Global Software and IT
A Guide to Distributed Development, Projects, and Outsourcing

Christof Ebert

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Foreword

Ongoing economic challenges are affecting and impacting business and society in nearly every industry and geographical region. Taking decisive action to reprioritize the way we are doing business is a key focus for companies. Around the world, companies are taking the necessary measures that will enable us to adjust to today's reality and to future challenges. In adjusting and refocusing we need to stay on course to ensure that short-term challenges won't distract us from planning for longer-term opportunities to achieve sustainable growth. Information technology is part of the solution if handled in a truly global scale.

   With decades of experience in making companies globally successful, I believe that we are faced with a unique opportunity to nurture global economic prosperity. Global software engineering, IT outsourcing, and rightshoring are all pieces toward readjusting the software and IT business. The prestigious journal *Harvard Business Manager* recently stated that outsourcing with global IT services and software development ranks as one of the top business ideas of the past 100 years. This certainly makes sense, because software and IT industries are today truly global. Be it offshoring or outsourcing, component or service integration, managing global software engineering has rapidly become a key competence for successful engineers and managers. The diversity of suppliers, cultures, and products requires dedicated techniques, tools, and practices to overcome challenges.

   This book, *Global Software and IT,* written by my colleague and friend Christof Ebert, summarizes experiences and provides guidance, processes, and approaches for successfully handling global software development and outsourcing. It offers tons of practical hints and concrete

explanations of "how to do it better." Readers will get an opportunity to explore the current state of practice in this area as well as new thoughts and trends that will shape the future.

Global Software and IT provides a framework for mastering global software and IT, and also summarizes experiences from companies around the globe. The book is very readable and provides a wealth of knowledge for both practitioners and researchers. With its many practical insights, this book will be a useful desktop reference for industry practitioners and managers within the software engineering and IT communities.

Global IT and software development, service, and provisioning imply a great organizational and industrial shift in structure. Let's rise to the challenge and, in doing so, raise the quality of life and our economic prosperity for generations to come. Now is the time to grow and improve global software and IT and thus empower all of the world's citizens to participate in the human network.

MICHAEL CORBETT

New York

July 2011

About the Author

Christof Ebert is managing director at Vector Consulting Services. A trusted advisor for companies around the world, he supports clients to improve product development and product strategy and to manage organizational changes. Dr. Ebert sits on a number of advisory and industry bodies. Over the years he has set up several offshoring sites, performed due diligence assessments, and supported numerous companies in improving their global software engineering and IT outsourcing programs. He serves on the executive board of the IEEE International Conference on Global Software Engineering (www.ICGSE.org) series and teaches at the University of Stuttgart.

He can be contacted at christof.ebert@vector.com.

Introduction

Things do not change; we change.

Software and IT have gone global at a fast pace. Be it IT outsourcing, global software engineering, or business process outsourcing, growth rates are more than 20% per year [IAOP09, USA07]. While the cost advantage and skill pool of global development and outsourcing may appear to be advantageous, they bear a set of risks that come on top of the regular project risks. Not knowing these risks and not mitigating against them means that your project may soon belong to the growing share of failed global endeavors.

Global Software and IT provides guidance and examples of experiences, as well as processes and approache,s to successfully handle global software development and outsourcing. It offers many practical hints and concrete explanations of "how to do it better."

Global Software and IT addresses practitioners, namely:

- Developers and engineers workingin global development projects to make their collaborations more effective, through
    - captive sourcing within a company
    - provision of outsourcing services to clients, or
    - engaging in open source development.
- Software and IT managers on all levels from the individual working in a distributed team to the senior manager who decides where to open a new site and what it means to be successful.
- Project managers and project teams who want to succeed with distributed activities.
- Product managers and R&D managers taking advantage of globalization.

- Procurement teams interested in making sourcing of development partners more effective.
- Suppliers trying to understand the practices and needs that drive their clients.

Global Software and IT provides a framework for global development, covering topics such as management of people in distributed sites, management of projects across multiple locations, mitigation of the risks of offshoring, processes for global development, practical outsourcing guidelines, and use of collaboration and communication to achieve goals. It summarizes experiences from companies of different sizes and organizational layouts as well as information about industries around the globe. This book shares the best practices from various professional projects, including ones that involve locations in different continents and a variety of cultures.Perhaps most relevant, the book explains the means and strategies needed to survive in a globally dispersed work environment.

This book helps each reader to improve his global software activities by providing examples of:

- Hands-on experiences, including opportunities, lessons learned, and risks
- Management education and training in companies
- Self-learning for students in business and software
- Hands-on practical insights for industry practitioners and managers, and
- A course layout for university or professional training.

When writing the book we decided for readability purposes to only use the male form of pronouns. We are well aware that software and especially global projects is one of the few engineering fields where we find today almost the same number of women as men. We thank you for your understanding.

Global Software and IT provides practitioners with practical guidance as well as examples of experiences from

companies and projects from across the globe and different application domains. Hands-on examples are shown in shaded boxes. Practical guidelines and take-away tips are also prominently displayed. Some topics, such as cultural differences, play a role in all global projects, while others depend on the size and organizational styles of individual companies and projects. We provide an explanation for why something is done in a certain way as well as which risk is addressed by which method. We recommend "translating" these concepts to your own environment, rather than taking a specific solution as the one and only possible.

I want to thank IEEE and John Wiley & Sons for supporting this book and asking me to write this second edition. A book about such a quickly evolving topic would be impossible to write without the continuous feedback of my colleagues and clients. Special thanks go to Alberto Avritzer, Suttamally Bala, Werner Burger, Daniela Damian, Filippo Lanubile, Audris Mockus, Daniel Paulish, S. Sadagopan, Bikram Sengupta, Andree Zahir, and everyone else who has for provided insight from their own in global software and IT experiences. Additionally, Filippo Lanubile, Rafael Prikladnicki, and Aurora Vizcaino deserve thanks for contributing to tools topics. Finally, I would like to thank Dave Gustafson and Dan Paulish for being good and long-time companions while going global.

The IEEE conference series ICGSE (International Conference on Global Software Engineering) has helped to build a strong research and industry community of smart people who drive knowledge and competence evolution in this quickly growing field. I am honored to serve on its executive committee and look forward to the evolution of this discipline.

Global software and IT is not for free. Often people argue that we are going global because of cheaper labor rates. But software and IT business based solely on cost is almost

certainly doomed to fail. Successful global software businesses, on the other hand, are driven by global innovation, talent, and markets. Salaries adjust over time; innovation keeps moving.

Global software and IT necessitates a shift in culture. This cultural adjustment is often underestimated, but in order to be successful we need to change. We need to reinvent business models and working paradigms, we need to learn new formats of collaboration and communication. This book will show what it means and how to succeed.

There are two challenges with going global: to get started and to keep going. With the many rewards from your business combined with guidance from this book, you will translate risks to chances and opportunities, which is what they should be. I wish you, the reader of this book, the best of success in this endeavor!

CHRISTOF EBERT

Berlin

August 2011

Part I: Strategy
Chapter 1

Different Business Models

Summary: Globalized software development and various formats of information technology outsourcing (ITO) are as natural for the software and IT business as project management or requirement engineering. Going global with software and IT is a great way to distribute work effectively as well as appropriately assign tasks to employees who are most qualified for the task at hand. To attain the greatest success in the fields of software and IT we must take advantage of opportunities for continuous collaboration around the globe. This chapter looks at different business models in software and IT.

The annual volume of global IT outsourcing and software development in 2010 was approximately $100 billion. Considering the field's growth rate of 5 to 10 percent per year, the industry is clearly rife with portential [BCG09, McKinsey08]. When one examines the facts about the software business, it becomes readily evident that it has become a truly global venture. Examples are manifold:

- Offshoring is growing at double-digit rates across Europe and the United States throughout many different industries and all major business functions.
- Offshoring is no longer just about cost reduction, low-end manufacturing, IT, and back office work; it has become a major driver for entire business processes.

- 50% annual growth in the offshoring of core innovation activities (i.e., R&D, product design, engineering).

As early as 1962, EDS began offering IT on spare capacity, also known as time-shared computing as an external service (today this is called application service provisioning). In 1976 EDS started deploying global IT services, such as financial accounting. Entrepreneurs in India realized early on that this form of business could help the country leapfrog into current technologies, therefore becoming a major business partner to the Western world. Indian institutes of technology were formed in the 1960s. They featured strong computer science curricula which laid the foundtions for India's current success in the IT domain. The first e-mail sent from China to a foreign country was on September 20, 1987 to the University of Karlsruhe. The text was short, yet powerful: "Across the Great Wall we can reach every corner in the world." It was the vision of an increasingly connected world in which all citizens and enterprises would have the ability to do business with one another. The world was getting smaller. The notion of "across the wall" is about bridging gaps. It demonstrates that being connected does not necessarily mean sharing the same values with one another, nor does it make countries and continents borderless and integrated.

Today, practically all new business plans contain offshoring as a key element for containing cost and creating flexibility in order to cope with changing demands on skills and numbers of engineers. Different business models are applied in the global context.

First, there is a distinction made between outsourcing and offshoring:

- **Offshoring**—is a business activity beyond sales and marketing which takes place outside the home country of an enterprise. Enterprises typically either have local branches in low-cost countries or they ask specialized

companies abroad to perform a service for them.— Offshoring performed within the company is called captive offshoring.

- **Outsourcing—**is a business's lasting and result-oriented relationship with a supplier who executes business activities for an enterprise which were traditionally executed inside the enterprise. Outsourcing is site-independent. The supplier can reside in direct neighborhood of the enterprise or offshore.

Offshoring and outsourcing are two dimensions in the scope of globalized software development and IT. They do not depend on each other and can be implemented individually.

For sourcing, a distinction is made based on the type of service being sourced from an external supplier:

- **Business Process Outsourcing (BPO)—**where a business process (or business function) is contracted to a third-party service provider.
- **Information Technology Outsourcing (ITO)—**where software and It related services are outsourced to a third-party service provider. ITO is a form of Business Process Outsourcing (BPO) for software and information technology activities.
- **Application service provisioning (ASP)—**where computer-based services are sourced from a third-party service provider. ASP is a form of Information Technology Outsourcing (ITO) for operationally provisioning software and IT functionality.
- **Software sourcing—**where software components are sourced from an external supplier. Sourcing is a business process that summarizes all procurement practices. It includes finding, evaluating, contractually engaging, and managing suppliers of goods and services.

- **Open source—**where, considering restrictions such as IPR, software is sourced from a supplier (often unknown) and a community of developers in different parts of the world. Global software and IT do not depend on having legal entities as suppliers. The open source movement has shown that big global software projects can also be conducted by enthusiastic individuals.

The time and relationship perspective of the outsourcing demands a third distinction:

- **Tactical Outsourcing—**is a form of outsourcing with short-term ("just in time") focus. Suppliers are selected on a case-by-case basis for activities within projects. Those suppliers who are best suitable for the concrete task at hand are selected . Tactical outsourcing, which is similar to subcontract management, is used to improve operational efficiency.
- **Strategic outsourcing—** is a form of outsourcing with long-term and sustainable focus. A business process is moved to an external supplier in order to focus resources on the core business. Within engineering projects this can be a process (e.g., maintenance, test) or a system (e.g., legacy product). Strategic outsourcing changes the entire value chain.

Outsourcing and offshoring allow more flexibility in managing operational expenses because resources are allocated to places and regions that are most suited to flexible needs and ever-changing business models. Figure 1.1 summarizes the reasons for outsourcing and offshoring [Ebert07a, BCG09, IAOP09, IDC07, Hussey08, Rivard08][1].

Figure 1.1 Reasons for outsourcing and offshoring.
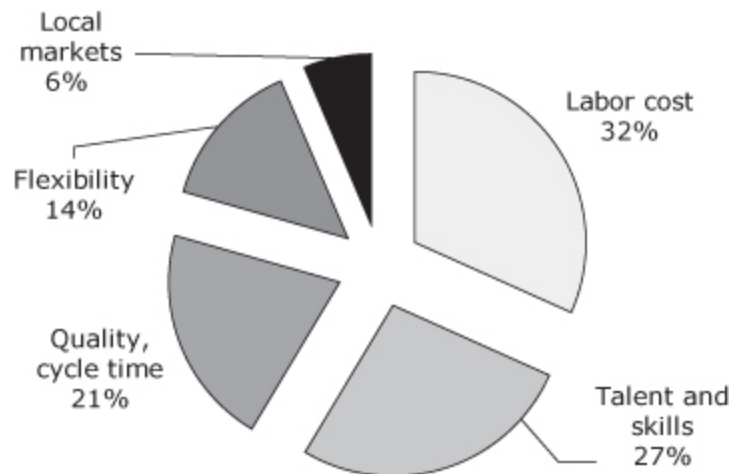
Figure 1.2 shows the penetration of enterprises with different types of global development and IT activities [IAOP09, Aspray06]. The horizontal axis provides the share of offshoring (as a proxy for the degree of global software engineering and IT in an enterprise for an activity) and the vertical axis provides a view on the penetration of enterprises for a specific activity. For instance, maintenance projects already penetrate more than half of all software activities worldwide (position on vertical axis) and it is typically done in an offshore environment rather than a single place in a highly paid country (right position on horizontal axis). Some activities, such as new applications and OEM product development, are clearly not yet where they could be.

Figure 1.2 Impacts of IT and software offshoring.
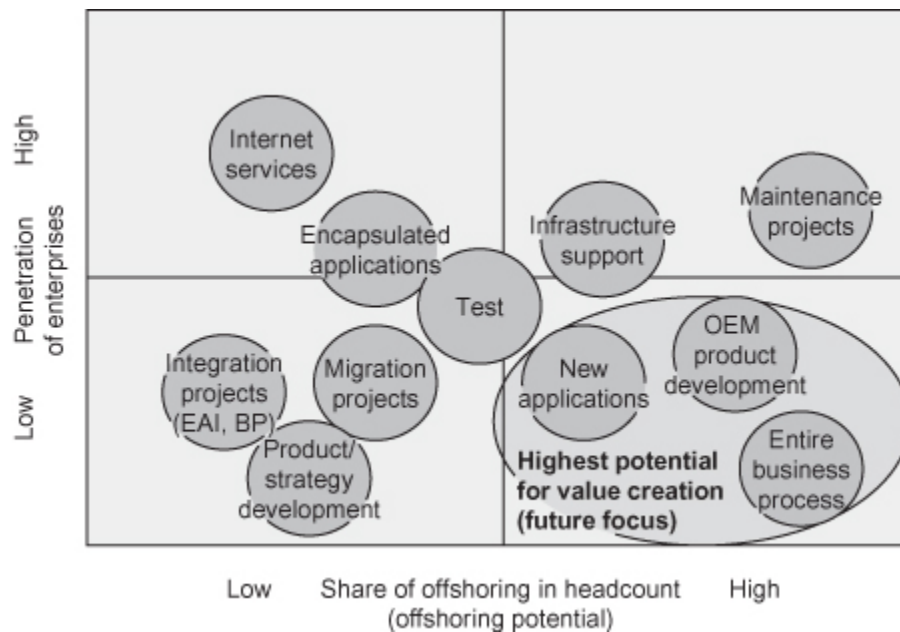
The share of offshoring or globalization depends on the underlying IT needs and on what software is being developed. While for mere IT applications or internet services global development is fairly easy, embedded software still presents major challenges to distributed development. A 2010 study by embedded.com found that only 30% of all embedded software is developed in a global or distributed context, while the vast majority is collocated. Similarly, the amount of quality deficiencies and call-backs across industries has increased in parallel to growing global development and sourcing.

> Business risks increase with global software, IT development, and sourcing. Not all software engineering tasks and projects benefit from outsourcing and offshoring.

The journey has begun, but it is far from being clear what the end result will be. Some countries will come to saturation because global development essentially means that all countries and sites have their fair chance to become players and to compete based on skills, labor cost, innovativeness, and quality. Software engineering is based

upon a friction-free economy in which any labor is moved to the site (or engineering team) that is best suitable amongst a set of constraints. No customer is in a position to judge whether a piece of software from one specific site is better or worse when compared to the same software being produced somewhere else in the world. In essence, the old economy labels of "made in country x" has become a type of thinking that does not relate to software industries. What counts are business impacts and performance such as resource availability, productivity, innovativeness, quality of work performed, cost, flexibility, skills, and the like.

BUSINESS PROCESS OUTSOURCING

Business Process Outsourcing (BPO) is the form of outsourcing where a business process (or business function) is contracted to a third-party service provider. BPO involves outsourcing of operations and responsibilities of that process or function. For example, one could use BPO for business processes such as supply chain, maintenance, welcome desk, financial services, or human resources. Historically, Coca Cola was the first company to use BPO for outsourcing parts of their supply chain. In the software industry, EDS was the first supplier for outsourced services.

  Today, business process outsourcing is a key element in most R&D and IT-driven industries. The reasons for this are manifold, and saturation has not yet been reached. In fact, outsourcing arrives at different speed in different industries. Figure 1.3 shows the offshore outsourcing penetration of different business processes across industries ranging from automotive and manufacturing, to finance, consumer, ICT, and health [Duke07].

The penetration of business process outsourcing (BPO).

Offshoring penetration [%]
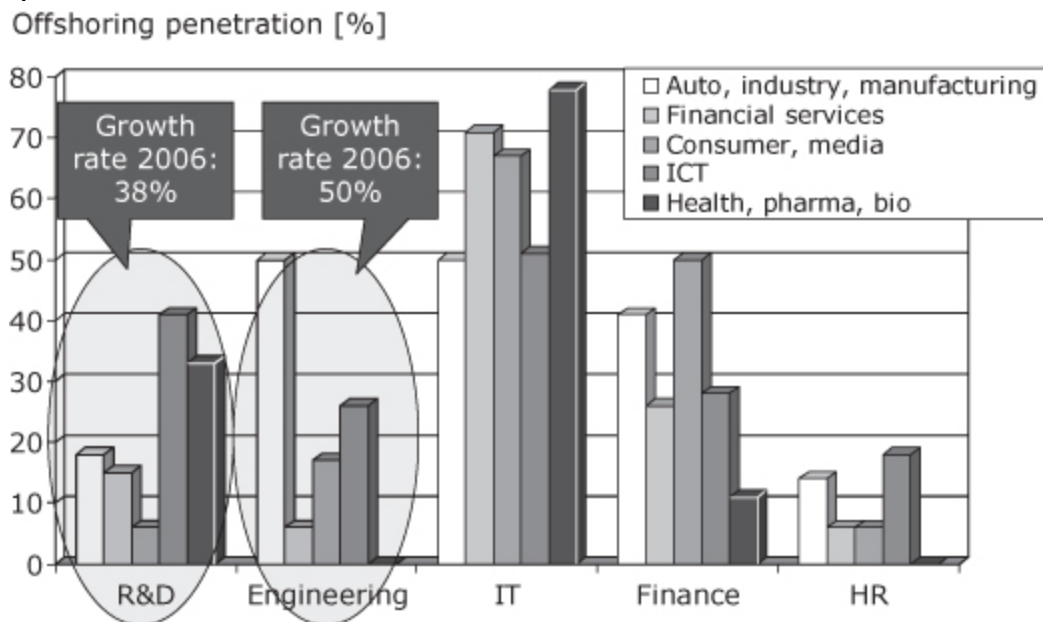
IT functions have the highest degree of outsourcing capacity across the five sectors, however, the core of these sectors, namely R&D and engineering functions, are at the steepest growth rate. No longer are support functions and services outsourced as we were once used to. Today's emphasis is on globally utilizing research and engineering to develop products. Global software engineering and IT are at the crossing point of both the IT sector and the engineering function which naturally builds the spearhead of this radical business change. IT outsourcing has reached 50% and more of all expenses for IT services occur across industries. But R&D and engineering is not yet saturated. They will continue to grow at rates way above 20% per year. This means that global software development as well as IT service outsourcing will further grow during this decade.

INFORMATION TECHNOLOGY OUTSOURCING

Information Technology Outsourcing (ITO) is the form of outsourcing in which software and IT related services are outsourced to a third-party service provider. ITO is a form of Business Process Outsourcing (BPO) for software and information technology activities. Historically, EDS was the first ITO supplier. Examples of ITO are outsourcing of software maintenance or IT provisioning services.

ITO is either driven by the need to reduce capital costs or by business process outsourcing. There is hardly any strategic component in ITO despite the fact that many companies claim otherwise. Essentially, companies that are in need of capital in the short term sell their IT assets and resources while immediately sourcing it back to maintain services. As shown in recent years by the cases of Xerox, J.P. Morgan, Swiss Bank, and Delta Airlines, when a company claims strategic reasoning in the sale of IT assets, in reality, the ITO has actually failed to deliver the expected long-term benefits. [Lacity09]. Realizing any strategic goals with ITO is difficult and demands a high degree of managerial attention.

GLOBAL SOFTWARE ENGINEERING

Global software engineering (GSE) is software development and maintenance in globally distributed sites. Different business models and work breakdown schemes, such as outsourcing, offshoring, and rightshoring, are used. Thus, GSE is not correlated with outsourcing and can coexist, for instance, by means of captive development centers within the boundaries of an enterprise or distributed project teams.

NETSOURCING AND APPLICATION SERVICE PROVISIONING

Netsourcing or Application service provisioning (ASP) is the form of sourcing in which computer-based services are outsourced to a third-party service provider. The application service provider (also ASP) provides these services to customers over a network. Therefore, increasingly, the term "Netsourcing" is used for this business model. ASP is a form of Information Technology Outsourcing (ITO) for operationally provisioning software and IT functionality. Software offered using an ASP model is called on-demand software or software as a service (SaaS). Examples of this are customer relationship management and sales (e.g., salesforce.com), as well as, increasingly, desktop applications. ASP is limited and is also a risk (to performance, security, and availability) because access to a particular application program takes place through a standard protocol such as HTTP. The market is divided as follows: Functional ASP delivers a single application, such as timesheet services; a vertical ASP delivers a solution for a specific customer type, such as a chimney sweepers; and an enterprise ASP delivers broad solutions, such as finance solutions.

SOFTWARE SOURCING

Software sourcing is the form of sourcing in which software components are sourced by an external supplier. Sourcing is a business process that summarizes all procurement practices. It includes finding, evaluating, contractually engaging, and managing suppliers of goods and services. Sourcing includes different types of goods and components

and, therefore, license models. This starts with commercial off the shelf (COTS), includes a variety of tailored components and solutions, and ends with the different community, open source distribution, and access models. Software component sourcing is also a type of distributed development. Today, distributed development is mostly a global business and, as a result, is part of global software development.

OPEN SOURCE SOFTWARE

One key driver in new value networks is free and open source software. Worldwide companies of various industries are investing in open source. They effectively use it as a viable ecosystem for access to skills, as well as for creating new markets. Today, a variety of global business models around open source are exploited The risks are known, but mitigating solutions exist. Specific communities have been created with suppliers and their customers using open source processes and mechanisms to provide faster access to hardware drivers, software updates, or specific features. New value networks are enhancing traditional approaches. Suppliers are teaming up to share their software basis and to offer tailored services to single user segments. Independent software vendors (ISV) distribute popular solutions and components, or integrate them, thus helping to accelerate integration efforts.

Note

[1] There are many such studies elaborating on reasons for global development. Exact percentages are not relevant here. It is the rank order that is important. Further studies are mentioned in the ACM Job Migration report [Aspray06].