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Evaluating A Communication Technology Assessment Tool (Ctat): A Case Of A Cloud Based Communication Tool

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EVALUATING A COMMUNICATION TECHNOLOGY ASSESSMENT TOOL (CTAT): A CASE OF A CLOUD BASED COMMUNICATION TOOL

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Abstract

A primary concern of distributed adaptive development environment (DADE) is that of human communication and knowledge sharing among geographically dispersed developers. Emerging cloud-based communication technologies claim to provide a support for communication and knowledge sharing among developers in a DADE. However, the challenge is how to enable developers to self assess and select appropriate cloud-based communication technologies for their DADE. Based on our recent empirical study, we have developed the construct of a practical communication technologies assessment tool (CTAT). We argue that, CTAT construct, as a part of our large conceptual framework of context aware cloud adaptation (CACA), can be useful to assist developers in the self assessment of appropriate cloud-based communication technologies for their DADE. This paper presents the evaluation of the CTAT by using it for the assessment of the Force.com cloud-based Chatter communication tool. The main objective of this evaluation is to determine to what extent CTAT construct is relevant, valuable and sufficient to achieve its purpose. The results of this evaluation indicate that CTAT seems useful when performing vendor independent assessment of communication technologies in order to make an informed decision about the selection of a communication tool for the DADE.

Keywords: Agile, Communication Technologies, Cloud, Distributed Adaptive Development Environment

1 INTRODUCTION

Distributed adaptive development environment (DADE) (Kircher et al. 2001; Poole 2004; Sureshchandra and Shrinivasavadhani 2008) integrates both the adaptive (Agile Manifesto 2001) and distributed multi-site (Prikladnicki et al 2003) information system development (ISD) aspects. Adaptive or agile ISD methods focus on active informal communication and working product rather than on reporting deliverables, which is often seen as a welcome shift of balance towards the most important factor in the ISD environment. Adaptive ISD methods embrace communication and collaboration among the project stakeholders (e.g. developers, managers, customers), and are tagged as *communication oriented* ISD methods as opposed to *documentation-driven* (e.g. Agile Manifesto 2001; Ambler 2002; Fowler 2003). However, a primary concern of DADE is that of communication and knowledge sharing among geographically dispersed developers. Developers working in the multi-site adaptive development environment need communication tools and infrastructure for effective communication and collaboration.

There are a number of cloud-based communication tools (e.g. chatter, twitter, yammer) that can be used to support the DADE (Schummer and Schummer 2001; Kircher et al. 2001; Herbsleb and Mockus 2003). However, little objective evidence exists as to which of these many so-called cloud-based communication tools really possess the kind of capability required for effective communication among geographically dispersed developers working in the DADE. This draws our attention to the key question: *How do we enable developers to self-assess and select appropriate cloud-based communication tools for their DADE?* We have developed a context aware cloud adaptation (CACA) framework (Gill and Bunker 2011) that includes a communication technologies assessment tool (CTAT) to enable developers to self assess and select appropriate cloud-based communication tools for their DADE. The scope of this paper is to present the evaluation of the CTAT construct usability by using it for the assessment of the Force.com cloud-based Chatter communication tool for a DADE.

The paper is organized as follows. Firstly, it discusses the research method for our study. Secondly it gives the theoretical background and summarizes the CACA (based on Gill and Bunker 2011) and CTAT (based on Gill and Bunker 2012b) to set the context and define the scope of this paper. Thirdly, it presents the CTAT evaluation by assessing the cloud-based force.com Chatter communication tool for the DADE. Fourthly, it discusses the contribution, limitations and related work. Finally, it presents future directions and concludes with a short discussion about how the findings of this study can be further used in our current research.

2 RESEARCH METHOD

The CTAT has been developed based on the review of both the recent literature and forty senior developers' interviews, which were analysed by using the qualitative analysis aspects of the grounded theory approach (Glaser 1978; Rene and Taylor-Powell 2003). Based on the qualitative analysis, we identified and categorized the communication technologies Assessment Areas (categories) and Assessment Factors (sub-categories) and their relationships in an effort to develop a construct, which is called here CTAT. The qualitative analysis and the resultant CTAT construct have been detailed in Gill and Bunker (2012b). The key steps of our ongoing iterative research process are summarized in Table 1.

Research Steps:
Step 1: Literature Review Reviewed literature and identified the research questions Based on literature analysis, identified and labeled the initial set of communication technologies Assessment Areas (categories) and Assessment Factors (sub-categories) and their relationships

Research Steps:
Step 2: Forty Senior Developers' Interviews Used Assessment Areas (categories) and Assessment Factors (sub-categories) of the communication technologies, identified during literature analysis, as a lens and obtained feedback from forty senior developers from Australia (e.g. DADE practitioners) via face-to-face interviews on their use of communication modes and technologies in the context of DADEs Identified and labeled the additional communication technologies Assessment Areas (categories) and Assessment Factors (sub-categories) and their relationships (e.g. additional to literature)
Step 3: CTAT Conceptual Construct Development Consolidated Assessment Areas (categories) and Assessment Factors (sub-categories) (as identified at steps 1-2). These have been grouped into final 12 key Assessment Areas (categories) and 52 Assessment Factors (sub-categories) to represent the construct of the CTAT. CTAT is a part of our large conceptual CACA framework
Step 4: Conceptual Construct Development CTAT conceptual construct was then implemented as a software service by using the force.com cloud application development platform in order to provide a practical software tool based support and contribution to industry
Step 5: Initial Reporting The qualitative analysis and the resultant CTAT construct and software service (Steps 1-4) have been detailed in Gill and Bunker (2012b)
Step 6: CTAT Evaluation The evaluation of the CTAT construct has been done by assessing the force.com cloud-based Chatter communication tool. The results of the CTAT evaluation provide a proof of concept and practical application of the CTAT construct, which are presented in this paper.

Table 1: Research steps

3 THEORETICAL BACKGROUND AND COMMUNICATION TECHNOLOGIES ASSESSMENT TOOL (CTAT)

Communication plays a vital role in project coordination, management, knowledge collection and transfer among different project shareholders (Malone and Crowston 1994; Espinosa and Carmel 2003). There are a number of challenges related to communication in the DADE due to geographical distances, time, culture and language differences (Lehtonen 2009). The use of communication tools (e.g. cloud and non-cloud) has been proposed to support DADE (Schummer and Schummer 2001; Herbsleb and Mockus 2003). However, there is need to assess which of these communication tools really possess the kind of capability required to support DADE. We have developed a CACA framework (Gill and Bunker 2011) to enable developers to self assess and select appropriate cloud-based communication tools for their DADE.

The CACA framework had been developed based on our qualitative empirical research results (Gill and Bunker 2011) and Actor-Network-Theory (Law and Callon 1988). Actor-Network-Theory (ANT) was used to review qualitative empirical study results and cloud reference architectures in order to identify actor, role, network, intermediary, black box (e.g. Technology Operating Environment) and prescription (e.g. Lifecycle management) aspects of the CACA framework layered architecture (see Figure 1).

The CACA framework layered architecture presents a number of views to depict different aspects of an organisation's business operating environment. The inner layer of the framework represents *organization-as-a-whole* concept, which includes one or many business operating environments and their relevant technology operating environment. Here, the *Platform* aspect of the technology operating environment, within the business operating environment (as highlighted on Figure 1), is referred to the DADE of an information system development organisation. The outer layer of the framework indicates the continuous Cloud-enabled transformation or adaptation loop of an organisation. This outer layer includes *Context*, *Self Assessment*, *XaaS* (e.g. service requirements analysis: software as a service, platform as a service), and *Self Adoption and Improvement* constructs for the continuous and iterative (back and forth arrows in Figure 1) transformation of an organisation. The links between the inner and outer layer indicate the organization-as-a-whole impact (e.g. dotted lines indicate the relationships between the inner and outer layers) on the organisation context modelling, assessment, XaaS, and adoption of improvement of cloud technology.

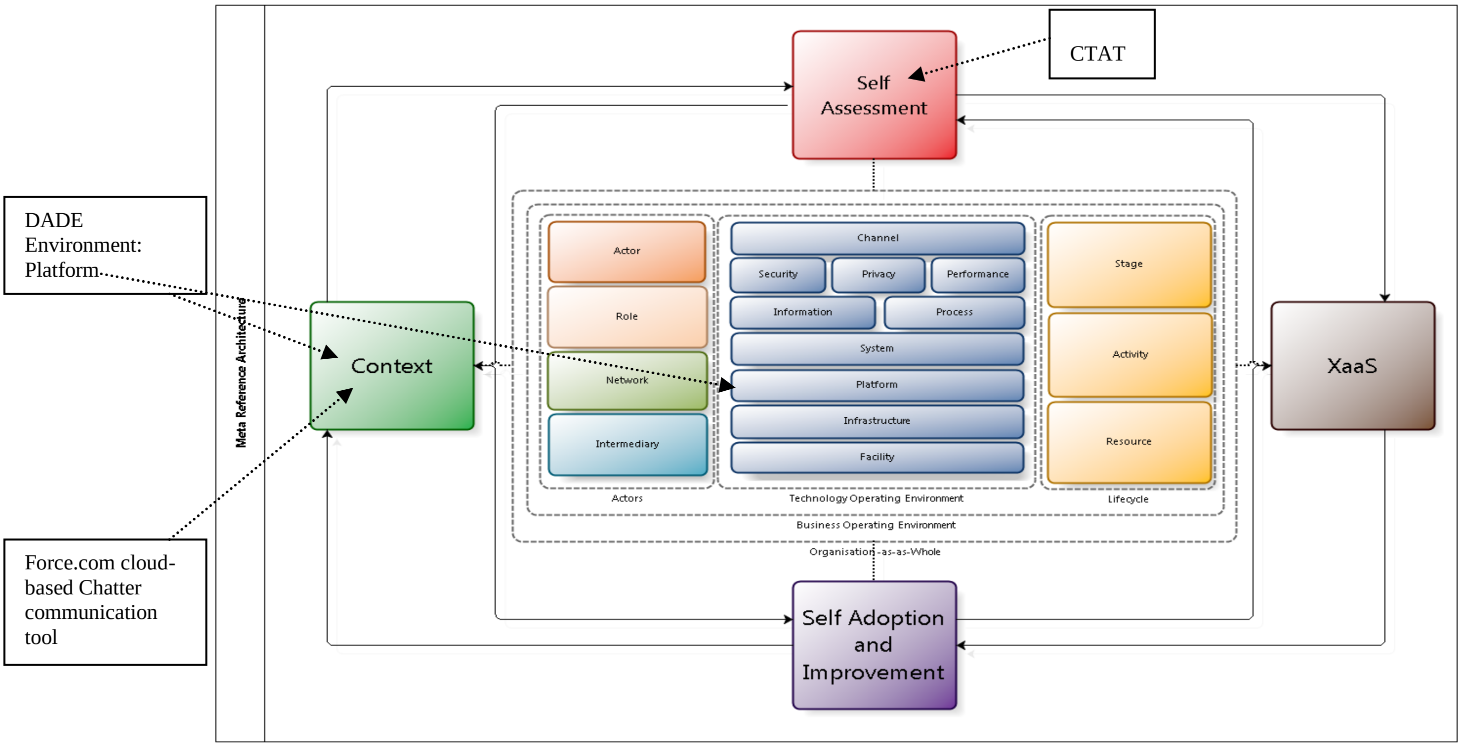


Figure 1: CACA framework (based on Gill and Bunker 2011)

The Context construct is included in the CACA framework to assist organizations to understand and iteratively map contextual information related to the area where they want to adopt cloud technology. For instance, in this paper the context is to assess Force.com cloud-based Chatter communication tool for the DADE environment (as indicated on Figure 1). As discussed earlier, DADE environment refers to the *Platform* aspect on the CACA framework. The Self Assessment construct focuses on the iterative assessment of cloud technologies in the local context (e.g. cloud-based communisation technology assessment for the DADE) of an organisation. For instance, in this paper, the Self Assessment construct refers to CTAT (as indicated on Figure 1). The CTAT construct of the framework has been explained in detail in (Gill and Bunker 2012b) and the evaluation of the CTAT is the scope of this paper. The XaaS or service requirements analysis model deals specifically with the identification, selection and modelling of services along with their motivators and de-motivators for cloud adoption. The XaaS construct of the framework has been explained in detail in (Gill and Bunker 2012a). The Self Adoption and Improvement construct is a roadmap to assist organisations with the overall management (e.g. cloud piloting, full scale cloud deployment) of the ongoing adoption and improvement of a specific cloud technology (e.g. cloud-based communication tools), consolidation of local legacy existing environment and their integration with the cloud environment (e.g. DADE integration with cloud-based communication tools). The Self Adoption and Improvement construct of the framework will be presented in future research communications.

As discussed earlier, one aspect of the CACA framework is *Self Assessment* (Red box on Figure 1).The focus and scope of this paper is to present the *Self Assessment* (Red box on Figure 1) aspect of the CACA framework, which is called here CTAT. The detailed discussion of the large CACA framework is beyond the scope of this paper. The CTAT construct of the CACA framework had been developed based on our recent qualitative empirical study involving forty senior developers (DADE practitioners) from thirty one Australian organizations (Gill and Bunker 2012b). The CTAT, as a part of our large conceptual CACA (CACA – Figure 1), provides an assessment index (e.g. 12 assessment areas and 52 assessment factors) construct to assist developers to self assess communication technologies for their local DADE context. Here, this paper presents the evaluation of the CTAT construct usability by using it for the assessment of the Force.com cloud-based Chatter communication tool for a DADE.

The CTAT has been developed based on the analysis of both literature and forty senior developers' interviews, which were analysed by using the qualitative analysis aspects of the grounded theory approach (Glaser 1978; Rene and Taylor-Powell 2003). During this analysis, the twelve communication technologies Assessment Areas (categories) and fifty two Assessment Factors (sub-categories) of the CTAT construct were identified and chosen based on the following criteria:

1. What types of key communication modes and technologies can assist a developer in a DADE?
2. Which types of key communication modes and technologies do developers recommend for a distributed, agile or adaptive workspace (e.g. semi-automated, automated, minimal automated, non-automated)?

The detailed literature, qualitative analysis and the resultant CTAT have been discussed in Gill and Bunker (2012b). The six Assessment Areas identified within the literature: (1) Technology Use Case (e.g. Venkatesh and Davis 1996; Denis and Valacich 1999; Wiredu 2005; Ambler 2009); (2) Business Value (e.g. Davis 1989; Green et. al 2010); (3) Quality (Venkatesh and Davis 1996; DeLone and McLean 2002; Wiredu 2005; Ambler 2009); (4) Type (e.g. Denis and Valacich 1999; Green et al. 2010); (5) Constraint (e.g. Daft and Lengel 1986; Wiredu 2005) and (6) Risk (e.g. Herbsleb and Moitra 2001; Ralyte et al. 2008; Persson et al. 2009), were used to elicit developers' responses. In analysing developers' responses a total of twelve key communication technologies Assessment Areas, were identified, with many additional Assessment Factors being identified across all the twelve Assessment Areas. This meant that an additional six new Assessment Areas were identified and labelled during this study which included: (7) Interface Management, (8) Mode, (9) Access Control, (10) Semantic Interoperability, (11) Contingency and Disaster Recovery, and (12) Communication Channel. Here, we summarized the twelve communication technologies Assessment Areas (categories) and fifty two Assessment Factors (sub-categories) of the CTAT construct (please see Table 2).

Ref.	Assessment Area (AA)	Assessment Factors (AF)
01	Core Technology Use Case (+)	1. Coordinate communication 2. Manage versions of project artifacts 3. Avoid Unnecessary Documentation 4. Prove Quality of Work 5. Record Communication 6. Support Project Situation-in-Hand 7. Facilitate Quick Project Monitoring and Management

Ref.	Assessment Area (AA)	Assessment Factors (AF)
		8. Capture Informal and Formal Communication 9. Keep Communication History and Traceability 10. View Prior Recorded Communication 11. Support Larger and Distributed Environment 12. Support Online Sharing Centralized Communication 13. Support Searching 14. Support Communication Structuring 15. Support Communication Version Control 16. Manage Communication Workflow 17. Manage Communication Templates 18. Generate Automatic Follow Up Communication 19. Find Developers for Collaboration 20. Follow Communication 21. Enable Communication Governance 22. Manage Communication among Group 23. Enable Interactive Modeling (Communication Artifacts) 24. Manage Changes to Communication Artifacts
02	Business Value (+)	25. Save Time 26. Reduce Effort 27. Save Human Resource 28. Train Newly Inducted Staff Members 29. Reduce Documentation 30. Reduce Risks 31. Resolve Conflicts 32. Enhance Coordination and Knowledge Sharing 33. Improve time to market 34. Reduce ambiguity
03	Quality (+)	35. Reliable 36. Simple 37. Easy 38. Single Source of Truth
04	Type (+)	39. Semi-Automated 40. Automated 41. Minimal Automated 42. Non-Automated
05	Constraints (-)	43. Capacity 44. Affordance
06	Risks (-)	45. Loss of communication
07	Interface Management (+)	46. Integrate-able with Project Knowledgebase and Development Environment 47. Desktop and Online Integration
08	Mode (+)	48. Desktop and Online

Ref.	Assessment Area (AA)	Assessment Factors (AF)
09	Access Control (+)	49. Manage Access to Shared Communication
10	Semantic Interoperability (+)	50. Enable Communication Semantic Interoperability via Standardization
11	Contingency and Disaster Recovery (+)	51. Manage Backups
12	Communication Chanel (+)	52. Multi-channel Communication

Table 2: Summary of CTAT assessment areas and factors (based on Gill and Bunker 2012)

The CTAT assessment areas and factors have been plotted on the CTAT template construct. The CTAT template categorizes Assessment Areas into positive "+" and negative "-" indicators (Please see Table 3). This template construct can be used by developers/practitioners for capturing the communication technology assessment details, which can later be used for the purpose of decision making when selecting a particular communication technology for a particular DADE. A developer may assess a particular communication technology against the each Assessment Factor listed for each Assessment Area. If a communication technology complies with the specific Assessment Factor, then the factor compliance value (FCV) would be 1 otherwise 0. A developer assessing a technology may capture the assessment score on the assessment scale value (ASV) between 1 and 5; and their relevant importance (e.g. very low, low). An assessor may assign a different weight (based on relevant importance) to each Assessment Factor (e.g. 80%, 100%) for the particular project or situation-in-hand. The possible maximum score for each Assessment Factor can be calculated if we multiply the maximum assessment scale value by the assigned weight (e.g. 5 * weight). The actual score for each Assessment Factor can be calculated if we multiply FCV, ASV and weight (e.g. FCV * ASV * Weight). The possible maximum and actual scores can be separately added up for all the Assessment Factors in order to determine the total possible and total actual scores. The actual total score can be divided by the total maximum score in order to determine the final assessment score percentage. The final assessment score percentage would show how strongly (higher percentage value) or weakly (low percentage value) a communication technology compliances to the overall assessment criteria.

Ref.	Assessment Area	Assessment Factors (AF)	Factor Compliance Value (FCV)	Assessment Scale Value (ASV)	Importance	Weight	Possible Max. Score	Actual Assessment Score
1	e.g. Technology Use Case (+)	e.g. Coordinate communication	0 or 1	1.2. 3. 4. 5 *situation-specific	e.g. Very High, High, Medium, Low, Very Low *situation-specific	Weigh of each AF out of 100% e.g. 80% *situation-specific	5 * Weight	FCV * ASV * Weight e.g. 1 * 4* 0.80 = 3.20
						Total.	Max.	Actual.
						Percentage	(Actual/Max.) * 100	

Table 3: CTAT template example

An assessment report generated with the help of CTAT template construct will assist developers in making informed decisions about the selection or adoption of a communication technology for their DADE. Although there are currently twelve assessment areas and fifty two assessment factors in the CTAT, it is in fact extensible – developers can add or remove assessment areas and relevant factors, if found necessary in the future.

4 CTAT EVALUATION: A CASE OF A CLOUD BASED COMMUNICATION TOOL

Cloud computing provides an online and flexible platform to support DADE, which is called platform as a service or PaaS (Mell and Grance 2009). PaaS offers the capability for quickly developing, testing, deploying and managing information systems by the developers working in the geographically dispersed locations in the cloud based DADE. Developers can work on different parts of the information systems in the distributed cloud platform and then integrate and merge their work with other developers' work for the final testing and release of a system in short iterations. However, a primary concern of the DADE is that of human communication and knowledge sharing among geographically dispersed developers. There are a number of communication tools (e.g. Chatter, HipChat, and Skype) for supporting communication and knowledge sharing among developers in multi-site or DADE. The challenge is how to assess these communication technologies appropriate to their communication needs in the DADE. As discussed earlier, based on our recent literature review and empirical study, we have developed and published the construct of a novel practical communication technologies assessment tool (CTAT) to assist developers in the self assessment (e.g. vendor independent assessment) of appropriate communication technologies for their DADE. In this section, we take the Force.com cloud-based Chatter communication tool as an assessment case, and assess it by using the CTAT. The proposed CTAT is generic enough to evaluate many communication tools in the context of DADE. However, given our current area of research and understanding about cloud computing, a well-known cloud-based Force.com DADE platform was selected. The Force.com, coupled with the Chatter communication tool, allowed us to rigorously evaluate the CTAT and its usefulness in the context of DADE. The main objective of this paper is to present an indicative proof of concept of the proposed CTAT construct usability as opposed to the assessment of the Force.com cloud-based Chatter. The following sections first provide an overview of the Force.com chatter (based on the description published in the public domain) in the context of DADE followed by its assessment by using the "Core Technology Use Case" assessment area of the CTAT.

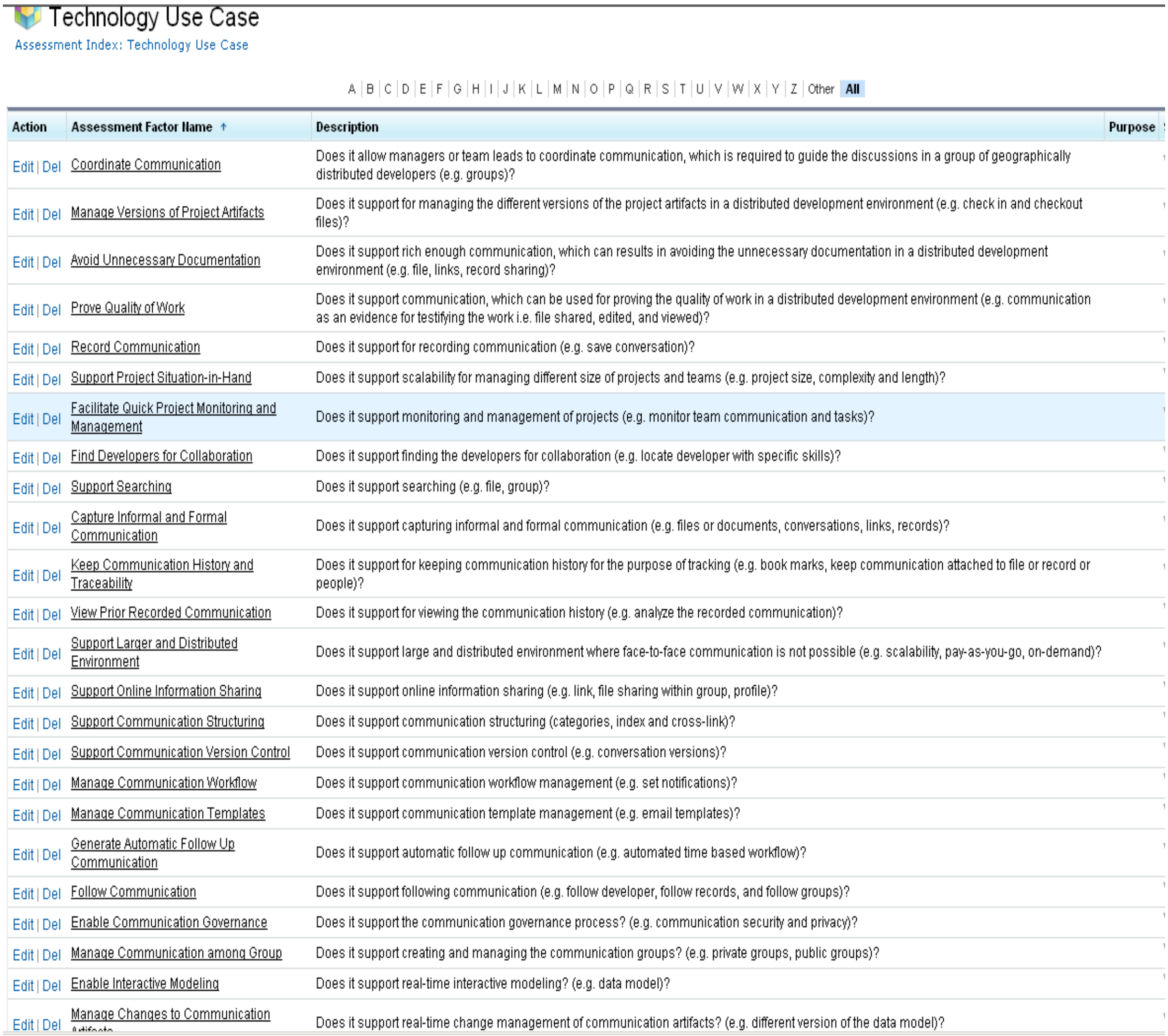
4.1 Force.com Cloud Chatter

Chatter (Wall and Bhanot 2011) claims to support communication among the developers geographically dispersed locations in the cloud-based DADE. Chatter is a cloud-based social platform, which has been developed by the Force.com (Salesforce, 2000). It has been built on the Force.com cloud application development platform. Chatter seems to allow geographically dispersed developers to communicate and collaborate while developing any applications or systems on the Force.com platform or any other platform in a DADE environment. The key features of the Chatter are: share personal and task related information, real-time data feeds and notifications, public or private individual or group communication management, resource sharing and workflow notifications. It can be configured to receive recommendations that may be helpful when one developer may want to identify other developers with certain skills located in different locations or teams in their DADE. It also allows the Chatter administrator to fully control, track and customize it for their own local DADE needs. The following sections presents the assessment of the Chatter by using the twenty four assessment factors listed under the *Core Technology Use Cases* assessment area of our newly proposed CTAT (Figure 2).

4.2 Assessment of Focre.com Chatter using CTAT

This section presents the application of the CTAT's main Assessment Area *Core Technology Use Cases* and related twenty four Assessment Factors (Figure 2). These twenty four Assessment Factors have been used for the assessment of the Force.com cloud-based Chatter communication tool. This assessment has been done based on the description of the Chatter published in the public domain (Wall and Bhanot 2011). Figures 3 and 4 summarize the assessment results of the Chatter.

The Chatter description and testing results were used as the source of the numerical inputs for the analysis. If the Chatter complies with the specific Assessment Factor, then the factor compliance value (FCV) would be 1 otherwise 0. For example, the *Manage Versions of Project Artifacts* is not supported by the Chatter therefore, therefore, zero (0) is assigned in the FCV column, whereas Chatter seems useful for *Proving Quality of Work* and therefore, one (1) is assigned in the FCV column. For the purpose of simplicity and brevity and in order to demonstrate the indicative proof of concept of the CTAT usage, we only used the factor compliance values (FCV) 1 and 0. Here, we used the default values for ASV as *5*, Importance as *Very High*, and Weight as *100*. Developers, specific to their DADE environment may adjust the ASV (e.g. between 1 and 5), relevant importance (e.g. between very high and very low), and weight (e.g. based on their relevance importance - 80%, 100%) in order to calculate the maximum and actual scores for all the Assessment Factors. The actual total score is divided by the total possible maximum score in order to determine the final assessment score percentage (Figure 3 – assessment summary). The results of the Chatter compliance to the *CTAT's Core Technology Use Cases* Assessment Area have been reported in Figure 4.



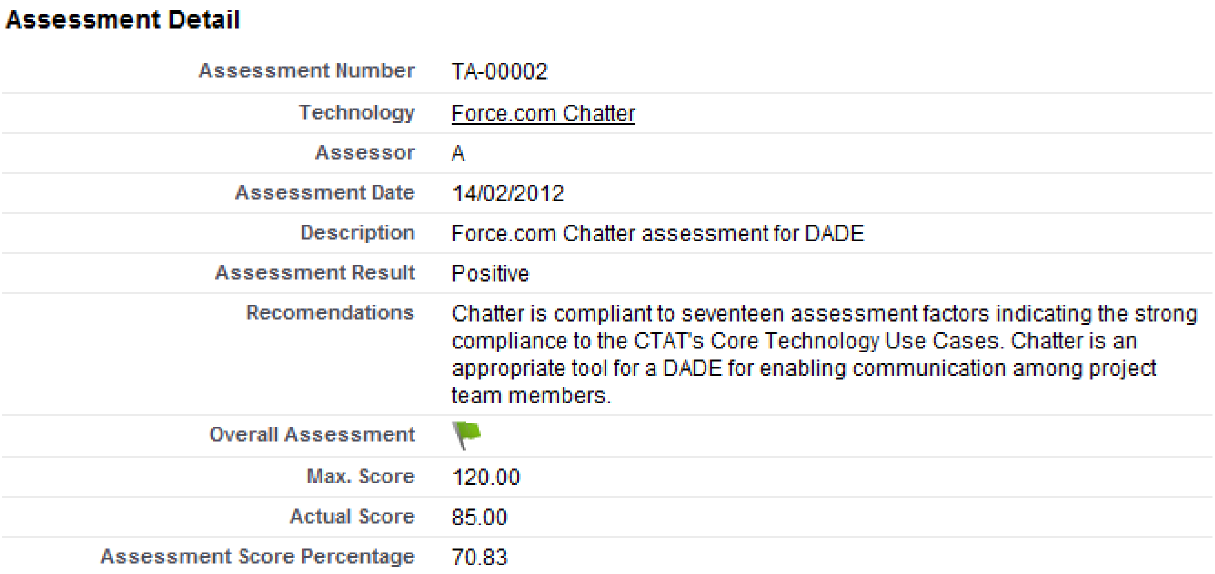
Technology Use Case

Assessment Index: Technology Use Case

A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | Other | All

Action	Assessment Factor Name ↑	Description	Purpose
Edit | Del	Coordinate Communication	Does it allow managers or team leads to coordinate communication, which is required to guide the discussions in a group of geographically distributed developers (e.g. groups)?	
Edit | Del	Manage Versions of Project Artifacts	Does it support for managing the different versions of the project artifacts in a distributed development environment (e.g. check in and checkout files)?	
Edit | Del	Avoid Unnecessary Documentation	Does it support rich enough communication, which can results in avoiding the unnecessary documentation in a distributed development environment (e.g. file, links, record sharing)?	
Edit | Del	Prove Quality of Work	Does it support communication, which can be used for proving the quality of work in a distributed development environment (e.g. communication as an evidence for testifying the work i.e. file shared, edited, and viewed)?	
Edit | Del	Record Communication	Does it support for recording communication (e.g. save conversation)?	
Edit | Del	Support Project Situation-in-Hand	Does it support scalability for managing different size of projects and teams (e.g. project size, complexity and length)?	
Edit | Del	Facilitate Quick Project Monitoring and Management	Does it support monitoring and management of projects (e.g. monitor team communication and tasks)?	
Edit | Del	Find Developers for Collaboration	Does it support finding the developers for collaboration (e.g. locate developer with specific skills)?	
Edit | Del	Support Searching	Does it support searching (e.g. file, group)?	
Edit | Del	Capture Informal and Formal Communication	Does it support capturing informal and formal communication (e.g. files or documents, conversations, links, records)?	
Edit | Del	Keep Communication History and Traceability	Does it support for keeping communication history for the purpose of tracking (e.g. book marks, keep communication attached to file or record or people)?	
Edit | Del	View Prior Recorded Communication	Does it support for viewing the communication history (e.g. analyze the recorded communication)?	
Edit | Del	Support Larger and Distributed Environment	Does it support large and distributed environment where face-to-face communication is not possible (e.g. scalability, pay-as-you-go, on-demand)?	
Edit | Del	Support Online Information Sharing	Does it support online information sharing (e.g. link, file sharing within group, profile)?	
Edit | Del	Support Communication Structuring	Does it support communication structuring (categories, index and cross-link)?	
Edit | Del	Support Communication Version Control	Does it support communication version control (e.g. conversation versions)?	
Edit | Del	Manage Communication Workflow	Does it support communication workflow management (e.g. set notifications)?	
Edit | Del	Manage Communication Templates	Does it support communication template management (e.g. email templates)?	
Edit | Del	Generate Automatic Follow Up Communication	Does it support automatic follow up communication (e.g. automated time based workflow)?	
Edit | Del	Follow Communication	Does it support following communication (e.g. follow developer, follow records, and follow groups)?	
Edit | Del	Enable Communication Governance	Does it support the communication governance process? (e.g. communication security and privacy)?	
Edit | Del	Manage Communication among Group	Does it support creating and managing the communication groups? (e.g. private groups, public groups)?	
Edit | Del	Enable Interactive Modeling	Does it support real-time interactive modeling? (e.g. data model)?	
Edit | Del	Manage Changes to Communication Artifacts	Does it support real-time change management of communication artifacts? (e.g. different version of the data model)?	

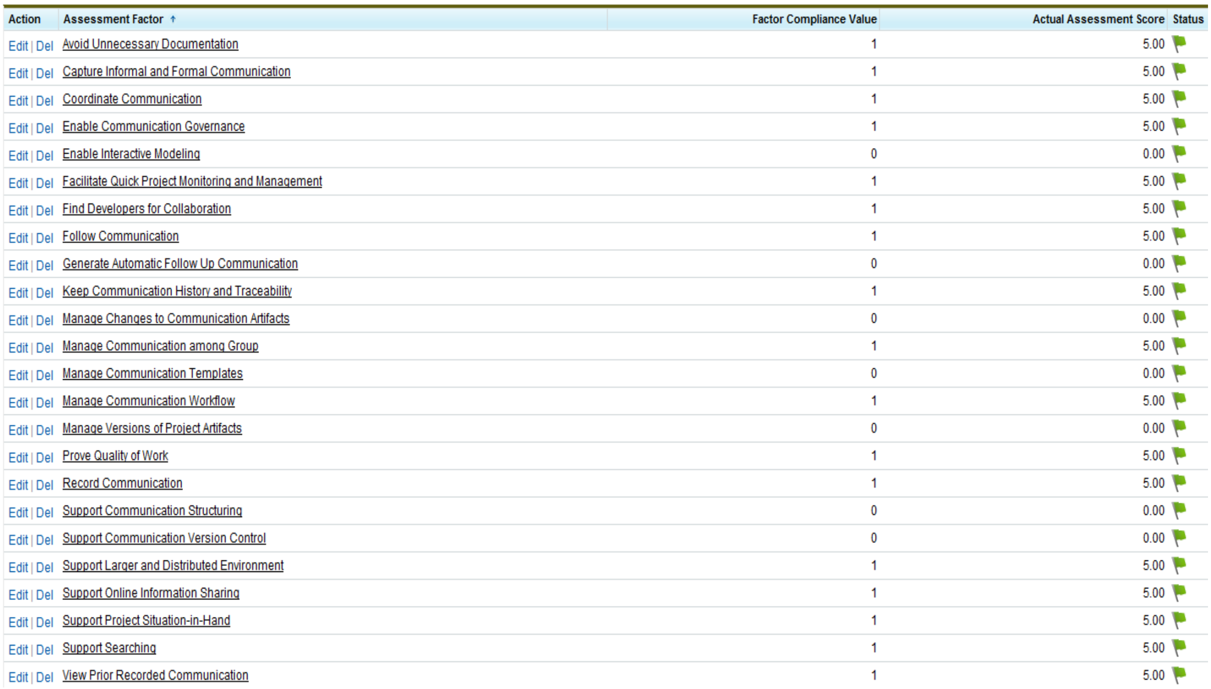
Figure 2: CTAT - technology use case assessment factors



Assessment Detail

Assessment Number	TA-00002
Technology	Force.com Chatter
Assessor	A
Assessment Date	14/02/2012
Description	Force.com Chatter assessment for DADE
Assessment Result	Positive
Recomendations	Chatter is compliant to seventeen assessment factors indicating the strong compliance to the CTAT's Core Technology Use Cases. Chatter is an appropriate tool for a DADE for enabling communication among project team members.
Overall Assessment	⚑
Max. Score	120.00
Actual Score	85.00
Assessment Score Percentage	70.83

Figure 3: Assessment Summary



Action	Assessment Factor ↑	Factor Compliance Value	Actual Assessment Score	Status
Edit | Del	Avoid Unnecessary Documentation	1	5.00	⚑
Edit | Del	Capture Informal and Formal Communication	1	5.00	⚑
Edit | Del	Coordinate Communication	1	5.00	⚑
Edit | Del	Enable Communication Governance	1	5.00	⚑
Edit | Del	Enable Interactive Modeling	0	0.00	⚑
Edit | Del	Facilitate Quick Project Monitoring and Management	1	5.00	⚑
Edit | Del	Find Developers for Collaboration	1	5.00	⚑
Edit | Del	Follow Communication	1	5.00	⚑
Edit | Del	Generate Automatic Follow Up Communication	0	0.00	⚑
Edit | Del	Keep Communication History and Traceability	1	5.00	⚑
Edit | Del	Manage Changes to Communication Artifacts	0	0.00	⚑
Edit | Del	Manage Communication among Group	1	5.00	⚑
Edit | Del	Manage Communication Templates	0	0.00	⚑
Edit | Del	Manage Communication Workflow	1	5.00	⚑
Edit | Del	Manage Versions of Project Artifacts	0	0.00	⚑
Edit | Del	Prove Quality of Work	1	5.00	⚑
Edit | Del	Record Communication	1	5.00	⚑
Edit | Del	Support Communication Structuring	0	0.00	⚑
Edit | Del	Support Communication Version Control	0	0.00	⚑
Edit | Del	Support Larger and Distributed Environment	1	5.00	⚑
Edit | Del	Support Online Information Sharing	1	5.00	⚑
Edit | Del	Support Project Situation-in-Hand	1	5.00	⚑
Edit | Del	Support Searching	1	5.00	⚑
Edit | Del	View Prior Recorded Communication	1	5.00	⚑

Figure 4: Assessment Details

5 OBSERVATIONS, LIMITATIONS AND RELATED WORK

The CTAT construct is a novel contribution based on both the theory (e.g. literature) and practice (e.g. practitioners' feedback). The CTAT needs to be considered with a view of its limitations. The CTAT is necessarily focused on the *communication* aspect of the DADE. Since the literature and practice are dynamic, the CTAT should be considered as an evolving construct to be revised and extended by future research. Despite its limitations, CTAT seems useful for providing the necessary criteria and test cases when assessing a particular communication technology tool (Force.com Chatter - as demonstrated in the previous Section) for the DADE environment. The main purpose of this paper was to evaluate the CTAT's usability as opposed to making any recommendations about the use of some specific communication tool such as Froce.com Chatter. Force.com Chatter has been used as a test case example for the evaluation of CTAT. It can be observed from the analysis (Figure 3) that the CTAT is of acceptable quality and *fit for purpose* and lays out foundation how one might rationally approach when assessing the communication tools for their DADE. The evaluation of the CTAT gave us a number of research insights. For instance, from the CTAT evaluation and coverage perspective, there were a number of assessment factors that had been identified during the assessment of the Chatter that were not present in the original CTAT construct. These are Customizability, Feed Tracking, Social Profiling, Recommendations and Support. The inclusion of these newly identified assessment factors in the CTAT construct is subject to further research and assessment. From the Chatter assessment perspective, It is clear from the analysis (Figure 4) that Chatter is compliant to seventeen assessment factors (e.g. indicating the strong compliance) of the Core Technology Use Case assessment areas. It does not seem to support other seven assessment factors listed in the index of CTAT (Figure 3). For instance, it does not seem to offer support for managing artifact versions, and therefore developers may need to assess other tools such as distributed cloud-base Dropbox for document and version management in the DADE. Here, it also hints us that a single communication tool may not be able to support all the communication needs of a particular DADE; and developers may need to assess other options as well. However, it has also been noticed that the Chatter supports Feed Tracking, Social Profiling and Recommendations, which are not present in the original CTAT construct.

We also compared the final version of the CTAT construct with the well-known IS success model (Delone and MacLean 2003), and found that in the IS success model only seems to discuss the quality (e.g. system quality, information quality and service quality) and net business benefit assessment areas of the technology. In addition to these assessment areas, CTAT provides a number of additional assessment areas and factors (e.g. 12 assessment areas and 52 assessment factors) that had not been discussed earlier. Therefore, we would like to further investigate and extend the IS success model of Delone and McLean and retest it, and present it to community for review and feedback as an ongoing contribution to both theory and practice. We will also present the evaluation of the CTAT’s other eleven main Assessment Areas in our future scholarly communications.

6 CONCLUSION

The CTAT construct, as a part of our large CACA framework, allows developers to assess and select appropriate cloud-based communication technologies for their DADE. This paper presented the usability evaluation of the CTAT construct. We assessed the Force.com cloud-based Chatter communication tool (based on the description published in the public domain) by using the *Core Technology Use Case* assessment area of the CTAT. The purpose of such an evaluation was to provide an indicative proof of concept of the proposed CTAT construct as opposed to the detailed assessment of the Force.com cloud-based Chatter communication tool. On the basis of this analysis, it seems that CTAT is useful when performing a vendor independent assessment of a specific communication tool. CTAT highlighted many aspects of the Chatter that were compliant or not compliant to the *Core Technology Use Case* assessment area of the CTAT (as discussed in Section 4). The result of such an assessment can be further used as an input for making an informed decision about the selection of a specific communication tool for the DADE. For instance, CTAT helped to indicate that a single communication tool (e.g. such as Chatter) may not be able to support all the communication needs (e.g. as listed in the Core Technology Use Case assessment area of the CTAT) of developers working in the DADE and they may need to consider other options as well. Such an evaluation is, of course, not an easy task and developers may use CTAT and include their own criteria of evaluation for the assessment and selection of the most appropriate communication tool for their DADE. In future, we will present the use of the CTAT’s other eleven Assessment Areas and apply it to the assessment of other available communication tools. We will also compare the CTAT with other available IS models, and update it (if it is required), and then present it to the community for review and feedback as an ongoing contribution to both theory and practice.

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