Framework for Optimizing Collaboration using Stimulation

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Abstract. Though collaboration is an important factor in any organization's business cycle, but achieving collaboration is not straight forward and poses many challenges. In order to enhance collaboration various tools and techniques have been proposed. Proposed research work aimed at finding out elements that can stimulate collaboration. How these stimuli can be utilized along with other factors to positively affect collaboration is also part of project. A measurement model is also intended to be developed under proposed work to study and optimize stimuli in collaborative processes. Finally a framework which provides basis for an adaptive environment for collaboration using stimuli and collaboration measurement model has been proposed along with tool support. Validation of proposed research work will be carried out through empirical analysis, process mining, case studies, experimentation and other available methods. Empirical analysis approach for extracting data from real world case-studies will be used.

Keywords: Collaboration, Process mining, Data modeling

1 Research Question

Various research studies have pointed out to issues faced while enhancing collaboration. These issues include lack of trust, reliability, communication gaps, organizational conflicts and politics, demographical issues. Collaboration related issues become even more critical in some scenarios such as virtual teams, global software development, online or virtual learning platforms. Collaborative activities can be influenced by internal and external factors such as trust, technology change, and social relations. Collaboration can be enhanced by using various techniques and technological enhancements. Usage of recommender systems is on such example [1] .So if the elements that can stimulate collaboration can be identified; same elements can be utilized to enhance and manage collaboration. Another factor that is missing is effective measurement of collaborative process that is necessary to understand which phase in business cycle requires stimulus to boast collaboration. Each organization has various processes being conducted at the same time; similarly their needs and overall structure differ significantly depending upon their respective business niche. Also due to frequent changes in technology and inter-connective nature of the collaboration; the collaborative activities requiring stimulus should be done in adaptive manner.

1.1 Research Questions

RQ -1	Identification of elements that can stimulate collaboration.
RQ-2	Measuring the collaboration process to identify phases that need stimuli
RQ-3	Developing adaptive collaboration environments able to variate the intensity of stimuli in order to optimize the process.

Table 1. Research Questions

2 Background

Collaboration is essence of any successful organization and has various benefits particularly in team based working environment. Research studies have been conducted to find out effect of various factors that can influence collaboration in different environments e.g. trust [2] [3].

Open Innovation factory [4] is a research study base solution which tries to bring open innovation in organization by extracting knowledge items which can be used as "stimuli". Based on these "stimuli", recommendations are made. Open innovation factory creates an environment for enhancing collaborative activities. Another similar study which focuses on result of technology enhanced recommendation in collaborative environments points out effectiveness of recommender systems [1]. Several authors presented results of qualitative analyses on the impact that collaboration platforms have on organizations [5] [6] [7].

Collaborative Learning is an old idea which is becoming part of many educational settings [8] [9]. Research work conducted in field of collaborative learning can be utilized in developing of other collaborative working environments as well. Various collaborative working platforms such question and answering websites ,knowledge sharing communities like stack exchange, global software development support environments apply various reputation building methods to increase users' collaboration [10] [11]. Research outcomes from these paradigms can be useful in development of proposed collaborative framework.

In order to utilize full potential of collaborative activities some kind of measurement model is also required. There are various performance measurement techniques are available such as e EFQM, Balanced Scorecard, Six Sigma or the Performance Prism. But there is a need to link performance measurement to collaborative activities. [12] suggested a technique for measuring collaboration in virtual organizations which took into consideration various sub perspective like information sharing, decision synchronization, trust, problem and conflict solving.

3 Significance

One of the most important workplace skills that organizations desire to have is collaboration or teamwork [13]. There are multiple reasons for giving collaboration so much importance, e.g. resolving intra-organizational conflicts, providing more inno-

vation and creativity in processes, services, and end products, blending complementary strength of organization, and improving learning. With advancement in information and communication technologies, organizations are getting more reliant on technology enhanced collaboration particularly in software and services industry. Some of the core objectives served by proposed work are as follows:

1. To develop an environment that can help in enhancing collaboration.
2. To develop technique and system interoperable with existing solutions.
3. To develop an environment that can help organization in increasing innovation through collaborative activities.

4 Research design and methods

3.1 Research Question # 1

From research studies it is evident that there are various factors which can influence and sometimes increase collaboration. These factors include trust, reliability, recommendations, security issues, policy changes and technology. For the factors whose influence is not possible to validate from existing literature; experiments and empirical studies will be conducted.

Factors:	Trust, Recommendation, Social Relations, Technology, Policies. Factors influencing collaboration can be internal or external to organization
Artifacts :	Artifacts are the elements which are assets which are involved during collaboration such as documents, source code, libraries or some tangible resources
Means:	Means refer to available tools and techniques which can be applied on factors to achieve collaboration. Means include technology enhanced environment, social media, crowd sourcing techniques, recommender systems etc.
Phases:	Phases refer to various periods during a collaborative activity.
Actor:	Actors are people or systems involved within a collaborative activity.
Trigger:	Which phenomena started or ended collaboration is a trigger.

Table 2. : Elements involved in collaborative cycle

Table.2 depicts elements which are directly linked with factors influencing collaboration. Based upon these elements an overall framework will be proposed.

3.2 Research Question # 2

Measuring collaboration is not an easy activity. It has been discussed earlier there are various performance measurement techniques available which can be used in conjunction with type of collaboration being conducted in an organization. A detailed

study of existing performance and collaboration measurement techniques will be conducted. Result of study will be compared and analyzed against various stimuli. Moreover a strategy will be devised to integrate proposed measurement methodology in proposed collaborative environment so that effects of stimuli can be measured.

3.3 Research Question # 3

Based upon findings of RQ-1 and RQ-2, framework will be proposed which is intended to create an environment where various stimuli can be used to enhance collaboration to optimum levels in adaptive manner. In proposed model users will interact with each other using a Technology Enhanced Collaboration Systems. Proposed system will utilize various means to stimulate collaboration; "means" include social media, recommender systems, collaborative filtering systems, crowd sourcing, reputation systems etc. These "means" will be directly integrated within processes. Measurement model is intended to find out effects of various stimuli.

3.4 Data Collection and Analysis

Data collection will be conducted by obtaining detailed understanding of collaborative architectures and also by analyzing sample applications for existing collaboration enhancement methodologies. For the purpose of data collection, group of stakeholders will be allowed to use application in varying circumstances so that all the situations and scenarios of data exchange and transmission are recorded efficiently. On the front of collaboration approaches; scientific publications and dissertations on empirical investigation would be studied so that proper understanding of usability of such approaches could be established.

UI interaction by users can be recorded in event logs. Through application of process mining technique, useful knowledge on actual workflows can be derived. Using these insights not only UI can be improved by also collaborative interaction between users can be understood. This understanding of collaborative working can be further used to improve processes and also to measure effectiveness of proposed methodology.

Process mining can help to find out deviation so by using process mining technique, comparison can be drawn between intended results of stimuli against its actual application to find out impact of stimuli. Process mining can help to discover usage patterns and workflow to correctly understand effect of certain stimuli on users' usage behavior against a stimulus.

4 Research stage

Initial proposal has been submitted and literature review is being conducted. Also study of relevant system is also being done.

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