



**Anglo-German Foundation for the
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Studium der Industriegesellschaft***

Global software outsourcing: The solution to the IT skills gap

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Workshop Report

**Global software outsourcing:
The solution to the IT skills gap**

Held at Wissenschaftszentrum Berlin

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**Anglo-German Foundation
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GLOBAL SOFTWARE OUTSOURCING

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Executive summary

This report provides a summary of an international workshop which was held at the Wissenschaftszentrum Berlin (WZB) on 30–31 May 2001. The workshop was entitled 'Global Software Outsourcing: the Solution to the IT Skills Gap' and was a collaboration between the University of Manchester and WZB. The objective of the workshop was to assess the current position for the UK and Germany with regard to the worldwide information technology skills shortage and to consider strategies for addressing this shortage.

The workshop content included presentations from academics, policy-makers and practitioners from the UK, Germany, the USA and India. The format also included panel discussion, followed by general discussion on the topics of the IT skills shortage and solutions to the problem. Potential solutions to the problem of IT skills included global software outsourcing.

Outcomes and conclusions of the workshop were addressed at the level of policy and at the corporate level. The workshop identified the multifaceted nature of the IT skills shortage and the need for a partnership between various stakeholder groups in solving the problem. The contribution of global software outsourcing is significant, particularly in the short or medium term. However, the process of global outsourcing is itself extremely complex and fraught with problems and is a strategy which must be given careful thought and advanced planning.

1 Introduction

Background

The Anglo-German Foundation provided a grant towards an international workshop which was held at the Wissenschaftszentrum Berlin (WZB) on 30–31 May 2001. The workshop was entitled 'Global Software Outsourcing: the Solution to the IT Skills Gap' and was a collaboration between the University of Manchester and WZB. The event was co-chaired by Brian Nicholson of the School of Accounting and Finance, University of Manchester, and Professor Dr Ulrich Jürgens of WZB. The programme committee also comprised of Professor S. Krishna of the Indian Institute of Management, Bangalore, India, and Sundeep Sahay of the University of Oslo, Norway.

Objective of the workshop

The objective of the workshop was to assess the current position for the UK and Germany with regard to the worldwide information technology (IT) skills shortage and consider strategies for addressing this shortage. Countries like the United States and Canada, facing a similar skills gap, have attempted different solutions such as liberalising visas and global software outsourcing. However, there are concerns from some quarters about immigration strategies as developing countries like India potentially lose out in the high-technology brain drain. Considerable experience has been accumulated with particular regard to global software outsourcing which appears to overcome several of the problems associated with other schemes.

Purpose and objective of this report

The purpose of this report is to satisfy the requirements of the grant provided by the Anglo-German Foundation. The primary recipient of this report is Dr Ray Cunningham, Director of Research, Anglo-German Foundation. Secondary recipients of the report include the workshop's participants and speakers and other interested parties. The objective of this document is to provide a summary and record of the proceedings which it is hoped will act as a stimulus for further debate and research on the topic of global software outsourcing and its contribution to the IT skills shortage.

2 The global IT skills shortage

Trends and statistics

The IT skills shortage is an international issue which is particularly affecting western European and US companies. Erran Carmel¹ pointed out that the skills shortage is strongly evident in the USA, even though policy has attempted to address the problem for several years. Referring to a study by the Information Technology Association of America, the shortage was estimated at 0.8 million in 2000.² In Europe, the United Nations has warned that a computer skills shortage could hamper future economic growth. The European Information Technology Observatory (EITO) has estimated the lack of IT competence in western Europe to be 14.5 million in 2000, increasing to 22 million in 2003. A report by the International Labour Organisation estimates that there will be 1.5 million vacancies in the information technology sector by 2002.

The problem is acute in UK and Germany. A recent IDC report³ predicts a shortfall of 330,000 IT staff in the UK by 2003, prompting the then UK e-commerce minister Patricia Hewitt to visit India in 2000 with an especial interest in Indian information technology. In Germany the IT sector federation BITKOM suggests that the gap between supply and demand will continue to grow. Workshop participants gave varying estimates of the demand for IT professionals in the country, ranging from the 75,000–150,000 figure given by BITKOM⁴ to about 250,000 (by 2001) by a federal government research study headed by Dr. Dieter Rombach.⁵ Dr Rombach stated that 55,000 programmers were required in 2001 and three or four times that number in the case of software developers (predictions based on interviews). Between 800,000 and 1,000,000 will be required over next five years, 210,000 of them programmers. Mr. Raphael L'Hoest of the *Bundeskanzleramt* estimated that 750,000 additional information and communication technology staff would be required by 2010.⁶ A further longer-term factor was said to be an ageing German population, which will increase the shortage of labour supply. Figure 1 summarises some of these trends and emphasises the shortfall.

Germany faces primarily a *skills shortage*, a genuine shortage in the accessible external labour market. There was less of a perception of a *skills gap*, where there is a deficiency

¹ Carmel's website contains a wealth of information on the subject of global software development: see <http://www.american.edu/academic.depts/ksb/mogit/carmel.html>.

² ITAA (2000) *Bridging the Gap: Information Technology Skills for a New Millennium*. Arlington, VA: ITAA. An executive summary of the report is available at <http://www.itaa.org/workforce/studies/hw00execsumm.htm>.

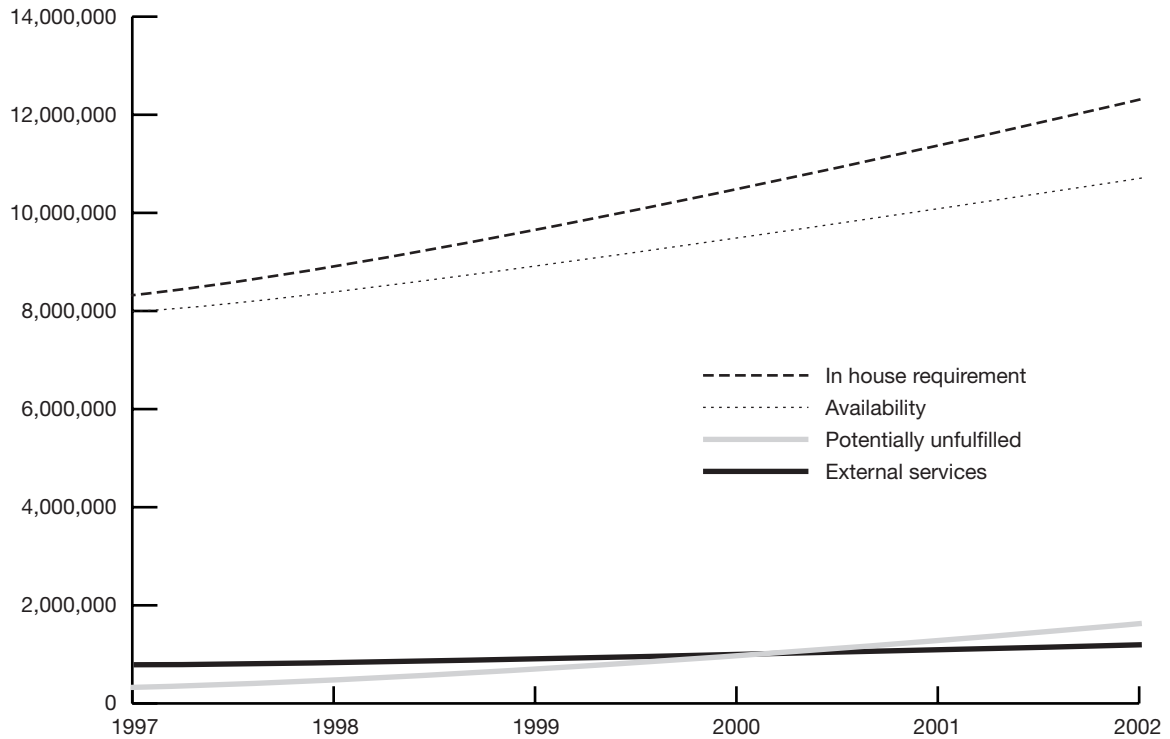
³ 'Europe's IT Skills shortage 1999–2003', report #WTT15G. <http://www.idc.com>.

⁴ BITKOM (<http://www.bitkom.org/>) also cites research which suggests that by 2003 Germany's shortage of computer experts will stand at around 400,000 in an industry that will employ 2.4 million (*Handelsblatt*, 30 July 2000. <http://www.handelsblatt.com>).

⁵ A copy of the report (in German) can be downloaded at <http://www.iese.fhg.de/software-study>.

⁶ R. L'Hoest (2001) 'The European dimension of the digital economy', *Intereconomics*, 36, 1, 44–50.

Figure 1
Widening skills gap in Europe



Source: IDC 1998
Courtesy of Ashank Desai, Chairman, Mastek.

in the skills of existing employees and new recruits which may reduce business performance. It was emphasised by all present at the workshop that IT is a major market in German industry, even bigger than the automotive industry since 1999. Mr. L’Hoest emphasised the important role the information industry played in the German economy. The industry currently has 1.7 million people employed and contributes about DM240 million to the national economy, and this is expected to grow to about DM300 billion by 2003.

Dr. Rombach made an important distinction between demand for IT professionals in the primary sector and those required for the secondary sector. The primary sector consists of firms that sell software, such as SAP and Microsoft. In contrast, the secondary sector consists of firms that use software in various manufacturing and services activities such as automobile manufacturing, banking and insurance.

Significantly, it was pointed out that nearly 80% of German software development takes place in the secondary sector, and is driven by the production specifications and quality and service level needs of the specific sector. Since traditionally the quality standards of this sector have been extremely high in Germany, the quality level requirements of the software sector are correspondingly high. Since the traditional strength of German industry is in engineering individual solutions, there is also the need for software to develop product line engineering solutions in applications.

Implications of the IT skills gap

It was widely accepted that the IT skills gap is one which is significant and steadily increasing, and the response of the industry in both quantitative and qualitative terms is inadequate and also poorly informed. This was seen as a serious problem because it serves to dampen the growth of individual firms and the national economy. For instance, according to a speech made in 2001 by Tessa Jowell, then UK Minister for Education and Employment, the European Commission expects e-commerce in Europe to grow from \$17 billion at the end of 1999 to about \$360 billion by 2003.

A further threat was indicated by the International Labour Organisation,⁷ which believes that the skills shortage could widen the gap between the technologically rich and poor regions of Europe, with computer experts from central and eastern European countries being enticed to work in western Europe. IT skills were described as a basic precondition for Germany to remain a global leader and to be able to develop innovative product ideas. Germany has traditional strengths in production facilities. According to Rombach, what is essential today is the need to develop software production technology. Software engineering was described as the manufacturing technology of the information age and the key driving factor for future innovations.

At the level of the firm, there was some debate over whether the IT shortage figures were misleading. There was, however, general acceptance that a significant threat exists of demand significantly outstripping supply, leading to inflated salaries, increasing staff turnover, higher operating costs and lower profit margins. Deferred projects may reduce an organisation's competitiveness, and users who are not properly supported do not achieve the potential productivity gains.

⁷ 'ILO urges training to offset European "skills gap" in Information and Communications Technology as Sixth European Regional Meeting convenes in Geneva'. Press release, 11 December 2000.
<http://www.ilo.org/public/english/bureau/inf/pr/2000/49.htm>.

3 Responses to the IT skills gap

Some of the responses to the skills gap were considered, from the retraining of unemployed social scientists as 'software documentation experts' to initiatives like the green card scheme. There were various suggestions, such as attracting groups of people to the workforce who traditionally have kept away, including women, older people and the unemployed. The problem is being recognised as requiring action at the highest level. For instance, in February 2001, speaking at a meeting of EU ministers in Lule, Sweden, Tessa Jowell requested a skills task force to examine the problem of skills shortages in Europe.⁸

Education

The development of education policy was described by Mr. L'Hoest as the key factor in the government response to the skills shortage. Current efforts in this regard were inadequate and there was the need to develop more public-private partnerships, to create stronger infrastructure to support education, and to integrate new media more centrally in educational processes. Other initiatives include the federal government's efforts to establish large educational programmes, and professional education through schemes including online e-learning. The government has also initiated a large research programme called IT-2006. The basis for a number of the federal government initiatives can be found in the September 1999 document called 'Innovation and Jobs',⁹ described by Mr. L'Hoest as the 'Bible of the federal strategy'. Since education is largely a state initiative, state governments are making various efforts to increase computer science graduates from 2000 to 8000 through an increase in bachelor's and master's programmes while trying to avoid the problem of faster qualifications for programmer jobs. There are also some attempts by the industry to increase continuing education and training, and some large corporations such as SAP and Daimler Chrysler have created 'corporate universities' for employee development.

As compared to this significant increased demand for IT professionals, Dr Rombach pointed out that the German industry is producing about 8000 computer science graduates per year, and about two-thirds of the programmers presently have formal academic qualifications. A very incomplete and maybe even flawed understanding of what the industry needs compounds the problem of inadequate supply of trained IT people. Illustrating this flawed understanding, Dr. Rombach quoted an advertisement for an IT person which read 'Wanted software engineer, requirement university degree or college or COBOL course'.

⁸ The UK government concerted action statement on this can be found at <http://www.dfes.gov.uk/skillsforce/index.htm>. This report has mainly an educational agenda and does not consider alternative strategies such as global outsourcing.

⁹ See http://www.e-envoy.gov.uk/publications/reports/benchmarking/summary_ger.htm.

Green card scheme

The most significant initiative by the federal government, and one that is attracting national debate, is the green card scheme to attract 20,000 IT-skilled people from non-EU countries for a maximum of five years with a minimum annual wage limit of DM100,000. The scheme was to operate in two phases, with 10,000 cards issued in the first phase and the rest in the second. Mr L'Hoest described this scheme as a 'success', with about 6000 cards having already been issued.

In discussion this figure was challenged by some who said that only 3000 IT people had actually come into Germany. Some German companies are complaining that the workers who have applied are under-qualified and that foreigners are being deterred by neo-Nazi violence.¹⁰ Jürgen Ruttgers, a Christian Democrat in North Rhine-Westphalia coined the slogan *Kinder statt Inder* (children not Indians), meaning that German children should be trained to fill IT vacancies.

Others challenged the basis for the green card estimate of 20,000 cards which was derived from the BITKOM report of a 75,000 shortage. It was pointed out that the BITKOM estimate was made on basis of stock-market predictions in March 2000 when dot-com businesses were at their peak. With the staggering collapse of this sector which began in 2000, the 75,000 estimate does not hold and thus the green card scheme is flawed.

Mr. L'Hoest also recognised some of the restrictions in the green card scheme (the five-year limit, the minimum wage requirement, the restriction on buying property) and also some of the natural disadvantages which Germany may seem to have (as compared to, say, Silicon Valley) with respect to weather, salaries, taxation (50% in Germany and 35% in the USA), language, food and potentially racist climate.¹¹ Mr. L'Hoest stated that the government is actively considering measures to make the scheme more attractive to potential green card applicants. This must be seen in the context of competition with the US H1B visa intake of almost 200,000 in the period 2001–2003. It is significant that the IT skills situation is volatile, and at the time of writing the global economic downturn has led to reductions in IT spending and the 'benching' of around 50,000 Indian staff, some of whom are returning from the USA to India as a result.¹²

Trade union concerns

The trade union speakers put the argument for focusing on in-country skills such as people currently unemployed rather than concentrating on foreign imports through the green card scheme. There are around 30,000 unemployed German information technology specialists and 50,000 jobless engineers.¹³ Unions see the IT skills problem as

¹⁰ *Handelsblatt*, 31 July 2000. <http://www.handelsblatt.com>.

¹¹ *Guardian*, 22 May 2000. <http://www.guardianunlimited.co.uk>.

¹² *The Times*, 15 May 2001.

¹³ *The Times*, 25 February 2000.

having many solutions and so involving a partnership between business, education, trade unions, job centres and employers' associations.

Balancing the tension between developing local capabilities and supporting values of international solidarity was described as a key current dilemma for the unions. A central challenge for the unions is qualifying the unemployed, and so green cards should only be granted in a clearly defined skills area. A key concern was seen as avoiding risks of immigration such as poor wages and undermining working standards. A modern immigration law was called for which would combine immigration and integration as well as protecting the right of asylum for victims of political persecution. This would entail certain integration demands on immigrants, such as learning German. It would also make demands on the German state to provide education, vocational training, help in finding jobs and housing, and protection against discrimination.

4 Contribution of global software outsourcing

Background

Information technology outsourcing is not a new concept, having been in existence in facilities management for several decades. Global software outsourcing is a relatively more recent phenomenon, becoming visible only in the early 1990s. One of the major reasons for the growth of offshore outsourcing is that digital information can be transported cheaply and easily across rapidly improving telecommunications links. Software development tasks can be exported abroad to take advantage of potentially increased access to advanced technological expertise and of cost reductions.

Vendor countries

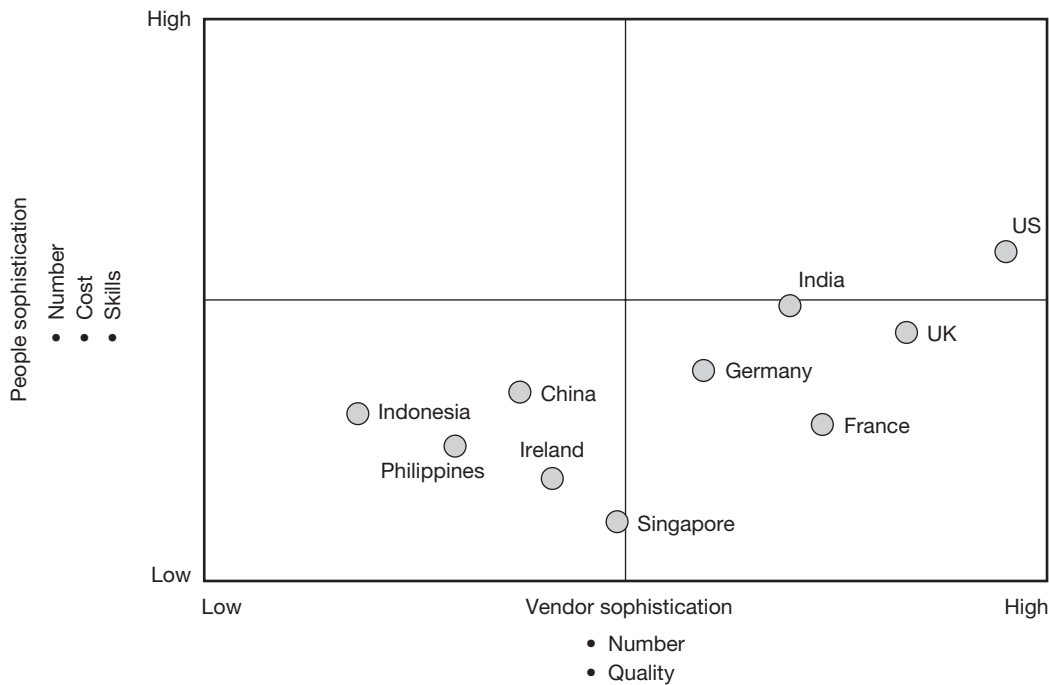
A number of countries are becoming involved in performing a range of offshore outsourcing activities, including Ireland, the Philippines, China, Vietnam, and Russia.¹⁴ Erran Carmel opened the discussion on global offshore outsourcing by pointing out that more than 56 nations are now exporting software products or services and that 'nearshore' locations are emerging, including Mexico and the Caribbean. Examples were given of America's largest IT professional services firms with massive offshore centres such as IBM, PricewaterhouseCoopers and EDS. Xerox has centres spread around the world in Brazil, Ireland, England, India, China and Singapore. India remains the undisputed leader for offshore development as a preferred site for North American and European companies. Figure 2 shows analysis from a NASSCOM-sponsored McKinsey study comparing the software industries in different countries in terms of vendor and people sophistication. India has a large pool of highly qualified English-speaking computer professionals, companies with a good track record of successful outsourced projects, a reasonable cost differential (which is fast eroding) and a strong scientific education system which means that many North American and European companies are outsourcing their software development activities to India. This is reflected in the fact that in 1997–8, nearly one-third of the Fortune 500 companies outsourced their software development to India,¹⁵ justifying the status of India as 'most favoured outsourcing destination' for North American firms. By all accounts, the growth of the Indian software industry can be described as spectacular, registering growth in excess of 50% each year since 1993. Nearly 59% of the software produced in India is for the North American market, and Europe accounts for about 22%.¹⁶ According to Shekar Subramanian of Mascot, based upon the

¹⁴ A paper on the subject can be downloaded at <http://les1.man.ac.uk/accounting/personal/nicholson/nicholson.html>.

¹⁵ See <http://www.nascomm.org>.

¹⁶ NASSCOM statistics: see <http://www.nascomm.org>.

Figure 2
India's value proposition



Courtesy of Mastek. Analysis from NASSCOM McKinsey Indian IT Strategies report (<http://www.nasscom.org>).

market opportunities, companies based in India hope to increase revenues from US\$4 billion in 1998 to US\$87 billion in 2008. These will fall in following areas: value-added IT services (web-enabling legacy, e-commerce, application integration, knowledge management, convergence), software products (productisation, embedded software), IT-enabled services (business process outsourcing, remote customer interaction) and e-business (domestic and international).

Categories of offshore work

The two major categories of offshore outsourcing include IT enabled services and IT services. IT enabled services are concerned with business processes and services sourced from a location different from that of the end user. They are delivered over private and public secure networks, provided by a joint venture, subsidiary or vendor, and are increasingly cross-border rather than within a nation. Services include call centres and customer interaction services (such as technical support, help desks, complaint handling, lead generation, credit and billing problems, market research), medical transcription, finance and accounting services, animation and digital content development, web content development, network management and website services. IT services include software development and maintenance activities. Either activity can take place on-site ('bodyshopping'), involving physical import of staff into the host country. Alternatively,

work can be undertaken offshore where the development staff are primarily based in their own countries, or in some cases a mixture of both.

Application service providers

Wendy Currie discussed the important area of application service providers and the trend towards hosting a wide range of applications remotely (such as enterprise systems). According to the Application Service Providers (ASPs) Consortium,¹⁷ ASPs deliver and manage applications and computer services from remote data centres to multiple users via the internet or a private network. Using an outside supplier offers an alternative to owning the system in-house, with its implications for capital, expenses, implementation and a continuing need for maintenance, upgrades and customisation. Commercial ASPs offer leasing arrangements to customers, whereas non-profit or government organisations may provide these services gratis. An ASP may be a commercial entity or a not-for-profit or government organisation supporting end users. ASPs give customers a viable alternative to procuring and implementing complex systems themselves. In some cases, ASPs even provide customers with a comprehensive alternative to building and managing internal IT operations. ASP customers also are able to control more precisely the total cost of technology ownership through scheduled payment schemes. If data processing is performed off-site by a third party, organisations can focus on their areas of core expertise. Examples of the kinds of applications which are available include e-mail and more complex enterprise applications, access to which is leased by the number of users and made available via an intranet. This offers greater flexibility for the provision of applications for corporations in the UK and Germany who are able to access resources located across time and distance. ASP also presents opportunities for Indian software companies to engage in this market. However, weaknesses in many developing countries' telecommunications infrastructure (for example, India) would currently hold back any attempts to host applications remotely.

Motivation for offshore outsourcing

A recent research report¹⁸ indicated that a key motivation for outsourcing was access to less expensive software production. In the USA this was seen as the most significant factor with fast ramp-up, skills and talent being key factors. Erran Carmel identified three archetypes of large US corporations based on patterns of offshore sourcing: 'classic offshore outsourcers', mostly non-technology firms, which are early adopters, and contract with third parties to perform offshore work; 'tech internalisers', which are technology firms building offshore internal-to-the-firm IT development centres; and

¹⁷ <http://www.aspindustry.org/>.

¹⁸ E. Carmel and R. Agarwal (2000) 'Offshore sourcing of information technology work by America's largest firms'. Technical report, Kogod School, American University. Available at <http://www.american.edu/academic.depts/ksb/mogjit/carmel.html>. See also E. Carmel (1999) *Global Software Teams*. Upper Saddle River, NJ: Prentice Hall.

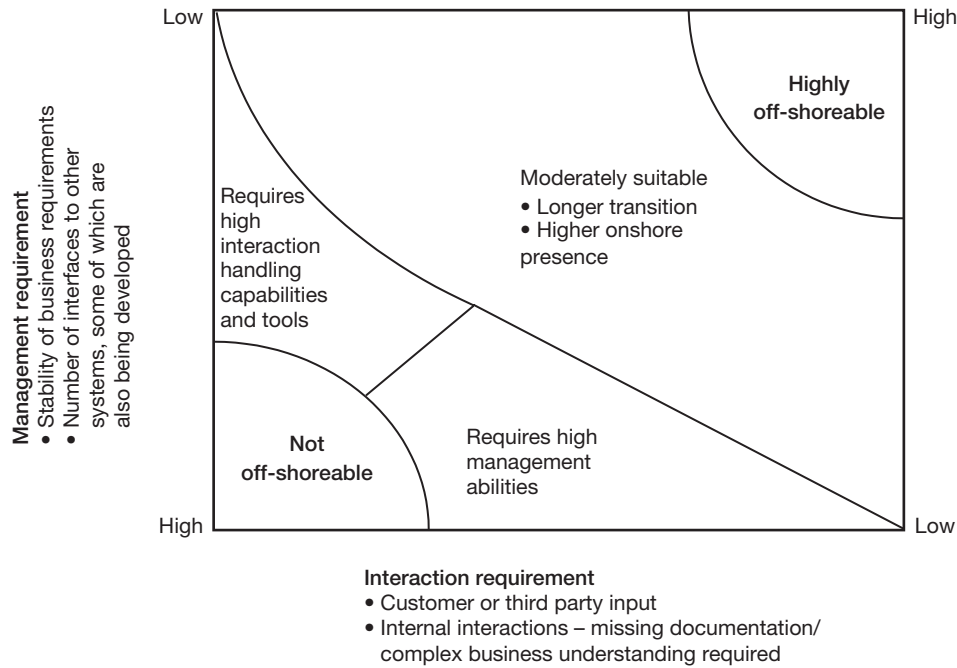
'stymied bystanders', firms which are just beginning the offshore effort and have internal managers lobbying. Dr Rombach pointed out that the costs may be less in terms of pure programmer hours, but in general this was not true when taking into account other cost factors incurred. German firms tended not to look for simple cost reduction, according to Rombach, and were interested in other benefits such as flexibility, quality, skills and development time.

Managing offshore outsourcing

Again from the US perspective, Carmel identified several factors that are critical to making offshore outsourcing effective. An internal corporate champion, effective leadership, and incentives (targets, budget and an internal bidding process) all proved to be effective in US companies. Obstacles included a non-cosmopolitan, co-location mindset. Some managers in the USA practised 'management by walking around', clearly impossible in offshore scenarios. Carmel also gave some indications on factors in choosing the siting of software development subsidiaries or offshore outsourcing. These were labour costs and skills, facilities in the client's country, use of the English language, 'culture closeness' and the business climate. According to Carmel's study, future indicative trends in offshore sourcing include the building of megacentres for offshore development and a greater proportion of work being done offshore. There was also an indication that small companies will increase their offshore sourcing activity. Dr Rombach listed a number of factors in managing offshore outsourcing, drawing attention to communication and coordination problems. Rombach's research findings indicate that offshore sourcing was most suited to mature companies with well-specified software outside the critical value generation chain (*Wertschöpfungskette*) of an organisation. Dr Rombach discussed his offshore outsourcing framework, which includes a consideration of legal, knowledge transfer, development, project management, quality management, language, time and infrastructure issues.¹⁹ The study concluded that most German outsourcing follows a subcontracting model with an offshore company and in fewer cases establishing a subsidiary abroad. Decisions to outsource should depend on utilising missing or better-qualified resources, and on careful analysis of the competitive role of software in products and services. Figure 3 shows a model indicating the suitability of projects for offshore sourcing. The positioning of the 'highly offshorable' component largely concurs with Rombach's analysis that projects that are the most stable and most easily developed offshore are those with high levels of structure and low interaction requirements. Mascot and Mastek demonstrated their capabilities to work on a range of projects for their clients by serving as 'virtual extensions'. They demonstrated knowledge management systems hosted on the intranet and internet which could provide access to client daily project progress in real time.

¹⁹ See W. Kobitzsch, H.D. Rombach and R.L. Feldmann (2001) 'Outsourcing in India', *IEEE Software*, 18, 2, 78–86.

Figure 3
Framework for assessing offshore suitability



Source: NASSCOM McKinsey study (<http://www.nasscom.org>).

Research programme on global outsourcing²⁰

Sundeep Sahay, S. Krishna and Brian Nicholson reported on an extensive research programme on global software outsourcing arrangements. The basic aim of the programme has been to understand the process by which global software outsourcing collaborations evolve over time and articulate strategies for effective management. Since 1995, and spread over six countries and multiple organisations, they have identified various complexities in managing these global collaborations. Four key sets of issues that influence global collaborations in software development have been identified.

Tensions of standardisation, control and power²¹

As a strategy of global collaborations, firms try to develop central control from the headquarters to gain benefit from a standard product design, global scale manufacturing and a centralised control of worldwide operations. Standardisation is a key feature of this strategy, whereby efforts are made to homogenise operations to the extent that the 'outsourced company' cannot be 'distinguished' from the set-up of the outsourcing firm.

²⁰ R. Heeks, S. Krishna, B. Nicholson, and S. Sahay (2001) Synching or sinking: Global software outsourcing relationships, *IEEE Software*, 18, 2, 54–60.

²¹ See, for instance, B. Nicholson, and S. Sahay (2001) 'Some political and cultural issues in the globalization of software development: Case experience from Britain and India', *Information and Organization*, 11, 1, 25–44.

Standardising around the operations of the outsourcing company has also been seen to gain political advantage over local staffing arrangements. The scope of this standardisation effort is varied and includes *physical appearance* (for example, office layouts), *technical processes* (for example, methodologies for quality control), and *management practices* (for example, systems of performance appraisal). However, these standardisation attempts at various levels are greatly problematic, and in continuous tension with the need for flexibility at the 'local' level. While some degree of standardisation is of course essential to enable global coordination, there is the need to develop a pragmatic balance between these attempts and the local reality.

Tensions of distance²²

In global software outsourcing there is an ongoing and inherent tension between the primarily economic need to work at a distance and the needs of organisations and individuals to operate in conditions of proximity. These tensions play out at three levels. At the *structural* level, organisations try to operate in locations where labour is inexpensive and readily available. This imperative is in tension with the organisational need to be proximate to the market, typically based in high-wage areas of the western marketplace. At the *organisation* level, firms try to increasingly operate in logic that is distance-independent, even though their practices are people and location-dependent. At the *individual* level, in trying to comply with the organisation logic of distance independence, individuals are in tension with their primordial needs for human contact and socialisation. Tensions of distance and proximity are thus endemic to the relationship, and need to be balanced in terms of the nature and extent of offshore versus onshore work. Different information technologies are used by firms to try and find this balance, but they have their own enabling and constraining characteristics.

Tensions of knowledge transfer

A key assumption of global software work is that the outsourcing firm would be able to seamlessly transfer to the outsourced firm knowledge about their products, processes and practices to enable software development to take place at a distance. Empirical work has revealed that such a transfer is extremely problematic and difficult to achieve in practice. For example, a North American telecommunications company studied was outsourcing the development of software required to drive its telecommunication switches to an Indian firm, needed to transfer knowledge about its switches (products), its development and quality control methodologies (processes) and practices such as criteria for personnel appraisal. While it was relatively simpler for the company to formalise and transmit (the 'hard') knowledge about products, it was not the same with practices because of their tacit and context-specific nature. Over the years, information systems researchers have established the problematic nature of transferring and sharing such knowledge between users and developers, even in conditions of co-location. When we factor into this transfer process the conditions of time, space and cultural separation, the complexities magnify manifold. Brian Nicholson reported on a case study of Sierra, which opened a subsidiary in Bangalore, India. The presentation analysed the process of software development using a theoretical frame derived to analyse the problematic issues of knowledge transfer. This case study shows some barriers to knowledge management and transfer across global

²² S. Sahay and K. Krishna (2001) 'Understanding the process of development of a GSO relationship: A dialectical perspective'. Working paper, University of Oslo. Available from Sundeep Sahay at sundeeps@ifi.uio.no.

software teams. Time, distance, language and communication problems, coupled with high expectations, were key problem areas.²³

Tensions of identity²⁴

Sundeep Sahay and S Krishna presented findings from a study of individual identity which is a significant aspect of global relationships and has important instrumental use to organisations trying to hire and retain the best talent in a fiercely competitive knowledge-intensive industry. Individual identity is in a constant state of flux and turmoil, as software professionals need to rapidly switch between different projects, technologies and countries. Individual identity is tied up inextricably in the identity and image of the organisation which is also constantly redefined for different global stakeholders. As organisations increasingly experience the problems of attracting and retaining professionals, they need to actively understand the nature of self-identity of developers and what is it that makes them attract, retain and motivate them in an organisation. For example, in India, developers often see it as important to be associated with latest technologies and projects where they feel that a contribution is being made to the country's technological base. To develop strategies for human resources, management needs to consciously draw upon an understanding of various complex socio-psychological and cultural needs of developers, in addition to the economic.

²³ B. Nicholson (2002) 'Managing knowledge in offshore software development: Case study evidence from UK and India', in S. Sahay, S. Krishna and B. Nicholson (eds), *Globalisation, Software and Organisations*. Cambridge: Cambridge University Press (forthcoming).

²⁴ S. Sahay and S. Krishna (2001) 'Transformations of identity in GSO relationships'. Working paper, Indian Institute of Management. Available from Sundeep Sahay at sundeeps@ifi.uio.no.

5 Conclusions

The workshop offered a range of perspectives on a complex problem and identified that there are many stakeholders with differing interests. Clearly, global outsourcing is one possible strategy for an organisation to adopt in the face of a skills shortage. The presentations showed that the management of this process is not trivial but highly complex and challenging, due to the range of issues involved.

Managing the IT skills shortage

Measures to cope with the skills shortage have had limited success so far. The German green card initiative to attract 20,000 IT professionals has been unsuccessful because in a year only 6000 green cards have been issued, and only about 3000 programmers have actually come to Germany. The workshop concluded that schemes based primarily on financial incentives are inadequate in the present-day context where developers are operating in a 'seller's market' and can basically go where they please. The union view involving a partnership between business, education, trade unions, job centres and employers' associations seems to offer the clearest way forward. However, offshore outsourcing was accepted as a short- or medium-term measure prior to longer-term measures involving education becoming effective. Attracting the best foreign IT experts remains a problem.

Implications for Anglo-German organisations

Global software outsourcing offers possibilities in working towards solutions to the IT skills shortage. India offers a mature software industry but there are still many infrastructure problems, such as telecommunications, relative to the UK or Germany. The largest Indian outsourcing companies are tending to aim for close long-term relationships, moving up the value chain with large companies. This means that small to medium-sized enterprises must either look elsewhere or take higher risk with the less well-known suppliers. Other countries such as Ireland and Israel offer possibilities with equally mature software industries and capabilities. Countries with significantly less mature software industries such as Philippines, Russia and, in the future, China offer possibilities in certain areas but significantly greater risk.

Dr. Rombach pointed out that offshore outsourcing is only suitable for certain types of work and for mature organisations with strong processes. Mastek also pointed out that models based on practice have emerged showing that not all types of work can be safely undertaken offshore. With regard to relationships, the range of difficulties in setting up and managing the process means that for all but the largest organisations with mature

processes the subsidiary model is fraught with difficulties and the subcontracting model should be used.

Global software outsourcing should be taken as one solution among a number of strategic options including in-country outsourcing, ASPs, internal and external education and training, as well as attempting to attract staff through such schemes as the green card.

Implications for Anglo-German policy-makers

Clearly policy-makers should take global software outsourcing seriously as a strategy companies may need to adopt to overcome the IT skills shortage. Solving the problem requires a systems approach, not a reductionist one. The UK and German task forces consider education to be a key attribute of the problem. However, a more sound proposition would be the idea of a partnership between business, education, representatives of software outsourcing nations (such as India's NASSCOM), trade unions, job centres and employers' associations.

The provision of government agencies to assist and guide Anglo-German companies based both in the United Kingdom and Germany and with connections in vendor locations is essential. The US example is instructive: for instance, the US consulate in Russia offers US companies assistance in setting up arrangements with Russian software companies.

Outcomes and future plans

Several workshop participants presented their work following the formal presentations. The workshop has led directly to a number of applications for funding to the Anglo-German Foundation. The organisers are considering a related proposal for funding to extend the case study work to survey based and then case study based analysis of trends and issues in Anglo-German firms.

Bibliography

Apte, U. (1990) 'Global outsourcing of information systems and processing services', *The Information Society*, 7, 287–303.

Apte, U. and Mason, R. (1995) 'Global disaggregation of information intensive services', *Management Science* 41, 7, 1250–1262.

Arora, A., Arunachalam, V.S., Asundi, J.M. and Fernandes, R.J. (2000) *The Globalisation of Software: The Case of the Indian Software Industry*. Available at <http://www.heinz.cmu.edu/project/india/index.html>.

Barrett, M., Hinings, C.R., Krishna, S. and Sahay, S. (1997) 'The process of building GSO relationships: The experience of a multinational vendor with Indian contractors', in J.I. DeGross and K. Kumar (eds), *Proceedings of the 18th International Conference on Information Systems*, Atlanta, GA, 14–17 December.

Barrett, M., Sahay, S. and Drummond, A. (1996) 'Exploring the impact of cross cultural differences in international software development teams: Indian expatriates in Jamaica', in J. Dias Coelho et al. (eds), *Proceedings of the 4th European Conference in Information Systems*, Lisbon, 2–4 July.

Carmel, E. (1999) *Global Software Teams*. Upper Saddle River, NJ: Prentice Hall.

Carmel, E. and Agarwal, R. (2000) 'Offshore sourcing of information technology work by America's largest firms'. Available at <http://www.american.edu/ksb/mogit/carmel/offshore.pdf>.

Carmel, E. and Agarwal, R. (2001) 'Tactical approaches for alleviating distance in global software development' *IEEE Software*, 18, 2, 22–29.

Gupta, U. and Raval, V. (1999) 'Critical success factors for anchoring offshore projects', *Information Strategy*, 15, 2, 21–27.

Heeks, R. (1996) 'Global software outsourcing to India by multinational corporations', , in P. Palvia, S. Palvia and E Roche (eds), *Global Information Technology and Systems Management: Key Issues and Trends*. Nashua, NH: Ivy League Publishing.

Heeks, R. (1996) *India's Software Industry*. New Delhi: Sage.

Heeks, R., Krishna, S., Nicholson, B. and Sahay, S. (2001) 'Synching or sinking: Global software outsourcing relationships', *IEEE Software*, 18, 2, 54–60.

Kern, T. and Silva, L. (1998) 'Mapping the areas of potential conflict in the management of information technology outsourcing', in W.R.J. Baets (ed.), *Proceedings of the 6th European Conference On Information Systems*, Granada, Spain.

Kobitzsch, W., Rombach, H.D. and Feldmann, R.L. (2001) 'Outsourcing in India', *IEEE Software*, 18, 2, 78–86.

Kumar, K. and Willcocks, L. (1999) 'Holiday Inn's Passage to India' in E. Carmel, *Global Software Teams*. Upper Saddle River, NJ: Prentice Hall.

Lacity, M. and Hirschheim, R. (1993) *Information Systems Outsourcing: Myths, Metaphors and Realities*. Chichester: Wiley.

Lacity, M. and Willcocks, L. (2001) *Global Information Technology Outsourcing*. Chichester: Wiley.

McFarlan, F. (1996) 'Issues in global outsourcing', in P. Palvia, S. Palvia and E Roche (eds), *Global Information Technology and Systems Management: Key Issues and Trends*. Nashua, NH: Ivy League Publishing.

Meadows, C. (1995) 'Globalizing software development', *Journal of Global Information Management*, 4, 1, 5–13.

Minoli, D. (1995) *Analyzing Outsourcing: Reengineering Information and Communication Systems*. Maidenhead: McGraw Hill.

National Association of Software and Service Companies (2000) *Software Industry in India*. New Delhi: NASSCOM.

Nicholson, B., Sahay, S. and Krishna, S. (2000) 'Work practices and local improvisations within global software teams: A case study of a UK subsidiary in India'. Paper presented at the IFIP 9.4 Conference on Socioeconomic Impacts of Computers in Developing Countries, Cape Town, 24–26 May.

Rajkumar, T. and Mani, R. (2001) 'Offshore software development: The view from Indian suppliers', *Information Systems Management*, Spring, 63–72.

Ravichandran, R. and Ahmed, N. (1993) 'Offshore Systems Development', *Information and Management*, 24, 33–40.

Rhodes, C. (2000) 'Germany faces storm over tech staffing', *Wall Street Journal*, 7 March.

Sahay, S. and Krishna, K. (2001) 'Understanding the process of development of a GSO relationship: A dialectical perspective'. Working paper, University of Oslo. Available from Sundeep Sahay at sundeeps@ifi.uio.no.

Smith, M., Mitra, S. and Narasimhan, S. (1996) 'Offshore outsourcing of software development and maintenance: A framework for issues', *Information and Management*, 31, 165–175.

Taylor, P. (1999) 'India: Information Technology', *Financial Times*, 1 December.

Terdiman, R. (1999) 'Offshore programming: What cultural differences exist?' Gartner Consulting Group Report. Available at <http://www.gartner.com>.

Vitalari, N. and Wetherbe, J. (1996) 'Emerging best practices in global systems development', in P. Palvia, S. Palvia and E Roche (eds), *Global Information Technology and Systems Management: Key Issues and Trends*. Nashua, NH: Ivy League Publishing.

Appendix A: Workshop programme



Ulrich Jürgens

Brian Nicholson

International Workshop on 'Global Software Outsourcing: The Solution to the IT Skills Gap?'

to be held at the

Wissenschaftszentrum Berlin für Sozialforschung

Reichpietschufer 50, 10785 Berlin,

Room A 300

March 30–31, 2001

Supported by Anglo-German Foundation

Programme

Friday, 30 March

11.45–12.45 Registration

12.45–1.00 Introduction

Programme committee

Understanding the IT Skills Gap

1.00–1.30 Setting the scene on the IT skills gap

Raphael L'Hoest, Bundeskanzleramt

1.30–2.30 The end user experience of GSO: lessons from North America and Japan

S. Krishna and Sundeep Sahay

2.30–3.30 An American view: offshore sourcing by America's largest firms

Erran Carmel, Kogod School of Business, American University, Washington DC, USA

3.30–3.50 Coffee break

3.50–4.10 Mascot Systems (Indian software outsourcing company)

S. Sivasubramanian, Founder and chief technology officer

4.10–4.30 Mastek (software outsourcing company based in UK, India and Germany)

Ashank Desai, chairman

4.30–4.50 PSI (products and systems of information technology) company experienced with IT skills shortage and software outsourcing

Alizadeh-Saghati, Germany

4.50–5.20 Discussion (*facilitator S. Krishna*) & Break

5.20–6.20 Application outsourcing: the answer to the global IT skill shortage

Wendy Currie, Brunel University, UK

6.30 onwards Dinner

Saturday, 31 March

Practical Strategies in Global Software Outsourcing

- 9.00–9.10 Introduction to day 2
Programme committee
- 9.10–10.10 German software development scene: Labour shortage and outsourcing trends
Dieter Rombach, Fraunhofer Institute Sauerwiesen, Germany
- 10.10–11.10 Qualification demand and the development of training and retraining systems
Klaus Schömann, WZB
- 11.10–11.30 Refreshments
- 11.30–12.30 Issues facing a UK company setting up a software development subsidiary in India
Brian Nicholson, University of Manchester, UK
- 12.30–1.45 Buffet lunch
- 1.45–2.25 A case of global collaboration in a telecommunications company
Leo Renneke, WZB

Appendix B

List of IT skills workshop participants

Pamela Abbott	Judge Institute Management Studies
Mr. Allesch	Berlin-brandenburgischer Softwareverband (SIBB)
Albert Annoh	Seefax Computer Institute, Ghana
Timm Beyer	Skilldeal AG
Prof. Erran Carmel	Kogod School of Business, American University, Washington DC, USA
Dr. Paul Charlton	ABS Team
Ray Cunningham	Anglo-German Foundation
Wendy Currie	Brunel University
Jan de Meer	
Mr. Ashank Desai	Mastek Limited
Dr. Christoph Dörrenbächer	WZB
Amanfo Dwumah	National Service Personnel, Ghana
Susanne Espenlaub	University of Manchester
Andreas Hüner	WZB
Karin Hirschfeld	FAST e.V.
Thomas Heitmann	WZB
Karl-Heinz Jauch	Mastek GmbH
Prof. Dr. Ulrich Jürgens	WZB
Prof. S. Krishna	Indian Institute of Management, Bangalore
Deepak Kumar Kandwal	Siemens Public Communication Networks Ltd.
Seamus Kelly	National University of Dublin
Georg König	ABS Team
Dr. Raphael L'Hoest	Bundeskanzleramt
Dr. Inge Lippert	VDI/VDE-Technologiezentrum Informationstechnik GmbH
Lars Lorenzen	Skilldeal AG
Dr. Dr. Talat Mahmood	WZB
Geiza Marques-d'Oliveira	Lisbon New University
Dr. Brian Nicholson	University of Manchester
Suraj Prakash	
Dr. Brigitte Preissl	Deutsches Institut für Wirtschaftsforschung (DIW)
Peter Rack	CSL Global Solutions GmbH
Leo Renneke	WZB
Susanne Rode	Wissenschaftliches Zentrum für Berufs- und Hochschulforschung, Universität Gesamthochschule Kassel
Raul Rojas	Freie Universität Berlin
Prof. Dieter Rombach	Fraunhofer-Gesellschaft
Joachim Rupp	WZB
Dr. Thomas Sablowski	WZB
Mr. Sundeep Sahay	University of Oslo
Prof. Dr. Alfons Schmid	Universität Frankfurt am Main

GLOBAL SOFTWARE OUTSOURCING

Dr Klaus Schömann	WZB
Wilfred Seidler MBE	British Consulate General
Rolf Schmidt	Projekt Telekommunikation, Informationstechnologie und Neue Medien (T.I.M.) der Gewerkschaft ver.di
Dan Sorensen	University of Oslo
Mr Shekar Sivasubramanian	Chief technology officer, Mascot Systems
Prof. Arndt Sorge	University of Groningen, Faculty of Management and Organisation
Christina Teipen	WZB
Paul Tjia	GPI Consultancy
Katrin Vitols	University of Duisburg
Prof. Dr. Karin Wagner	FHTW
Ulrike Wahl	PSI
Ministerialrat Herr Weismann	BMWi
Prof. Johann Welsch	FH Wiesbaden
Dr. Rainer Winkelmann	Forschungsinstitut zur Zukunft der Arbeit (IZA)
PD Dr.-Ing. Helmut Winkler	Wissenschaftliches Zentrum für Berufs- und Hochschulforschung, Universität Gesamthochschule Kassel
Michael Wortmann	FAST e.V.

Speaker biographies

Erran Carmel studies software teams, globally dispersed software teams, and offshore sourcing of IT work. His 1999 book *Global Software Teams* was the first on this topic. He consults and speaks to industry and professional groups. He is a tenured associate professor at the Kogod School of Business, at American University in Washington, DC, where he was co-founder and shares leadership of the programme in Management of Global Information Technology (MoGIT).

Wendy Currie's research interests are strategic information systems, IT outsourcing, electronic commerce and high-tech start-ups. Professor Currie is also director of the Centre for Strategic Information Systems at the Department of Information Systems and Computing, Brunel University. The Centre currently manages over £1 million in research grants from the European Union and EPSRC. Prof Currie is also associate faculty at Henley Management College and Templeton College, Oxford.

Ashank Desai is the founder of Mastek, an Indian software outsourcing company. He has been one of the key members responsible for putting Mastek among the top 20 software export houses in India. He has also been responsible for developing Mastek's export markets in Europe and the Asia-Pacific region. Currently, apart from creating the vision and strategic direction for Mastek, he oversees the global marketing, quality and public relations functions. Ashank is among the founder members of NASSCOM and has served as its president. He has also served as the vice-president of the Asian-Oceanian Computing Industry Organisation. He is the only Indian from the Asia-Pacific region to be presented with the Honourable Contributor's Award, which he received in 1994 for outstanding contributions made to ASOCIO's growth in the past 10 years. He is a rank holder in BE and MTech (IIT) as well as in MBA (IIM). Ashank serves on several professional forums, such as the Western Regional Council of the Indo American Chamber of Commerce, Employee Stock Option Plan committee of the Securities and Exchange Board of India, and the Executive Council of NASSCOM.

Ulrich Jürgens is director of the centre for regulation of work at WZB. His research is concerned with industrial policies, work-related policies, production and work organisation, corporate governance, systems of innovation, all this in an internationally and sectorally comparative perspective. He is a member of the German Association of Political Science (DVPW), and was leader of its 'Politik und Ökonomie' section from 1988 until 1992. He is a board member of the Euro-Asia Management Studies Association (EAMSA). Since 1992 he has been a member of the Groupe d'Etude et de Recherche Permanent sur l'Industrie et les Salariés de l'Automobile, Réseau International (GERPISA) and a member of the Steering Committee of that association. He is an associated member of the International Motor Vehicle Program at the Massachusetts Institute of Technology.

Raphael L'Hoest is from the German Federal Chancellery (Bundeskanzleramt). He has written widely on the subject of economics and work and overcoming the IT skills gap.

S. Krishna is a professor at the Indian Institute of Management, Bangalore. His research interests concern global software work arrangements. He holds a PhD in software

engineering and chairs IIM's software enterprise management programme, focusing on research and management education in partnership with local software industry.

Brian Nicholson is a lecturer in information systems at the University of Manchester. His research interests focus on the complexities of software development and software outsourcing between UK and Indian companies.

Leo Renneke is a doctoral student at WZB. He studied economics at the Free University of Berlin; he has held internships in European and Canadian companies, and since 1995 has been a member of the 'Globalisation and Alliance Building in the Telecommunications Equipment Industry' research project team at the Science Centre Berlin. His research interests are in international alliances and joint ventures, integration processes in inter-organisational relationships, international know-how and technology transfer.

Dieter Rombach is a professor in the Department of Computer Science at the University of Kaiserslautern. He is also executive director of the Fraunhofer Institute for Experimental Software Engineering. His research interests include software methodologies, modelling and measurement of software processes and resulting products, software reuse, quality management and technology transfer. He is associate editor of *Empirical Software Engineering*, an editor of *Computer* and a member of the German Computer Society.

Sundeep Sahay is an associate professor in the Department of Informatics, University of Oslo. His research interests concern globalisation, IT and work arrangements. Over the past four years he has been involved in an extensive research programme analysing processes of global software development using distributed teams.

Klaus Schömann (WZB) is a researcher and project manager working within the Centre for Social Research in the department of labour policy and occupation. The topics 'work' and 'learning' are at the core of his research work at the WZB as well as during earlier occupation phases. His interest is in the scientific evaluation and the improvement of the combination of work and learning with their economic, sociological and political institutions and processes.

Rolf Schmidt is a trade union negotiator for five German Ver.Di unions. He is involved in the Ver.Di working project on telecommunications, information technology and new media (TIM).

Shekar Sivasubramanian is chief operating officer of Mascot, an Indian offshore outsourcing company. During his 11-year tenure, Shekar has been credited with several significant achievements. He was instrumental in setting up the offshore line of services for Mastech (subsequently renamed as iGATE Capital Corp). After initiating the offshore-centric sales model, he moved to India in April 1997 to head Mascot. Prior to Mastech, Shekar worked at TCS where he helped cultivate key offshore-centric relationships. He has an aggregate experience of 17 years in the software industry.

Johann Welsch is a professor of economic science at the professional school in Wiesbaden. His interests are in the future of work, teleworking, environment, technology and work, innovation, politics and work, macro-economic policy, economics, work and education, production locations, regional development and work industries, and the future of the trade unions.

