

# **Collaborative Performance: Addressing the ROI of Collaboration**

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### **Abstract**

Collaboration is a hot issue, and is to an increasing extent recognized as a key driver of overall business performance. However, few companies methodically evaluate how well they perform in the area of collaboration, and few companies have implemented management principles to systematically improve collaborative performance. The research described in this paper indicates that there is a mismatch between the potential impact of collaboration on business performance and the attention given to collaboration, in particular in terms of investment in tools and methods supporting collaboration involving tacit interactions and tacit knowledge work.

This paper highlights a few important dimensions of collaborative work, and suggests a few action points for organisations that are interested in improving their collaborative performance and obtaining a higher Return on Investment (ROI) on their collaboration initiatives.

### **Introduction**

Collaboration is a dimension of work that has not yet been fully understood, neither in terms of components, patterns, routines, interactions, or business implications of new collaborative strategies and approaches. Measuring knowledge worker productivity is notoriously difficult, as the type knowledge work that characterizes many different types of jobs today involves complex interactions with others, and many intangibles that are difficult to relate to other key metrics of corporate performance such as profitability, top and bottom line growth etc. In addition, the number of commercially available collaborative tools with various degrees of overlap in functionality can be very confusing.

Despite the problems with evaluating and managing collaboration, a range of recent studies emphasize the importance of collaboration as a key driver of business performance. One study show that workplace innovations account for 89% of multifactor productivity gains [Black and Lynch, 2001], while a recent study by Frost & Sullivan [Gofus et. al., 2006<sup>1</sup>] concludes that collaboration positively impacts an organization's business performance, as collaboration constituted twice the impact of a company's strategic orientation and more than five times the impact of market and technological turbulence influences. The data collected in the study indicates that collaboration counts for 36% of overall corporate performance, a finding that suggests that collaboration is indeed a business area that should be monitored, facilitated and managed to make sure businesses reap the potential benefits.

The common view that strict protection of IPR (Intellectual Property Rights) is the only sustainable way of keeping a competitive advantage is also challenged by

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<sup>1</sup> Meetings around the world report [Gofus et. al., 2006] – based on an online survey with 946 decision makers in key positions as line managers or in the IT department.

alternative, open approaches to sharing knowledge. Foroohar argues that [Foroohar, 2005] 'the new work paradigm – sharing, rather than protecting, trade secrets – is quickly becoming the way forward'. She further argues that 'the era of the information silo is over. As the world has gotten smaller – and its problems have gotten more complex – it's increasingly apparent that we will need coordinated teams to get things done.' This shift towards more collaboration is based on the assumption that few if any companies have all the necessary competencies in-house to successfully innovate today – successful innovation does not occur in isolation, but rather at intersections; where different disciplines and organisations meet, merge and adapt while ideas are confronted - as a collaborative effort.

This research is a part of the European research project ECOSPACE funded under the SO 2.5.9 Collaborative Working Environments in FP6 / IST. The ECOSPACE project develops new working paradigms and metaphors for knowledge workers, and a user-centric platform enabling the interoperability of innovative collaboration tools and services. Through this, the project will empower users to easily build-up and deploy on-demand virtualised and knowledge rich collaborative environments<sup>2</sup>.

The ECOSPACE project specifically addresses the needs of eProfessionals. The concept of eProfessional strongly relates to the concept of eWork, and extends the traditional concept of professional and includes any type of expert or knowledge worker intensively using ICT (Information and Communication Technology) environments and tools in their working practices. An eProfessional typically operates in different contexts involving many different types of interactions and intensive coordination. Identification and verification of potentially useful knowledge resources (other eProfessionals with complementary knowledge, information and data repositories) are common activities [Pallot et. al, 2007].

## **Methodology**

This research is based on an extensive literature review in the areas of collaborative performance assessment, knowledge worker productivity and competitive advantage based on collaborative knowledge work.

Consultations with industrial practitioners have served as an additional source of input regarding prioritisation of organisational issues and challenges related to managing collaborative performance improvement initiatives.

## **Collaboration; Interactions, Tacit Interactions and Knowledge Work**

According to a study on knowledge work and the 21-century organization [Bryan and Joyce, 2005] 'today's big companies do very little to enhance the productivity of their professionals. In fact, their vertically oriented organisational structures, with ad hoc and matrix overlays, nearly always make professional work more complex and inefficient.'

An *interaction* can be described as a mutual or reciprocal action or influence<sup>3</sup>. The increasing specialization of work and complexity of products and services requires

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<sup>2</sup> Retrieved from [www.ip-ecospace.org](http://www.ip-ecospace.org), 11 July 2007

<sup>3</sup> Retrieved from Merriam-Webster's Online Dictionary: <http://www.m-w.com>, 11 July 2007

coordination, and the importance of interactions is growing. In a broad survey on interactions, McKinsey has defined interactions as 'the searching, coordinating, and monitoring required to exchange goods and services' [Butler et. al., 1997; Johnson et. al., 2005]. As products and services typically are becoming more complex, the *interaction overhead* becomes substantial, and effectively managing this overhead becomes critically important. A 1997 study on interactions [Butler et. al., 1997] concludes that in 1994, interactions represented 51 percent of labour activity in the United States – or more than a third of GDP. At an individual level, interactions peak at nearly 80 percent for interpersonal knowledge workers, managers, and supervisors, typically a company's highest paid workers. Even a modest productivity increase for these knowledge workers could have a substantial impact on business performance.

Most sectors have experienced dramatic increases in productivity over the last decade or so. However, when looking more closely at different types of jobs, certain differences emerge that have interesting consequences. A McKinsey study has classified today's jobs as *transformational*, *transactional* or *tacit* [Johnson et. al, 2005]. In this context, transformational means jobs mainly concerned with extracting raw materials or converting them into finished goods while the two latter categories involve interactions of various kinds. Transactional jobs involve mainly routine interactions (often script- or rule-based), while tacit jobs involve complex interactions which typically require people to deal with ambiguity. These complex interactions are defined as *tacit interactions*. Knowledge workers with tacit jobs typically often draw on deep experience, and must exercise high levels of judgement. Studies indicate that productivity gains for knowledge workers involved in tacit interactions [Johnson et. al., 2005], *tacit knowledge workers*, are typically hard to duplicate, and such gains therefore represents an opportunity for organisations to build a sustainable competitive advantage.

The combined effect of globalization, specialization and new technologies are making interactions far more pervasive in developed economies, and the complex interactions found in tacit jobs is growing rapidly. 70 percent of all US jobs created since 1998 are tacit, and the pattern is similar in other developed countries. Hence, knowledge workers involved in tacit interactions represents the quickest growing segment of workers - and *these jobs will constitute the core of tomorrow's competitiveness for developed countries* [Johnson et. al, 2005]. This growth represents a management challenge, as tacit interactions are difficult to manage. Furthermore, there seems to be a substantial underinvestment in IT tools and methods supporting tacit knowledge work.

This finding is complemented by another study indicating that only co-investment in tools and methods yield positive performance outcomes [Brynjolfsson and Lorin, 1998].: In a study of computers' effect on productivity, the authors argue that productivity growth by definition does not come from working harder; working harder may increase output, but it also increases labour input. Similarly, using more capital or other production factors does not necessarily increase productivity. The authors hence conclude that any productivity growth comes from working smarter. This means adopting new technologies and new techniques for production. Techniques for production in knowledge work in most cases involve tacit interactions, and the ways these interactions are supported depend on a range of factors in addition to the technology itself. The combination of these factors can be represented by the

broader term work practice or work system. In a survey describing different combinations of IT and work practices [Brynjolfsson and Lorin, 1998], firms that couple IT investments with new, decentralized work practices are about 5% more productive than firms that do neither. However, firms can actually be worse off if they invest in computers without the new work systems. Hence, IT investments should be accompanied by new work practice (new methods, new attitudes, new organizational structures, etc.) to unlock the full range of potential benefits contributing to productivity growth. This survey demonstrates that implementing new ICT tools alone does not automatically increase productivity, but that new ICT tools can be an essential component in a broader system of organizational changes that does. Furthermore, as the pervasiveness of interactions and ICT tools increases dramatically, it is increasingly important to consider organizational changes as an integral part of this transition process. This further adds to the complexity of managing tacit interactions.

People in transformational jobs and transactional jobs have increased their productivity dramatically over the last few years through process automation and IT investments. However, competitive advantages based on productivity improvements in these categories are short-lived as they more often than not can be scripted or codified and copied by competitors or even other industrial sectors. Far less has been done in terms of empowering knowledge workers involved in the most knowledge-intensive work requiring experience-based judgement and complex analyses - jobs involving *tacit interactions*.

Productivity improvements for these jobs very hard to duplicate, as they are often based on unique organizational and leadership models and complementary technologies that help these knowledge workers to reach out, collaborate and interact with other tacit workers. As a result, the variation in company-level performance<sup>4</sup> is greater in companies with an intensity of tacit interactions than in others [Beardsley et. al, 2006].

This large performance variation for businesses with the highest intensity of tacit interactions indicates that improving the productivity of the workers that are involved in the most complex, advanced knowledge work – tacit interactions – may constitute a robust platform for building a sustainable competitive advantage.

However, this opportunity is not observed and acted on by many organizations. More ICT investment alone is not necessarily beneficial for productivity and business performance. However, there is often a relation between the two, and tacit-dominated sectors in the top quartile of labour productivity have typically equipped their employees with five time more IT stock than the bottom quartile, and they are also increasing their IT stock per employee 40 percent more rapidly, on an annual basis [Beardsley et. al., 2006].

Studies indicate that the IT stock is, strangely enough, lower for tacit jobs than for other job types. Whereas no jobs typically involve purely tacit interactions, IT investments more often than not are designed to automate and facilitate routine interactions or transactions. Implementations of SAP would be a typical example of

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<sup>4</sup> Performance is here defined as EBITDA (earnings before interest, taxes, depreciation and amortization) per employee, while variation in company-level performance is defined as the ratio of standard deviation to mean for EBITDA per employee within each industry [Beardsley et. al., 2006].

this. For the typical transactional functions of any job, there are often several good support systems available. But for the complex, tacit interactions that are becoming such a pervasive phenomenon, the IT support offered in terms of IT stock per employee is lagging far behind. And not only is the base IT stock typically at a substantially lower level for tacit jobs than for transactional jobs; both for the top and bottom quartile, but the compound annual growth rate is also significantly lower (top quartile only). This difference in willingness to invest strategically in tacit interactions from an IT perspective indicates that support systems complex, tacit interactions is still a field that is relatively less mature than transactional support systems.

Table 1: Intensity of tacit interactions, number of workers and performance variation

Intensity of tacit interactions	Portion of interaction workers	Performance variation	Comment
Low	< 14 %	0.9	In this segment, there is little variation in performance, indicating that it is relatively straightforward to copy competitors' best practices if these are known.
High	14–62 %	5.5	In this segment, there is some variation in performance, indicating that there it is possible to identify and copy best practices, but that this is more difficult than in the segment with low intensity of tacit interactions.
Higher	> 62 %	9.4	In this segment, there is substantial performance variation, indicating that some companies have identified and implemented combinations of technologies and work practices that support high-performance collaborative work, and that are difficult to copy by competitors.

An MIT study on collaborative advantage [Hansen and Nohria, 2006] concludes that 'firms come into being in order to enable human beings to achieve collaboratively what they could not achieve alone. If one accepts this as the true purpose of any organization, then the main focus of executives' attention should be on how to foster collaboration within their companies.' This conclusion is based on a view that for many years, multinational corporations (MNCs) could compete successfully by exploiting scale and scope economies or by taking advantage of imperfections in the world's goods, labour and capital markets [Hansen and Nohria, 2006]. However, these ways of competing are no longer as profitable as they once were. In today's transparent markets, these sources of competitive advantage have limited impact. The study further concludes that 'while multinationals in the past realized economies of scope principally by utilizing physical assets (such as distribution systems) and exploiting a companywide brand, the new economies of scope are based on the ability of business units, subsidiaries and functional departments within the company to collaborate successfully by sharing knowledge and jointly developing new products and services. Multinationals that can stimulate and support collaboration will be better able to leverage their dispersed resources and capabilities in subsidiaries and divisions around the globe.'

Collaboration is identified as a potential source of competitive advantage for MNCs because inter-unit collaboration does not occur automatically, but rather requires

simultaneous co-orchestration of several factors and dimensions. Several key barriers obstruct collaboration within complex multi-unit organizations and other networked organizational forms. Furthermore, in order to overcome those barriers, companies will have to develop a set of distinct competencies and organizing capabilities that cannot be easily copied by others.

## **Collaborative Effectiveness and Efficiency**

In tacit knowledge work, collaborative performance depends on collaborative effectiveness and collaborative efficiency. Many organizations launch improvement initiatives with the aim to improve collaborative efficiency, focusing on reduce necessary travel time and associated costs, and increase time on task by providing better integration between collaborative and individual work [Kristensen, 2003]. A factor often influencing the choice of issues considered is the emphasis of vendors of commercially available collaborative solutions, emphasizing collaboration efficiency and promising a solid return on investment (ROI). However, measuring collaborative ROI is not a simple task. Comparing budgets for business travel and costs associated with hardware and software for collaboration is straightforward, but monitoring cause and effect relationships for complex dispersed collaboration situations involves a long list of additional factors. For instance, trust and shared understanding often develops quicker in collocated settings. In a study on proximity and distance in work groups [Kiesler and Cummings, 2002], it is argued that getting together often has intrinsic value such as enhanced trust through traditions such as the handshake and other bodywork. These mechanisms enhance the collaboration effectiveness rather than collaborative efficiency. The work of O'Donnell and Duffy [O'Donnell and Duffy, 2001a; 2001b] on design performance provides a framework for improved understanding of the fundamentals of collaborative performance.

O'Donnell and Duffy view design as a knowledge process and design performance a compound metric where both design effectiveness and design efficiency are considered ( $E^2$  performance model). This is analogous to collaborative performance; defined as a compound metric of collaborative effectiveness and collaborative efficiency respectively. Below is a figure and description of the collaborative performance compound defined by collaborative efficiency and effectiveness used here [Kristensen, 2003; O'Donnell and Duffy, 2001a; 2001b].

Efficiency and effectiveness are fundamentally different, although related. In Figure 1, this fundamental difference between collaborative effectiveness and efficiency is indicated. While efficiency considers the resource usage necessary to obtain an output from a given input, effectiveness considers the alignment between output and goal, or simply the goal fulfilment [O'Donnell and Duffy, 2001a; 2001b]. As today's knowledge processes often depend on collaboration, this model has been useful in the process of exploring the facets of collaborative performance. This is further explained below.

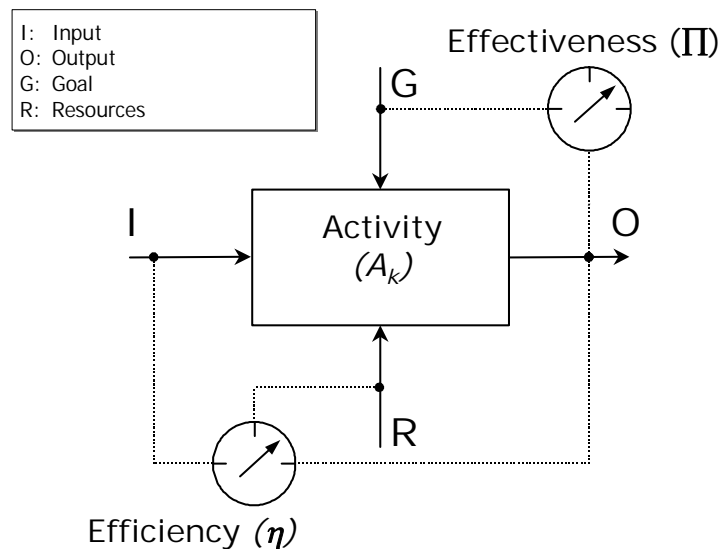


Figure 1: Collaborative E<sup>2</sup> model (adapted from O'Donnell and Duffy)

Efficiency:  $\eta(A_k) = K^+ : R_U$       *and*       $K^+ = O - I$

Here,  $\eta(A_k)$  describes Efficiency ( $\eta$ ) of an Activity ( $A_k$ ), I describes Input (Knowledge), O describes Output (Knowledge),  $K^+$  describes Knowledge Gain, and  $R_U$  Describes Resource (Knowledge) Used.

Effectiveness:  $\Pi(A_k) = r_C (O, G)$

Here,  $\Pi(A_k)$  describes Effectiveness ( $\Pi$ ) of Activity ( $A_k$ ),  $r_C$  describes the Relationship (Comparative), O describes Output (Knowledge), and G describes Goal (Knowledge).

As a result of the following exploration of collaborative effectiveness and efficiency, the importance of goal fulfilment has been given added emphasis. The E<sup>2</sup> performance model outlined above [O'Donnell and Duffy, 2001a; 2001b] has been utilized for improved clarity and understanding of the mechanisms influencing collaborative performance.

## Findings: Exploring the ROI of Collaboration

A number of dimensions of collaborative work have been highlighted to provide a comprehensive coverage of key drivers of collaborative performance. The importance of collaboration is further emphasized by the rapid proliferation of interactions in general and tacit interactions in particular. When coupled with the apparent under-investment in ICT systems supporting tacit knowledge work, opportunities emerge for businesses that seize the opportunity to develop a competitive advantage that is not easily scripted and copied by competitors. Investments in ICT infrastructure alone are not enough; they should be followed by a co-investment in methods to secure productivity improvements.

Knowledge in complex fields is often created as a direct result of interactions between knowledge workers. However, this process is neither well understood nor possible to manage with existing tools and approaches. A more systematic approach to knowledge work and the emergence of dedicated tacit knowledge interaction

support systems may enable improved collaborative performance and hence more productive collaborative knowledge work.

Tacit knowledge workers or eProfessionals are typically highly networked individuals operating under dynamic, unpredictable conditions. Their interactions with others can take many forms, but often conditions outside their control often impose restrictions on the potential ways eProfessionals can interact with others. There number of potential restrictions imposed on eProfessionals operating in complex networks is, for practical purposes, limitless. All these restrictions negatively influence the professionals' collaborative performance, either by reducing collaborative effectiveness or limiting collaborative efficiency. Furthermore; for most users, the costs and benefits associated with different collaborative tools and methods are not clear. To better understand relations between collaboration inputs and outputs, there is a need for collaborative diagnostics tools that are able to provide decision support by indicating areas that require attention, and by suggesting possible solutions in terms of collaborative strategies, tools and approaches, and hence improve the return on investment (ROI) of collaboration.

Collaboration and knowledge sharing are primary drivers for creativity and innovation for today's networked businesses. As work is becoming more collaborative, both productivity and the ability to innovate depend on advances in the way we collaborate. The problem is that evaluating when, how and with whom to collaborate to achieve business objectives in the most effective and efficient manner is very difficult, due to the inherent complexity of today's highly dynamic interaction patterns.

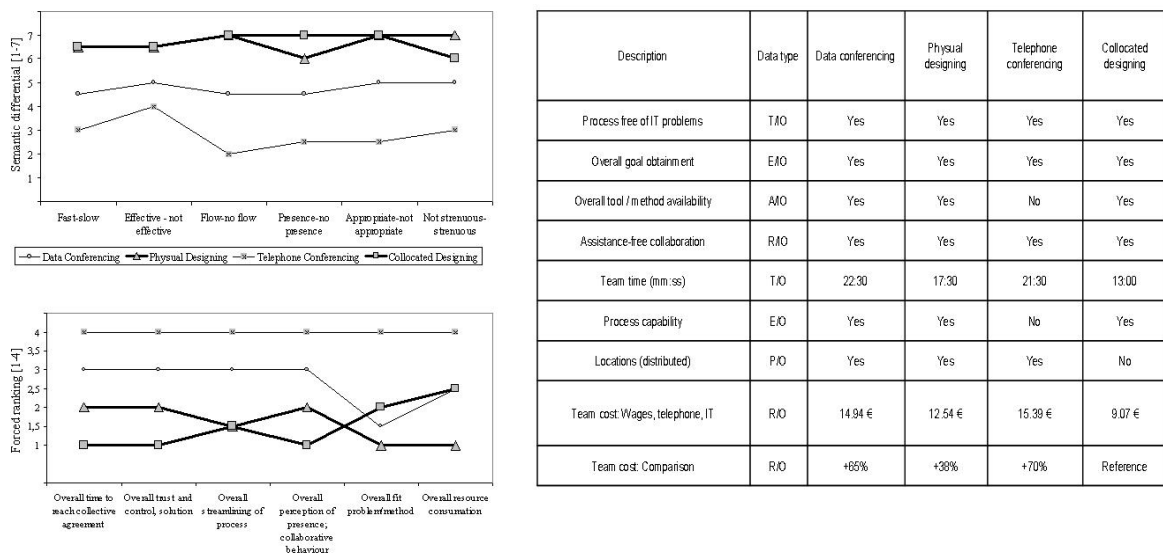


Figure 2: Collaborative ROI Dashboard

The choice of collaborative methods and tools is usually based on intuition and previous experience through habitual practice. As a result, decision makers have no effective and systematic ways of evaluating the costs and benefits different collaborative strategies and scenarios imply for their organizations [Puybraud et. al., 2006]. There is hence a need for modelling tools that can assist the decision making process regarding what collaborative strategies to pursue at any given time. This figure above highlights a simple diagnostics tool that has been developed to provide

simple decision support on the organizational ROI (return on investment) of different collaborative strategies [Kristensen and Røyrvik, 2005]. This decision-making tool has been developed to identify the most effective collaborative strategies for any given situation, in order to improve collaborative performance. The modelling tool displays comprehensive information about six dimensions of collaborative performance in a dashboard-type graphical output for easy comparison, as shown in the figure above.

The six dimensions in the modelling tool are time, effectiveness, flow, presence, appropriateness and resources. Furthermore, the modelling tool links each of these six dimensions to a classification matrix where collaborative phenomena are categorized as subjective, intersubjective, objective or interobjective respectively [Wilber, 2001], for a comprehensive overview of relevant aspects. For evaluation and comparison of different collaborative strategies, the model uses performance measurement methods. Using the model, it is possible to evaluate collaborative approaches based on facts and structured comparison of costs and benefits, instead of habitual practice and somewhat blurry perceptions. This increases the transparency of costs and benefits, asymmetries and trade-offs. When accurate data are fed into the model, it can indicate areas of improvement related to time, collaborative effectiveness, flow, presence, appropriateness and resources. When relating effectiveness data with resource data, it is also possible to assess collaborative efficiency, although the model is primarily concerned with collaborative effectiveness, which is evaluated directly.

## Conclusions

Collaboration is rapidly manifesting itself as a key driver of overall business performance. New ICT tools and systems may enable new types of interactions, or extend existing interactions to new settings (improving mobility etc.). However, companies seeking to use collaboration strategically to build a sustainable competitive advantage should take a broader approach than merely looking to implementation of new features or new tools. Collaboration works at its best when it forms an integral part of the organisation itself, and only when new collaboration concepts and scenarios are supported by a joint focus on new technology and new organisational practices do they form the typical embedded system that is difficult to copy by competitors.

Studies indicate that an investment in collaborative tools and methods that enable effective knowledge interactions is money well spent. One can argue that collaboration comes at a cost, but so does “non-collaboration” or poor collaboration - and these costs can in many cases far exceed the total cost of collaboration. However, since the costs of “non-collaboration” appear on budgets other than ICT investment and organisational development, the optimization should be done on an enterprise-wide level. This requires direct involvement of senior executives with the authority to balance these tradeoffs between units, departments and projects on an enterprise-wide level, or even inter-enterprise / network level. Below a few suggested action points are described.

**Business case:** As a starting point, senior managers should recognize the importance of collaboration and start building a company-specific business case for collaboration to clarify how improved collaboration affects business performance.

This business case can assist a general understanding of the importance of collaboration in today's coordination-intensive business environment, and justify collaboration improvement initiatives. The potential cost implications related to "non-collaboration" for different security policies should be evaluated against the corresponding risk profiles for different collaboration scenarios. To achieve this, it is recommended to work closely with other units to understand the deeper implications of collaboration (or non-collaboration).

**Collaborative performance – optimizing for effectiveness:** Companies interested in improving their collaborative performance should focus not only on collaborative efficiency (converting knowledge inputs to knowledge outputs by means of collaboration, using a minimum of resources) – studies indicate that the current underinvestment in ICT tools and methods supporting tacit knowledge work does not yield the expected efficiency improvements. What is perhaps even more critical is collaborative effectiveness, or the alignment of knowledge outputs generated by means of collaboration – with organizational goals or objectives.

**Collaboration management:** ICT managers must get involved in the process by defining and elaborating principles that balance the need for a flexible collaborative working environment with the required security level for different collaboration scenarios. This is needed to improve the collaboration capabilities of the organisation. Furthermore, organisations should seek to define a set of collaboration guidelines that support high-performance collaboration practices.

**Role consolidation and service provision:** Collaboration is multidisciplinary, and ultimately involves stakeholders from IT, HR, senior management, and other line and staff disciplines. The need for establishing a cross-functional collaboration task force that convenes regularly should be considered. To improve the collaboration quality or collaborative infrastructure utilization rates, it is recommended to initiate a support function (collaboration helpdesk) that handles a range of (multidisciplinary) collaboration issues. This function has the potential to simultaneously improve service levels and the fundamental understanding of user needs and bottlenecks. Furthermore, it can initiate changes that expand the range of potentially profitable collaboration services that can be provided internally.

Companies that increase the awareness of collaborative challenges for tacit knowledge workers, establish an infrastructure that enables robust collaboration in a variety of settings, and use a defined approach to systematically evaluate what collaborative strategies to pursue, can use this to establish a sustainable competitive advantage. Through this approach, they can leverage their own and other companies' competencies and capabilities effectively in global networks.

## **Acknowledgements**

The author would like to thank Marc Pallot, Burak Sari, Viktor Kaufmann, Björn Kijl, Hans Schaffers, Robert Slagter and Wolfgang Prinz for valuable contributions to the ECOSPACE D1.3 report. The paper presents selected initial achievements of the Workplace Analysis work package of the ECOSPACE Integrated Project, which is co-funded by the European Commission under the IST Priority within the 6th Framework Programme. The authors wish to acknowledge the ECOSPACE project partners contributing to the successful development and launch of the project.

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