# Strategy Models for Enabling Offshore Outsourcing: Russian Short-Cycle-Time Software Development

**Jan Pries-Heje**
*The IT University of Copenhagen, Rued Langgaards Vej 7, DK-2300 Copenhagen S, Denmark. E-mail: jph@itu.dk*

**Richard Baskerville**
*Department of Computer Information Systems, Georgia State University, 35 Broad St. NW, Atlanta, GA 30302-4015, USA. E-mail: Baskerville@acm.org*

**Galina Ianshina Hansen**
*The IT University of Copenhagen, Rued Langgaards Vej 7, DK-2300 Copenhagen S, Denmark. E-mail: galina@itu.dk*

## ABSTRACT

Economic factors are driving software development projects onto globally dispersed models, as offshore outsourcing becomes more common. Software development companies in developing economies compete for lucrative, job-creating offshore contracts on the basis of industry maturity, labor skills, technology infrastructure, and government support. Diffusion of technology is a key aspect of each of these determinants of competitiveness. This paper analyzes the development of strategies for the diffusion of short-cycle-time software development into and within Russia. Short-cycle-time development is sometimes called agile development or Internet-speed development and uses a number of techniques to move software quickly into production. These techniques are spreading rapidly among software developers worldwide. The benefits of these techniques are well known and provide a credible explanation for why this rapid diffusion is occurring. This paper explains how these techniques are spreading in a borderless fashion. Using the Kline model of innovation diffusion and the Greiner model of evolution and growth of organizations, we analyze the enablers and barriers to diffusion of short-cycle-time software development techniques in Russia. This analysis reveals a complex interaction of political, economic, and technical elements enabling and inhibiting the development of knowledge that supports the innovation diffusion necessary for companies to compete for offshore contracts. 

**Keywords:** software engineering; information systems development; agile systems development; short-cycle-time systems development; diffusion of innovation; offshore outsourcing; global information systems; systems development strategy

## 1. INTRODUCTION

Outsourcing is the purchase of goods or services that were previously produced internally (Lacity & Hirschheim, 1993). It arises from the fundamental conversion of those goods

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and services into commodities through careful planning. Outsourcing requires a shift in the governance of a business function from a hierarchical mode to a market mode involving outside organizations (Loh & Venkatraman, 1992a; 1992b). Offshore outsourcing, also known as international or global outsourcing, takes place when organizations cross national borders to obtain these commodities.

While the outsourcing of functions related to information systems has been a common practice since the advent of business computing in the 1950s (Caminer, Aris, Hermon, & Land, 1998), the offshore outsourcing of information systems functions is a relatively recent phenomenon (O'Hara, 2004). The offshore outsourcing market is large and growing, estimated at $162 billion in 2002 and expected to grow to $236 billion by 2007 (O'Hara, 2004). This market is very attractive for the providers of offshore outsourcing worldwide. This business is big for offshore outsourcers as well. For example, U.S. offshore outsourcing is expected to grow from $16 billion in 2004 to $46 billion by 2007 (Ferranti, 2004).

Offshore outsourcing may take place when there exists a comparative advantage in obtaining equivalent information systems functions abroad. The provision of equivalent information systems functions is enabled by the presence of a highly skilled labor force of software developers; a mature, professional information systems industrial base; and the widespread availability of state-of-the-art computing machinery, networking, and software. For example, India's growing network capacity and CMM-certified contractors have led to near-parity between Indian and U.S. providers of many information systems functions. Comparative advantage is provided by economic factors such as the cost of labor and political factors like government support for the information systems industries and related educational programs (Overby, 2002). Thanks to salary differences (U.S. programmer salaries are at least six times those of India) and strong government support for technical education and technology infrastructure, India is known as "India, Inc." among outsourcing authorities (Vijayan, 2003), reflecting a national policy toward information industries similar to the French support for aviation industries and the Japanese support for auto industries.

Disparities and parities distinguish competing offshore outsourcing providers from each other. In a transaction cost comparison between China and India, Qu and Brocklehurst (2003) cite key disparities that moved India to the forefront of provider sites, including lower costs for IT education and lower costs associated with the relevant legal framework. In addition they discovered that India has stronger provider presence on-site with outsourcers, better marketing, and a more robust trust network between outsourcers and providers.

The importance of IT training and education in this comparison suggests that the international diffusion of information technology and information systems practices is a key component in the process of creating parity in the industrial base and skilled labor force of two different national business settings. Such diffusion entails the spread of innovative products and practices, "the process by which an innovation is communicated through certain channels over time among the members of a social system." (Rogers, 2003, p. 5). It also involves the spread of the act of innovation itself, as creative individuals innovate in their own settings as a response to the availability and experience of new products and practices (Baskerville, 2000).

In this paper, we investigate strategies promoting the diffusion of recent software development practices into business settings in Russia. With regard to these business settings, Russia ranks near India in its political stability and national technological infrastructure. Programmer salaries are also comparable. However, despite a very strong system of higher education, the technical skills of Russia's information systems labor force are weaker than those of India's (cf. Trombly, 2003; Vijayan, 2003). Russia's labor force could

improve its competitiveness by embracing short cycle-time development methodologies. The widespread adoption of Internet technologies for electronic commerce in the 1990s led to fierce information-based competition worldwide. In response, innovations in rapidly developing and adapting computer applications were dramatic. These new methods are variously known as short-cycle-time development (Baskerville & Pries-Heje, 2004), agile methodologies (Cockburn, 2001), and Internet-speed development (Baskerville, Levine, Pries-Heje, Ramesh, & Slaughter, 2002). By studying the diffusion of these methods into and within Russia, we gain insight into the barriers and enablers underlying the diffusion. We can then derive strategies for promoting this diffusion and improving the parity between Russia and other countries.

Short-cycle-time systems development focuses on short time-to-completion by using release-oriented parallel prototyping, software architecture, and a very high quality workforce to produce software products with negotiable quality. A study of U.S. companies working in this mode (Ramesh, Pries-Heje, & Baskerville, 2002) identified the following nine "Internet-speed" practices:

1) Parallel Development
2) Release Orientation
3) Tool Dependence
4) Customer Involvement
5) Prototyping
6) Fixed Architecture
7) Components
8) Maintenance Ignored
9) Tailored Methodology

These key practices include the use of parallel development processes to speed up development. A new breed of tools that automate much of the development has emerged. Customers are intensely involved in development and help guide the acquisition and prioritization of logical requirement groups (called "chunks"). Prototyping is heavily used in understanding requirements and in developing throwaway and iterative releases. The critical role of good architectural design is also well recognized. Time pressure forces developers to reuse components as much as possible. Development has to take place in chunks of functionality, and an extreme release orientation is used to accommodate the need for speed and fixed delivery schedules. Maintenance issues often are ignored in order to speed up development time. The development process and methodology are tailored to meet the need for quality and speed in the next product release. Moreover, the process is also constantly changing and evolving as the products, markets, and software development organizations mature.

These techniques are spreading rapidly among software developers worldwide and are often featured in popular new methodologies such as eXtreme Programming (Beck, 2000). The techniques are also visible in studies of both large and small organizations developing software for Internet applications (Baskerville, Levine, Pries-Heje, Ramesh, & Slaughter, 2001). The benefits of these techniques—at least the claimed benefits—are well known and provide a strong motive and credible explanation for why this rapid diffusion is occurring.

What is missing is an explanation of how these techniques are spreading in a borderless fashion. Internet-speed practices are relatively recent achievements in developed commercial economies. By examining these practices in Russia, we discover how these techniques

are diffusing into developing economies. In analyzing these phenomena, we use the Kline model of innovation diffusion. Analysis using this model permits us to discover key enablers of diffusion of high-speed software development techniques in Russia. We then use Greiner's model of organizational innovation to develop an analysis of barriers to this diffusion and to develop strategies regarding enablers and barriers. The Kline and Greiner models are introduced more fully in the analysis section.

## 2. RESEARCH METHOD

From the viewpoint of globalization, Russian software development is an arena of particular interest, for three key reasons. First, we appreciate the sheer geographical size (12 time zones) and importance of Russia in the world. Second, in contrast to the geographical size, the Russian Internet market is tiny compared with countries in Western Europe or in North America. According to *PulseOnline*, only 1–2% of Russia's 145 million people access the Internet regularly (2001). A third reason is the widely circulated prediction that this small percentage is expected to rise dramatically. Optimistic estimates predict upwards of 50% annual growth. Given Russia's relatively low current level of Internet access, it might be characterized as a "developing country" in the arena of Internet software development with serious prospects of becoming a leading country within a relatively short period.

Russian companies develop about half of the software systems used in Russian businesses. Software production in Russian had been expected to reach $350 million in 2003, and is forecast to rise to $1 billion by 2005. By comparison, India exported nearly $10 billion in software and services in 2002 (Hayes & MacSweeney, 2003).

The Russian software development industry has its roots in military and space applications. The Soviet State raised "an army" of highly educated mathematicians and computer science specialists to serve "rocket" science. Due to radical economical changes in Russia in the 1990s, the Russian software development industry faced many challenges. Economic crises in late 1990s limited the ability of Russian companies to operate with the expensive mainframe computers that dominated Russian computing. As a result, the industry had to shift its technical platform from mainframe to personal computers. Private Russian software companies were the main leaders in this shift. As a result, Russian software development companies have a high percentage of mathematicians and are primarily focused on the personal computer market. Internet access is important for the creation of powerful software on personal computers. These highly qualified software developers are a driving force in the rapid expansion of Russian access to the Internet.

In October 2002 we conducted interviews in three Russian software houses and in May 2004 we interviewed in six more. The Russian software development market is immature and unstructured. Most of the current leading companies in the Russian software market are only eight to 12 years old, yet are considered market veterans (Terekhov, 2001). The selected companies represent this young and still forming generation. Those interviewed were discovered through their social network abroad and were cooperative in granting us access for interviews. The interviewed companies were located in Moscow, St. Petersburg, and Novosibirsk—three of the main Russian "brain" centers. Table 1 provides overview profiles of these companies. To add an outsourcer's perspective, we also interviewed managers from a Danish software company with 10 years of experience in outsourcing software development to a Russian software house in Saint Petersburg. We also carried out an extensive literature and Internet search for documents in either English or Russian related to high-speed and Internet software development in Russia.

TABLE 1. Profiles of the Russian Companies Studied

| Name | Industry and offered services/products | Year founded, company size | Number of employees interviewed | Organizational roles represented | Percentage of outsourcing (turnover) |
|---|---|---|---|---|---|
| InterSoft | Intranet and Internet systems, such as online catalogue shopping, content management, project planning, and control system | Founded in 1999, 10–12 employees | One | Technical director/ chief of maintenance department | 0 |
| RusERP | Bookkeeping systems, ERP systems | Founded in 1991, 15 employees | Two | Two persons have been interviewed: developer and marketing chief | 0 |
| FinSoft | Applications to the financial sector | Founded in 1997, 53 employees | Two | Two persons has been interviewed: analyst and developer | 0 |
| BridgeOut | Decision support, planning, and scheduling applications for industrial, environmental, and civil defense use | Founded in 1992, subsidiary company (50%) of Danish software house, 20 employees in Russia, 50 employees in Denmark (working together) | Three | CEO in Danish mother company, manager responsible for Russian development, manager responsible for outsourcing | 50 (mainly for Denmark) |
| Luxoft | Consulting, software development, enterprise application integration, legacy system re-engineering, ERP systems, CRM solutions, maintenance, testing | Founded in 2000 (30 employees), today 600 employees | One | Vice president responsible for marketing | 100 |

*Continued*

TABLE 1. Profiles of the Russian Companies Studied *(Continued)*

| Name | Industry and offered services/products | Year founded, company size | Number of employees interviewed | Organizational roles represented | Percentage of outsourcing (turnover) |
|---|---|---|---|---|---|
| Jensens Technologies | Content and document management applications, ERM applications, CRM applications, customer support and contact-center software, electronic commerce, electronic catalog applications, Web content management, publishing systems, Web site design, and development | Founded in 1999 (51× employees), today 30 employees | One | Project supervisor | 95 |
| Artezio | Services industry applications, network management software, middleware, telecommunications/utility applications | Founded in 2000, 50 employees | One | Project manager | 70 |
| JS Rcom | Software for enterprise economic activity and business process automation. The main lines of activity are system integration; design, development, and implementation of process control systems with their further maintenance, consulting, and staff training. | Founded in 2001, seven employees | One | Director | 50 |
| Darout Service Corp., Ltd. | Applications for the Internet design, mobile devices, databases, Web site design and development, administration and tuning, banking & finance applications, data warehouse systems, SCM, CRM, ERP systems | Founded in 2001, subsidiary of larger Swiss company | Two | Project manager and software developer | 100 |
| Lanit-Tercom, Inc. | Networking & telecommunications, mobile technologies, audio/video processing, real-time & embedded systems, re-engineering technologies, CASE systems. Services provided are research & development, software engineering, hardware engineering, offshore development centers | Founded in 1991, 200 employees | One | Software developer | 50 |

Overall, our research follows well-established research methods used in qualitative research. We carried out data collection through telephone interviews using a semi-structured interview guide (see the Appendix). To avoid any misunderstandings between respondents and interviewers, the interviews were conducted in native Russian by one of the authors. In order to avoid differences in the interpretation of the terms we first asked the respondents to tell us "the story" about how they develop their software products and then we explained the nine practices in terms that the respondents could recognize and identify in their own development practice. The duration of the interviews varied from 20 to 45 minutes. The 2004 interviews were consistent with the 2002 interviews with two exceptions. First, we noticed more openness and engagement during the 2004 interviews than in the 2002 interviews. Indeed, the companies that were interviewed in 2004 granted permission to reveal company names in this paper. Second, we observed a greater interest in quality assurance in the 2004 interviews. Some of the companies were in the preparation phase for ISO certification and one of them (Luxoft) was the proud recipient of the first European Level 5 certification in CMMI (Capability Maturity Model Integrated).

## 3. CASE FINDINGS

We will discuss the case findings in two sections. First, we describe the nature of software development at high-speed as found empirically in the Russian cases. Second we will describe some of the publicized Russian political initiatives. The combination of these two sources of data enables analyses of the current and future enablers of, and barriers to, further advancement in this area.

### 3.1 Short-Cycle-Time Software Development

From a general perspective, we found a surprising degree of usage of short-cycle-time software development techniques in Russia. All 10 of the software developing organizations in our study used some or several (but not all) of the techniques. These techniques were not acquired through training at universities or technical schools. The Internet itself has been the effective mechanism for spreading new knowledge about high-speed software development, and work experience (on-the-job Internet use) has been an important knowledge diffusion technique. Most of companies interviewed in 2004 also named external and internal courses as an additional knowledge diffusion technique used in their organizations. In the following paragraph, we will summarize the techniques used by each of the ten companies, their rationales, and how new knowledge about these techniques is typically acquired.

Intersoft acknowledged time pressure in all their projects, whether these were for the Internet, for an intranet, or for some traditional software application. Common practices included using parallel development heavily as their specific solution to cope with time pressure. They were also using a fixed architecture to save time in at least some projects. They were tailoring their development methods, justifying this because of the diversity of their customers and projects. Intersoft had considered methods like eXtreme Programming (Beck, 2000), Rational Unified Process (Kruchten, 2000) and Agile methods (Aoyama, 1998). They had found the latter to be especially interesting and inspiring. Missing from common practice, however, was customer involvement to the degree common in most short-cycle-time methods. Intersoft interviewees said that they didn't like it and only involved customers "if a customer insisted on being involved." It was also not a common

practice for designers to ignore maintenance. In fact, we found quite the opposite, since Intersoft developers were quite proud of their ability to maintain their software products. Finally, when asked what had been their source of information and learning about these high-speed techniques, they answered primarily the Internet plus a number of journals.

RusERP is developing both standard (ERP-like) products and totally new Internet-based products. Developers confirmed the time pressure in producing these products, especially in the newer kind of projects. In response to this time pressure, RusERP uses parallel development. To some extent they also employed a fixed architecture and were dependent on tools for developing software. They were often ignoring maintenance issues in their projects, but usage of this technique varied according to the customer needs. The only learning source for new techniques they mentioned was the Internet.

FinSoft experiences time pressure when developing the more important modules of a system, but not if a module is just "nice to have." Finsoft uses a fixed three-layer architecture and very often involves customers in the development. Prototyping is the common means for involving customers for communication and feedback. To cope with the time pressure for important modules or systems, FinSoft developers apply parallel development and use a release orientation. For those purposes, they depend on tools. Like RusERP and Intersoft, Finsoft reported that the Internet was a primary source of information and knowledge about short-cycle-time techniques, together with books, courses, and journals.

The time pressure at BridgeOut was intensive: "time to market is decisive, . . . to be first in a market means everything." This rush led to tough experiences when BridgeOut launched a new product too early. In this case, "too early" meant that at launch the product was of such inferior quality that it would destroy the product's potential forever. Developers also worked on tailoring their methodology. This tailoring work began during their first prototyping development effort 10–15 years ago. After this initial work, the company adopted a waterfall-influenced methodology, which was used to plan and execute the joint work of the Danish headquarters and the Russian subsidiary. However, BridgeOut subsequently abandoned the waterfall-model and replaced it with an iterative methodology. This methodology is an adaptive approach in which the number of iterations and the content of each are determined by those involved in each individual project. "I have so much confidence in iterative methods that I will use them in any situation" said the Manager responsible for Russian development. BridgeOut is also using parallel development in the sense that different development processes are conducted simultaneously in Denmark and in Russia on the same project. In general, the BridgeOut development process includes several iterations with frequent releases. BridgeOut has experimented with techniques from eXtreme Programming (Beck, 2000), trying, for example, pair programming. Pair programming was abandoned because it was too stressful for their developers. Finally, BridgeOut is also using courses, journals, new books, and the Internet to acquire new knowledge.

Luxoft was the first European software company to achieve a Level 5 CMMI-certification, which means a high-level description of (and control over) software processes. In achieving this certification, Luxoft increased its tool dependence by adopting a number of tools. In discussing Internet-speed development, the Vice President said: "For us it is more than that—it is Rocket Speed Development." Luxoft practices customer involvement from the earliest phases of requirements formulation (called Primary Customer Engagement). Reuse of components and Prototyping are also recognized practices in Luxoft. Operating with

offshore development means that the company works with different clients, and in most cases the architecture of the developed software product is "dictated" by the customers. Even though Luxoft would prefer to make the architecture fixed, it would not be realistic. The company is proud that maintenance is a part of its business. "We do not abandon our customers!" Luxoft is a mature organization in which learning is a well-organized process. "We are learning from the best teachers in the world." For example, all of the project managers are certified by the Project Management Institute. Analysis of organizational experience is an important part of their learning process. Among our 2004 sample, Luxoft was the only Russian software company familiar with the E-Russia program (discussed below). The director of their parent company (IBS) was one of the founders of Electronic Russia. "We can see the progress but it is not enough—it could be faster and better."

Jensens Technologies is a company that experiences time pressure when developing e-commerce and web applications. The company practices parallel development but prefers avoiding it. Jensens has a strong orientation toward offshore development. The resulting geographical distance between the developers and the customers requires developers to use communications technology as an intermediary to involve customers in the development process. Such involvement depends on the type of project; for example, Java and web projects usually require more customer involvement than traditional applications. Customers have an opportunity to make comments and influence projects through experience with test servers. Projects are characterized by strong release orientation where new versions are available every day. Component reuse is a known technique in Jensens Technologies, but respondents admit that it could be used more frequently in their day-to-day practice. Maintenance and support arrangements are commonly included in customer contracts. In addition, customers have the opportunity to contact their project managers any time after their system has been implemented. Jensens Technologies uses an iterative development process and usually divides project groups into small subgroups with some parallel tasks. This scheme requires a relatively fixed architecture, but the sub-grouping helps keep a project moving forward even when one of the groups encounters a work-stopping problem that must be solved before moving on to the next stage. The most important source of new knowledge in the company is learning from experience.

Artezio uses short-cycle-time development in about 40% of its projects. For example, for very urgent projects, the company uses parallel development. "Between-releases" give customers the opportunity to monitor and comment on the development, although respondents would not admit that this could be called a release orientation. Like other respondents, Artezio confirmed tool dependence through the whole development cycle. It is up to a developer to choose a tool but the standards have to be settled in the beginning of the project (e.g., coding standards). Outsourcing complicates customer involvement, but usually a customer has an identified contact person as a cooperative link between the company and the customer. Prototyping is a common practice in the projects. Because customers' task requirements differ so greatly, a fixed architecture is not feasible. The architecture depends on the task from the customer and the nature of the customer's systems. Components are not often reused because of the company's licensing policy and the absence of a central repository for components. Artezio relies on its own experience for new knowledge or adopts it from the Internet.

JS Rcom employs mainly graduates from Novosibirsk Technical University. Its main product is a real estate agency application. Originally, offshore development was a means to raise capital to promote and develop the main product, but later it became an equal part of the business. JS Rcom's products fully employ the Internet. The development methodology

is based on a mixture of different principles, including eXtreme Programming (Beck, 2000). The most important issue for the company is a clear plan (and control over fulfillment of the plan) and that "the plan should be realistic." Parallel development is a common technique. "It is the analysis and synthesis; we take a big task and break it into small pieces and then work with those small pieces. If we know how to make some of the pieces (from our previous experience or because the task is familiar and clear), we begin to work in another way." The company is release orientated. The customer can always see the current changes of the version on a Web server. Sometimes several releases are issued per day. Respondents also acknowledge tool dependence but primarily they rely on "home-made" tools. Client involvement depends on the client. Some clients prefer working less closely, providing a requirement specification and avoiding contact until the first version is ready. Most clients, about 70%, are closely involved in the development process. "There is a one specific thing about it—our geographic location—we need to communicate with our clients by mail or phone. In our office we have a lot of wall clocks; they are showing time for our clients located in different parts of the world." Prototyping is a widely used method. Architecture is fixed depending on the client or the task. For development of its own product, the company uses a three-layer architecture to develop business logic independently from the client and the operating system. The company maintains a repository for components and is actively trying to increase component reuse. Project teams tailor methodology only in the sense that they use one methodology for their own products but different methodologies for offshore development. In discussing Electronic Russia (discussed below) our respondent quite skeptically called it "a nice masquerade."

Darout Service Corporation often feels time pressure when developing software. One of the respondents noticed that such situations occur two or three times monthly, when a client requires some urgent changes or a product version should be updated rapidly. The respondents confirmed that they avoid stress by good planning. However, 50% of their projects do not have a margin for any sort of "relaxed" development. Parallel Development is a common technique for the company. If they know that the "core" functionality will not change, developers may build a prototype of the whole product (if the product is well known) or part of it before the requirements are formalized. The company is release oriented, sometimes releasing new versions several times per month. Release frequency depends on the customer and the customer's requirements. Customers can review releases on a test-server and enter feedback on the server. The development process in the company depends heavily on the tool being used. Experienced developers can choose the tool they want to apply, but project managers help beginners to select their tools (usually depending on the project type). Customer involvement is greatest in web or Java projects where the initial specification must be very structured. Seventy-five percent of the projects use Prototyping, and some large applications have a fixed architecture. Darout has a repository for code reuse components and a repository for methodologies, but seldom reuses either. The development process is iterative. New knowledge is aggregated from experience, the Internet, and ISO 9001. One developer pointed out that university education does not provide managerial knowledge—only pure technical and mathematical knowledge at the highest level. But developers participate in courses, including some sponsored by Microsoft. Methodology is tailored. "We jump over some stages in the development process, especially in the beginning. But it depends, of course, on customer requirements." The respondents had never heard of Electronic Russia.

Lanit-Tercom is one of the leading companies in the Russian software industry. Founded in connection with St. Petersburg State University, the company is successfully combining

development and research. Respondents acknowledge time pressure, especially in short-term projects, but they claim that the company always delivers on time. When they are sure that a contract will be signed and develop some modules in advance, project teams use parallel development. Release orientation is also one of the recognized techniques. Lanit's experience shows that greater release frequency leads to a better understanding between developers and the customer. A project team is formed even before the project officially starts. The risk is that the project might not be signed, but early formation gives teams more time when projects do become engaged. Lanit developed its own case-tool, which is required for use in most projects, unless a customer specifies another tool (e.g., for coding). The company seldom contacts customers directly, but has an agent in the United States who works with the customers. Customers may use test-terminals to review a current version of the product and make comments. Sometimes developers contact a customer directly by phone. Prototyping is the most common development technique. Although developers try to hold to recommended standard architectures, these can vary depending on the customer. As an offshore company, Lanit-Tercom must destroy everything after a product has been delivered to the customer. But the respondent has pieces of code he had developed during university study and reuses those components in his work. The issue illustrates the interesting tension between reusable code and software development outsourcing. Outsourcing contracts can protect the software rights for the customer and prevent vendors from reusing code for other customers. Maintenance is not ignored. The company has documentation standards (installation instructions, user information, code description, comments in code). New knowledge, especially methods, comes from best practice, the Internet, and education. Lanit-Tercom organizes many courses and seminars where employees have opportunities to learn from each other's experience.

Table 2 summarizes the Internet-speed practices discovered among the 10 companies. We found sufficient presence of short-cycle-time software development to conclude that this approach was common practice among all the firms. Nevertheless, the de-emphasis of maintenance was not among the common practices.

### 3.2 Russian Software Political Initiatives

Companies such as those reviewed above do have support from Russian government and professional organizations for acquiring the latest software development techniques. These organizations understand the importance and growth of the Internet. For example, the Russian Ministry for Economic Development launched a very ambitious federal program called "Electronic Russia 2002–2010" in January 2002. This program copies many of the incentives and mechanisms from other national programs that successfully promoted the building and use of a national information infrastructure, such as the IT2000 program in Singapore (Chia, Lee, & Yao, 1998). The Russian program recognizes information and communication technologies (ICT) "as spurring economic change and development, boosting Russia's international competitiveness, improving the productivity and responsiveness of government, and creating a more educated, informed, and engaged citizenry" (Azrael & Peterson, 2002).

This program does not directly aim to increase the efficiency of the economy by developing a Russian high-tech or Internet marketplace. Rather, it aims at improving management in the public sector, governmental performance, and transparency in decision-making. Four concrete improvement goals comprise Electronic Russia 2002–2010 (Lakaeva, 2001, 2002; Hiltunen, 2002):

TABLE 2. Short-Cycle-Time Practices in the Russian Companies Studied

| Name | Parallel development | Release orientation | Tool dependence | Customer involvement | Prototyping | Fixed architecture | Components reuse | Maintenance ignored | Tailored methodology |
|---|---|---|---|---|---|---|---|---|---|
| InterSoft | y | - | - | n | - | y | - | n | y |
| RusERP | y | - | y | - | - | y | - | y | - |
| FinSoft | y | y | y | y | y | y | - | - | - |
| BridgeOut | y | y | - | - | y | - | - | - | y |
| Luxoft | - | - | y | y | y | n | y | n | - |
| Jensens Technologies | y | y | - | y | - | y | y | n | - |
| Artezio | y | n | y | y | y | - | n | - | - |
| JS Rcom | y | y | y | y | y | y | y | - | y |
| Darout Service Corp.Ltd. | y | y | y | y | y | y | - | - | Y |
| Lanit-Tercom, Inc. | y | y | y | - | y | y | y | n | - |

*Note*. y = practice is present in some form, - = practice unrecognized, n = practice not followed.

1) Create a more friendly business environment through effective legislation and better communication between public institutions and private organizations such as the Internet software houses we interviewed.
2) Establish an Internet infrastructure of better telecommunication networks and access to electronic libraries, archives, and databases. More specifically, connect every city in Russia with more than 30,000 inhabitants.
3) Enable e-Government by establishing e-commerce market places for procurement and other commercial activities of the state. By 2010, 65% of all internal and up to 40% of external (across state organizations) communication will be done electronically.
4) Support e-Education by providing computer training for education professionals and delivering a wide range of distance learning packages.

Electronic Russia 2002–2010 aimed to create a friendly environment (the first part of no. 1 above) in 2002, conduct feasibility studies and pilot projects in 2003–2004, and implement the program at full scale in 2005–2010 (Lakaeva, 2001). According to press reports, the general reception to this Russian federal initiative has been quite positive among potential outsourcing customers. For example Kimmo Sasi, Finnish Minister of Transport and Communication, called it "a timely document that could increase the efficiency of the Russian economy" (Hiltunen, 2002).

The Electronic Russia program may not get the resources necessary to succeed because "it is not clear that focusing on IT should be a priority at this time for Russian government or industry" (Azrael & Peterson, 2002). Critics claim, "that the program is in many ways detached from what an average Russian person needs and can afford" (Hiltunen, 2002). In August 2003, fewer than one in five Russians were aware of the program; of these, only about half believed it was helpful. Although the plan called for 7.55 billion rubles (U.S. $249 million) for 2003, the budget was reduced to 1.42 billion rubles (U.S. $46.8 million) (Fak, 2003). Missing are many initiatives that characterize the Indian government's support for its industry, including software technology parks, tax-sheltered zones for developing software exports, and reduced technology import taxes that promote research and development (Mainville, 2003).

## 4. ANALYSIS

Our goal is to discover explicit and implicit offshore outsourcing strategies. Such strategies often involve promoting key enablers and overcoming key barriers. To analyze the interview data, we employ three frameworks or models. We use one framework to surface the issues and concepts discovered in the interviews, one model to discover the enabling factors, and one model to discover the barriers. This system of models helps to identify the issues, explain the results, and shape the theoretical propositions of the research. We begin the analysis with a framework for outsourcing issues (Smith, Mitra, & Narasimhan, 1996) that delineates factors affecting the suitability of an offshore site for software development. We analyze how the Russian political initiative, Electronic Russia 2002–2010, supports those factors and frames the environmental capabilities and resources of Russian offshore software development. A description of this framework and the results of the analysis follow in Sections 4.1 and 4.2.

Having framed the suitability factors, we analyze key enablers of the diffusion of the high-speed development techniques in this environment. For this purpose we apply the Kline (1985) linked-chain model of innovation diffusion. We selected the linked-chain model

because the diffusion of high-speed software techniques across economies is knowledge intensive. This intensity is a feature of post-industrial economics, a branch of economics that recognizes that information industries have assumed a powerful, ideological role among consumer societies in knowledge economies (cf. Rustin, 1989). Kline's linked-chain model is a knowledge-centric process model that is not linear. Its knowledge-centricity is important for modeling the origins and flow of knowledge related to the techniques. Its non-linearity is important for modeling the informal and emergent flow of technical knowledge across national boundaries. From the perspective of the Kline model, the diffusion of short-cycle-time techniques in Russia is well enabled. A description of the Kline model and the results of the analysis follow in Sections 4.3 and 4.4.

Finally, we turn our focus to the barriers confronting this diffusion. For this purpose we apply a model of organizational evolution and growth by Larry Greiner (1972, 1998). While an alternative would have been the stages of growth model (Galliers, 1991; Galliers, Madon, & Rashid, 1998), we selected Greiner's model of the evolution of organizations because many of the software houses in the Russian Internet development market are small organizations in early growth stages. Given the key enablers suggested by the analysis using the Kline model, we expect these firms to evolve rapidly the coming years. Greiner's model explicates organizational evolution and growth and suggests the barriers the companies will face. From the perspective of the Greiner model, the diffusion of short cycle-time techniques in Russian faces challenges. The model also suggests enablers needed to overcome future barriers to the growth of this high-speed software development industry. A description of the Greiner model and the results of the analysis follow in Sections 4.5 and 4.6.

## 4.1 A Framework for Outsourcing Issues

Offshore vendors benefit from consolidation of technological infrastructure in their home environment, favorable governmental policies, tax subsidies, and access to skilled personnel resources (Gopal, Mukhopadhyay, & Krishnan, 2002). We analyze the factors that affect the suitability of an offshore site for software development and show how the Russian political initiative, Electronic Russia 2002–2010, supports those factors. For this analysis we use a framework (Smith et al., 1996) that combines software development resource classes with a project perspective and an environmental perspective. We focus on the environmental perspective because the project management perspective is relevant only when a concrete project is under consideration for outsourcing.

The framework centers on resource availability and the environment at outsourcing sites. The framework has five software development resource classes: hardware, software, personnel, intellectual property, and financing. For our study, we focus on the offshore outsourcing resources available in Russia.

***4.1.1 Hardware.*** The Electronic Russia 2002–2010 initiative focuses on hardware resources. The development of telecommunication infrastructure is one of the important objectives of the program. A sizeable part of the initiative aims at providing more hardware, more servers, more sites, etc. Russia currently has a poor telecommunication infrastructure that makes bandwidth costly in most of the country. In contrast, the three major technology centers—Moscow, Saint Petersburg, and Novosibirsk—have excellent infrastructure.

***4.1.2 Software.*** Russian domestic systems software products, such as development tools, are rather limited. Perhaps this is irrelevant for our study since the Russian software

companies we interviewed seemed to have access to all the necessary software through the Internet.

***4.1.3 Personnel.*** Software development is a labor-intensive activity, and many countries outside the Western hemisphere lack the resources to attract or train a sufficient pool of qualified labor (Reichgelt, 2000). In Russia, in contrast, a 45-year-old tradition emphasizing "rocket science" in schools and careers produced a sizeable population of well-educated mathematicians and scientists. Working for lower wages than comparably educated individuals in the United States and Europe, these developers offer an attractive workforce for foreign companies in developed economies (Sieber, 2001). The Electronic Russia program also addresses education through training and distance learning.

***4.1.4 Intellectual Property.*** The legal environment in Russia is a barrier for outsourcing providers. The Russian government has been slow to protect copyrights. For example, Russia did not adopt the 1952 Universal Copyright Convention until 1973 and adopted the 1886 Berne Convention for Treatment of Literary and Artistic Works only in 1952. Russian legislators have adopted an approach that protects software as literary works in order to make these conventions nationally effective for software (cf. Outsourcing-Russia.com, 2003). Unfortunately, enforcement of these laws has been lax and there have been few convictions.

***4.1.5 Financing.*** The necessary financial infrastructure is available, and foreign investors are now investing heavily in Russia. Unfortunately, the Russian political system has a history of interfering in the financial system (e.g., the November 2003 arrest of a Russian oil magnate).

In addition to resource availability, the Smith framework considers the outsourcing providers' environment. The firm, the government, the infrastructure providers, the business environment, and international organizations are distinctive elements of the outsourcing environment.

***4.1.6 Firm.*** The firm environment includes both the vendor and the client firms. In Russia, the vendor companies decide what markets to enter and what methods to apply to increase their capabilities in hardware, software, communication, or language skills.

***4.1.7 Government.*** Government directly affects resource availability in Russia. The government has major legislative, regulatory, and legal reforms that are either planned or underway. For example, Russia is encouraging the rapid adoption of international accounting standards. Because of such reforms and initiatives, Russia's economy, international standing, and general business climate are likely to continue improving. These improvements will benefit the expansion of the offshore software development industry in Russia. Policy-makers have plans to introduce tax incentives for software developers, entrepreneurial incubators, and cooperative research programs such as the Electronic Russia Program (Outsourcing-Russia.com, 2003).

***4.1.8 Infrastructure Providers.*** Except for those in Moscow, Saint Petersburg, and Novosibirsk, infrastructure providers in Russia offer poor and limited service. The Electronic Russia program has very ambitious goals for the spread of the Internet and expansion of telecommunications to improve the availability and performance of Russian infrastructure providers.

***4.1.9 Business Environment.*** The business environment includes financial institutions, competitors, customers, and users of similar IT products and services. The Electronic Russia program establishes legislative principles for Russian IT development that embrace the ideals of equality in business conditions and the elimination of IT monopolies. In order to simplify the export of IT products, the program advocates a unified package of IT legislation that will bring Russia into compliance with international law.

***4.1.10 International Organizations.*** International industry organizations can help facilitate strong business links for firms in multiple countries by recognizing industrial equivalence. While only three Russian companies are currently certified under CMM standards, more than 1500 have ISO 9000 certifications. Many vendors expect a trend toward the certification of software development processes based on such standards. Russians hope that these certifications will lead to market growth and a broader range of market players (Outsourcing-Russia.com, 2003). More and more Russian companies are adopting international accounting standards. Maturity models such as CMM are likely to play a key role in the future.

Capability and maturity in the above areas are critical success factors that must be completely understood before engaging in an offshore B2B relationship. Doing so without this level of detail exposes the buyer to unnecessary risks. (Outsourcing-Russia.com, 2003)

## 4.2 The Future of Outsourcing to Russia

The issues developed in the outsourcing framework are inconclusive about the future of outsourcing operations in Russia. Russia has some clear advantages in personnel quality and certification by international organizations. There are also some problems, including poor legal and financial infrastructures, and a telecommunications infrastructure that is weak outside of the three major technological centers. The Russian government and industry organizations recognize many of the problems and are acting to improve the situation. While the issues framework presents a mixed view of the offshore outsourcing potential in Russia, it also indicates movement in a positive direction.

Will the Russian IT industry be able to develop beyond a product-oriented relationship with offshore clients? Recent research (Lee, Huynh, Kwork, & Pi, 2003) forecasts that outsourcing will move toward global and partner-based alliances. Such alliances are most successful when expectations are realistic and there is a shared understanding of each other's business objectives and goals. Under such alliances, the partners share benefits and risks, communicate standards, and prepare themselves for changes and potential problems.

These factors stress the importance of close communication as a basis for partnership. Communication has an important impact on control, and loss of control is a critical risk in outsourcing partnerships (Lee et al., 2003). Communication and coordination mechanisms reduce project uncertainty in offshore development (Gopal et al., 2002).

Few of the firms in our interviews seemed to have developed close communication with their clients. At least one firm worked through an intermediary. Given the mixed characteristics of the Russian resources and environment, the need to understand partnership risks and control, and the lack of historically close communication between vendor and customer, Russian companies may not be ready to move into successful partner-based alliances with offshore firms. This immobility may limit the ability of Russian firms to participate fully in some important segments of the offshore outsourcing market in years to come.

### 4.3 Kline Linked-Chain Model

We use the Kline Model to reveal key enablers of diffusion of high-speed software techniques. Unlike linear models that define sequential patterns for idealized cases of the innovation process, the linked-chain model has five concurrent pathways or links. In Figure 1, arrows denote these concurrent links within the other elements of the model. These elements are (1) market finding, an assessment of a product improvement or new product that meets an unfulfilled market; (2) analytical design, which is a preliminary design activity that establishes the scope of further design alternatives; (3) development, which includes detailed design, prototyping, and testing; (4) production, which includes redesign for manufacture and production; (5) marketing, which includes distribution as well as product marketing; (6) research and knowledge, which together constitute pure science. Knowledge is placed between the elements of the innovation chain and research as a buffer to imply that the store of human knowledge may fuel the innovation chain without further research processes. According to this model, "research leads to product innovation only insofar as it stimulates a design via either invention or analytical design" (Kline, 1985, p. 37).

The links or pathways in the innovation chain include (1) central chain, which represents the long pathway of innovation through each element from market finding to marketing; (2) feedback links, which flow dynamically back-and-forth across the central chain boundaries; (3) knowledge-linked research, in which innovation arises from the interaction of knowledge and the elements of analytic design, development, production and research; (4) invention-linked research, involving the unstructured exploration of analytical designs; (5) product-linked research, including long-range product and "support for science" research.

The linked-chain model leads us to discover four concepts from innovation diffusion that explain the typical context for Russian high-speed software development. First, knowledge is the foundation of innovation and its diffusion. Research alone is not innovation,

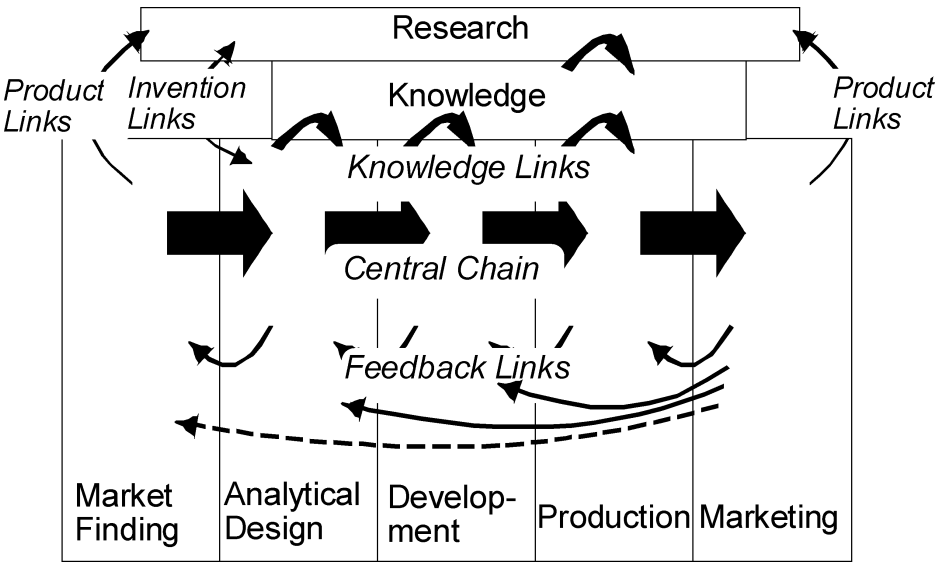


Figure 1 Kline's linked-chain model.

but is critical for creating knowledge. For innovation to diffuse, knowledge from research must be actively applied. Second, the systems and process research associated with product development and production are undervalued innovation elements. If one focuses entirely on product innovation, one may overlook critical innovations in process that enable innovations in products. Third, a preoccupation with science has diminished the ability for researchers to recognize that invention and analytic design are key elements of innovation. For example, designers of a product can add remarkable innovations that do not spring directly from scientific research, such as ease of use and functional features. Fourth, our understanding of creativity and innovation in design is poorly developed, especially of the interaction between invention and analytic design. Design research, especially in the information systems arena, only began to emerge in the late 1990s (cf. Vaishnavi & Kuechler, 2004).

### 4.4 Strategic Analysis: Enablers of Diffusion of Practices in Russia

We will now apply the Kline Model to the diffusion of short-cycle-time software practices in Russia. An analysis of the cases indicates four key enablers of diffusion that affect the transfer of these Internet software practices into and within Russia. These include (1) Internet-based research, (2) rapidly developed knowledge through the Internet expansion promoted by Electronic Russia 2002–2010, and (3) the demands of rapidly developing markets through the Russoft Outsource marketing program. A fourth enabler (4) appears to be a developing social norm that for high cost development tools software copyrights can be disregarded unless they generate revenue.

The first two key enablers are interlocking. Perhaps foremost is the use of the Internet for research. As shown in Figure 1, this research is important for all five phases of the product innovation cycle and for developing and maintaining the knowledge base required for innovation diffusion. In all our cases, the major research source for developing knowledge on Internet-speed software development is the Internet itself.

The importance of the Internet as one important source of learning was thematic. InterSoft learned about Internet-speed development techniques "from different journals and the Internet"; FinSoft and BridgeOut, from "different books, courses, journals, and the Internet"; Artezio and Darout also learned from their "own experience and Internet"; JS Rcom, from "education and Internet"; Lanit Tercom learned about the techniques from "our own experience, education, and Internet"; and at RusERP, the only learning source mentioned was the Internet.

The second of these interlocking enablers is the growing body of knowledge that is proceeding from Internet research, which has been enabled by the government-sponsored Internet expansion. According to the Kline model (Figure 1), this knowledge is especially important for the design, development, production, and marketing of software products in Russia. The Electronic Russia 2002–2010 seeks to enhance Internet access throughout the country. Our respondents suggest that the project may be working for the big cities, but is having less of an impact on the smaller communities. Both the research and the knowledge development via the Internet are improving in some areas. BridgeOut provides a good illustration of this:

> "We have good telephone connections to Saint Petersburg and Moscow. But connections to the remainder of Russia are lousy. As for the Internet there are only eight hubs for my email to

pass from Denmark to Russia, whereas my email from home to my office in Denmark has to pass 12 hubs."

The third key enabler of the diffusion of Internet-speed techniques is efforts to develop a marketplace for Russian software products. Russian software industry groups are vigorously developing the outsource software marketplace. For example, Russoft, an association of leading Russian software development companies, aims to advance its economic sector by leveraging high quality Russian mathematical sciences and the natural innovation of Russian engineers. Its goals include lobbying and promoting software exports and investment through international IT marketing. These activities cover the marketing and market-finding elements in the Kline model.

"A number of associations (Rusoft, Inforus) similar in function to the Indian's NASSCOM were formed to promote Russian software development companies in the U.S. Europe, Asia and to improve Russia's image as that of a reliable center for offshore software development" (Luxoft, 2002, p. 7).

Back-channel acquisition of software development tools is a fourth key enabler, which represents the knowledge links between research, knowledge, analytic design, and the development and production processes. Software development environments, object-oriented design packages, and other tools are features of Internet-speed development (Ramesh et al., 2002). Because these tools are difficult to acquire at low cost in Russia, some of them are made accessible through back channels (illegitimate transfer of unlicensed copies). The back channels are not planned or accommodated by any real organization, but emerge from social networks. The social networks are Internet enabled, and embody some of the important knowledge links suggested by the Kline model (see Figure 1). The ability to acquire these tool packages freely enables developers and their organizations to research, experiment and build the minimum necessary knowledge and skills to compete with other Internet-speed software developers. Once the knowledge has been acquired and serious production yields revenues, the software tools are purchased through more traditional front channels.

"Intellectual property and security are major concerns of companies considering offshore software development in Russia. Thankfully, the laws on intellectual property ownership in Russia are relatively clear and developed. While enforcement of these laws remains a problem for domestic consumer level products (music, movies, clothing), there have been no recorded violations of intellectual property rights in the offshore software development industry" (Lewin, 2001, p. 5).

The transfer of Internet software practices into and within Russia is not driven singularly by either the government, by private investment, or by industry groups. A combination of efforts to create these enablers seems to be underway. The first three enablers constitute a set of strategies that should be effective in fostering diffusion of software development innovation in Russia: (1) Internet-based research, (2) rapidly developed knowledge through the Russia 2002–2010 Internet expansion, and (3) the demands of rapidly developing markets through the Russoft Outsource marketing program. While effective, the fourth enabler is a developing social norm about software copyrights combined with a lax governmental view toward the protection and security of these copyrights.

### 4.5 Greiner's Model of the Evolution of Organizations

As mentioned in the introduction to this section, the small firm size in the Russian high-speed software development industry suggests great opportunities for organizational growth, adaptation, and development. Most software companies were founded after radical reforms in early 1990s and are relatively young. The cases chosen for this research represent this dominant part of Russian short-cycle-time development market. A useful model for suggesting future barriers (and necessary future enablers) can be found in Greiner's (1972, 1988) evolutionary model. Figure 2 shows the five phases of organizational development and change defined by Greiner. An organization starts its life in the "creativity" phase shown in the lower left corner. In this phase, the founders of the company are typically entrepreneurs (enterprising and risk-taking owner-managers), communication among the people in the organization is informal, long work hours are normal, and the feedback from the market is immediate, as is as the reaction from management.

Greiner's model describes how a company, as it grows in size and matures, reaches its first crisis, the "leadership crisis." Informal communication is no longer sufficient. The dedication, long hours, and small salaries of the first hired "pioneers" are no longer sufficient motivation. New procedures are needed to exploit efficiencies of size and to provide better financial control. To solve the leadership crisis, a strong manager is needed. Often the owner or founders lack the necessary skills and knowledge, and "hate to step aside even though they are . . . unsuited to be managers" (Greiner 1972, 1998).

If the organization survives the leadership crisis, it will "embark on a period of sustained growth under able and directive leadership" (Greiner 1972, 1998). In this second phase, communication becomes more formal, a hierarchy is built within the organization, and the upper levels take responsibility for the direction of the organization. It is also in this phase that formalized systems for accounting, incentives, work practice, and job specialization arise.

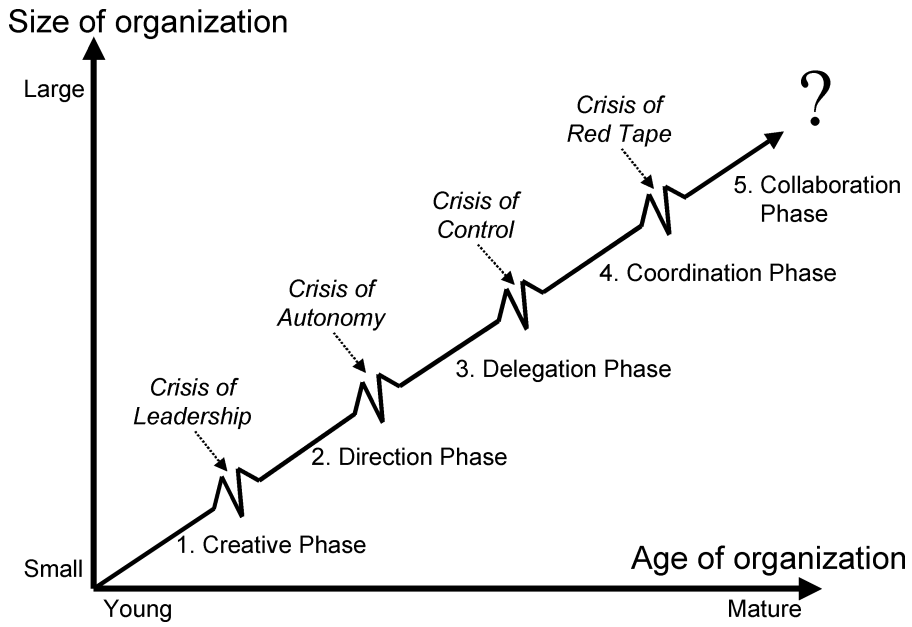


Figure 2 Greiner's model of organizational evolution and revolution.

The second crisis is the "autonomy crisis." Middle-level managers see the centralized decision structure of the second phase organization as a burden, and some of the more autonomous field-unit middle managers start acting independently. Often top management reacts by attempting to return to centralized management. Greiner suggests that the solution to the second crisis is a more decentralized organizational structure where middle managers have greater responsibility and autonomy.

Phase three ends in the "control crisis" where top managers realize that they have lost "control over a highly diversified field operation." This crisis is overcome by the use of coordination techniques such as formal planning, the creation of product groups treated as investment centers, and by the initiation of staff functions that control and review for line managers.

In the crisis of "red tape," the line managers are suspicious of staff functions and distrust grows between headquarters and the field. Overcoming this crisis leads the organization into what Greiner calls "the last observable phase in previous studies." In this last phase, strong interpersonal collaborations are established to overcome the red-tape crisis. A more flexible and behavioral approach to management is implemented through the use of teams. The staff functions are reduced in number. The motivational structure becomes more geared to team performance than to individual achievements.

### 4.6 Strategic Analysis: Overcoming Barriers to Diffusion of Practices in Russia

An analysis of our 10 cases in relation to Greiner's model indicates a number of barriers for the future diffusion of high-speed software development practices in Russia. The model also suggests some potential enablers for overcoming these barriers.

The prospects for establishing new companies seem quite bright. New companies will enter phase 1 in Greiner's model where growth is primarily spurred by creativity. BridgeOut describes the market for qualified IT people very positively:

"In Russia you have access to a pool of very strong resources . . . highly motivated and well educated . . . i.e., in Saint Petersburg you have about 50 technical schools and universities with more than 200,000 students to choose among . . . financially attractive compared to salaries in Denmark. And the new generation is taught English as their second language so communication becomes easier in the future."

This remark sheds light on both a barrier and an enabler. Language is a barrier. Russian doesn't use the same alphabet as most Western languages and consequently communication problems are intensified between Russians and their foreign partners. The language situation is, however, changing (as illustrated by the extensive use of the Internet as a transfer mechanism for high-speed practices). The remark above shows that continuation of the Electronic Russia 2002–2010 program's focus on bringing Internet access to Russian classrooms can be an enabler. Enablers such as foreign language training strengthen the links between higher education programs and information technology expansion. Such links are exemplified by educational programs in the area of professional career success (Desplaces, Beauvais, & Peckham, 2003) and information technology aspects of programs for national economic recovery (Jorgenson, Ho, & Stiroh, 2003).

Many of the Internet software producing organizations in Russia are young and small. These features suggest that they are positioned in the lower left corner of Greiner's model. They are growing through creativity, and they can expect to meet the "crisis of leadership" in the near future. Consequently, a real barrier in a Russian context will be a sufficient supply

of capable managers who can safely bring Russian software development companies into phase two. A remark by a respondent in BridgeOut suggests this barrier: "It is our experience in Russia that there is a lack of highly educated leaders."

Unfortunately, this barrier doesn't seem to be addressed at all in the Electronic Russia 2002–2010 program. A new key enabler, such as improved training for software development managers, will be needed to overcome this barrier in the near future.

Russia also needs legislation that improves the autonomy of subcontractors. A large number of foreign companies have established outsourcing arrangements in Russia. One example is BridgeOut. Greiner's model predicts that the Russian companies will soon be growing through the direction phase. The quick growth of the Russian market—as targeted by Electronic Russia 2002–2010—will lead to an autonomy crisis in many of the Russian companies. The Russian organizations engaging in high-speed development of software lack key enablers to overcome this barrier, however. Currently, Russian contract law does not enable delegation of responsibility, especially in terms that regard recovery of damages. Carefully crafted legislation might enable a smooth transition from phase two to phase three in Greiner's model. A respondent at BridgeOut says: "The Russian market is still immature. Of course you write a contract, but try to take that contract to court and you will find that your protection in a contract hardly can be trusted."

In addition to this legislation, other legal steps would help begin improvement of control over the widespread copyright abuse. The enforcement of intellectual property rights is a two-edged sword in this setting. On the one hand, the current lax standpoint toward copyright abuse has value as an enabler for development. On the other hand, this standpoint interferes with the trust that foreign customers need to place in Russian companies in order to share valuable intellectual property. A graduated strategy for slowly shifting from the present lax viewpoint to more stringent enforcement of copyright may serve to slowly increase long-term confidence in the protection of intellectual property in Russia. The gradual nature of this shift would not necessarily choke off the exploratory development that needs to be present for short-term experimentation. In this way, the needs to gradually decline the support for phase I of Greiner's model (creative stage) while gradually increasing the support for phase III (delegation stage) would shape the movement of Russian software houses into and out of phase II (directive phase).

The analysis using Greiner's model points to two near-term barriers to the future advance of companies developing software at high speed. First, Russia is missing a source of well-prepared organizational managers for software companies. Second, Russia will need improvements, such as changes in their contract law, that enable companies to decentralize their authority structures in the near future. Such decentralization means developing reliable observance of contracts by both internal and external organizations. New strategies are needed to overcome these barriers. These strategies should embody national programs to improve preparation for software company managers and stronger contract laws.

## 5. CONCLUSION AND FUTURE RESEARCH

The offshore software outsourcing industry in Russia has attracted substantial interest in the last decade. Using Smith's framework for outsourcing issues, we analyzed software development resources and environmental factors in Russia. The framework allowed us to analyze the characteristics of the Russian software development market and evaluate the environment for new innovative methods as short-cycle-time software development.

Short-cycle-time software development uses a number of techniques to move software quickly into production. It is an example of innovation diffusion in software development that indicates a growing ability to undertake offshore-outsourced software development. We found many short-cycle-time techniques in a case study of Russian Internet software houses. Using the Kline model of innovation diffusion and the Greiner model of evolution and growth of organizations we analyzed the enablers and barriers to diffusion of high-speed software development techniques in Russia, leading us to the following national strategies that prove effective for enabling offshore outsourcing to Russia:

Strategies Currently in Place

1) Internet-based research
2) Rapidly developed knowledge through planned Internet expansion
3) Rapidly developing markets for short-cycle-time techniques
4) A social norm against paying for copyrights unless there is associated revenue
5) Internet access in Russian classrooms

New Strategies Needed to Overcome Barriers

1) Expand the Electronic Russia 2002–2010 initiative to include foreign language training
2) Improve training for software development managers
3) Pass legislation to enable a smooth transition from outsourcing agreements to more autonomous Russian software houses
4) Enforce laws on intellectual property

In discussing these offshore outsourcing strategies, we analyzed recent Russian political and economic initiatives, including the Electronic Russia 2002–2010 program. Our research is limited by its focus on a small number of cases, the limited number of subjects interviewed, and its interpretive data analysis. Further research is needed to explore these research questions more fully. First, more quantitative research could determine if the barriers discovered in this exploratory study are found across many Russian software organizations, including those developing less innovative forms of software development. Second, more rigorous qualitative research would also reinforce or disprove the findings in this study. More expansive data collection and rigorous data analysis, such as with grounded theory methodology, would strengthen this study. Third, there is a need for research to identify a more comprehensive set of barriers to and enablers of offshore outsourcing than those suggested by the relatively simple application of Greiner's model in this paper. A good example would be a Delphi study using carefully selected experts to predict the barriers and derive the respective enablers. Fourth, there is a need for comparative analyses of the Russian diffusion of high-speed development techniques vis-à-vis the diffusion of such techniques in other cultural or national settings where offshore outsourcing has proved more effective (e.g., India).

Our study of the enablers and barriers to diffusion of high-speed software development techniques in Russia reveals a complex interaction of political, economic and technical elements that both enable and inhibit the development of knowledge necessary to support this case of innovation diffusion. This analysis permits us to understand how this diffusion occurs, to identify current national strategies that are being effective, and to suggest national strategies that might be relevant in the near future.

Appendix: Interview Guide

1. Demographics of the organization.
2. Do you work at Internet speed? Are you feeling any time pressure when developing software (this may lead to information on how they develop and what they develop)?
3. Are you using any of the following techniques:
   - Parallel development
   - Release orientation
   - Tool dependence
   - Customer involvement
   - Prototyping
   - Fixed architecture
   - Components
   - Maintenance ignored
   - Tailored methodology
4. If yes, where did you learn about this?
5. Are you using techniques not in that list? Please describe.
6. How and where did you learn these techniques?
7. To what degree are you developing software under contract for use by companies outside of Russia?
8. To what degree do you use the techniques above for developing this contracted software?
9. What is the relationship between your firm or your projects and the Electronic Russia 2002–2010 political initiative?

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**Jan Pries-Heje** *has a Ph.D. from Copenhagen Business School. He now works at the IT University of Copenhagen. Since 2002 he has also been a Professor at the IT-University in Gothenburg. His main research interests are information systems development, software engineering, and software process improvement. He has carried out research with industry on specific topics such as high-speed software development, IT project management, requirements specification, and successful organizational change with IT. He has published in these areas in journals including* Journal of Accounting Management and Information Technology, IEEE Computer, The Data Base for Advances in Information Systems, European Journal of Information Systems, *and* Annals of Software Engineering.

**Richard Baskerville** *is Professor of Information Systems and Chairman in the Department of Computer Information Systems, College of Business Administration, Georgia State University. His research and authored works regard security of information systems, methods of information systems design and development, and the interaction of information systems and organizations. He is a chartered Engineer, holds a B.S. summa cum laude from The University of Maryland, and M.Sc. and Ph.D. degrees from The London School of Economics, University of London.*

**Galina Ianshina Hansen** *has a M.Sc. in economy from Moscow Technical University/State Institute of Roads and Automobile Transport and a M.Sc. from the IT University of Copenhagen. She is presently a Ph.D. student in the Department of Design and Use of IT at the IT University of Copenhagen. Her research interests are in understanding software process maturity models as a change initiative that requires use of measurements of organizations ability to improve.*