploit the full creative power of virtual teams by managing and optimizing such platforms. The development of more effective virtual platforms will re-ignite the global innovation co-creation movement. Our wish is that this book is a small step towards this—towards true virtual co-creativity.

Value and Highlights

There is no quick and easy answer to achieving the higher creativity necessary for innovative co-creation. However, through the 15 chapters of this book several critical insights emerge which will help the reader find an answer for their own context. Several key themes are progressed through three distinct parts of the book, the ABCs of virtual teams and creativity: “Section I: Tests,” is the experimental test-bed for uncovering critical insights into virtual teams and creativity. This preliminary section aims to build a thorough understanding of the principles of virtual teams and creativity—in essence detailing a specification for creative virtual teams support. Next, “Section II: Tales” regales experiences from the ‘battlefield’ of virtual team practice. Industrial cases show the use of virtual teams and current status in leading companies, thereby moving towards a general understanding of how we can improve the virtual creative work of such teams, as well as showcasing best practice for others to implement. Finally, “Section III: Tools” details support in the form of technology, methods and processes, as well as integrated environments which combine elements of each. Three parts, five chapters in each, tied together by the common aim of higher creativity for virtual teams. It is important to promote dialogue between different areas of the virtual community—researchers, practitioners, and teachers—in order to facilitate a holistic approach to adding value through virtual work—one that is at the same time rigorous, practical, and efficient. In this way, different members of the community may help evolve virtual creative performance.

We now note interesting themes, highlighting several chapters. A full chapter by chapter description follows later. We therefore view the content on both a comparative, cross discussion and individual level.
First, it may no longer be appropriate to talk about ‘virtual’ and ‘nonvirtual’ teams. Roger Leenders, Jan Kratzer, and Jo van Engelen (Chapter IV) state that all teams are now virtual and it is the degree of their virtuality which distinguishes different teams and work designs. Indeed, Margaret Oertig and Thomas Buergi (Chapter VI) state that the majority of virtual team leaders interviewed for their research—senior level managers with years of experience, “have no experience of project management in a colocated team”. So, if all teams are virtual to some extent, should the aim be to replicate the colocated space? Leenders et al., in their investigation of the right “media ensembles” that lead to higher creativity stress the importance of media richness, believing that for complex creative work, face-to-face interaction, or at least the richest communication media available (thereby replicating face-to-face interaction) is essential. Several other authors concur on this point, although through experimentation Rosalie Ocker (Chapter II) showed that asynchronous teams were at no performance disadvantage as compared to synchronous teams. She uses several of these previous experiments to uncover further insights into asynchronous creative work, highlighting, for example, the importance of team composition and personality.

Communication modes are but one area of the overall environment to encourage higher creativity. The role of leadership is highlighted by Oertig and Buergi (Chapter VI) who discuss that effective virtual leaders have to know when to encourage new ideas and when to inject realism into the process, acknowledging that virtual teams can sometimes lose sight of the project constraints and overall objective. Higher creativity is therefore also important in the context of new workable solutions as well as radical ideas. This is highlighted by Andreas Larsson, Tobias Larsson, Nicklas Bylund, and Ola Isakson (Chapter VII) who discuss the role of creativity for “streamlined” product development (mature, accelerated development with a focus on cost reduction while maintaining or increasing performance), highlighting several creative dilemmas, including trust and information sharing. This contrasts with the ‘fuzzy front end’ focus examined in detail by John Feland (Chapter X) and shows that virtual teams are pervasive at all stages of the co-creation process, and that creativity has a role to play in different types of industry.

Realism and control may also be related to the pressures that virtual teams often operate under. The impact of time and stress on the performance of virtual teams, and creative output in particular, is discussed in several chapters. Most of the industrial tales (including Larsson et al., Chapter VII, and Javier Fínez, Chapter IX) state that time pressure has a positive effect on creative output. This is mostly anecdotal and is contrasted with the academic based experimentation by Ocker (Chapter II) which found the exact opposite—she highlights and confirms research by Amabile, Hadley, and Kramer (2002) which states that creativity is reduced when individuals feel time-pressured to complete the task. Yet creative tension has been noted in several places as being a prerequisite for successful innovation. With apologies to our Swiss authors it is perhaps worth recalling the famous (yet factually incorrect) line from Orson Welles in The Third Man regarding the respective creative outputs of Italy and Switzerland during their periods of war and peace. In comparing da Vinci with the cuckoo clock we can perhaps conclude that in practice, at least some element of stress and tension is good for creativity.

Knowing when to encourage and control creativity can be related to patterns of divergent and convergent work, a common feature of best practice design. The rationale for using design as a lens to examine creativity in virtual teams is discussed by Steven MacGregor in Chapter I. Design allows a view of ‘extreme virtual teams’—the most challenging type of work for virtual teams, because of the large diversity of knowledge bases, cultures, and complexity that usually comprise the design function. If we can make these work the hypothesis is that we can show how all types of virtual teams can strive for higher creativity. In total, six chapters focus on the role of design—in various guises—Chapters I, X, XI, XIII, XIV and XV. A new product development (NPD) focus further complements this co-creative core in another six chapters (Chapters III, IV, VI, VII, IX, and XII).

Arguably, the more conventional view of creativity for virtual teams focuses on the conceptual stage of co-creation where radical ideas can be generated. Several authors allude to concepts of ‘experimentation’ and ‘playfulness’ in the virtual space. Larsson et al. (Chapter VII) detail that the present industrial ‘battleground’ may convert to the ‘playground’, as a result of higher levels of trust, and in agreement with the disappearance of boundaries as detailed in the IBM GIO 2.0 noted earlier (IBM, 2006). Feland (Chapter X) refers to the “sandbox” of virtual teamwork, detailing a very successful case—the prototype development of the Onyx mobile phone concept at Synaptics Inc.
The success of the Onyx project can be partly attributed to the process frameworks used by manager Feland during the project. Concept maturity and an understanding of technical, business, and human level progression helped the virtual team to maintain a high awareness of progress. Such mental models help to measure creative evolution in the virtual space, the importance of which is first discussed in Chapter I by MacGregor. Effective platforms for co-creation therefore rely on effective processes and structures. Finez (Chapter IX) details the organizational structures used by three successful companies in the Mondragón Corporation. Developing an examination of types of creativity presented above, he highlights the switch in focus between incremental and radical creativity. Through the description of several forms of mature, successful virtual structures, for example the use of stable virtual teams and project virtual teams in MCC graphics, we can at last see the virtual teams model as a value-adding complement to conventional team structures such as heavyweight, lightweight, and tiger teams.

Other process frameworks are detailed by Avril Thomson, William Ion, and Angela Stone (Chapter VIII) who detail a strategy for virtual teams in SMEs. Such a roadmap approach is perhaps essential for smaller enterprises that often, as shown in the chapter, have to deal with day-to-day ‘firefighting’ pressures at the expense of virtual team performance and creativity. Thomas Leerberg (Chapter XIII) shows how a view of supplemental and substituted processes results in technology more fit for virtual team purpose while Jill Nemiro (Chapter V) sums up the fundamental building blocks that should be considered for creative virtual teams, in one way, a basic specification for the platforms we aim to develop.

Technology of course plays a central role in virtual teams, and used correctly with the right processes and structures, can contribute greatly to creativity. Julian Malins, Stuart Watt, Aggelos Liapis, and Chris McKillop (Chapter XI) provide a guide for those engaged in the design process to the main proprietary tools that can contribute to success. Even for those out with the design field, identified tools for tasks such as idea generation, collaboration, and knowledge management may provide significant value. Clues as to the necessary role of technology for virtual creativity can be derived from the three very different virtual environments which constitute the final three chapters of the book. Leerberg (Chapter XIII) and particularly Terry Rosenberg and Mike Waller (Chapter XIV) focus on less complex design and the pursuit of radical new ideas for creativity. In contrast, Ian Whitfield, Alex Duffy, Alistair Conway, Zuchao Wu, and Jo Meehan (Chapter XV) focus on the engineering design of a large, technically complex product (ship design). It follows that the necessary support in each environment to facilitate creativity will be very different. Technology support for Leerberg, Rosenberg, and Waller takes on the role of a medium to improve communication and creative development between members of the virtual team, while Whitfield et al. exploit technology as an “intelligent assistant”, using the power of technology to manage complexity and perhaps free up ‘cognitive space’ for creativity, a concept introduced by MacGregor in Chapter I. Further, depending on the specific type of design different needs may be satisfied by each of the environments. Whereas Whitfield et al. admit that due to “tool management limitations ..., it was not possible to provide any additional information ... regarding the rationale for undertaking the activity.” Rosenberg and Waller show that rationale traceability will be a key feature of their iCE environment. In the section “Leaving Traces” they show how innovation trajectories may be recorded during the course of co-creation.

Yet tools for creative success should not focus on the development of technology. Effective methods are also required as shown in the flexibility framework detailed by Preston Smith in Chapter XII. How virtual teams cope with change is of course important, and an area that they have been traditionally poor in coping with. Innovation is about change and Smith details methods that virtual teams may use to cope with the inherent change in creative work. His flexibility framework details eight methods, influenced by fields including agile and lean development, and design.

Creativity-based management aimed at fostering virtual team creativity must also better manage similar environmental variables. This will help to enhance employees’ internal drive to perceive every project as a new creative challenge. Nemiro (Chapter V) identifies several key elements that influence creativity in virtual teams and therefore result in effectiveness and high levels of performance. In a virtual team, creativity is highest where the design is appropriate, the climate is supportive of creativity, the resources are sufficient, the proper norms and protocols are agreed on and adhered to, and the team takes the time to assess and to learn from its assessments.
Finally, how to measure creativity is a common theme. Teams ought to have an idea of overall progression regarding the final objective. Various authors use notions of performance, quality (Ocker, Chapter II), and satisfaction (Thomson, Chapter VIII), either using outside evaluators or asking the virtual team members themselves (Leensberg et al., Chapter IV). In both cases, there is an agreement about the measurement of creative performance through “the expert subjective point of view”; a perspective broadly accepted in the literature. The value of higher creativity may also be linked to the learning process, whether it is situated in an academic project or executive education (Roman Žavbi, Jože Tavčar, and Jouke Verlinden, Chapter III). This chapter together with that by Leenders (Chapter XIII) perhaps show the next generation of virtual academic projects, moving beyond a simple evaluation of learning functionality (which dates back over 20 years) to a test-bed for truly preparing students for the real world after their studies. As shown in Chapter III the virtual space offers opportunities for all in an age where the learning process does not stop after university. The lessons learned by Žavbi et al. are also being exploited to train present members of industrial teams, a real need as identified by several authors in the book, including Nemiro (Chapter V).

Detailed Description of Content

The characteristics of each section of the book add value: “Section I: Tests” involves the participation of over 100 teams involved in either industrial or academic virtual creative work. “Section II: Tales” is a detailed description of virtual creative work in eight companies, seven of which are leaders in their field while four are large multinationals and four SMEs. The sectors of automotive, aeronautical, domestic electrical appliances, industrial design, mechanical and electrical engineering design consultancy, design and print graphics, and plastics manufacturing, comprise these rich experiences. Finally, “Section III: Tools” prescribes a wide range of technologies, methods and integrated environments which have either been used extensively in practice or tested on virtual creative teams in academia. The content in each part may either facilitate direct implementation or generate ideas, either for practice or research. Higher Creativity for Virtual Teams: Developing Platforms for Co-Creation is comprised of the following 15 chapters:

In the first chapter, “Modeling Work Processes and Examining Failure in Virtual Design Organizations,” Steven P. MacGregor examines virtual work and ‘failure’ in the oil and gas and fast moving consumer goods sectors. Based on two case studies originally conducted to develop process support for virtual (distributed) design, he models the virtual process observed in the original and adaptive/variant design environments that characterize each sector. These models are used to generate a list of virtual problems or ‘failures’ which are subsequently examined using the engineering-based techniques 5W2H and Failure Modes and Effects Analysis (FMEA) to develop insight into virtual team problems and possible solutions. The suitability of the design field is shown for the study of creativity in virtual teams and the link between design, creativity and business performance discussed. In many cases, if support is provided to solve virtual team problems not directly associated with creativity then team members may free up time and energy to focus on the increased ‘cognitive capacity’ required for higher creativity.

Rosalie J. Ocker, in her chapter, “Creativity in Asynchronous Virtual Teams: Putting the Pieces Together,” presents four studies conducted to explore creativity in asynchronous virtual teams. Following the input-process-output model developed by Hackman (1987), Ocker investigated different aspects related to team’s creativity. Her analysis highlights the importance of team members, in terms of personality, as well as the composition of individuals into teams, in influencing team interaction and the resulting level of team creativity. One relevant finding from her research is that “the findings from the studies of asynchronous virtual teams are consistent with those of traditional teams. Thus, it appears that the body of research on creativity in face-to-face teams applies to asynchronous virtual teams.” This statement gives rise to the conclusion that maybe there are no meaningful differences between the factors that affect creativity in traditional environments and those that affect creativity in virtual contexts.

In Chapter III, “Educating Future Product Developers in Virtual Collaboration: Five Years of the E-GPR Course,” Roman Žavbi, Jože Tavčar, and Jouke Verlinden describe the European Global Product Realization (E-GPR) course program and reflections from the perspective of participating students and company representatives.
The E-GPR course tries to bring the reality of the virtual enterprise into the classroom through international and cross-disciplinary virtual teams, thereby raising awareness in the students of the principles of global product realization in virtual enterprises. Žavbi, Tavčar, and Verlinden show us an exceptional ‘learning-by-doing’ experience designed to develop knowledge about the new distributed organizational world and the new professional skills required.

In “Media Ensembles and New Product Team Creativity: A Tree-Based Exploration,” the main argument presented by Roger Th. A.J. Leenders, Jan Kratzer, and Jo M.L. Van Engelen (Chapter IV) is that creative teams are not characterized by their use of one particular mode of communication, but rather by the combination of the modes they use. In this chapter the authors attempt to explain why the creativity of some teams is above average, whereas others perform below the average. The results show that being above or below average cannot be explained by theories that focus on single media: the creative performance of NPD teams is a function of the media ensembles used. Some ensembles afford much higher probabilities for above-average creativity than others. These findings enrich theories of media choice and may provide managers with some ideas of how team creativity can be managed.

In the fifth and final chapter of Section I, “The Building Blocks for Creativity in Virtual Teams,” Jill Nemiro reviews the relevant literature, including prominent models of virtual team performance, and factors necessary for creativity in teams in general. The main aim of this chapter is to present a model that outlines five building blocks for enhancing and supporting creative work in virtual teams: design, climate, resources, norms and protocols, and continual assessment. By building and maintaining each of the five building blocks discussed in this chapter, virtual teams may move to higher levels of creativity and ultimately success. Lastly, an integrative model is proposed which links the five building blocks back to the earlier discussed models of virtual team performance.

“Section II: Tales,” begins with Margaret Oertig and Thomas Buergi’s chapter, “Fostering Creativity in Global Virtual Teams: Conversations with Team Leaders.” Oertig and Buergi present insights from conversations with global team leaders on how to foster creativity in global virtual project teams in the field of product development. Conversations show how the leaders pay attention to team formation and managing the group dynamics in order to create a climate in which creativity will flourish. Three major themes (the leadership challenge, virtual aspects of communication, and developing trust) and four subthemes (managing the task, people, language, and cultural issues) are identified as key factors that affect the project management task.

Next, Andreas Larsson, Tobias Larsson, Nicklas Bylund, and Ola Isaksson present the fascinating ‘battlefield’ of auto and aero engine development in “Rethinking Virtual Teams for Streamlined Development.” They focus on people and teams that might not usually describe their own work to be of a primarily ‘creative’ nature, and that currently work under circumstances where traditional approaches for enhancing creativity might no longer be applicable. Drawing from experiences in Volvo Aero and Auto Corporation, they argue that it is time to radically progress our current understanding of how creativity could be introduced in organizations. Virtual teams (and organizations) that are able to build the foundation for creativity in natural, seamless, and effortless ways, will be way ahead of the competition.

In Chapter VIII, Avril Thomson, Angela Stone, and William Ion detail the results of case studies in a UK based SME in “Enabling Creative Virtual Teams in SMEs.” It is a medium sized company contribution to the tales section yet it also complements the tools and methods of the book through the presentation of a strategy for supporting the creative potential of virtual teams within distributed design projects. It is not uncommon for SMEs to have tools and working practice imposed on them by collaborating multinationals to meet the requirements of the multinational. SMEs however, need to develop their own working practices to support effective, virtual team design within their own organization or extended design team. This chapter describes, through a series of four case studies, how a typical SME achieved successful virtual team working within their organization. Generic and transferable findings drawn from this two year study aimed at helping other SMEs, form the conclusion of this chapter.

Javier Fínez then writes a chapter about “Virtual Teams and Creativity in the Mondragón Cooperative Corporation.” A detailed insight is provided of three experiences of virtual teams built into MCC (Mondragón Co-
operative Corporation) cooperatives, companies in the domestic electrical appliances, plastics manufacturing, and design print and graphics sectors. Each company is a market leader and forms part of MCC, the largest industrial cooperative in the world, based in the Basque Country in the North of Spain. Detailed for each case is an overview of the company’s activity, before going into greater depth regarding the needs and opportunities behind the decision to set up a virtual team, the organizational structure adopted in each case, the dynamics incorporated to achieve higher creativity, and suggestions for some practices that can put the reader on the path towards common drivers for virtual creativity.

A growing number of enterprises are building virtual teams to assist in crafting new opportunities in the fuzzy front end of the innovation process. John Feland, in the 10th and final chapter of Section II, “Virtual Teams in Practice: Tales from the Battlefront of the Fuzzy Front End of the Innovation Process,” uses examples from industry to examine the challenges of managing customer expectations, explore the membership dynamics of virtual teams, and suggest a new framework for assessing the progress of creative virtual teams, concept maturity. An example from the creative virtual team at Synaptics, the Red Dot award-winning Onyx mobile phone concept, is used to delve deeper into these concepts. Finally, trends for the diffusion of creative virtual teams as well as potential challenges in bringing such teams into your organization are investigated.

“Section III: Tools” starts with “Tools and Technology to Support Creativity in Virtual Teams” by Stuart Watt, Julian Malins, Aggelos Liapis, and Chris McKillop. The authors examine the ways in which currently available software applications can support the creative process in general, and designers, in particular, working in virtual teams. It follows the main stages in the design process, examining how existing software can support the creative process. Emerging innovations for each stage of the design process are also presented. The chapter provides examples of tools, considering their strengths and limitations, and speculates on future directions for software development to support creativity and collaboration within virtual teams.

“Enhancing Flexibility in Dispersed Product Development Teams,” a chapter by Preston G. Smith, is devoted to exploring the paradox between dispersed (virtual) teams that are easiest to manage when they can execute their plans without change and the changes required to be creative. To address this, the author introduces the notion of flexibility in dispersed teams showing how one can enhance the flexibility of a team to deal effectively with change. If the team is dispersed, the complications of dealing with changes in plans magnify. This chapter provides tools and approaches for being flexible to such changes as creative teams proceed. These include ways of lowering the cost of change, anticipating change, isolating change, and maintaining options as late as possible.

The final three chapters of the tools section, and of the book, detail three very different virtual environments for virtual team work. In Chapter XIII, “A Spatial Environment for Design Dialogue,” Thomas Leerberg offers a spatial concept of the way virtual design team work. He is concerned with two problems that face creative teams today: (1) that the design process is carried out through a diverse range of poorly integrated digital media and (2) that the digital tools used by virtual teams are not designed for virtual team work, which often limits the creative efficiency. The chapter argues that space has a structure and that we can use that structure to navigate and place information in space and thereby create a design space with the virtuality and creativity of an open ‘reflection-in-action.’ Further, it argues that we have to develop concepts of team setting, team solving, substituted process paths, and supplemented process paths to expand our understanding of these issues. These concepts are demonstrated through two constructions for virtual teams: virtual platform and topos.

Terry Rosenberg and Mike Waller, in their chapter entitled “iCE: Interactive Co-Innovation Environment,” point out the way a virtual space may be built and used to facilitate group, team and individual thinking in developing projects and also shaping practice in organizations where innovation is an important focus. The chapter describes the work being done to produce an interactive networked based ‘co-innovation’ environment (iCE); where members of an organization, individually and variously, may contribute their thoughts to help innovate—developing ‘prospects’—for the organization’s projects.

Finally, in Chapter XV, “A Virtual Environment to Support the Distributed Design of Large Made-to-Order Products,” Robert Ian Whitfield, Alex Duffy, Alastair Conway, Zhichao Wu, and Joane Meehan, present a virtual environment for ship design which can be generalized to any large made to order products. An overview of the virtual environment developed as part of the European Commission funded VRShips-ROPAX (VRS) project is
presented. The main objectives for the development of the virtual platform are described, followed by the discussion of the techniques chosen to address the objectives, and finally a description of a use-case for the platform. Whilst the focus of the VRS virtual platform was to facilitate the design of ROPAX (roll-on passengers and cargo) vessels, the components within the platform are entirely generic and may be applied to the distributed design of any type of vessel, or other complex made-to-order products.

**FINAL NOTE**

Finally, we must note that the development of this book—like many academic and industrial endeavors these days—was a virtual collaborative project that required high levels of creativity. The numbers are interesting but perhaps not ‘extreme’: 38 people (two editors, three publishers, 33 authors), 22 different locations, and nine native languages—united by English, complemented by a healthy dose of Spanish. Tame by some of today’s standards but nonetheless very challenging. We hope that you enjoy the results of our own creative virtual efforts as you aim to increase creativity in your own virtual teams. Enjoy the learning and don’t forget to share your knowledge, impressions and interests in this creative field with all of us!

**REFERENCES**


