



# Management of an Outsourced Satellite Phone Development Project: Sasken's Experience

## Case

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## Abstract

Although Indian IT industry is well known for its software services business capabilities, product development still eludes the sector. The case illustrates Sasken Technologies', a communication services company in India, five-year journey to design, pre-build, test, integrate and certify a complex end-to-end satellite phone for a global satellite communication service provider. Knowing very well the inherent risks and uncertainties associated with such technology-intensive project, the CEO of Sasken signed the contract with the client with immense belief in his team to execute the project successfully. The case highlights the challenges encountered by the project managers of Sasken in acquiring the technology know-how, integrating hardware and software components, managing globally distributed teams, meeting regulatory requirements and mitigating unforeseen risks inherent in such off-shore outsourcing projects.

## Case

**Keywords:** project risk; global satellite communication; outsourcing strategy; engineering services; multi-site projects

It was a leap of faith on their part. For us too, because there is no history. – Rajiv C Mody, Chairman, Managing Director and CEO, Sasken Communication Technologies.

For the first time, they were combining their software capability in Bengaluru with their hardware teams in Finland and designing a complete product for us. – Senior Director of one of the world's largest satellite communication service providers and Sasken's Client.

## Preamble

One of the world's largest satellite communication service providers (hereafter referred to as the 'Client') wanted to build its own satellite handset at half the prevailing cost of \$1,000 for such phones. With nine satellites in orbit, the satellite service provider wanted to capture the market for voice calls by developing a low-cost satellite phone that replicated the features of a normal mobile handset at an attractive price to customers. After considering various options, including building its own phone, the firm dialled Bengaluru (India)-based Sasken Communication Technologies Ltd. (hereafter referred to as 'Sasken').

In November 2008, Rajiv Mody, Chairman, Managing Director and CEO of Sasken ([www.sasken.com](http://www.sasken.com)), a mid-size Engineering Research & Development (ER&D) firm based in Bengaluru took the call and signed a contract with the Client to build the satellite handset.

This was one of the first attempts by an Indian Information Technology (IT) company to design, pre-build, test, integrate and certify a complex end-to-end satellite phone for a foreign client. The project required expertise in hardware design and development, antenna design, software design and development, integration and testing. Although IT firms in India created a mark for themselves in outsourced IT services projects, outsourced product development was still very rare.

The satellite phone had to be handy, meeting the stringent certification requirements including radio frequency interference testing and mechanical testing. Some of the physical tests include intrusion of solid objects, dust and water on the phone. The phone contained silicon chips, multiple processors, software device drivers, protocol stacks and user interfaces. This required an optimal combination of hardware and software expertise.

Hence, this project was very risky for both the client as well as Sasken.

Should the Client trust an off-shore vendor for such a technology-intensive project to design and build the

phone on time to take it to the market?

Should Rajiv Mody sign the dotted line, committing his firm's resources on such an ambitious risky project?

## Sasken: Company Profile

Sasken is a leader in providing Product Engineering services and Digital IT services to global tier-1 customers. Sasken's core operations involve information technology services and the development of embedded communication software for communication companies across the entire value chain (including leading vendors of verticals such as mobile devices, semiconductors, terminal devices and network equipment). Operating since 1989, Sasken maintains its corporate headquarters in Bengaluru, India, and utilizes several strategically located offices as well as state-of-the-art global development centres in various locations in India; Kaustinen and Tampere, Finland; and Beijing, China. Sasken employs over 2200 individuals globally, has been involved with over 200 commercial products and maintains a portfolio of over 70 registered/pending patents, all of which establish Sasken as a technological innovator and leader within its industry. The company is publicly listed on the India's National Stock Exchange and Bombay Stock Exchange since its initial public offering in 2005.

## Birth of the Project Technical Complexity

Satellite phone is a complex product with stringent requirements of functionality, standards compliance, physical attributes, electrical behaviour, radio behaviour and system specifications. Hence, focused product management is essential. Sasken has many Intellectual Property (IP) components related to mobile networks and standards. It has been an active member of various standardization bodies since 2000. However, satellite phones are different from the traditional cellular phones in terms of functionality, performance and certification requirements. The technicality of catching the signals arriving from the Geo Stationary Satellites, located at a distance of about 35,786 km from the earth's surface, is different from homing onto nearby cellular towers a few kilometres away.

The Client, who is a leading satellite phone manufacturer and service provider with global presence, approached Sasken in 2008 to build its first dual-mode satellite phones that can latch onto both satellite and mobile networks. It was a dream come true for the CXOs of the organization. The then Chief Technology Officer of Sasken, Dr. G. Venkatesh, who has a PhD from one of the most prestigious institutes in India, took this opportunity to showcase Sasken's capability in developing a technology-intensive product.

However, the Client had an earlier unsuccessful out-sourcing contract with another third party vendor for the phone development. Hence, the Client was cautious from the beginning for a successful outcome. It was incumbent on Sasken as per Statement of Work to get the required transfer of technology and knowledge (ToTK) from the previous contractor. Sasken was also responsible for owning all the transitioned elements soon after the three months of ToTK. Hence, there was lot at stake for Sasken to clearly define the scope of the project and manage the requirements effectively for successful project outcomes.

Sasken's forte was its capability in developing embedded software for mobile phones. This was the first time that Sasken would be developing a satellite phone solution. However, the project included developing reference designs and complete working prototypes that included both software and hardware components. The hardware components such as antennas require special skills in design and testing. There were huge uncertainties regarding the technology transfer from previous contractor and the integration of hardware and software components. The only silver lining was that Sasken had acquired a hardware design and testing firm based in Kaustinen, Finland, in 2006 as part of its strategy to provide integrated communication solutions. Although this project provided a perfect setting for utilizing its acquired capabilities, the project would then become a multi-site project spread across India and Finland with its associated challenges in communication, logistics and project management.

With such complexities, why should Sasken be interested in taking up this project?

## Financials and Contract

In general, the contracts in software outsourcing projects are of two types: Fixed Price (FP) contracts and time & material (T&M) contracts (Anandasivam et al., 2003). In FP contracts, the software firm gets a fixed price and pays for all realized costs and hence the interest of the software firm to manage the projects effectively with available resources at minimal costs to meet project schedules. In T&M contracts, although the client pays for all realized costs, the onus of finding resources (mainly competent engineers) for the projects rests with the firm and hence the challenge of effective staff management in a highly attrition-oriented industry. Although, in both types of contracts, the requirements for effective project cost management translate into good planning, it assumes tremendous importance in FP projects. Since the client was interested in Sasken taking the overall product and project management ownership, Sasken leadership had to brace itself with signing on the dotted lines for a fixed price on the project. The project managers were aware that the financials of the project could go either way. If the project was well managed, then Sasken could potentially make substantial profit. On the other hand, if things did not turn out the way it was expected, then there would be cost escalations and the project could go into red.

Should Sasken opt for FP or T&M contract, considering the risk involved?

## Regulatory Requirements

According to Srinivas Prasad, the Program Director of the project, there are strict customs regulations for import of satellite phones in India. The hardware modules would be designed and manufactured outside India as India did not have the hardware capability to do them. However, for software porting and testing, the hardware would be sent to Bengaluru software development centre. The project managers were concerned about the delays and uncertainties associated with this process. There were other complexities as well. Once the software was ported onto hardware, the phone had to be re-tested in the Bengaluru lab. This required satellite radio frequency assignment from the Indian government which often was a lengthy process with a number of bureaucratic procedures.

How should Sasken plan to get these regulatory approvals?

## Capability Management

Sasken had been doing a number of long-tenure projects, with the choice to rotate engineers across roles and even across projects. This job rotation policy was successful in breaking down monotony, improving responsibility of engineers and increasing job satisfaction resulting in containing the attrition of engineers, which was a serious problem in the Indian IT industry. However, this project included design and development that warranted highly skilled engineers and technical architects. It was estimated that the design, development and testing of the phones would take about 18 months followed by another 18 months of maintenance and support. For Srinivas Prasad, holding the project team together for 18–36 months could be a major challenge.

Hence, the risks and uncertainties associated with such large technically intensive project were huge for Sasken. On the other hand, it was a golden opportunity to showcase its talents and project execution capabilities to the world and be an example for the ER&D service sector in India (NASSCOM, 2010). Rajiv Mody and Dr. G. Venkatesh had to take a call on whether they should go ahead with this project or not, in consultations with Srinivas Prasad and other project managers, both in India and Finland.

Taking a huge bet, the call was made by Sasken in 2008 and the dotted line on the contract was signed with the Client on this challenging endeavour.

## Challenges on the Way It Is Requirements All the Way

Clearly writing down the Statement of Work and specifying requirements in large software product development projects is often tricky. A key determinant of the location of product development activity in

software is the location of the user (Sridhar and Vadivelu, 2011). The argument is that if you cannot feel the pulse of the target market, it is not possible to develop a product for that market. This is particularly true with business software and technology-intensive software such as satellite mobile communication. This is the primary reason for the Indian IT industry being more service oriented even today as most of the outsourced work is for customers based in the U.S. and Europe. With the Client located in Europe and product being positioned for the U.S. and European markets, it was a challenge for Sasken project team members, most of whom had not even seen a satellite phone, to conceptualize the product requirements for design and build.

## Project Schedule Management

The project involved two phases: (i) phone development for 18 months and (ii) 18 months of warranty period for support and maintenance. The overall project schedule was divided into significant milestones, and within each milestone, sub-milestones were identified and tracked to completion. The following are the distinguishing aspects of schedule management in this project:

- 1.  
In this project, the hardware was designed in Sasken's Finland subsidiary and the prototypes manufactured in a third party facility at Tallin, Estonia. Subsequently, the hardware prototypes were tested in Finland and shipped to Bengaluru. The software developed in Bengaluru were flashed onto the hardware and tested. However, the hardware testing needed the minimum subset of requisite software, while the software flashing and testing needed a minimum set of hardware configuration. Hardware could not be tested without software and vice versa. Hence, the project managers faced the 'chicken and egg' problem in this project.
- 2.  
The transportation of hardware prototypes from Europe to India took a few weeks and in some cases even months due to customs procedure in respective countries. These had to be clearly incorporated into the schedule.
- 3.  
Moreover, software development often is amorphous and can continue for a long time without showing tangible progress. This would have not only irked the Client but could also demotivate project teams who worked day and night on the project.
- 4.  
There were about a dozen certifications to be done by certifying bodies after the final prototype was constructed. Examples include certification for specific absorption rate (SAR) for radio emission levels, electromagnetic compatibility (EMC) for electromagnetic interference, testing for Bluetooth (BT), global positioning system (GPS), universal serial bus (USB) standards, and compliance to federal communications commission (FCC) and European Telecommunications Standards Institute (ETSI) norms. These required reserving the labs in the U.S. and Europe in advance and conducting the certifications in the lab.

In total, 1300 activities were identified and it posed considerable schedule management challenges for Srinivas Prasad.

## Project Cost Management

Sasken entered into a fixed price contract with the client for this project. Hence, it was very important to contain project costs so that the estimated profit margin could be achieved. In software projects, about 80% of the project cost is due to salary of engineers and architects working on the project. Sasken used a commercial evaluation process to arrive at the project cost and hence the price in the case of fixed price projects. An important input to this process was estimating the person months of effort required for the project and appropriately calculating the cost for engineering resources and subsequently the price of the project. Although it is often much easier to do such calculations for an IT services project, doing it accurately for product development is a daunting task for project managers. The only consolation was that Srinivas Prasad was involved in the development of the mobile network protocol stack at Sasken and had a wealth of experience in managing such projects. Sasken had also been involved in developing multimedia protocols earlier. The software intellectual property (IP) components developed by Sasken could be modified and



adapted for the satellite phone project to some extent. This reuse reduced the overall cost of the project. Moreover, the effort estimates for the current project could be derived using data from similar previous projects handled by Sasken. However, as legendary Barry Boehm noted, software effort estimation continues to haunt project managers (Magne et al., 2009).

In order to contain cost, it is a common practice in software firms to adopt the 'pyramid model' of resourcing so that an optimal combination of fresh and experienced engineers is used in the project team (Ramakrishnan et al., 2011). However, 'right skilling' is very important in technology-intensive projects such as this. Right mix of resources with various experience and skill levels was important to complete the project within schedule and manage the cost within the allowed limits.

The contract was signed off for an 18-month development period followed by an 18-month warranty phase of the project. The project involved more than 100 engineers spread across Sasken Finland and Sasken India.

## Distributed Project Management

To leverage the engineering capabilities existing at different locations, Srinivas Prasad along with four project managers, devised a delivery management structure cutting across geographies and technical domains. Sasken Bengaluru team developed the core software protocol stacks and application framework; Sasken Pune centre was involved in the development of the satellite modem interface and customization of some applications. The experienced engineering team at Sasken Finland handled the hardware design and testing from its facility at Kaustinen, Finland. Sasken Finland also had the required expensive hardware testing equipment at its Kaustinen facility. Sasken at that time had also acquired a small team of engineers from erstwhile Nokia centre at Bochum, Germany, who were experts in hardware–software system integration architecture. While Bochum architects were involved in system architecture, the subsequent system integration and verification were carried out in Sasken Bengaluru. Thus, the delivery management function was split across the above four sites, with project managers at each site reporting to Program Director located at Sasken headquarters at Bengaluru. This enabled spreading activities across dispersed locations based on available capability and integrating them smoothly. The project organization structure is illustrated in [Figure 1](#).

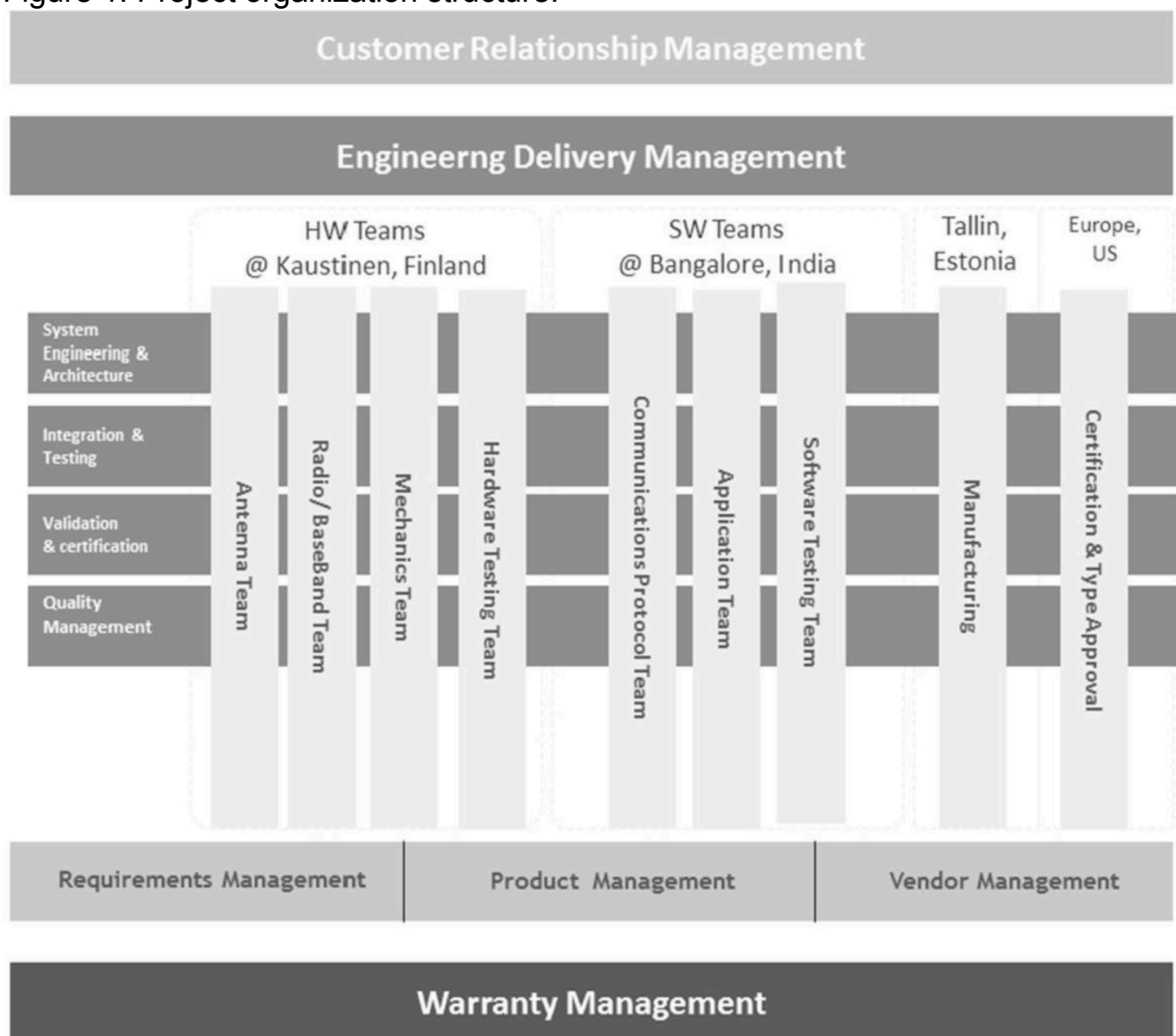
Despite distribution of work across locations, Srinivas Prasad and his project managers faced the following challenges:

- 1.  
Employee retention is key for successful projects. For managers in Indian IT companies that face annual attrition rates of 12–15% in large companies and even up to 25–30% in mid-tier companies, it is all the more challenging to retain skilled engineers and their gained knowledge within the firm and in projects.
- 2.  
It was very important for all the four locations to work collaboratively on the project. While the time difference between Finland and India could be used to increase effective work time (Carmel, 1999), there were communication and cultural challenges that had to be addressed by Srinivas Prasad.
- 3.  
Apart from distributed development locations, Srinivas Prasad also had to manage 13 different component vendors across the globe including the handset manufacturing facility at Tallinn, Estonia. A map of vendors and teams located at different geographical locations involved in the project is indicated in [Figure 2](#).
- 4.  
During the field testing phase, software and hardware bugs arrived from across the world to Sasken. Sasken with a team of support engineers located at Kaustinen, Finland and Bengaluru, India supported the product by resolving critical bugs and releasing feature enhancements and software patches throughout the warranty period. A map of field test and customer support locations is shown in [Figure 3](#).

## Regulatory and Logistics Challenges

The regulatory clearance required for importing and testing satellite phones was cumbersome and lengthy in India. The import and operational license for satellite phones comes under the purview of the Wireless Planning and Coordination Wing (WPC) of the Department of Telecommunications, Government of India (<http://wpc.dot.gov.in/>). The lead time for getting these licenses ranged from 1 to 6 months, depending on the complexity of the phone and its use within India. Sasken India had to import the prototypes from Sasken Finland for software porting and testing. Although Srinivas Prasad envisioned this and appointed a vendor for getting the appropriate licenses, there was a slip by the vendor. Hence, the first consignment of phones got stuck at Customs at Bengaluru Airport for want of the import licenses. Unfortunately, since Sasken did not have any prior satellite phone operating licenses, security clearance by the Central Bureau of Investigation (CBI), New Delhi, had to be completed before the license could be issued by WPC. The problem had to be escalated to Rajiv Mody and required interventions at the highest levels of the government to clear the phones and receive the operating licenses for testing at Bengaluru facility.

Figure 1: Project organization structure.



Source: Authors' own.

Testing of the phone over the satellites in orbit was not allowed in India due to the WPC license restrictions.



There were a total of about 33 handsets imported in three phases from Finland to India over a period of 1 year to synchronize the integration of prototype hardware with the associated software.

## Risk Management

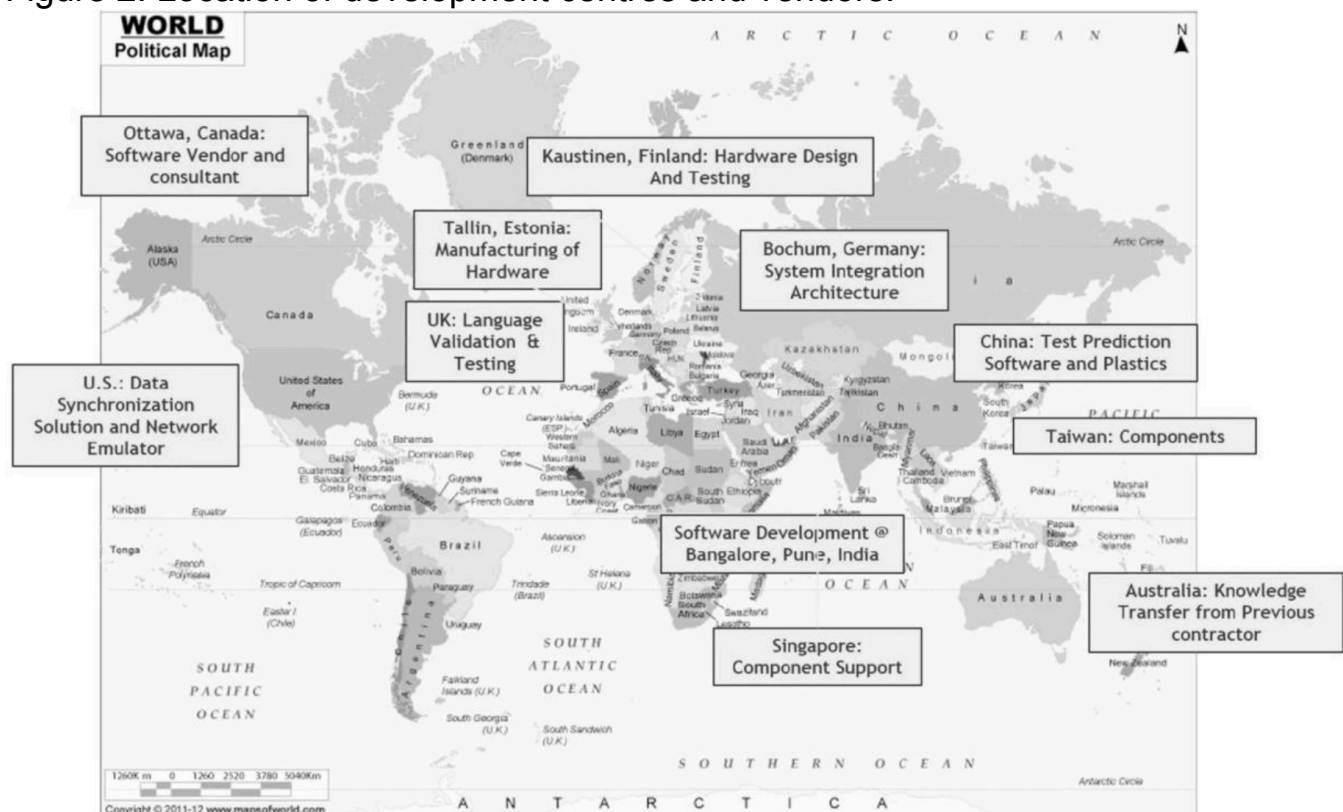
As in any large IT project, risk planning is essential during the initial stages of the project (Boehm, 1989). Sasken followed an organization-wide framework for identifying, analysing and prioritizing risks and preparing risk mitigation plans. The analysis involved assessing risk impact, estimating the probability of occurrence of the risk event and arriving at risk exposure values. Based on the risk exposure values, the risks are prioritized and appropriate risk mitigation plans are formulated based on the priority.

One such major risk occurred one week prior to the announced product launch date. The battery of the phone failed during its certifications due to an incorrect technical specification. Although the Sasken testing team found the reason, it required corrections of the electrical circuitry and testing at the vendor facility in Europe. The project team worked round the clock, revised the circuitry, tested it and re-certified it on time for the launch. During the course of the project, three vendors got acquired. It was incumbent on Srinivas Prasad to re-negotiate the terms and conditions with the new owners of these firms to keep the project going.

While such project risks could be minimized and mitigated through careful planning, natural calamities such as the one described below could not be envisioned at all.

The eruptions of Eyjafjallajökull volcano at Eyjafjöll, Iceland, on 20 March 2010, just a few months before the launch date threw major challenges to the project. The resultant ash cloud led to the closure of most of Europe's airspace from 15 until 20 April 2010. Consequently, a very high proportion of flights within, to and from Europe were cancelled, creating the highest level of air travel disruption since the Second World War. It was at this stage that the last phase of hardware needed to be shipped from Tallinn, Estonia to India for software porting and testing. Obviously, this risk could not be planned and hence required collaborative team effort across locations to manage it.

Figure 2: Location of development centres and vendors.



Source: Map retrieved from [www.mapsofworld.com](http://www.mapsofworld.com); annotations are Authors' own.

There were about 200 risk items identified (80 related to hardware and 120 related to software) in the project which were entered into a risk register and tracked to closure.

## Epilogue

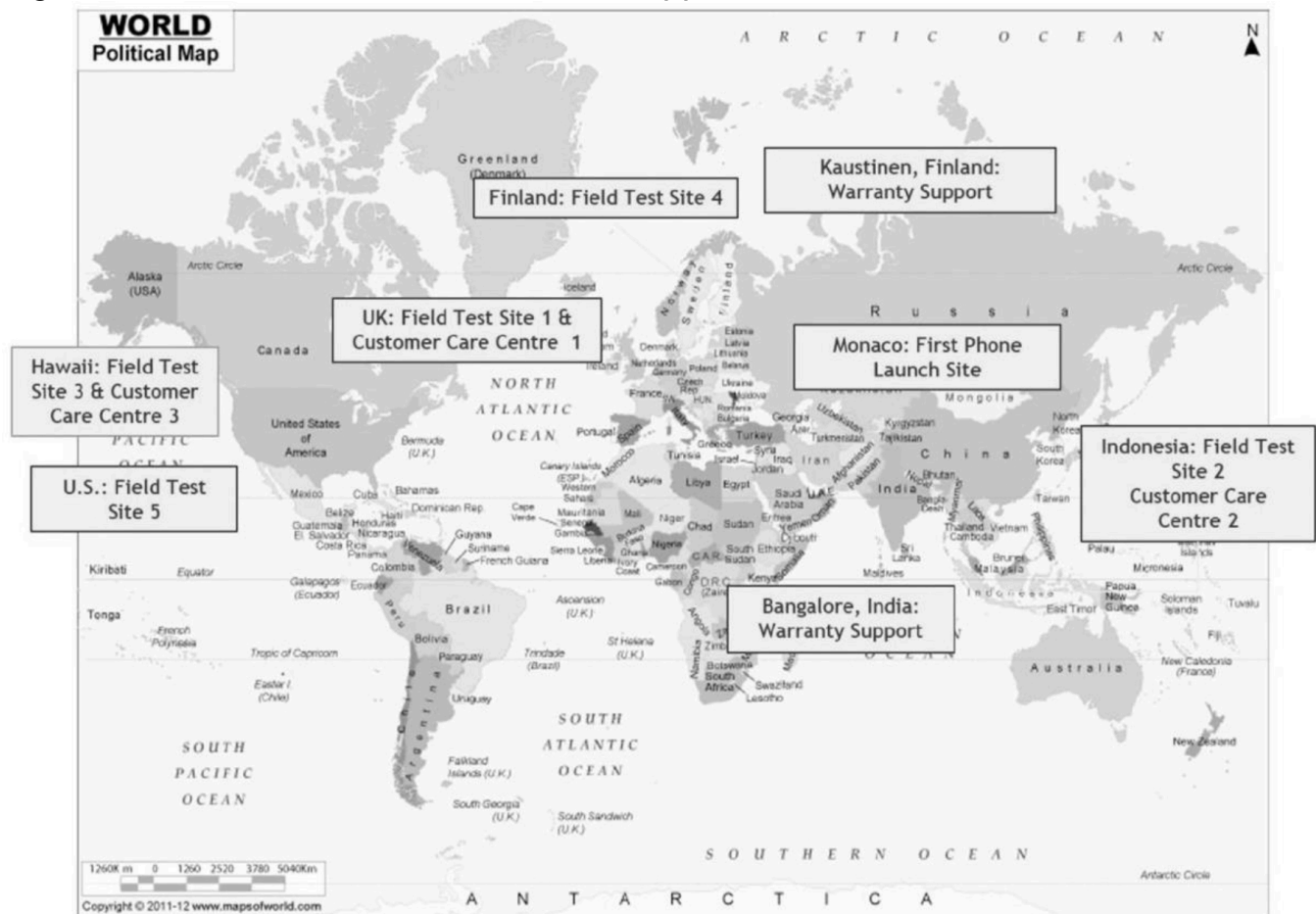
There were a number of lessons learnt by the CXOs, Program Director, Project Managers and the team members during the building, development and support of the first satellite phone for the Client.

Sasken was jubilant when the client's chief operating officer (COO) released their first global satellite phone on 15 June 2010 at Monaco. The following is a quote from him that made the whole Sasken team proud:

The Satellite Phone was delivered on time, on budget with the high quality that is expected of our product. The successful Phone launch was achieved with Sasken's amazing contribution. – COO, Client

After the phone was launched and the development part of the project was completed, Rajiv Mody handed over a Sasken plaque to all the project team members and others who contributed to the project in its headquarters at Bengaluru. The inscription on the plaque simply read "Celebrating Excellence".

Figure 3: Location of field test sites and support centres.



Source: Map retrieved from [www.mapsofworld.com](http://www.mapsofworld.com); annotations are Authors' own.

## Suggested Case Questions

- 1. What are the factors that CEOs should take into consideration when deciding on whether to take up a technically intensive and risky project?
- 2. How should outsourcing vendors manage the product life cycle while building products for distant markets?
- 3. What are the methods to do scope management when dealing with ambiguous requirements?
- 4. How was the global vendor management done in this project?
- 5. How can unforeseen risks be mitigated in projects?
- 6. How and why is communication management important in distributed projects? How can communication gaps be overcome?
- 7. What are the different Human Resource Management practices the project managers can use to retain highly skilled engineers in projects and in turn within firms?
- 8. Why knowledge management practices are important in technology-intensive projects? Suggest few knowledge management practices for such projects.
- 9. Discuss conditions under which a software outsourcing vendor prefers a fixed price (FP) contract versus a time & material (T&M) contract? Was the decision of Sasken to sign the FP contract for this project correct?
- 10. Are reputation and brand important for outsourcing vendors who are involved in Business-to-Business services? And if so, how can they promote the firm's reputation?

## Note

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