

Successful Offshore Testing

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Abstract:

Offshore subcontracting of testing activities is a large potential market that is becoming more and more common. However a number of organizations are unaware of the numerous risks associated with offshoring. This paper lists a number of common risks, including a number of usually hidden (or overlooked) risks and suggests solutions.

Keywords:

Offshore Hidden risks, HyperSpace of Danger, Intellectual Property, Cultural issues, IEEE829:2008, ECSS-E-40b, TPI, ODC, SDLC.

1 Introduction

Offshoring – of software development or of software testing activities – is similar to outsourcing, and is becoming more and more common in the software industry while already commonplace in the manufacturing industry. The size of the offshore market is huge and has been evaluated, by McKinsey in December 2005, at 17.2 Billion USD for India alone. The most common reasons mentioned to offshore activities are:

- Lack of in-house competencies (47%)
- Lower costs (40% of respondents),
- Objective of reduction in development time (and time to market)

The decision is often seen as a simple economical equation, where the daily rate of the offshore contractor is compared to the daily rate in one's own company.

However, there are risks which are seldom mentioned (or addressed) when offshoring development or testing activities. This paper addresses a number of those and suggests mitigation solutions.

2 Types of Offshore solutions

There are different types of offshore solutions available:

- *Pure offshore*, where the only person present onshore is the business development representative, and all the work is done offshore;
- *On site / offshore*, where some of the contractors are onshore (or onsite) and a (larger?) part of the contractors are offshore. This includes the times where a contractor offshore (sub-contracts) some of the work offshore with (or without) the end-customer's knowledge, in order to reduce costs. Several cases of work contracted to India and then sub-contracted to another country come to mind.
- *Pivotal provider* is based on the On site / Offshore version, but sub-contracting is openly notified to the customer. It is based on a partnership between the customer and an offshore provider who in turn subcontracts to a number of

offshore providers. The end-result is usually guaranteed for the customer and the offshore contractor is responsible to ensure the end-result is attained.

- *Resources management* is another solution, where the customer directly manages the resources provided by the offshore provider. In this case the type of services offered is mostly a “best effort” solution.

Beyond the type of contract is also the decision on offshore location. The different parameters taken into account for such decision are :

- Quality of the educational system
- Quantity of trained personnel and
- Low cost of resources.

This helps to ensure that an adequate number of qualified personnel will be available.

2 Selected Offshore Risks & Solutions

In order to ensure the success of offshored work, one must identify the specific risks associated to offshore operation and mitigate them. Methods to identify risks are mentioned in 2.2.

2.1 Risks vs. Threats

Risks and Threats are similar. Threats are events that are sources of concern. Risks are considered as the possible impact (loss) of these events if they occur. The uncertainty factor is the most important aspect in this case: if a threat is 100% certain to occur, it is not a risk anymore, but a problem.

There are different categories of threats (i.e. different levels of risks) such as those to the company (mission threats) or to the project (operational threats such as Design, Activity, Environment and Event threats). These threats should be assessed at customer level and at subcontractor (offshore) level

2.1.1 Mission Threats

Mission threats apply to the project. These include having a too ambitious project, or one where the tasks to be done are not in line with the allocated budget or timeframe. These threats are intrinsic to projects and not specific to offshore. However it is not a reason not to take them into account.

2.1.2 Design Threats

Design threats, such as weaknesses in the work processes, bottlenecks etc. apply to the processes. These intrinsic threats are highlighted with offshore, as the processes of the offshore subcontractor are not identical to those of the customer.

2.1.3 Activity Threats

Activity threats include personnel actions, unreliable performances, and similar threats that may impact the project (and are internal to the project). In the case of offshore activities, it is necessary for the customer to be aware of any such threats at subcontractor level, in order to ensure correct management of these threats. Such threats have also been evidenced at customer level (remember the strikes of the Detroit auto-workers in the 70s).

2.1.4 Environment Threats

Environment threats include those to the morale and the project, but located outside of the project. These threats are present at customer and at subcontractor level. A lower level of morale and/or changing project environment will not lead to higher performances.

2.1.5 Event Threats

Event threats, such as unexpected changes in a process mandated by external events, should also be evaluated. This extrinsic threat will also impact the projects, whether at customer or at subcontractor level.

2.2 Risk Detection Techniques

Standard risks detection techniques are available such as Brainstorming, Fault Tree Analysis (FTA), Failure Mode and Effect Analysis (FMEA) etc. A number of risk detection and mitigation techniques are mentioned in the “ISTQB Certified Tester Advanced Level syllabus” version 2007 (see ref. [1]), such as the TPI® method.

A new technique, the “HyperSpace of Danger”, emerged some years ago to help identify and anticipate risks (see also ref. [5]).

2.2.1 The HyperSpace of Danger

This method has been introduced in France in the 1990s by G.Y. Kervern. It is based on a multidimensional (5 axis) analysis of the possible dangers (i.e. risks) associated to the activities being evaluated. The 5 dimensions are:

- *Statistics dimension*: related to the data available from historic events and statistical data (the environment)
- *Epistemic dimension*: related to representations and models created from the facts (the operation)
- *Finality dimension*: related to the objectives and goals (the social objectives of the organization)
- *Deontological dimension*: related to law, norms, rules and standards subscribed to, mandatory or freely accepted, whether previously controlled or not
- *Axiological dimension*: related to the intrinsic and fundamental system of values and beliefs (those that will lead to self-sacrifice) of the organization and its members.

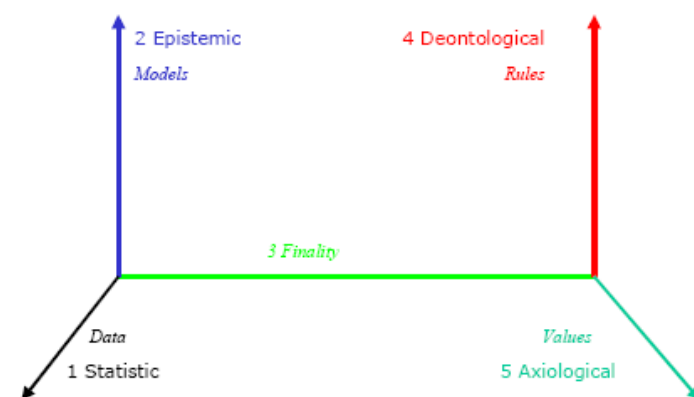


Figure 1 : HyperSpace of Danger

10 deficiencies, named Cindynogenic Structural Deficiencies (DSC), are associated to the 5 dimensions of the HyperSpace of Danger:

- DSC#01: *Infallibility culture*, where the basic thought is “we are the best, no need to ...”, is associated to Epistemic dimension.
- DSC#02: *Simplisism culture*, where the basic thought is “this is simple, let’s make a prototype and adapt it afterwards” is associated to the Finality dimension.
- DSC#03: *Non-communication culture*, where the basic thought is “everybody knows this” is associated to Epistemic, Finality and Deontological dimensions.
- DSC#04: *Navel-gazing culture*, where the basic thought is “we know what is better for the customer (without asking the customer)”, is associated to the Finality dimension.
- DSC#05: *Dependency to production*, where the basic thought is a dependency on delivery dates and production schedule, is associated to the Finality dimension.
- DSC#06: *Dilution of responsibilities*, where the basic thought is “it is not my responsibility”, is associated to the Deontological and Axiological dimensions.
- DSC#07: *Lack of practical feedback*, where the basic thought is “I know what you mean”, is associated to the Statistical dimension.
- DSC#08: *Lack of cindynical methodology*, where the basic thought is “we don’t need standards”, is associated to the Epistemic and Deontological dimensions.
- DSC#09: *Lack of training to risks*, where the basic thought is “don’t worry, it won’t happen”, is associated to the Axiological dimension.
- DSC#10: *Lack of planning of crisis situations*, where the basic thought is that crisis situations will not happen and thus no advanced planning is necessary, is associated to the Axiological dimension.

By looking at the 10 type of deficiencies, one completely covers all dimensions of the HyperSpace of Danger, and strongly limits impact of risks on the organization, project and ultimately product.

2.2.2 The Test Process Improvement method (TPI®)

This method has been introduced in the 1990s by Martin Pol and is widely known in the testing industry. It contains 20 key areas that should be evaluated to determine the level of risk remaining in the company or for the project:

2.3 Risks & Advantages of Offshoring

As offshoring can be seen at multiple levels, the risks and advantages are seen for each type of actor (individual level, company level, country level), with both short and long term impacts.

2.3.1 Customer Risks

At an individual short term level, offshoring can be seen as a major threat, with possible job loss and lower wages. It is indeed more difficult to negotiate a raise when your job may be cut.

In the short term, at organization level the risk of producing a product with an inadequate level of quality is large, as is the risk of impact to time to market.

In the long term, at organizational level, the risk of losing core competences (know-how) is real, depending on what is being offshored. Another major mid- to long-term risk in a global market is the emergence of more competitors, as companies being offshored-to reverse engineer software and produce other (cheaper) version.

At country level, the increase of software activities being offshored leads to a long term reduction in competitiveness and possible inadequate response to market demands. Such consequences can be seen in many industries, whether in the manufacturing of software industries.

2.3.2 Customer Advantages

There are also advantages to offshoring, not only in financial terms: at individual level, it allows the individuals to focus on architecture and design (creative R&D) and to enhance their management and technical expertise.

At organization level, the resources freed by offshoring activities can be used to enhance the knowledge of one's market, and focus on value added services. These activities are directly in line with the Balanced Score Card methodology.

2.3.3 Supplier Risks

The supplier (organization being offshored to) also has a number of risks: at individual level (short term) the domain expertise is quite limited, which leads to a lack of added value.

At organization level, in the short term, the limited timeframe and possible lack of overall project management is an important aspect to be taken care of: business development is a challenge when projects are short and far apart.

At organization level, the possible lack of long-term relationship with the customer, the limited added value provided and the lack of direct (end-user) customer access is an important risk because the organization can not build a long term strategy based on a specific product.

At country level, the lack of domain expertise, the focus on "older" technologies (when maintaining legacy applications) and the strong dependency on the price of resources means that – if another country provides the same level of service for a cheaper price – the customer can leave and whole areas of the economy can be ruined with little prospect for improvement.

2.3.4 Supplier Advantages

Providing offshore services also has a number of advantages for suppliers: at individual level, the possibility to have professional experience, technical expertise and – for some – management experience can be seen as a major advantage.

At organization level there is the possibility to increase short term incomes and develop domain expertise.

At country level, the emphasis can be to develop specific technologies.

3 The Hidden Risks

The risks and advantages mentioned above should not make us forget the usual risks that plague projects such as changing deadlines, ambiguous requirements, incomplete specifications, communication problems, inadequate resource allocation, lack of adequate measurement, conflicting interface definitions, irreproducible errors, invalid

environment and late delivery of the software to be tested. If these plague our own in-house projects, why should we expect that they will disappear for offshore projects? To these known risks we should add a number of hidden risks such as those related to industrialization, contractual impacts, language and culture, interdependencies, and number of suppliers.

3.1 Industrialization

Industrialization is a large source of underestimation by major organization. What can easily be done with a small team is more difficult – and more costly – when done by a larger corporation. Increased numbers of components, of changes and versions, of interfaces, etc increase complexity and impacts cost. When offshoring, and before selecting the supplier, the level of experience in complex industrial integration / projects by the supplier, should be taken into account. Similarly, we know that the quality of specifications and requirements documents is often improvable. This has a larger impact when the developer (in this case an offshore organization) does not have the same level of expertise as the local developer.

3.2 Contractual impacts

Whenever two separate organizations decide to work together, a number of aspects have to be specified, in order to define the respective obligations of each of the parties. These should include definition of SLA (Service Level Agreements), formal milestones, quality metrics, etc.

Some organizations have decided to reduce the number of their suppliers, to have a better leverage and reduce their supplier management. Such solutions lead to a strengthening of the supplier position.

Contract management should also be taken into account, not only the initial contract negotiation, but also any contract changes due to modifications or upgrades, and the impact of multiple versions or releases.

Penalties may be included in the contract, but they lose their impact if the upper level of penalties has already been reached. In such case, penalties can be a bartering tool in the supplier's advantage.

3.3 Interdependencies

Large contracts are those that are often sub-contracted and potential candidates for offshore. In such projects, interdependencies between the different hardware and software suppliers become an important aspect. Interdependencies can lead to delays (how are they compensated?) and must be managed, often by the customer who has the overall project / product responsibility.

3.4 Number of suppliers

When a project is wholly subcontracted to a single – offshore – supplier, the relative power of the supplier is larger than the power of the customer. On the other hand, increasing the number of suppliers makes it easier for the customer to negotiate, at the expense of a more complex supplier management.

3.5 Contract management

An increase in number of suppliers and in number of interdependencies for large – offshored – contracts leads to the necessity of increased quality of specifications and requirements. Conflicting specifications, missing or ambiguous requirements are

frequent in in-house projects. This becomes more difficult to manage in offshore projects due to the contractual impacts to numerous different suppliers. It is thus necessary to ensure the quality, completeness and validity of the specifications, requirements, architecture etc through the use of quality assurance activities at customer level.

3.6 Country specific

Country specific hidden risks include a number of aspects often overlooked, such as: language, culture, localization, time zones and holidays, political & economical stability, weather & climate or Intellectual Property & judiciary cooperation. Of these some come to mind immediately for certain countries, but all should be evaluated for all countries.

3.6.1 Language

English is considered as the international means of exchange. However, even if this language is the means of exchange between customer and supplier, the fact that it may not be the native language of either includes the possibility of data being lost in translation (twice, one from customer to English, a second time from English to supplier language).

In terms of methodology (such as preferred SDLC), the different influences of the cultures will have impacts. If the customer expects one type of SDLC and the supplier uses another, the possibility of misunderstanding increases, as well as the risks.

3.6.2 Culture

Cultural differences abound between East and West, or between North and South (and even between countries in the Western world). Some countries considered it rude to say “no”, and misunderstandings are bound to occur. Similarly, some cultures are reluctant to openly display disagreements, to forcefully argue some points, or are particularly sensitive to “loss of face”. If this is not understood by the other parties, frictions will ensue with negative impacts.

3.6.3 Localization

Some technical differences are overlooked and sources of problems: keyboards arrangement are different in the different countries; the same software – localized in different countries – has different implementations of its libraries (different names for the functions) which impacts the end-user product.

Similarly some languages are right-to-left or left-to-right. Even though if correctly processed in terms of localization, it is necessary to evaluate the impact on drawings: what may be considered a growing curve in one language can be considered as a diminishing curve in another.

3.6.4 Time zones & Holidays

The impact of time zones differences are frequently underestimated with the prevalence of email interchanges nowadays. One should remember that, even if emails are a remarkable asset, they are not as efficient as conversations to exchange information. When one has to wake up extremely early (or stay up very late) the quality of the exchanges will be impacted.

Partnership and cooperation between supplier and customer is extremely important. If the differences in terms of holidays (or week-ends) limit the number of days per week when both customer and offshore supplier are simultaneously present, the quality of the exchanges is impacted. For instance some countries have the week-end on Saturday and Sunday when others have it on Thursday and Friday. When offshoring to such countries, any meeting – teleconference, etc – will need to be scheduled on one of the three remaining days. One has also to take into account regional and religious holidays that strongly impact the availability of resources.

3.6.5 Political & Economical stability,

Political and economical stability is necessary to ensure long term relationships. If stability is fragile, mitigation actions may need to be anticipated. News media provide us with multiple examples of countries which are fragile to some degree or other, either to political or economical impacts: Indonesia after the fall of Suharto, Asian developing countries in the end of the 90s, Afghanistan since 2001, Tibet in 2008, etc.

A thorough and in-depth evaluation of the offshore environment needs to be done before subcontracting to a supplier in such location. One should not forget that western countries are not exempt of risks: think of the organizations located in the Twin Towers on 9/11 and all companies impacted by the financial crisis of the sub-primes in 2008.

3.6.6 Weather & Climate,

Climate and weather might not be considered as a major risk, but should however be evaluated. Tsunamis, earthquakes, ice and snow damages, floods and twisters will impact the projects, either directly by impacting the supplier or indirectly by impacting the supplier's personnel, or the means of communication between the supplier and the customer.

3.6.7 Intellectual Property & Judicial cooperation,

Some countries are known for their capacity to turn out fake goods in record time. Defending your intellectual property rights in these countries is next to impossible.

A significant level of judicial cooperation should be present between the customer and supplier countries, so that the customer's rights can be defended with some chance of success if the need arises. One should also take into account the differences between the different types of judicial systems (common law, Napoleonic code, etc).

This means that international lawyers need to be taken inside the loop to advise customer (and supplier) when the offshore contract is negotiated, and also during the life of the project.

3.7 Capacity for change

One hidden risk that is often overlooked is the capacity for change of the customer's organization. When one is subcontracting offshore, the standard "Plan-Do-Check-Act" activities are changed to "Plan-wait-subcontract-wait-Check" with a possible smaller "Act" at a later stage.

If a lack of product – or project – quality comes to light, the customer has very little means of leverage on the offshore supplier. It is thus necessary to anticipate any problem sufficiently in advance and implement mitigation activities in a timely

manner. This is frequently a challenge for the customer organizations. To believe that all testing and quality assurance activities can be offshored, without strong customer supervision, shows a definitive lack of realism on the customer part.

4 Suggested Mitigation Actions

To all the hidden and perceived risks, one can provide mitigation actions. A number of possible mitigation actions are provided hereafter. Some can be implemented directly before contract signature and some should be enforced during project execution.

4.1 Methodology

The supplier SDLC, standard and development methodologies should be evaluated, and the supplier's understanding of the customer's methodologies should be evaluated.

Either the supplier's or the customer's methodology should be adopted. If the customer's methodology should be implemented at supplier side, the cost – and time – of supplier training should be taken into account.

The selection of the methodology will have an impact in terms of deliverables and available metrics.

4.2 Multiculturalism

Customer and supplier cultures are always different. It is necessary to understand these differences and keep them in mind throughout the life of the project. This may lead to the selection of representatives that have a double culture and are able act as facilitators between customer and supplier teams. They may need to sometimes bypass hierarchical barriers, and must ensure that all parties respect the strictest code of ethics to avoid future problems or litigations.

4.3 Communication & Telecommunication

Communication between customer and supplier teams is mandatory to share a common vision of the end product, and to provide adequate feedback data.

Technical issues are present, such as access to development, integration and testing environments to all necessary personnel (whether on the customer side or on the supplier side). This can be done via VPN and other technical solutions, but some countries prohibit the use of VPNs for censorship purpose.

Aspects such as available bandwidth, speed and security of the data link, monitoring of data usage, etc should also be taken into account.

Synchronization between customer and supplier for the usage of shared environment is also important.

4.4 Transport & Residency

We all know that in-person are often more productive than email exchanges or phone conferences. This can be costly when the offshore supplier is half-way around the globe, with the cost not limited to travel and accommodation (think also of health issues, jet-lag, lost connections, family issues, etc.). However such in-person meetings are necessary so that human rapport and relationships can be built.

In order to overcome a number of the issues mentioned previously, the selection of a customer representative at the supplier site has been implemented in a number of cases. This representative – the resident –is usually an experienced senior member of

the customer staff that is mandated to follow each and every issue raised between customer and supplier. Being resident at the offshore supplier location, with access to the project team, the resident is able to ensure that the project remains on track, to inform the customer team of potential issues at supplier side, and thus anticipate a number of risks.

Aspects that should not be forgotten with Residents is their possible burnout (from being cut out of their roots) and their eventual return within the customer organization: for a period of time they had important responsibilities, increased pay (to cover accommodation, travel expenses and family relocation) and large autonomy, and they will have to be reintegrated in an organization where these perks will be removed.

4.5 Turnover

As offshore personnel often suffer from lower hourly rates, they may be quite susceptible to higher wage propositions. Some organizations even go to such lengths as offering jobs in the parking lot of their competitors. In offshoring projects, the customer transfers information to the supplier's project leaders and teams. If the turnover in supplier personnel is high the information (and any rapport built with the customer organization by these individuals) is lost and new transfer of information (and rapport building activities) must be implemented. This has an impact on the project schedule.

One possible mitigation solution would be for the offshore supplier to provide raises to its personnel, but that impact the project costs and on the attractiveness of the offshore location.

4.6 Changes at Customer level

At customer level some changes will need to be taken into account:

- The decision loop is longer, because most changes will have to be checked wrt. contractual documents;
- Obtaining feedback on the impact of decisions will be even longer because of the distance between customer and offshore contractor;
- Long term impact of any decision should be anticipated because of the difficulty to impose any new change;

To ensure the success of the (customer) project the customer has an important stake in the success of the offshore supplier. It is thus necessary to provision some sort of supplier support or call center, where any question by the offshore supplier can be answered in the shortest possible time.

Evaluation of the defects detected during the course of development should be done. The ODC (Orthogonal Defect Classification) methodology provides a complete set of metrics and measurement that can help customer and supplier to assess the maturity of the product and of the different processes.

4.7 Reporting

Provision of adequate reporting data is paramount to ensure project success. Metrics must be implemented at offshore supplier side, so that the customer team can be informed of project evolution. A significant number of metrics should be selected, so that multiple views of the project status can be obtained.

This may have an impact on the supplier side: provision of periodical metrics requires resources, but should also be considered as of paramount importance on the customer side. Any possible variation in trends should be identified and evaluated as this might be the only available mean to anticipate risks and problems.

4.8 Contractual suggestions

The software industry has much less experience than manufacturing industries in drafting international offshore contracts related to the delivery of quality goods. It is thus useful to follow some of their guidelines.

4.8.1 Legal aspects

Involving lawyers early on in the discussion and in the contractual negotiation is a good way of protecting oneself from the miseries of inadequate contracts. Lawyers will also enable you to assess the risks to your intellectual property and the quality of the judicial support you may have in the offshore country. Notice that your usual lawyer might not be adequate and that you may need to contact international lawyers.

4.8.2 Accountability

You do not want to be the sole owner of the risks to your projects. In order to be able to build a long term partnership with your offshore supplier, it is necessary to ensure that the offshore contractor is accountable. Aspects of accountability include the necessity for the offshore contractors' team members to have a significant understanding of the interface language (both the end-user language to evaluate the GUI, and English or whatever contractual language is used); and also a guarantee that the offshore contractor will not in turn sub-contract any part of the project; that a stable project leadership will remain available throughout the project.

Other aspects that should be taken into are measurement and timely delivery of metrics to enable customer to track project advancement.

Whenever the need arise, it may be necessary for the customer to audit the supplier's processes and activities, to ensure that the agreed processes are properly enforced. The principle of audits and coverage of the associated costs should be mentioned in the contract.

4.8.3 Design Aspect

In order to ensure that the design is of a good enough quality, it is strongly suggested that a formal SDLC be followed, that formal milestones are implemented and that the list of deliverables is defined. This includes qualification plan and description of the different processes such as change management processes. These should be validated by both customer and supplier as they will form the basis on which any audit will compare effective processes.

This implies those customers who agree to the use of agile development methods (such as XP) by supplier, do so at their own risk.

4.8.4 Qualification

Formal qualification against a known list of requirements, with agreed upon test cases and test data, and formal test levels ensuring a complete coverage of all requirements, as defined in the ISTQB syllabus [Ref 1], should be implemented.

Traceability and level of compliance should be provided according to the integrity level of the software as defined in Annex B of IEEE 829:2008 see ref. [3], and take into account the specific risks of the software being developed.

4.8.5 Contractual milestones

Contractual milestones – such as Kick Off, PDR (Preliminary Design Review), CDR (Critical Design Review) etc. – and the specific documentation associated with each of these milestones (cf. ECSS-E-40b ref [4] and table 2 of IEEE 829:2008 ref. [3]) provide a way for the customer to ensure that the project proceeds according to plan. It also enables both customer and the offshore contractor (supplier) to exchange formally at different points in the project lifecycle.

5 A Change of Management Paradigm

As with any human endeavor, offshoring has a number of risks. To all the normal risks associated to project management, one should add a number of additional risks – known or hidden – that are specific to offshore contracts. In order to correctly manage these hidden risks, a shift in the management paradigm must occur at customer level.

6 How to be Successful at Offshore

As with any human endeavor, offshoring has a number of risks. To all the normal risks associated to project management, one should add a number of additional risks – known or hidden – that are specific to offshore contracts. In order to correctly manage these hidden risks, a shift in the management paradigm must occur at customer level.

6.1 At Customer level

The decision to go for offshore suppliers should not be taken lightly. One should first specify the reasons for going offshore and define objectives that will be evaluated during and after the project to see if the decision was sound or not.

6.1.1 Define Expectations

Expected benefits to offshoring should be specified with clear and measurable objectives:

- Reduce time-to-market by nn% for the same costs and quality level
- Reduce costs by mm USD while keeping the same level of quality
- Etc.

If objectives are not measurable, post-project evaluation will only be subjective.

6.1.2 Obtain & Evaluate Information

When contracting, one should always obtain information on the other party to the contract. Once obtained, this information should be evaluated and compared to customer practices, to detect any possible area of concern. Areas that must be evaluated are: configuration management and change management processes; qualification, testing and acceptance processes; traceability from requirements to development and to testing; maintenance and documentation.

6.2 At Supplier level

It is always interesting for the offshore supplier to have a good understanding of the reasons why a customer decides to contract with them. This enables the supplier to keep in mind the principal reasons throughout the duration of the project.

Mapping the customer processes with the supplier processes enables the supplier to anticipate possible requests from customer, and define the deliverables needed.

6.3 Some Tips

The following suggestions have proven to help ensuring offshore projects success:

6.3.1 During Early Program Phase

Establish a Configuration Control Board, and a Risk Management process, so that any change in configuration and all risks are correctly managed.

Ensure that all stakeholder groups participate in requirements process. This will limit the risk of a stakeholder group complaining at a late stage, and changing the requirements.

Provide training on “good” requirements & requirements management process. This limits the risk of inadequate – ambiguous, conflicting – requirements being written in the RfP (Request for Proposal).

6.3.2 Before Release:

Require documentation of change management & requirements management processes, as implemented by the supplier so as to form the basis for possible audits.

Address performance as well as functional requirements in the list of requirements.

Specify approval of the requirements baseline by the supplier, so that both supplier and customer have the same understanding of what is expected.

Document the system interface requirements and all contractual and project interfaces. This will help in defining a traceable system of exchanges where decisions and any changes can be tracked and appended to the contract.

6.3.3 During Contract Negotiation:

Discuss requirements management with the offshore contractor, so that any remaining ambiguity can be lifted

Delineate respective roles regarding requirement development & management, and ensure risk management program and responsibilities are present in contract, so that the limits of responsibility are clearly known by both parties.

Potentially modify incentive plan to encourage offshore contractor. This should not be limited to penalties in case of late delivery or low quality, but should include real incentives for the contractor (and possibly its project staff)

6.3.4 During Program Execution:

Ensure that requirements traceability is maintained top-down and bottom-up, but also from requirement to test case(s) and test results.

Ensure that all software requirements are effectively documented in order to determine their full impact.

Consider requirements changes on a case by case basis, deferring new requirements where possible. One should take special care to evaluate the full cascading impact of any requirement change (impact to software but also to test cases), and ensure that the relevant requirements baseline is updated accordingly.

Involve end-users/operators throughout system development, though this is difficult to implement due to the different location of the customer and offshore contractor. Implement a risk management system (with mitigation and recovery actions and periodic risk assessments). Without such periodic re-evaluation some risks can become more likely and/or have a larger impact.

7 Conclusion

Offshoring adds another layer of complexity to program and project management. When projects are effectively managed in-house, adding the complexity of offshoring can frequently be managed correctly. When projects are not efficiently managed in-house, there is no reason to expect that it will be successful if offshored.

A number of – hidden – risks will always be present, and should be anticipated and mitigated. Most of these risks stem from the difference in culture, education and experience between the customer and the offshore provider. Experience has shown that implementation of a residency program (with Q.A. and monitoring activities) and of partnership-like ties between customer and offshore supplier is a solution that has worked effectively. Another point to remember is that the flexibility available when working in-house is lost and that it will require a larger dose of anticipation by customer management in order to attain the same level of quality.

The size of the offshore market is so large that all emerging countries want a piece of the cake. Any developing offshore market will find its price being undercut by other emerging countries where hourly rates will be lower. Already there are examples where offshore companies in India are already sub-sub-contracting to China. And some Chinese companies are sub-contracting in Vietnam... Decision to offshore is often initially taken based on the difference in hourly rates between the customer and supplier countries. The decision to continue and persevere depends on the level of quality of the delivered products (including time to market), and on a number of other criteria commonly considered as hidden risks. A number of organizations are already turning away from offshore due to these hidden risks.

The end users, your customers, are looking for quality and price, not one over the other. Your decision to go offshore to reduce prices should not impact quality; otherwise your organization may suffer. An increase of Quality Assurance and Testing activities at customer level should be anticipated to ensure that end-user quality expectations are met.

Your shareholders look for return on investment, not higher risks. Offshoring projects increase the risks, so these risks should be identified (the HyperSpace of Danger enables you to detect some of the hidden risks) and avoided or mitigated. Long term impacts, at organization level, should be evaluated before a decision is taken. Testing can provide metrics that enable evaluation of such long term impacts.

At offshore supplier level, taking care to minimize the risks perceived by the customers should be a priority, to ensure that a long term partnership can be implemented. Implementing such solutions will enable fruitful long term relationships.

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