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Structured Role Based Interaction Model for Agile Based Outsourced IT Projects: Client's Composite Structure

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Abstract: In this study, we have explained and elaborated the client's factor and interaction during software development project through model diagrams. This research presents the composite structure of client by analyzing the role it plays during software projects. Role of client is presented from both technical and non-technical aspects. Key roles in a software team are identified and both Intra-team interactions and client-team interactions are explained through an interaction overview model. A cross case analysis of real projects is performed to verify and validate the findings. Both client's composite structure and interaction overview model provide a deep understanding of clients and interaction strategies to the researchers and industry practitioners. The research predicts that future process models and framework would be purely based on client factor instead of heavy weight processes and standards.

Key words: Agile, client, interaction, offshore, outsourcing, roles

INTRODUCTION

Project outsourcing has emerged as a common practice in global software development (Cho, 2007) industry (Rao, 2009). Outsourcing has rapidly changed the overall software development trends. Traditional software engineering practices are increasingly being replaced with agile methodologies due to certain limitations as described by Ferreira and Cohen (2008) Cockburn and Highsmith (2001). By discouraging centrally located teams it has promoted geographically distributed offshore team structures (Phalnikar *et al.*, 2008). The decision of project outsourcing is based on many factors like cheap and skilled developers, more advanced tools and technologies and early launching a product early in the market (Rao, 2009). From relocating development teams to leaving traditional software engineering models and approaches it has revolutionized overall software development practices. Overwhelming response to agile based light weight methodologies over traditional heavy weight approaches is also considered due to project outsourcing. Offshore teams along with client work in very close interaction and collaboration. Frequency of interaction is apparently high. During this interaction client is quite influential on the project and development processes. Client's interest and decisions take priority over established processes and practices. Fulfilling the client's requirements is the ultimate goal of every project. Instead of putting more effort on documentation and processes, both client and developers seems agreed on preferring direct coding and

development. Agile models also provide support to these practices (Ferreira and Cohen, 2008). In addition to these characteristics short iterations and quick deliverables has made agile methodologies so popular among developers (Mirakhorli *et al.*, 2008). Project pressure also causes deviations from established processes (Lawson, 1999). Standards like CMMI, ISO, Six sigma focuses on practices for process improvement but they do not propose best practices for software development (Card, 2004). These currently building scenarios such as agile development, offshore teams have highlighted the importance of role of the client. Also in agile manifesto emphasis is given to client based development which is more likely a direct communication process. On contrary agile methodologies provide limited support to globally distributed software development (Turk *et al.*, 2002). Face-to-face communication is hard to adopt in such environments. In such cases modern technologies and proper project planning and management techniques can be supplemented to it (Turk *et al.*, 2002). Face-to-face communication with the client to support the distributed agile based development has already been presented through DAAD model (Akbar *et al.*, 2008b). The model has emphasized on close and interactive communication with the client to bridge the gap of offshore development. In spite of its effectiveness, model is unable to present communication interaction strategies in offshore development. Also client is not properly addressed in the model. As an extension to DAAD model, client based requirement gathering and tracking process was introduced in (Akbar *et al.*, 2008a). Client of a software

project and interaction strategies are rarely addressed by the researchers. In this study we have presented these models. Advanced development strategies have realized the importance of client but unfortunately researchers have not paid deserved attention on this important aspect. Business management group has built up their strategies by realizing the importance of client (Hills, 2007). Problem with such client based business models is that they are more focused on client's interests, likes and dislikes.

They are more likely strategic business and marketing models for client. The concept of client for IT people is different from business group. The difference in perception of client by business management people and IT people is the obvious reason behind it. For business group client is a customer and buyer of their products while for IT people client is the owner of the project and investor. Fundamental concept of client for both at grass root level is same. Gable and Chin (2001) discussed in their two-actor model that client's involvement is considered as a key success factor. Also factors that may encourage and discourage the client's involvement have been discussed. The consultant and client's viewpoints have been well explained but no evidence is found on the role of client in overall software project development life cycle.

The role of client becomes more effective when it interacts and communicates with different key roles such as project manager and team leader in an offshore software development team. Alone client is not a decision maker. Communication, interaction and coordination between client and these roles become more critical in offshore development. We could find very limited research works on models and frameworks that describes client and its interaction strategies with offshore team. This study is the part of work that has already been published by Akbar and Hassan (2010). In this study two models are presented. First model is a fundamental structure of client that gives the answer of 'What is meant by Client in Software development projects?' Second model identifies the key roles in an offshore team and provides a model of client based interaction process. Client's involvement is presented through interaction between client and other key roles in an offshore software team. For the first time, in this study, the composite structure of client is presented. Various contextual roles of client are also described in it. The model recommends the effective interaction process between client and key team members. We have already explained how to maintain client's perspective during software development projects through 'The Spider Web Model' (Akbar *et al.*, 2010). The model presents how client based practices could be adopted and maintained throughout

the agile based software development project. The model presented in this study is a part of our client based process management research work. Our client's interaction model is an extended component for existing agile based methodologies. Very limited research works in this regard bound us to rely on our academic and industry experiences and real project's analysis as participant to make the findings to complete these models. Case study is conducted to provide support to our model. The model was implemented in real projects and results are described based on our observations and analysis.

The structure of client: The role of client in software development projects is diversified. The role client performs in different projects depends on many factors such as project domain and technical expertise of client. In case of outsourced projects, the role of client becomes more important. From the start of the project till its end, client has to keep its grip on the project. Client may be a single person (owner of the project) or more than one person (client's resources). These roles vary from project to project, client to client and are purely need based. Global Software Development (GSD) has changed the style of information system development (Cho, 2007). Unlike traditional approaches project outsourcing to offshore teams has introduced the client as a third key role player as shown in Fig. 1 (Cho, 2007). Though the importance of participation of stakeholders in development process (Nussbaumer *et al.*, 2006; Biffi *et al.*, 2007; Giordano and Bell, 2000) has been realized but rarely researchers have discussed the critical role of client in this perspective. We have observed that roles of same client in multiple projects are not necessarily the same. The roles performed by IT professionals at client side were most likely the same as they existed in offshore project teams but were need based. The fundamental structure of the client and its roles are shown in Fig. 2.

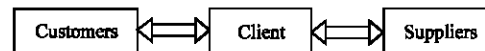


Fig. 1: Three main players in GSD (Cho, 2007)

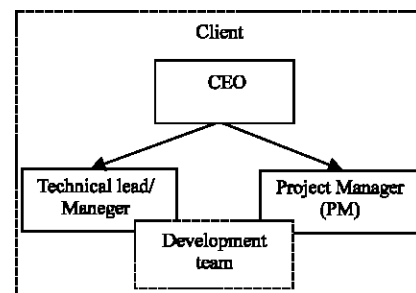


Fig. 2: The structure of client

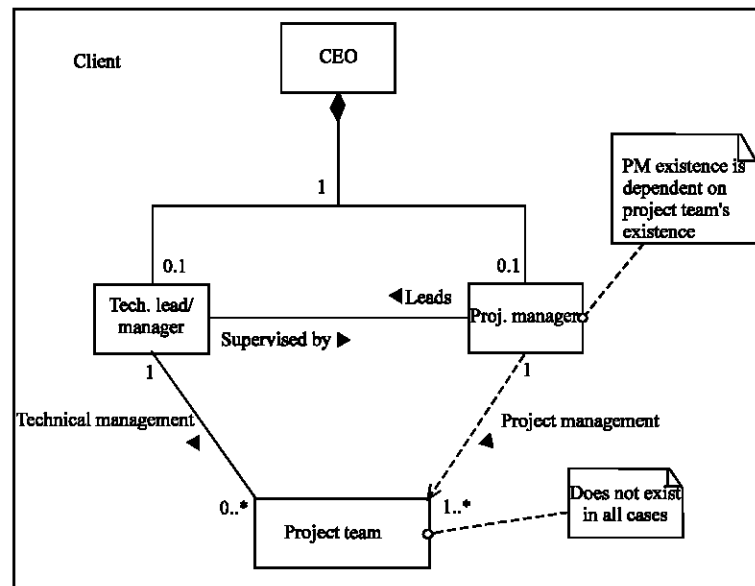


Fig. 3: Client's composite structure (Akbar and Hassan, 2010)

The CEO of the company from the client side is the actual client. CEO (client) may be technical or non-technical person. Technical expertise of client depends on project domain. Projects in which CEO (client) is a technical person usually do not have technical lead/manager role. The role of technical lead/manager is dependent on requirement of the project. Technical abilities of the actual client are not a factor in defining this role. Offshore project manager's role may also exist depending on the project's requirement. Further, that the offshore team at client side does not exist always. This is represented by small rectangle with dotted boundary in Fig. 2. Software development team is hired at client side by the client in particular scenarios when software is developed both by offshore team and team at client side. Project manager is then hired to manage the team at client side in addition to the technical lead role.

Akbar and Hassan (2010) described that the existence of project manager is dependent on the existence of team at client's side as shown in Fig. 3. Normally technical lead/manager from client is enough to handle the project with off shore team when there is no software team at client side. Irrespective of role classification, each role by offshore development team is considered as client. CEO itself, technical lead/manager and project manager are considered as client by the offshore development team. Professionals at client side in their capacity of designated roles are used to frequently interact with the development team. Equal importance is given to each role by the offshore development team. Prioritization and re-prioritization of

the requirements/tasks received from each role of client is though make to keep the balance of work, managing requirements, achieving milestones and completing all major and minor tasks and bug fixes. The block diagram (Fig. 2) of client as produced by Akbar and Hassan (2010) is transformed into composite structure of client in Fig. 3. Client's composite structure of Fig 3 explains entities at client side, their roles, interaction and existence with better understanding through UML specifications. CEO, the actual client, is shown as aggregated group entity, which is comprised of project manager and technical lead/manager. There might be no or one existence of both tech lead/manager or project manager. Project team does not exist in all projects. Possibility remains for one or more project teams at client side as shown in Fig. 3. Role of project manager is associated with existence of project team. Project manager may have one or more project teams to manage. Responsibilities of each entity are labeled on lines associated between two entities. All the client side roles are encapsulated in a big rectangle labeled as client. Analysis shows that irrespective of individual roles client is considered as a single entity by offshore project team. All other roles are part of it and make it a composite single entity. The diagram of Fig. 3 represents client as a class having its own components encapsulated in that class. In our next model we have also used client as a single entity irrespective of its composite structure. Our client's composite structure is the first model of its kind that explains client, its roles and structure in a real manner.

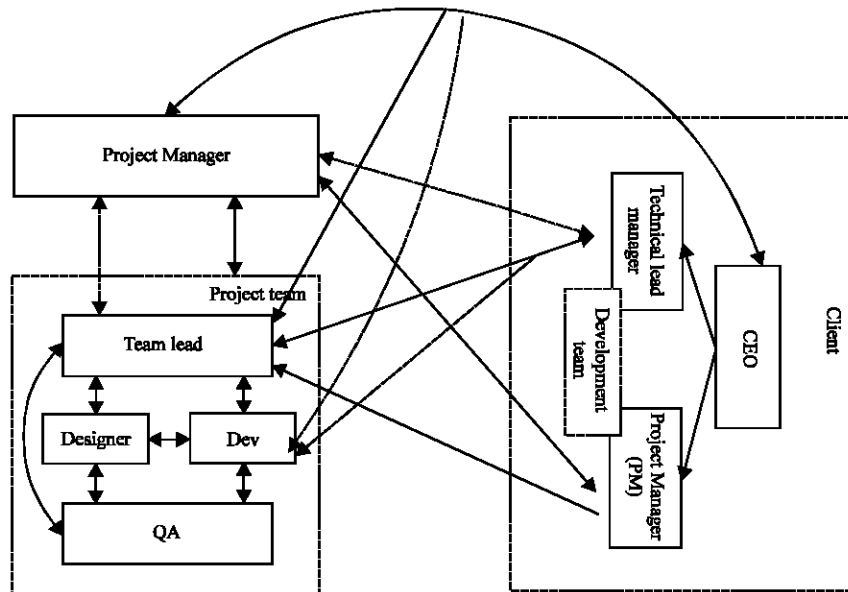


Fig. 4: Client Interaction Model (CIM)

Key team roles: Team members in offshore development team are normally appointed on a project with the consent of client. Requirement of each project is different; therefore, the roles defined for one project are not necessarily be suitable for other. In a software development company there are many persons of different domains. Few resources are permanently fixed for a particular project, few are shared and a few are rotated. Project manager takes the top position in the hierarchy of team. An experienced, senior and expert developer or technical resource among the team members holds the position of team lead. Project manager and team lead are the two key positions in a software development team that require highly professional skills. Among other roles are programmers/developers (Dev), graphic designers (designer) and Quality Assurance (QA) engineers. These roles are further subdivided into different designations based on their experience and expertise. All these roles are different but as a whole they are called software development team represented by a big rectangle labeled as Project Team in Fig. 4.

Client interaction model (CIM): Interaction and communication with client and among team members of an offshore team is critically important. Lack of coordination, less frequent and irregular interaction and communication raises many problems in projects. Missing requirements, improper resource utilization and late deliveries are among few of such problems.

We have identified interactions among various roles of an offshore team and client. These are important for a project progress and success. These roles and their interactions are shown in Fig. 4. Direct and frequent interactions are represented through solid lines and less frequent are shown through dotted lines. Double arrow headed lines represent two way interactions and one way is represented through single arrowhead. Following interactions are shown in Fig. 4 and 5.

Between client and offshore team: The interaction between client and offshore team is the most important among all interactions. Project success mainly depends on the transparency of this interaction process.

- **CEO-to-project manager:** CEO is the actual client of the project. Interaction between CEO and project manager is direct and very frequent. Frequency is normally once in a day. The entire project related information, progress, resource allocations, deliverables are discussed.
- **CEO-to-team lead:** Client directly interacts with project team lead on technical matters. Usually both project manager and team lead are part of the same meeting every time.
- **CEO-to-dev:** The frequency of this interaction is very less. Rarely client interacts directly with the developers during the project life cycle. The interaction or communication of client with the developers is very specific, related to some functionality. This is shown with dotted line in Fig. 4.

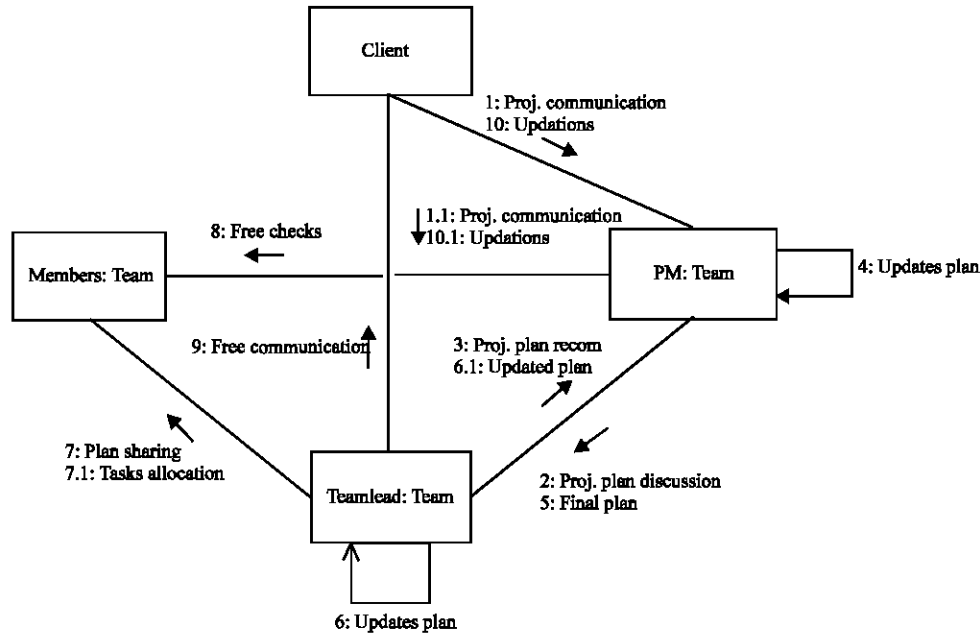


Fig. 5: Interaction overview meta-model (Akber and Hassan, 2010b)

- **Technical lead/manager-to-project manager:** Technical lead of client does not interact with project manager of offshore team on technical matters. Such interaction is limited to project management stuff and performance of resources. This is less frequent and is shown through dotted line in Fig. 4.
- **Technical lead/manager-to-team lead:** This is the most important and direct interaction. Both persons are technical and discussions on pure technical matters are part of it.
- **Project manager-to-project manager:** This interaction is more concerned with overall project progress, planning and scheduling and resource management.
- **Project Manager-to-Team Lead:** As an overall incharge of the project, project manager also prefer to directly interact and communicate with the team lead on project progress and team performance related issues and feedback.

The frequency, regularity and transparency of these four interaction channels can increase the coordination among all human resources of a project. Problems and issues are solved mutually with the help and guidance of each other. Learning level is also increased. Client is aware of each major and minor detail of the project that increases its satisfaction level and builds trust in the project team.

Among offshore team members:

- Project manager-to-Project team
- Project manager-to-Team lead

In addition to interaction between client and project team, intra-team interaction is also considered more important for project success. Project manager of the offshore team directly interacts with the whole team very frequently. Direct communication is made with the team lead in order to discuss project plan, tasks allocation, resource utilizations, scheduling and performance of each team member. Individually project manager interacts with all the team members like developers, designers and QA engineers to check their performance, to keep them on track and updating the whole team with new requirements, modifications, priorities and delivery dates. The role of project manager is quite important and dynamic in a team. The four roles as described by Kurkovsky (2008) may also be the part of project manager's role.

Team lead-to-dev:

- Team lead-to-designer
- Team lead-to-QA

Team lead directly interacts with the developers many times in a day. With QA engineer, the interaction is not as

frequent as with the developers. It is more frequent and direct when QA engineers are testing some components before the release of a build. Interaction with the designer is only need based. The effort of designer might be distributed in more than one project.

Dev-to-QA:

- Designer-to-QA
- Dev-to-designer

Developers (Dev) directly interact with QA engineers during the phase of testing and bug fixing of their respective components. The interaction is more frequent and regular when delivery dates are near. The interaction of designers with QA is somehow less frequent.

Developers interact with the designers when they need some graphical components; otherwise their interaction with them is not that much.

Interaction among CEO (client), project manager and team lead of the offshore team is direct in both ways. The nature of work of team lead of the project team and technical lead of client binds them in a single and close interaction channel. Technical lead/manager of client being concerned mainly with more technical matters related to code, code factoring and bugs partially communicate with the project manager of the offshore team and rarely with the developers. Team lead handles all the team resources on technical matters and provides direct and quick help and guidance to other team members. The model in Fig. 4 is reproduced in Fig. 5 by Akbar and Hassan (2010). The interaction among various entities of a project in Fig. 5 is presented in a very structured way at meta-level. Client is represented as a single entity and its interaction with other key roles of offshore team is shown. The model provides basic structure of interaction in offshore teams. The interaction sequence is presented through numbered labels on associated lines connecting the role entities. The

proposed model is the meta representation of client-team interaction mechanism. Each role identified represents a group of its sub-roles. Though same roles with different names exist in all projects but their interaction methodology remains same. Interaction among various roles of a project team and client is the fundamental part of project management practices.

Case study: The case study analysis of real projects in a USA based software development company was made to verify the model. All the projects were outsourced from USA to offshore teams. Agile based methodologies were being followed. Two projects ChatApp and FBGangs were selected for case study analysis based on the following criteria: 1) outsourced to offshore team, 2) geographically distributed offshore team, 3) offshore client and 4) agile based development. The duration of the case study was ten months from April 10, 2008 to February 25, 2009. The ChatApp project was a multiple chat messenger application. It was designed to provide instant messaging services of Yahoo, MSN, Gtalk, XFire and SecondLife in a single roster window. The main components of ChatApp multi messenger were SecondLife services. Likewise, FBGangs project was also a web based game application designed for facebook. The clients of both projects were offshore. Both ChatApp and FBGangs were medium scale and small scale projects respectively. During case study we have analyzed the structure of client, interaction between client and offshore team and within team interaction. Analysis of projects is presented in Table 1 that we have used (Akbar *et al.*, 2010). All the projects are web based applications of different kinds and are analyzed at least up to release of three major milestones. Analysis based on client's satisfaction criteria as in Table 1 is made and observations are explained in Table 2. Cross case analysis (Seaman, 1999) of both projects is made during the study. Both ChatApp and FBGangs are medium and small scale projects, respectively that strongly support the case study

Table 1: Client based project analysis (Akbar *et al.*, 2010)

Project	Team size (no. of persons)	Project progress (months)	Improvement(s)		Client's satisfaction
			Process	Documentation	
CchatApp	8	2	Communication, plan sharing and updating, tasks list and allocation	Requirement gathering, project scheduling, meeting minutes	HS
	6	4	Communication, plan sharing and updating, tasks lists and allocation	Requirement gathering project scheduling, meeting minutes	HS
	4	6	Communication, plan sharing and updating, tasks list and allocation	Requirement gathering, project scheduling, meeting min	HS
Bganga	2	1	Communication, live requirement	Tasks allocation, meeting minutes.	HS
	2	2	Communication, change management, live requirement gathering, email notification of dev status, tech lead	Tasks lists with all modifications including each major and minor detail, meeting minutes	H
	2	4	Communication, live requirement gathering, project improvement suggestions, Frequent meetings	New features list, approval of new features, schedule of new features incorporation, meeting minutes	HS

H: Happy, HS: Happy Satisfied

Table 2: Interaction analysis

Interaction	ChatApp	FBgangs
Client-project manager	Direct, frequent	Direct, frequent
Client-team lead	Direct, frequent	-
Client-project team	Indirect,	Direct, very
Members (Dev,	Rare	Frequent
Designer, QA)		

Dev: Developer, QA: Quality assurance engineer

objectives. Project plans and schedule documents are maintained and shared with the client on regular basis.

Meeting minutes were recorded. Different communication channels like phone calls, email, voice chatting and video chatting were used for effective interaction during the projects. All the documents and processes were analyzed closely and carefully. Client of ChatApp project was itself the CEO and one technical manager. Like ChatApp same roles existed in FBGANGS project. Later stages the CEO (client) of FBGANGS after release of beta version handed over the whole project to the technical manager who till the completion of the project performed as client. CHATAPP project executed normally and smoothly but issues were observed in FBGangs. Client of FBGangs made complaints of improper project planning and communication with project manager of the project. With proper documentation, daily plan sharing and updating client solved this issue. Case study gave us the results that observed between client and project manager of both projects while interaction of client with team members in both cases was different as shown in Table 2.

The difference was due to type of project and particularly size of the project. The FBGangs project had only two team members, one project manager and one developer. The developer was also performing the role of team/tech lead of the project. Therefore, interaction was direct and very frequent. Client was used to chat daily with the developer to check the progress and implementation of new requirements. The client of ChatApp project was interacting with the project manager and team lead on weekly basis but regularly. Weekly meetings were scheduled to check the progress and getting new requirements. In both projects, direct and frequent interaction was observed between client, project manager and tech/team lead of the project team. The roles of CEO itself and technical lead were considered as client by the offshore teams. Both project team and project manager need not to be existed at client side in all projects. In a short observation of a third project LangPlanet, there was a development team at client side and does exist the role of project manager. The results of the case study truly supported our model. We have also found few other interesting facts about client based process management activities, which we would produce later as a part of future research work.

CONCLUSION

The direct interaction between client, project manager and team lead has been observed as an important element of good project management. Close and frequent interaction with the client, interaction strategies and communication channels are found as key success factors for a project. Communication gap and un-necessary roles in a software development team are always non-productive and affects the project. Irrespective of roles, client is always considered as a single entity. Client's satisfaction is the basis of project success which is obtained from frequent interaction among key roles of a project. The early involvement of client in development process is also recommended in agile manifesto (Rico, 2008). Ferreira and Cohen (2008) said that interaction strategies are also considered important. Our client based interaction meta-model realistically presents fundamental structure of client and interaction mechanism among the key roles of a project it is more likely to be the first client based structure. Client is the main component of all interaction channels among all the roles. Singh and Kotze (2003) emphasized that realizing end user as an important part of the process can overcome problems in a software process model. Names of roles may vary in some projects but fundamental responsibilities, interaction and coordination approaches remains same.

Communication channels, ways of interaction are always defined according to the requirements. Development scenarios from one company to other company may differ. Identification of those scenarios contributes towards effective interaction processes. The fundamental structure of the model would remain same but can be customized or extended according to the company's environment. The model supports today's quick and fast paced software development paradigms which are rapidly emerging in global software development.

Future work: Presented models are the early version of our series of work on client based processes. We would be publishing enhanced client based models for effective process management and project management mechanisms. Enhancements in existing software engineering models by adding client's factor is an important research area. Identification of sub-roles in a software team and identification of alternative paths of interaction also require more work in this direction. Client oriented project management practices is the research area that needs more efforts from the researchers and practitioners for producing effective project management process models.

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