CHAPTER - 3

PROBLEMS & PROSPECTS OF VARIOUS HUMAN RISK FACTORS IN SDLC

3.1 INTRODUCTION

The recent failure rate of the software development makes development people to be aware of the importance of software project risk management [78]. Software Risk Management [79] has been used widely because of risk management in software development will allow the project is developing software that have the efficiency completed as required in time and have high quality. Within the distributed teams, the project manager is the responsible person to minimize the human risk factors. Information technology supports and enables processes and activities of many organizations and departments within the organizations. These include human resource departments, finance departments, manufacturing departments and security related operations [80]. The main activity of human resource department is to enable to find the defects which reduce the productivity and also want to solve them. The software life cycle is divided into several stages, and each stage has a relatively independent tasks. And then gradually complete the task of each stage. Since software engineering has the novelty and complexity, as well as the difficulty of controlling human resources, many companies are facing the imbalance problem of human resources in software development. The problem is mainly reflected in: a lack of management talent, programmer surplus, the uneven distribution of various types of talents during different stages of software development, the people and position mismatch, etc. The purpose of this thesis is to identify the additional risk areas in the distributed teams and develop the frame work to describe that risk areas. By introducing some parameters to that risk areas, the frame work is also designed. From analysing 72 scientific articles, it is identified inherent risks in distributed teams, techniques to solve them, and guidelines for applying the techniques. Then they integrated these findings into a framework to support risk management in distributed team.
Task environment complexity, global team dispersion, process capabilities and coordination in software development which collectively increase task complexity, influence team coordination and software development success in the global context. To address these important issues a set of relevant hypotheses using field survey data obtained from both project managers and stakeholders is used [81]. The cultural work is intended to improve their understandings of the effects of team member cultures on various aspects of team performance, across a range of team types [82]. Group awareness has received considerable attention lately in distributed projects and global software engineering. They found that more than half of all distributed projects fail, most often owing to insufficient communication and trust. There are four types of group awareness namely. Informational awareness, group- structural awareness, workspace awareness and social awareness [83].

3.2 SYSTEM DESIGN

Based on the analysis of the distributed software development environment, twelve risk areas which gives various risk to the human factors in project management is taken in to investigation. These risk areas are categorized in to three categories like very important, important, not important. The risk areas such as task distribution, knowledge management, geographical distribution, collaboration structure, cultural dimension, stakeholders relations, communication infrastructure, technology setup, loss of team coherence, coordination breakdowns, time zone difference and developers skill development training.

3.2.1 Risk Area and its Categorization

The risk identification may be arranged in different ways in terms of timing, scope, participants and techniques. The loss of team coherence, coordination breakdowns, time zone difference and developer skill development training are the newly added proposed risk areas. The loss of coherence is added as a risk area, because the team work is much important in building a software product. Reducing the negative aspects in a job creates greater efficient outcome during the process development. In a team each of the human should be able to realize their capacity and capability. The humans worked in the task must know the task intensity and reliability. Increasing the rewards limit will probably increase the team spirit and work spirit of individuals. Giving acknowledgement for the
well done jobs are also making the humans to create some amount of coherence in between the team.

The coordination breakdowns are also taken as a proposed risk area because equal amount of coordination should needed for the team task. Actually here the coordination is not only mentioned for its relationship between the co-works. It is also related to the communication bonding between the top to bottom levels of the human resource. Eventually the co ordinations are separated in to three forms. Internal and external, vertical and horizontal, procedural and substantive coordination and was explained in chapter - 2. The normal coordination is mentioned by helping in particular task complexity and providing a normal level of association. Handling a good level of association between the team brings an essential thing in coordination. When the degree of coordination increases the percentage of normal present risk will be decreased.

The time zone difference is a major risk area in handling of a distributed team [84]. The task distribution, knowledge management technology setup and other areas were worked by the time as an base. Each of the tasks should be conducted, managed and discussed on the basis of the time, because each team and its members were separated by the geographically separated locations and different time zones. The meeting planner should plan the meeting on working hours. Each of the meeting schedules must be published in company blog or to the private network. If the meetings, online sharing and audio video discussion were not properly carried means, then there occurs a complement in managing the team.

The developers training is also considered as risk area where the proper training is needed for the team for its successful outcome. The reusability of the code in the new system from the existing system, training to manage the proper tools, techniques to adopt, delivery of the process are the steps taken to complete the training process. The training provides an idea to withstand during the project complex city.

3.2.2 Loss of Team Coherence

The loss of team coherence is described by the Frame work. Each of the Steps in frame work is used to increase the motivation of the team. The team motivation creates the team spirit in between the development of team members. The appreciation, decision making rights and good involvement of the team makes humans a way to increase the team coherence.
Motivating human employees in the workplace can be a challenge for a person who makes leadership on teams. When human members work as a team on distributed projects or special assignments each human must exhibit similar levels of energy and commitment to successfully complete their required tasks. Sometimes one or more human in a team possess low morale, which can decrease the productivity of the entire team. Motivating both individual members and the team as a whole is important to the organization’s bottom line.

Employee motivation can be created by using the insight that is created to gained from the discussion to lift the employee's morale by meeting his/her needs such as a better work-life balance or an accommodation in the office. However, when an entire human team is not working up to a standard, it can be difficult to pinpoint the problem. Attempt to motivate the entire team by inspiring the top management executives. Work motivation is the process that initiates and maintains goal-directed performance. It energizes the thinking, fuels the human enthusiasm and colours their positive and negative emotional reactions to work.

Motivation generates the mental effort that drives human to apply their knowledge and skills. Without motivation even the most capable human also refuse to work hard. Motivation prevents humans to convert intention into action and start doing something new or to restart something done before. It also controls employee decisions to persist at a specific work goal in the face of distractions and the press of other priorities. Finally, motivation leads human to invest more or less cognitive effort to enhance both the quality and quantity of team work by their performance.

Allowing employees to take responsibility for completing work assignments helps them to control their productivity and be accountable for the duties they perform. Individual staff members display more creativity when left to determine their own process to accomplish tasks. Motivate the entire team by allowing the team to map out details of how the project will be completed and each step in around them. It will create a good collaboration between them. Taking ownership of the entire project motivates the team to work cohesively to accomplish the process developed by its members. Rewarding an individual employee in one of the company may result in competition between staff members. On the other hand, a team is rewarded on the basis of the
group's performance and not just one employee. If everyone completes the necessary tasks to successfully finish the assignment, the entire team enjoys the benefit earned.

### 3.2.3 Coordination Breakdowns

Creating the coordination between the team decreases the team breakdowns. Here the coordination is categorized into three types. Each of the type is used to describe each type of coordination bonding in between the team members and in turns creates the team activity and performance [85]. The three level of management is described for their coordination type. First is the top level management having the position as the project manager. The second and middle level of the management is the human who involves in leading the team as the team leader. The final and last level is the humans who becomes as the team that they are mentioned as the team members.

The decision making about the requirement change is done within the top level of management and the user site. They convey the changes in requirements through the meeting in between the team leader and other members of the team. The team members are required to change some specifications by their team leader. All types of coordination is done by means of some electronics media and casual meetings. The software development activities across geographic and time zone boundaries present unique challenges to both management and practitioners. A close coordination is required between members of a group. Although tools, techniques and technology do help to improve productivity within a team, the largest gains for improving coordination are all related to the human aspects of relationships between people, teams and organizations. The problems of physically separated groups are becoming a more common challenge due to business needs and the requirement for multiple locations of modern software companies. These issues apply to any discipline in which close coordination is required between humans of a group. The major problem faced by multi-site operation is difficult in contact between team members. The barriers to communication that cause the problem similarly limit the solution. Traditionally software development has been an extremely difficult and time-consuming process and requires more than just common access to source code. Proper improvement in a distributed environment requires tightly coupled work and extra effort in managing the various locations.
Here we split the coordination in to three categories like internal and external, vertical and horizontal, procedural and substantive. The internal and external coordination is must in between the users and customer requirement gathering personals. This coordination helps to improve the good relation in between the end users. The work time charts are used to analyse the task in between the team members. Top, bottom and middle personnel are the three levels of management. Software development project coordination refers to the planning, monitoring and control of all aspects of a project and the motivation. It is used to achieve the project objectives on time and to the specified cost, quality and performance. To carry out these tasks the project partners must set up a management structure and appoint a top level management person, whose main task is to manage the project effectively. Each project should set up a management structure to ensure that effective methods for planning, communicating and decision making in location and it should be finished in as early as possible. The deliverables and reports are delivered on time and within the allocated budget by the organization. The objectives can be achieved by the good coordination. Each and every project should develop a project management framework that works best depending on its scope and the work that needs to be performed.

Nevertheless, the top management structure should at least identify a project manager and project team. For larger projects, a management committee could also be appointed by the top management executives. The top managerial activities such as coordinate and manage project work by monitoring the project progress and performance, Ensuring that project outputs are delivered on time, identify risks, problems, issues and escalate them as appropriate, Managing communication within the project, preparing progress to better coordination, survey on final, and other reports of the project coordination teams. The top ten qualities of a project manager from the top management should have the following qualities like, visionary leadership, ability to communicate with people at all levels, integrity, enthusiasm, empathy, competence, ability to delegate tasks, ability to act under pressure, team building and problem solving capacities.

The low level managers have to work on the basis of the managerial frame work. The procedural coordination is also an important coordination in which the functional units coordinated to emerge the whole content of the project. Here the additional
changes can be initiated, if required. Separated units are totally connected in between the procedural activities of the project.

In the software environment proper coordination is a major contributor to project success in large-scale development. Over a past decade, researchers and some progressive software organizations have been actively studying an area called coordination. This interest is motivated by the continued growth in the size and complexity of application development projects and the use of the internetworking and World Wide Web (WWW) as virtual development tools for the coordination growth. Another driver is the understanding that the context of a software work environment and the formal and informal mechanisms of contact are important to project success, especially in large development projects and geographically distributed projects. The desire to improve coordination has also spawn a numeral of popular computer-supported cooperative work tools and team ware applications that have unbreakable the importance of coordination of separated teams.

The term coordination is defined as "the direction of individuals’ efforts toward achieving common and unequivocally recognized goals and the incorporation or linking together of different parts of an organization to accomplish a collective set of tasks which is handed in advance. In a software development environment this typically means that a common definition of the project exists, all human developers are determined to build and organize the various parts and that everyone is sharing collective information and coordinating design activities as the project earnings. Fundamentally, all the information and activities are being integrated so the application can be handed off to the customer in an expeditious fashion. The factors affecting the team coordination are physical separation, loss of ad-hoc communication, lack of contact among team members, duplication of processes, time zone changes, time to initiate contact or communication, communication differences or preferences, lack of trust, personal work style differences, different backgrounds of team members, new team formation and not realizing there is a need to communicate within team.

A surprising barrier to coordination occurs from the lack of contact among team members. For example, the lack of contact prevents team members from knowing the daily schedules or availability of other team members. The lack of familiar contact usually prevents team members from knowing who is on vacation, who is off-site for training, who is taking a holiday or who is absent due to illness. This lack of contact
makes it difficult to coordinate software schedules and makes it less likely that team members will take the time to try to contact the other team members at another locality.

During the development of the geographically distributed development team trust was not in the beginning apparent as an barrier to coordination. The team communicated by email and with video conferences on a regular basis of schedule. It is noticed that after the team met face-to-face for the first time for a team building session, the relationships between the team members and the project activities has been altered. The agreement from team members was that the software individuals from different locations seemed to work better collectively. There was an improved sensitivity and understanding to the problems that each location had to deal with corresponding tasks. Project problems were resolved faster after the team construction session. Part of this improvement is attributed to increased familiarity with each other and an increase in belief among the various team members. The rest of things can be recognized to the feeling that both groups now realized that they were dealing with the same problems and situations on all projects.

3.2.4 Time Zone Difference

When time zone differences are large humans have to work asynchronously. Asynchronous work also occurs when team members have to split expensive or insufficient, computing or scientific resources, or if the collaboration involves individuals who are too busy to schedule face to face meetings. To overcome this situation humans often exchange e-mail and fax. On the other hand it is often tricky to explain visual content using text even if additional illustrations and possibly audio explanations are attached to a message. This is because these of the media often come in a separate and un-combined form. The viewer of the message must correlate the text with the picture and the audio explanation in order to form a full understanding of the message. Technology might be breaking up distances and allowing folks spread across continents to work together but no matter how good collaboration tools get none of anybody could alter the course of the earth around the sun and eliminate the hassles of time zone differences. Any human who has ever worked with a colleague half-a-world away knows of the occasional necessity of late night calls to bridge time differences but besides knowing how to brew themselves as a strong with a cup of coffee and operate their alarm clock is there anything no humans can make working across many time
zones less painful and more productive. So the time zone difference in between the distributed team makes a strong defect in communication and co working team.

Some managers are there who again and again call humans in other time zone hours well outside of normal business hours. This is the greatest drawback to the humans who are ordered to work in non business time. So the additional incentives must be provided to the humans who were working in such circumstance. Each and every working hours of all distributed team humans should be tracked by the top level management. The distribution of team members does not have a visible effect on performance. Teams with members who all work at the same location do not receive significantly higher performance ratings from their mangers than do teams with members in multiple locations.

Above and beyond geographic distance there are a number of other factors that can vary among globally distributed teams. Some issues such as multinational and multicultural factors that differ among the sites in global teams. Communication style, dealing with conflicts, and the understanding of time add to the differences in distance that global teams must navigate from the one location to another. However, the distance in between the team affects collaboration and that should eliminated by proper time difference zone. Time zone deviations can be especially problematic in the eight hour offsets common in globally distributed teams. Thus we focused on issues around time zone differences with taking account about organization and culture. Here a web tool called world meeting planner is used to maintain a schedule about the meeting times of all human teams in one time. This planner runs on the Greenwich meridian time. It collaborate all the distributed team location and prepare each of the working, non working hours and sleeping hours of each site. The overall meetings in the form of video or audio calls in between distributed teams. Each hour are separated by different colours.

The calendar of this web tool is used to select the date, month and year for scheduling the meeting. The select icon is used to select different cities where the teams are geographically distributed. That is mentioned as location 1, location 2, location 3 etc. By clicking the show time table button the list of working, non working and sleeping hours of the added locations are displayed. From that the project manager can choose one of the table. The table having the details of location, local time, time zone and UTC offset. This is used to know all the details of the local timings of different time
zones. The event time announcer is used as a remainder to give a remainder to the participating human teams about the meeting by sending a remainder mail and by other notifications. This web tool arrange a standard time to the project manager based on the zone of the project manager, that time is the main and actual time of the meeting. Corresponding to the time mentioned the project manager starts meeting through the video calling. The teams from the different location get connected by the group video calling techniques. They collaborates each other and the discussion is continued. If any of humans gets call on non working hours then they have proper rights to get additional incentives. The different locations are having different working hours according to the corresponding work culture of that location. So in the distributed development environment the humans should always ready for collaboration in non working hours also. The video copy must be uploaded in the blogs for future verifications and clarifications. The meeting planner gives possible number of suggestions to the meeting planning personals. According to the suggestions, it is used to know the working hours, sleeping time and non working hours. Meeting schedule can be used to choose the time which is comfort for all the members in distributed teams.

According to the obtained meeting table, for example, in Delhi the meeting time is 9.30, but in Kuala Lumpur the meeting time is 12.00, and in Las Vegas the meeting time is 21.00. The corresponding UTC time is Wednesday, 9th July 2016. The time zone of each location is different from others. For example the Indian cities have time zone as the Indian standard time. The corresponding Greenwich Meridian Time is UTC + 5.30 hours. The time zone difference is the important risk areas because the risk areas such as coordination and communication have a time zone as an obstacle. However without the management of time zone difference the distributed software development environment becomes failed. Although the communication is done through internet, it is easy to transfer the requirements sharing. The face to face meeting is getting more complex due to the difference of each time zone in between the distributed teams.

3.2.5 Developers Skill Development Training

Human Resource training and improvement should be of such nature that it should oil the human resources machinery making it something that takes the association forward. If human resource training and development is not professional the result is a technical setup that is a difficulty to everyone in the organization. Human resource development and training have a vital role in developing the skill efficient of the human developers of
the distributed system. Nowadays, the training and education process is done by the social media networks and by using some common blocks. For example, Webcasts, Webinars and computer-based trainings are the order of the day to make sure maximum participation in a cost effective manner. Another aspect of a modern training and development had a private network that allows the developers to use the website and makes an entry by logging in to that particular private network. Usually the nook and corner of the human team can be connected by means of this private networking organization. The data requirements training can be analysed and discussed in between the team members by using this private shared networking. Each of human team is provided by the user identification and password, by using this they can log in to the network for training and development. If any change is needed the future training and development activities are modified and enhanced or eliminated.

Moving from a traditional training program that is paying attention on the human employees of one agency to a more dynamic interagency and family involved training program can be not an easy one. Training and development is a subsystem of an organization. It ensures that randomness is reduced and learning or behavioural change takes place.

There are two types of structured format.

- Theoretical Approach.
- Model Approach.

The theoretical approach is the approach that having lecturers, demonstration, discussion and computer based training. The computer based training provides the instructional training. It is having the advantages such as reduces the trainee time period which allows the trainee to reach good level and reduces the cost of training. In the model approach a trainer’s job is to organize and develop the training session. Each of the participants or trainee is allowed to access the private network of the organization. The trainee should select the calendar date for the training process. Trainee must know the details of the involving humans such as educational qualification and experience.

After selecting the calendar date the information about the meeting is send to the trainees through the electronic mail. The training and development is done by collecting the core information of the software. Based on the system requirements, hardware,
software tools and user choice the training content is prepared. The description of tools ie, the way to implement the tool in the system design is explained to the trainees. Each of the new tools and techniques are trained to the trainees during the training days. The project requirements and way to fulfil the user requirements are described during the training session. The human resource manager is a main source for this training and development phase. Conducting the workshops to the team including the project manager is managed by the human resource management. The manager is trained to handling the skills of his team members and assist in some human resource situations. The team members had a chance to develop the soft skills from these training. The administrative skills such as meeting management, organizational skills and business writings are trained during project managerial training session. The project manager is trained to handle the team conflicts and different personals in team. The personal development such as public speaking, social intelligent, social integration, critical thinking, stress management and work life balance is developed during this session.

The overall activities, plans, assumptions and interaction between the team members are balanced through the training in the development period. So it is considered as the important proposed risk area which had several impacts to the humans of the development teams that affects the software development. Insufficient training results the less adoption between the humans of the teams and software system. The training and development is an important phase to the business process, which trains the teams to face the user requirements and their needs. It also ensures the greatest productivity to the organization. This also makes the team coordination and team spirit.

### 3.2.6 Risk Resolution Techniques

Risk resolution is a part of risk control techniques of the risk management process. Risk resolution has the prototyping and simulation model. The prototyping is defined as buying information through the physical model. The simulation is defined as the analytical model. We proposed risk resolution techniques in to three ways.

- **Managerial Techniques**
- **Risk manager Techniques**
- **Configuration managerial Techniques**
3.2.7 Managerial Techniques

The project manager is allowed to take some risk resolution techniques in all the risk areas. We proposed some managerial techniques that should be done by manager to decrease the effect of risk area. The project manager is considered as an actor of this framework of the twelve risk areas that is specified as in horizontal arrangement. The managerial techniques such as team structure, conflict management, bench marking, rewards, compensation, locus of knowledge and survey instrument. The distributed software development teams requires motivated and responsible project management committee for the management of different activities related to the project and must also be able to overcome the unique problem of distributed teams.

Team structure is a main activity that should be focused by the manager. A good team structure reduces the risk on future. The team structure should be centralized to its task and the proper team coordination should be maintained. First, all the team should be structured based on the user requirements and that is useful to fulfil the objective of the organization. Second, some essential ideas such as architectural theory and collaboration of tools should be discussed in between the team. Third, internal team decision should be heard from the team members. It gives more ideas to select the better things. Fourth, the team manager should structure the team by analyse the capabilities of the participants. Experienced persons in team are used to maintain the coordination of team.

The conflicts are common in between the humans in team. The project manager should try to resolve the dispute between the team leads without involving the other team members. When there are multiple people involved in business process, there are bound to be conflicts. So the conflicts should managed by the project manager. The conflicts are managed by the project manager by using some conflicts resolution techniques.

- Problem Solving Capacity.
- Compromising Behaviour
- Forcing Capacity
- Smoothing Capacity
- Withdrawal of Single
3.2.7.1 Problem Solving Capacity

Problem solving capacity is necessary to all project managers which involve the use of logical thinking to understand the problem. In this conflict resolution technique, manager will need to understand the view point of all conflicting parties. Finding a better solution to the conflicts is based on the manager’s skill. Problem solving capacity helps to developing trust in the team, since each team collaboratively tries to explore possible solutions. By using the problem-solving technique manager can able to select a better solution to the conflicts.

3.2.7.2 Compromising Behaviour

This technique tries to reach an agreement between each of the conflicting parties giving something. Therefore, both parties don’t get exactly what they want. Hence, compromise is sometimes called as a loss to the good conflicts. Compromise is very useful when the manager is not succeeded with the problem-solving conflict resolution technique.

3.2.7.3 Forcing Capacity

Forcing capacity is involved when there is a need to force conflict party to accept the thoughts and decision of the top authorities. In project management, forcing can lead to the low management capabilities. However, forcing is very useful when manager need to resolve a conflict in the shortest possible time. Manager should conduct meetings with the conflict parties.

3.2.7.4 Smoothing Capacity

This conflict resolution technique involves playing down the issue of the conflict parties. The key focus is simply on the positive aspects. By using the Smoothing technique, a party would not confront the issue; rather the party will treat the problem like it never happen before.

3.2.7.5 Withdrawal of single

This technique is actually not included in conflict resolution technique. Withdrawal simply means to avoid the problem altogether. It is an escapist’s approach to conflict.
Conflicts are one of the reasons that lead to project management failure. The conflict should be considered as important factor in decision making.

The next managerial technique is measurement and benchmarking. Benchmarking is defined as the comparison of the present business process to the best business process of the organization. Measurement is a part of business process that is the fundamental techniques of project management, the global software managers should measure the unique dimensions of the distributed teams which include use of collaborative technologies, meetings and face-time, site handoff effectiveness, issue management and some specific items like telecommunications, travel and labour. Benchmarking is defined as the imitation of something that is exist in a successful manner.

The next managerial activity is rewards, reorganization and compensation norms. The organization recognition and reward policy sets out the process by which team members are rewarded for their commitment to supporting the organization objectives in the performance of their duties. This policy provides a coherent and practical approach for both repeated and one-off payments to be made to the staff in order that individual contribution within a role may be recognized and rewarded in a reasonable way. All members will be rewarded fairly in accordance with demonstrable levels of sustained contribution; this might include the application of new skills and or knowledge in any role developed over time. The outcome of the annual presentation and development review process should be taken into account before an application is made for an award.

The project manager should select the appropriate members for rewards on the basis of progress. An application may be made by either self-application or managerial recommendation. A well-designed recognition and reward policy that creates a work environment where employees feel appreciated for their efforts and contribution serves to attract, retain and motivate employees. Recognition is as simple as saying thank-you or as elaborate as a formal presentation at an organization event. Manager leaves the employees to select what kinds of rewards they would appreciate possibly provide a matching set of rewards that employees can choose from. Rewards can be cash or non-cash. It also can be a promotion. This type of managerial activities can able to minimize the risk in risk areas. By encourage supervisors and peers to thank. The manager establishes formal recognition programs based on a specific organizational goal or value.
Making the knowledge exists in individuals as well as there is collective knowledge in the next resolution technique. Here the knowledge can be gathered from all levels of the teams. The manager can able to select the best individual knowledge and it can be announced as common idea. Individual knowledge is a own knowledge can be known from one by the meetings. It is the knowledge possessed by individual in their minds. This knowledge can be in the form of experiences, abilities and skills of individuals. Collective knowledge also gathered from the team members. Collective knowledge is distributed and shared among members of a group. It is defined as the accumulated knowledge of the organization stored in its policy, procedures and routines. By this resolution technique the manager can allows the team members to participate in public team speaking. It promotes the importance to the speech of humans in the teams of distributed system.

The final risk resolution technique by the manager is to find the risk about the project, people and process from the survey. The survey is the name given to the schedule of questions or response items to be posed to respondents. It is comparable to the terms questionnaire or interview schedule depending on the type of project. The survey of research is conducted by the manager within the team. In this survey both interviews and questionnaire were used to know the drawbacks of humans while working in the distributed projects. This survey is stored in the form of documents and later the top level executives should try to analyse and solve the issues. Since the team members were distributed geographically the survey can be taken by through the organization private networks. Questionnaire is send through mail or other indirect methods of manager. Email surveys are done usually among the least expensive modes and it is used to identify the challenges in distributed software development environment. Also corrective measure is taken to the team members to overcome the challenge.

The managerial techniques are implemented to reduce the risk in the risk areas. Risk resolution process is used to minimize the effect of risk during the development stage. Management techniques are not short-term tricks used to motivate employees, but rather it promotes effective methods of managing that help to develop a productive workplace and also reduces the risk. The risk resolution managerial techniques are able to promote the work force environment to the teams.
3.2.8 Risk Managerial Techniques

The risk manager is a manager who advises organizations on any potential risks to the profitability or existence of the organization. Risk managers identify and assess threats, put plans in place, if things go wrong and decide how to avoid and reduce or transfer risks. In the distributed environment, the risk manager is an important person, who can find the risk on the ongoing development.

![Risk Management (RM) Planning Process](image)

**Figure 3.1: Risk Management (RM) Planning Process**

Risk management planning step produces a coordinated plan for resolving the risk items and integrates the risk management plan with the overall project plan. Net the risk resolution steps are executed according to the schedules in the risk management plan. They are then monitored with respect to the risk resolution milestones, and also highlighted at the project’s periodic upper management reviews.

The risk monitoring activity can identify four possible situations.

The risk item is resolved, completing its risk resolution task. The risk resolution activities are tracking the risk management plan, in which case the risk resolution activities continue as planned. Some risk resolution activities are not tracking the risk management plan, in which case corrective action measures are determined and implemented. The situation changes significantly with respect to one or more risk items. This involves a reassessment of the risks and often a replanning activity.

Each situation produces a somewhat different pattern of operation back through the risk management planning and risk resolution steps. Thus, as with the three risk
assessment steps, the three risk control steps are generally not performed in a purely sequential order.

The next three subsections expand on the techniques involved in the three risk control elements: risk management planning, risk resolution and risk monitoring. As the tutorial material on risk resolution techniques is fairly extensive.

The subsection begins with a discussion of the overall risk management planning process. It then presents a simple standard form for individual risk management plans, provides an example of the form’s use, and discusses the process of coordinating individual risk management plans with each other and with the overall project plan.

An overview of the risk management planning process is provided in the above figure 3.1, the inputs to the process are:

- The list of prioritized risk items resulting from the risk assessment process.
- The candidate risk resolution techniques considered in determining the RRL quantities for each risk item.
- The results of the RRL cost-benefit analyses, indicating the levels of budget, schedule, or other scarce resources required to achieve the corresponding reductions in RE.

The steps in the risk management planning process are presented sequentially in the Figure 3.1, but actually they proceed in a highly concurrent and interactive fashion. The first step, choosing the best cost-benefit mix of risk resolution activities, has to some extent already been performed during the risk prioritization process. However, the second step, developing individual risk management plans for each risk item, will provide more precise information about the resources necessary to perform each risk resolution activity, and about the value of its results. This information may alter the cost-benefit relations and the resulting risk item priorities. And the third step, coordinating individual risk management plan with each other and with the project plan, will often identify cost-effective ways to combine individual risk resolution tasks; sources of conflict for scarce resources (eg. Key people); and need to rework the risk management plans and the overall project plan when these are in conflict.
Since the risk management planning process is also strongly intertwined with the process of determining the system’s requirements and architecture, it is likely that additional system objectives, constraints, and alternatives will surface during the risk management planning process, requiring some further backtracking to the risk assessment process. It is also valuable to review the risk management plan to ensure that the most effective techniques possible are being used to resolve the risk items.

Risk managers are accountable for managing the risk to the organization, its employees, customers, status, assets and interests of stakeholders. They may work in a diversity of sectors and may specialize in a number of areas including enterprise risk, corporate governance, regulatory and operational risk, business stability, information and security risk, technology risk, and market and credit risk. According to the distributed teams the human risk is a main risk that is to be handled first by the risk manager. Key activities of the risk manager are as follows.

- Planning, designing and implementing an overall human risk management process for the organization.
- Risk assessment which involves analyzing risks as well as identifying, describing and estimating the human risks affects the business of the organization.
- Risk evaluation which involves comparing estimated risks with criteria established by the organization such as costs of human work, legal requirements and human environmental factors.
- Evaluating the organizations previous human risk handling techniques and terms.
- Establishing and quantifying the organization risk level about the human risk factor.

Risk reporting in an appropriate way for different audiences, for example, to the board of directors so they understand the most significant risks, to top level management heads to ensure they are aware of risks relevant to their parts of the business and to individuals to understand their accountability for individual risks business governance involving exterior risk reporting to stakeholders carrying out
processes such as purchasing requirements, implementing health and safety measures, transport facilities and making business continuity plans to limit risks and prepare for if things go wrong conducting audits of policy and compliance to standards, including liaison with internal and external auditors providing support, education and training to staff to build risk awareness within the organization for the distributed software system.

**Table 3.1: Personal variables**

<table>
<thead>
<tr>
<th>Personal Variables</th>
<th>H1</th>
<th>H2</th>
<th>H3</th>
<th>H4</th>
<th>H5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Experience</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Hardware Experience</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Software Experience</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Educational &amp; Training</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Range of Successfully completed projects</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

The risk manager determines the human risk by analysing the two factors such as personal variables and technical variables. Some of the risks are known by the answers of the team members and also by tracking the humans or team members on working environment. This will helps to manage the risks. The personal variables such as application experience, hardware experience, software experience, education and training. Number of successful projects are taken in to account. Personal variables are ranged by the Risk manager from knowing the work profile of the humans. Tools usage, database usage, protocols & procedures, source code editor, compiler and architectural case tools are the common technical variables. The human risk factors that affect the distributed software developing environment is given in table 3.1 and 3.2 respectively. In this table H1 to H5 specifies the humans or team members of the distributed team.
Table 3.2: Technical Variables

<table>
<thead>
<tr>
<th>Technical Variables</th>
<th>H1</th>
<th>H2</th>
<th>H3</th>
<th>H4</th>
<th>H5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tools Usage</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Database Usage</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Protocols &amp; Procedures</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Source Code Editors</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Compiler</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Architectural Case Tools</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
</tr>
</tbody>
</table>

From these tables, the risk manager can able to calculate the effects of human risk factors which affect the distributed software developing environment. According to its range, the risk minimizing is done within the distributed environments.

3.2.9 Configuration Managerial Techniques

Configuration is defined as the arrangement of software elements in particular form. The manager who arranges the parts of software to construct system is called as configuration manager. Today’s competitive market place is driven by the consumer or end user who dictates the needed requirements, dictates acceptable performance levels regarding the delivery of system and services and they can change their requirements through the change management. Once the requirements are gathered from the customer area, then the system is started to design. Two important sites are there in the configuration process. That is onsite and offsite models. Onsite and offsite model means, some people will be sitting at customer location to gather the requirements, and provide the solution and actual development/build. That means entire project team will be split into two halves. This is the very common business process in which most of the humans are working in the organizational site. The offsite teams are the teams, in which the humans are working on the organization’s area for the onsite customer requirements.
So responsibility in offsite is to provide the information about requirements and to coordinate the offsite team. People who worked at clients or customer end under clients network comes under onsite team and the other team is known as offsite.

Basically onshore people do all the requirement gathering of the client and does development work as well if required by the end user or client. All offsite people get involved in many different activities such as development, providing support and many other things. In the onsite, configuration manager informs the offsite team about any changes in the work and interacts with offsite team for the new requirement. The offsite team has very limited access to customers. They know the customers requirement through the onsite coordinators, who presented in the customer area. Onsite coordinators gather the changes from the end users or client. The coordinators contact the configuration manager for the discussion about the change. The configuration manager performs the “change analysis” by discussing the changes with the distributed team manager. If the changes will not affect the project core, then the changes are implemented by the approval of change control board. The responsibilities of change control board is given below,

- Risk data requirements for Analytics, Reporting, MIS and Decision capabilities.
- Work with the CCB functions to establish the Data Definitions
- Develop Data Policies, Procedures and Standards for all CCB
- Develop the requirements plans for the distributed teams to make a necessary changes
- Determine the required Customer Data Inventory by CCB functions
- Constantly monitor and report the progress of the data to all stakeholders
- Buying the additional requirements from Stakeholders
- Make ready the teams to accept the implementation of changes
- Direction and support to additional data of the teams

Before implementing the change to the system, the team members should ready to accept the changes that are to be implemented. The risk faced by the humans or team members should be minimized by the following key competencies.
- Critical thinking and problem solving skills
- Planning and organizing the changes
- Good decision-making
- Cultural communication skills
- Influencing and leading
- Work delegation
- Controlled team work
- Negotiation
- Adaptability
- Stress tolerance.

### 3.3 ADDING OF ADDITIONAL RISK AREAS

The further more research on risk area in distributed teams are by adding areas like interaction with requirement engineers, work flow assessment, team work imbalance and ongoing education of new developers. The problems unsolved are self management between the members, communicational barriers, WBS monitoring by project manager, comparing the system outcome with requirements. The objective to be fulfils are regular communication between the members in common language, providing time schedule themselves, WBS monitoring by the common person and tracking all risk area by monitoring. Each of the risk areas are denoted by using separate parameters.

Adding four more risk areas to the existing eight risk areas, a table is formed in table 3.3.

Interaction between the Requirement Engineer’s (RE) with the participants is a important risk area to the distributed teams. The tasks which are completed by the teams need to be compared with requirement engineers. So the regular communication between the teams and RE’s paves a way to promote users satisfaction as in figure 3.1. This communication can also be defined as the road map to the distributed teams.
Table 3.3: Risk Areas and Descriptions

<table>
<thead>
<tr>
<th>RISK AREAS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task Distribution</td>
<td>Separation of task in between the team members.</td>
</tr>
<tr>
<td>Knowledge Management</td>
<td>Managing the knowledge in between the members. Eg: Resource allocation.</td>
</tr>
<tr>
<td>Geographical Distribution</td>
<td>Space and time distribution.</td>
</tr>
<tr>
<td>Collaboration Structure</td>
<td>Coordination between the participants.</td>
</tr>
<tr>
<td>Cultural Distribution</td>
<td>Cultural basis approaches between the members</td>
</tr>
<tr>
<td>Stakeholder Relation</td>
<td>Mutual trust and relationship between the stakeholders and teams.</td>
</tr>
<tr>
<td>Communication Infrastructure</td>
<td>Interaction media to promote the communication between the teams</td>
</tr>
<tr>
<td>Technology Setup</td>
<td>Tools and technical setup.</td>
</tr>
<tr>
<td>Interaction With RE’s</td>
<td>Communication between the requirement engineers and the team members.</td>
</tr>
<tr>
<td>Work Flow Assessment</td>
<td>Collecting, Checking and Reporting of work flow between the members by the project manager.</td>
</tr>
<tr>
<td>Team work balance</td>
<td>Team work activities should be recorded in project management data base.</td>
</tr>
<tr>
<td>Ongoing education of new developers</td>
<td>To provide proper education, training to the new participants.</td>
</tr>
</tbody>
</table>

Figure 3.2: Interaction between the Members and RE’s, in turns increase the User Satisfaction.
\[
RE(1,2)^k + \sum_{t=1}^{n} \rightarrow (< \text{(user satisfaction)})
\] .......................... (3.1)

1. RE’s from 1 to k, team members \( t = 1 \) to n, adding of these two in turns increase the user satisfaction.

2. The work flow assessment of distributed teams is an adequate feature which would able to determine the path of the activity. Meetings between the team members by the project manager increase the work force between the members. It could be considered as review meeting. From this the periodical meetings, manager could able to know the flow of the system construction.

3. The task monitoring of teams by using balanced sheets can able to schedule the work, work progress, to create team work balance to track. Each of team member’s task, working hours, modules completed can be recorded in those work sheets. The work sheets contains worker name, work allotment column, work finished column and time taken by the member to finish the particular task.

\[
M_{t=1}^{n} (PM) = < (\text{Work force})W^{mn}
\] .......................... (3.2)

Meeting of team members from 1 to n, by the project manager, obviously increased the work force of n team members by m modules.
Figure 3.4: Team work Balance - Task monitoring by Worksheets gives the details of the completed modules.

\[(\text{Task monitoring})^n = \int_1^n \text{teams (work sheets)} \sum_{t=0}^n \text{completed modules.} \quad (3.3)\]

n- number of Task monitoring gives the team worksheet from 1 to n task gives the completed modules.

4. Ongoing education of new developers should be conducted on the basis of the skill of the participants.

This study also describes the problems that are to be solved. They are

- Self Management between the members
- Communicational Barriers
- WBS monitoring by Project Manager
- Comparing the system outcome with requirements

The self management between the each member of the distributed teams can able to with stand during some situations. This report also proposed the strategy about the communicational barriers between the distributed teams. The team members should follow a common language for the communication. The conversation between the members are good means, it create the coordination between the members. The WBS of distributed team should be monitored by the project manager. By this the manager can able to coordinate the work details and other details. Then the outcome of the each module should be compared to the requirements which are mentioned by the user. This report proposed also a common person to track all the risk areas. By tracking the risk areas, it is easy to find the defects faced by the teams. The tracking person should capable to integrate the task with the corresponding modules. The present study
proposed an additional tracking table to the work flow tracking person as reported in table 3.4 and 3.5.

**Table 3.4: Task allocation**

<table>
<thead>
<tr>
<th>Team Members</th>
<th>Task Provided</th>
<th>Time Given in Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM 1</td>
<td>Task 4</td>
<td>5 Days</td>
</tr>
<tr>
<td>TM 2</td>
<td>Task 2</td>
<td>8 Days</td>
</tr>
<tr>
<td>TM 3</td>
<td>Task 1</td>
<td>10 Days</td>
</tr>
<tr>
<td>TM 4</td>
<td>Task 3</td>
<td>6 Days</td>
</tr>
</tbody>
</table>

**Table 3.5: Task completion**

<table>
<thead>
<tr>
<th>Team Members</th>
<th>Task Completed</th>
<th>Time Taken to Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM 1</td>
<td>Task 4</td>
<td>7 Days</td>
</tr>
<tr>
<td>TM 2</td>
<td>Task 2</td>
<td>6 Days</td>
</tr>
<tr>
<td>TM 3</td>
<td>Task 1</td>
<td>11 Days</td>
</tr>
<tr>
<td>TM 4</td>
<td>Task 3</td>
<td>6 Days</td>
</tr>
</tbody>
</table>

The time taken to complete every assigned task should be monitored by the tracking person. If the time taken to complete the task is extend from the allocated time means, the reason must be known by the tracking person.

**3.4 RISK ASSESSMENT TECHNIQUES**

The risk assessment includes risk areas, risk identification, risk analysis and risk prioritisation which are tabulated in table 3.6 and 3.7.
Table 3.6: Risk Assessment Techniques

<table>
<thead>
<tr>
<th>Risk Areas</th>
<th>Risk Identification</th>
<th>Risk Analysis</th>
<th>Risk Prioritization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task Distribution</td>
<td>Check list is used to identify the risk in dividing the tasks</td>
<td>Analysing task with the distance of the team participants</td>
<td>Low-Task fits capabilities Medium- Task fits medium High- Task unfits with capabilities</td>
</tr>
<tr>
<td>Knowledge Management</td>
<td>Decisional Driver Analysis</td>
<td>Performance Model</td>
<td>Low- Fully Managed Medium- Manageable High- Cannot be manage.</td>
</tr>
<tr>
<td>Geographical Distribution</td>
<td>Maintain Site Autonomy</td>
<td>Task overview within and across sites</td>
<td>Low-Average distanced team Medium-distanced team High-Very distanced team</td>
</tr>
<tr>
<td>Collaboration Structure</td>
<td>Focus on Deliverables</td>
<td>Team collaboration over different sites</td>
<td>Low- Less coordination Medium-Medium coordination High- Good coordination</td>
</tr>
<tr>
<td>Cultural Distribution</td>
<td>Language barriers, Work cultures, Bias</td>
<td>Improve coordination</td>
<td>Low-Less barriers Medium- Medium barriers High-Heavy barriers</td>
</tr>
<tr>
<td>Stakeholders Relations</td>
<td>Work Flow Relations</td>
<td>Analysis by using Checklist about the work modules</td>
<td>Low-Good relations Medium –Normal relations High- Worst relations</td>
</tr>
<tr>
<td>Communication Infrastructure</td>
<td>Adopt appropriate communicatio n Technologies</td>
<td>Handle different methods along the sites</td>
<td>Low-Good infrastructure Medium-Normal infrastructure High- Less infrastructure</td>
</tr>
<tr>
<td>Technology Setup</td>
<td>Improve Development Technology Skills</td>
<td>Handle Prototyping to analyse the technology</td>
<td>Low- Better Tool compatibility Medium-Approximate compatibility High- Low compatibility</td>
</tr>
<tr>
<td>RE’s Interaction</td>
<td>Emphasize early interaction activities</td>
<td>Analysing done by proper medium</td>
<td>Low-Useful interaction Medium- Approximate interaction High-Less interaction</td>
</tr>
</tbody>
</table>
### Work Flow Assessment

| Identify Risk based on collecting, checking, reporting the Task. | Analysis is made basis on the Actual task and completed task | Low-Good Assessment Medium-Approximate Assessment High-Low level of Assessment |

### Team Work Balance

| Able to identify the work balance in between the participants | Work loaded to the talented participants above their assignment | Low-Normal separation according to the Participant position Medium-Medium level of work force High-Talented gets tied |

### Ongoing Education Of new Developers

| Identifies the Drawbacks of new participants by answering QA. | Identify the technical talent needed to the participant on basis of the task | Low-Participants able to build modules Medium –Participants needs some help from their trainees Low-Participants have no idea about module buildings |

### 3.5 RISK CONTROL TECHNIQUES

The risk control techniques include risk areas, risk management planning risk resolution and risk monitoring it is given in table 3.7

#### Table 3.7: Risk Control Techniques

<table>
<thead>
<tr>
<th>Risk Areas</th>
<th>Risk Management Planning</th>
<th>Risk Resolution</th>
<th>Risk Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task Distribution</td>
<td>Planning to give adequate support with knowledge, and other resources.</td>
<td>Benchmarking Techniques.</td>
<td>Corrective Action by Decision Manager.</td>
</tr>
<tr>
<td>Knowledge Management</td>
<td>Establish Shared Control Mechanisms.</td>
<td>Staffing Method Knowledge management between Staffs.</td>
<td>Capturing More Knowledge From different Existing system.</td>
</tr>
<tr>
<td>Geographical Distribution</td>
<td>Reduce Zone difference by choosing approximately time zones.</td>
<td>Establish Temporal coordination mechanism, Maintain task overview.</td>
<td>Monitor and Improve Communication, Adjusted meeting to Distributed context.</td>
</tr>
<tr>
<td>Collaboration Structure</td>
<td>Maintain Supportive environment, Analyse and manage the errors.</td>
<td>Create Shared Collaboration Platform, Maintain project organization overview.</td>
<td>Monitor the structure and improve the Communication.</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Cultural Distributions</td>
<td>Combination of Cultural dimensions, Collect existing team culture and methods.</td>
<td>Improve capability to manage cultural differences</td>
<td>Establish Shared Goals. Adopt appropriate communication Technologies.</td>
</tr>
<tr>
<td>Stakeholders Relationship</td>
<td>Use face to face Meetings Appropriately.</td>
<td>Create Sharing of task information and requirements</td>
<td>Define Roles and Responsibilities of the Stakeholders.</td>
</tr>
<tr>
<td>Communication Infrastructure</td>
<td>ICT, Telecommunication Technologies.</td>
<td>Introduce language training, Establish English as Official language.</td>
<td>Use Supporting Techniques, such as Spell Checkers, Translators.</td>
</tr>
<tr>
<td>Technology Setup</td>
<td>Standardize and train in methods across sites</td>
<td>Focus on the strengthening the participants in tools, techniques</td>
<td>Devise task according to the sites, techniques, talent of the participants</td>
</tr>
<tr>
<td>RE’s Interaction</td>
<td>Buying information from the RE’s and Compare the ongoing process of task.</td>
<td>Benchmarking is used.</td>
<td>Monitoring to find the progress of the interaction.</td>
</tr>
<tr>
<td>Work Flow Assessment</td>
<td>Plans implemented for the regular assessment.</td>
<td>Ongoing Progress can be easily known.</td>
<td>Database is Managed by the project risk control management.</td>
</tr>
<tr>
<td>Team work Balance</td>
<td>Team should work basis on the work plan view.</td>
<td>Create, Request, Update, Delete Should be registered.</td>
<td>Monitoring the work schedules, and apply additional requirements on demand.</td>
</tr>
<tr>
<td>Ongoing Education Of New Developers</td>
<td>Prototyping Training of the trail system within hemselves.</td>
<td>Chance to get experience from prototyping</td>
<td>Maintain the Support of specialist to the new developers.</td>
</tr>
</tbody>
</table>

The flow chart for total risk area and the risk management framework is in figure 3.4
3.6 RESULTS AND DISCUSSION

Adding four more risk areas in the proposed system, it can be used to denote the risk in distributed teams. The objectives to be fulfilled are included on the research on the basis of the existing risk area. Given parameters to those areas can able to measure the efficiency of that areas, and also those impact of the risk on distributed teams. The user satisfaction is the most important thing that to keep in mind by the distributed teams. In this study, the communication between the teams and RE’s are denoted by giving more importance. So the teams can able to discuss the relevant modules with those early requirements. Periodical meeting are noted as the important conversations between the project manager and their distributed teams. From these meetings, the Project Manager (PM) can able to understand the task flow and task management of the teams. The next area is task monitoring; here the task is monitored by the work sheets. Each task is
separated and provided to the proper persons of the teams. The assignment and the completion of the task of teams can be known easily. The above mentioned all risk areas are categorized by the risk management practices. Risk management practices has two major sets, they are risk assessment and risk control. The assessment has identification, analysis, prioritization and the control techniques have management planning, resolution and monitoring. By implementing this risk management framework the minimization of people risk in distributed team is concluded.