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"An effective method of doing Remote System Testing"

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Abstract

Product Validation or in simple terms Testing has always been a key factor for the success and failure of a project in software industry. The effectiveness of the testing is determined by conformity of the released product with the quality requirements and the cost of the project.

Now as far as the cost of the project is concerned, it plays quite a critical role for deciding, how well was the project executed? In software service industry, one of the steps that a customer may take to reduce the product validation cost is to get their work done from contractual companies at their geographical location instead of calling them to work at their own geographical location if these two locations are quite far away like India and USA. In last few years there is quite a significant amount of increase in the number of testing projects running remotely.

In this scenario, quite a significant effort goes in maintaining the product validation setup and keeping sync between the vendor and contractor for the day-to-day progress and changing requirements in terms of hardware resources and time.

This paper will help customer to take a better decision whether the project should be executed offshore or onsite. This paper also elaborates following areas by going through the case study of the project where remote testing was implemented:

- Team competency build up for the remote setup and necessary training needed.
- Effective communication procedures/methods used between the two party's working offshore and onsite
- WAN connectivity/Bandwidth requirements for remote setup access and test suites execution, alternatives and risk mitigation techniques.
- Minimum lab setup required at Offshore to support remote testing.
- Probable issues during the project and the corresponding corrective solutions
- Proposed preventive solutions issues that may be faced during execution of similar projects

Scope:

In the first part of this paper, I try to put forward few factors, which effects the decision of test execution project location. Later in this paper we will try to understand the various factors we should have in mind to do the effective remote testing from the Contractor perspective.

Analysis:

Lets start with first part of this paper. There are many factors involved when you decide about the testing project location i.e. offsite or onsite. So, lets go through all these factors one by one and try to analyze how they are involved in this decision:

Duration of the project

This factor plays the key role in making this decision. We can possibly divide the duration of the project factor into three categories.

- 1.) Projects with duration less than one year
- 2.) Projects with duration 1 to 2 years
- 3.) Projects with duration more than 2 years

Case 1: If the visibility of the testing project life is for less than one year then the time available for the contractual company team members to understand the product well enough so that they can test the product with good quality is very less. In that case contractual company:

- Doesn't have time to setup the remote connectivity for accessing the testing setup from their location and secondly it will cost a lot and then after a short duration that setup become redundant
- Doesn't have the sufficient time to provide the training to all the offshore team members to make them competent enough to test the product
- Doesn't have the sufficient time for shipment of the required hardware to contractual company location if customer is thinking of setting up the lab setup at contractual company location and secondly it will cost a lot

So, in this case this factor goes in favor of onsite testing. And its better to have the setup as well as contractual team available at onsite to execute the testing project.

Case 2: If the visibilities of the testing project life is for 1 to 2 years then contractual company:

- Has time to setup the remote connectivity for accessing the testing setup from their location
- Has the sufficient time to provide the training to all the offshore team members to make them competent enough to test the product remotely.
- Decision on setting up the lab at contractual company location depends on other critical factors like
 - ❖ Complexity of the required setup: It means the time required to make the setup up and working, local expertise availability and the amount of the hardware for which shipment is required from Customer site to the Contractual site. For example it requires 3 to 4 months of shipment time from USA to India. Total Lab setup time is directly proportional to the amount and the type of hardware shipment required and the complexity of the lab setup installation and commissioning. If all the above things are available then customer can think of setting up the lab remotely.
 - ❖ Availability of space and Infrastructure: Does the contractor has the sufficient space and logistic available for the lab setup? If its yes then this factor goes in favor of setting up the lab at contractor site.

Case 3: If the visibility of the testing project life is for more than 2 years then all the points of case 2 are also valid for this case. But setting up the lab at contractual location is most favorable because

- Has time to setup the remote connectivity for accessing the testing setup from their location
- Has the sufficient time to provide the training to all the offshore team members to make them competent enough to test the product remotely.

- The contractual company now not only has the ownership for quality of the end product but also the whole testing lab setup. So, the Customer will need just to keep good track of the milestones of the testing project and quality parameters or SLA's decided at the beginning of the project. So, the customer has the better peace of mind.

Talent and expertise availability

The product, which needs to be tested, requires the people who have the ability and expertise to plan it and then test it. So, if the contractual company has the similar experience of projects and talent but not actually tested such technology product then the Customer needs should ask the Contractual company to execute the testing project onsite under its supervision.

But if the contractual company not only has the experience of projects and talent but also tested such technology product before then Customer can assume this factor in favor of remote test execution

Time Zone

Time zone difference between the customer and the contractor team geographical location plays quite a significant role in terms of the communication effort and the resource utilization.

Communication Effort: Assume that you as a customer in New York-USA time zone and the contractor team in New Delhi-India time zone. Since the time difference is around 11 hours, you generally communicate through mails. As we all know communicating face-to-face or using Tele or Video conferencing is far more easier than making your remote team aware about the work you have done or the issues you have in your mind. If the mail is wrongly interpreted or content is not understandable then it may cause misunderstanding, confusion or doubts. If this happens repetitively then it might result in waste of effort and contractor may require more time to complete the project. But if there is overlapping period e.g. between European countries and Asian countries then it will be better because Contractor can easily communicate over Tele or Video conferencing during that overlapping period.

Resource Utilization: If team is distributed both at onsite and offshore and the time difference is more than 8 hours, the resource utilization is much better. Each team can use the resource or the lab setup in its time and effectively the productivity will almost be doubled.

Testing scenarios to be executed

This factor might play a key role in deciding whether you want to have the whole lab setup at contractor site or you want to execute the remote testing. Depending on the product you are testing as well as the scenarios involve in the testing can make the difference. So, we can have two scenarios

1. Scenarios, which require lot of configuration change in terms of hardware modification or in simple terms the scenarios which require physical intervention
2. Scenarios which require configuration change in terms of software or in simple terms which do not require physical intervention

Other sub factor is, if physical intervention is required then what is the percentage of that intervention out of the total scenarios to be executed.

So, in case of testing project where lot of physical intervention is required then its better to have your contractual team members available at the same location where the lab setup is present. But if less than 30% of scenarios require a physical intervention then we can deploy one contractual team member at customer site which will help whenever physical intervention is required and other team members can execute the scenarios remotely.

In the other case where almost negligible physical intervention is required then it's better to do opt for the remote testing. So customer will have one contractual member available at customer site who will do the initial hardware and software installation and later day to day hardware and configuration changes which can not be done remotely.

Communication language

As we all know communication plays a vital role in any project performance. Customer always wants to be aware of the project status in terms of milestone tracking and day-to-day issues. Now, if the Customer and

the Contractor has one common language for communication with which both are comfortable then things becomes quite easy to understand in comparison to the situation where the two party's does not have one common language to communicate.

Now, if the two parties' does not have one common language to communicate and the visibility of the project is more than 3 years then its better to have the lab setup at Contactor location. Since the whole ownership now lies on contractor both in terms of setup as well as execution, so the amount or the frequency of communication is comparatively quite less. The two parties' generally focus on Milestone tracking.

But, if the Customer and the Contractor has one common language for communication and the visibility of the project is more than 1 year then the Customer can opt for doing the testing remotely.

Security or Access privileges to customer IPR

In case of Remote Testing, it's difficult for the Customer to enforce IPR sharing policies and keep control or watch on its IPR property. When you try providing the access to IPR property to the remote testing team then lot of work needs to be done at the IT side. But if the testing is done at onsite then the Customer already has its existing system to protect the IPR property and easy to control or watch on its IPR property.

Cost of the Lab setup

We possibly have three scenarios:

- 1.) Basic setup preparation at remote site if the testing setup is available at Customer site and testing is to be executed remotely
- 2.) Whole Lab setup preparation if the testing is to be executed at the Contractor site
- 3.) No lab to be setup as existing Customer site lab to be used and testing is to be executed at onsite

The quick look of the three scenarios gives the perception that the third scenario will cost the least. But from the perspective of overall performance of the project, you might need to involve other factors of the project we discussed so far.

Now, the second aspect of this paper is to give view about the “the effective way of doing the remote testing”. So, let me first introduce you about the general overview on how remote testing project generally starts after all the business deals are done between the two party’s. The project generally starts with few people working onsite. They will be in face to face with the customer in all there day-to-day activities. The Customer and the Contractor team try to understand each other requirements in terms of

- Team member/s competence and knowledge in the concerned field
- Each other complementing attributes and vice versa
- Remote connectivity Bandwidth requirements
- Remote Lab setup configuration requirements

After the onsite team member/s starts working independently, one or few of the team member comes back and try to share the knowledge and experiences with the offshore team members about the customer internal processes and the product that needs to be tested.

Now, lets take the case study of the testing project where our team is acting as the Contractor team and the testing project has to be executed remotely. The project has the following attributes:

- The Product to be tested is a Telecom Product
- There exist a large setup at customer site but it requires both hardware and software change whenever new release received
- Time zone difference is more than 10 hours
- Status of our team competence on Product to be tested
 - ❖ 75% of the team members are well versed with technology of the product
 - ❖ Product concept and architecture is new
 - ❖ Tools used for testing are new although worked on similar tools
 - ❖ Team has the experience of similar testing projects
- Testing teams are available at both the sites i.e. the Customer and the Contractor site although team at the Customer site includes team members from both the Customer as well as the Contractor
- Development team is at the Customer site

Few of our team members visited the customer site for three months to get hands on experience of the customer lab setup and the Customer internal processes involved in the testing project. After few months our team members came back to their site and started the Test Planning. Now, we will go through different aspects of planning which helped us to do the effective remote testing. When we say effective remote testing, it means we tested the product in such a way that we are able to achieve the quality and schedule requirements of the Customer decided initially between the Customer and the Contractor.

Following are the areas of the testing project, which needs to be focused for effective remote testing or the possible solutions to the challenges if testing projects to be executed remotely:

Competency development planning

The purpose of this plan is to provide the right trainings to all the team members so that each team member has the ability to perform his/her task comfortably without any errors. This is a normal process, which happens in most of the projects. But we discovered that few types of trainings are quite critical from remote testing perspective other than normal product related trainings. We found “Effective Communication” training quite useful which deals with communication through mails, teleconferencing, presentation capabilities, etc.

Basically by this part of planning you try to discover training needs of the individual team members by discussion with the individuals as well as with the whole team. And then provide the specific trainings to the individuals.

Strong communication channel and methods availability

It is quite necessary that both the teams should be in complete sync with each other. Now, for maintain the sync you need to communicate. So, we used various methods and tools to communicate between the teams.

Daily status mails: Both the teams send the daily status mails covering very clearly the following three areas:

- Work done by the team today
- Issues faced and their impact
- Any specific things required to be done from the other team, which might help the team in tomorrows work e.g., setup configuration, hardware change, etc.

Regular Meetings: We need to have regular meetings at different levels. We had monthly meetings and quarterly program review meetings either through teleconferencing or net meetings. It covers following areas

- Overall status in terms of milestones achieved
- Issues and their mitigation plan
- Training requirements

Instant Messaging (IM): This tool helps to communicate where you require instant response instead of waiting for the next day to get the response. This is quite a cheap but effective method to communicate in comparison to teleconferencing.

Net Meetings: Using this mode of communication, we are not only having the voice communication with the whole team but we can also view the same remote desktop that has been shared and in turn we can view the same document. This type of method is used for the monthly or quarterly review meetings and test document review meetings.

Common location for the project documents: We have a common location for both the teams to keep the daily status of test case execution as well as the other files related to lab setup update and important latest reference documents. By having this, new updates will be done always on the latest available version files otherwise there will be a risk that different team members or team are using the different version file. This will avoid the unnecessary confusion.

Having a onsite coordinator for support

There should always be one person available at the onsite for coordination. This person will help not only in the coordination work but also do the things, which cannot be done from the remote. For example the scenarios where you require the physical intervention in the setup like adding or replacing with the new hardware, cabling, etc.

Make the remote testing team independent in test execution

If both the team can work independently without the help from the other team in their day-to-day work then not only it saves the other team time and efforts but also gives the good amount of rest so that they has the sufficient energy to do their work in their time. Otherwise they will struggle for other team issues and they won't be able to work efficiently in their time.

Now to ensure this, each team has the expertise to resolve the issues locally. For that:

- We planned few team members' visits to customer site whenever we feel the team requires the training on the new hardware or testing tools.
- Trainings using net meeting with the other team
- Net meetings with Development team for the new features

Remote Connectivity

Remote connectivity is a quite critical element in remote testing. Basically, its availability decides whether testing can be done or not. So, we have following things to take care:

- Availability of remote connectivity and the availability of the mechanism or the process to restore the connectivity if it goes down.
- Remote connectivity bandwidth: We should have the sufficient Bandwidth available to carry out the testing without delays. Actually bandwidth requirement depends on following things:

- The type of application which needs to be tested or the application used to test the Implementation under test. For example we used console-based applications (like Telnet and SSH), Web based applications like http and VNC access for exporting program windows
- Number of users using the remote connectivity

Using online web based test bed reservation system

Since in this project lab setup is being shared among other teams of the company also. We have an online web based system, which is used to reserve the resources as and when a team member or team needs to use the specific resource of the lab setup. There are few rules that needs to be followed for setup reservation

- Resource should be reserved at least five working days before actually using it. This helps other team/team members to plan their activity accordingly
- If more than one team or members want to use the same resource during the same period then it should be resolved by team managers based on the priority and impact of the concerned teams activity
- If particular resources to be used for long duration say more than 3 weeks then it should be reserved at least one month before actually using it.

BIOGRAPHY



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Profile:

I am working in the field of wireless telecom domain for last 10 years. I started my professional carrier as a GSM commissioning switch Engineer for Siemens where I worked on MSC configuration as per their customer requirement.

After working there for few years, I joined Flextronics as a Protocol tester. I worked on various testing projects which involved testing of 3G core network protocols. I also worked on system testing GSM BTS. Currently, I am working on a Testing project of Telecom interface (SS7, GSM and 3G networks) Monitoring and revenue analysis tool. I am involved in planning and execution activities of this project

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