

A THEORETICAL FRAMEWORK TO CAPTURE STAKEHOLDER'S PERSPECTIVES FOR THE DESIGN OF COLLABORATIVE COMMUNICATION STRUCTURES FOR SPECIALIZED ORGANIZATIONS

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ABSTRACT

Small consults business often specializes in one aspect of the business analyst. This specialized focus is done by necessity due to scarcity of resources and to maintain a proprietary market niche. However, this specialized focus results in a growth inhibitor due to their lack of ability to address all the potential client's needs. Moving to a multiple entity collaborative approach can provide a competitive advantage. By having many specialized business analysts and interactions can provide different value generation objects to co-produce a product or service to best serve customer requirements. Yet, interacting with multiple entities that do not communicate with each other well can be dysfunctional and unsatisfying for themselves and most importantly for clients. When multiple interests and beliefs are in place, soft systems methodology (SSM) and CATWOE tool can assist leaders to find the "middle" ground for all participants to collaborate. However, SSM is based on the observer doing all the design work, a feature not desirable when designing collaborative structures. In this research, a participative version of Soft Systems Methodology for energy analysis was developed to assist E3 (Economic, Energy, and Environment) practices and principles by using a set of questionnaires to capture information regarding the diversity of stakeholder's perspective. The resulting data then lead to the creation of root definition and the design of communication structure in the collaborative organization. The resulting version is capable of assisting collaborative specialized organization's leaders in the design of communication structures to coordinate collaborative efforts.

Keywords: Soft System Methodology, Gap Analysis, Weltanschauung, Collaborative, CATWOE, Communication.

INTRODUCTION

The collaborative organization work, communication is important. Communication is a human activity system. It represents very important steps because it allows people to talk to others. Communication provides ability to communicate in order to exchange opinions, thoughts and meanings, so it enables people to shows their own points of view. Flood (2010) states that human systems are better understood in terms of developing systems of human interaction which requires learning and understanding about emergent systems of meaning and moral dilemmas through human activities, communication (Flood R. L.,

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2010). Better communication tools and techniques have to be create to enhanced human communication. The collaboration in E3 program is complex because each stakeholders does not understand what each individual agency programs has to offer. The communication will help stakeholders understand common agreement, goals, contributions, and productivity in each organization; furthermore, it helps build strong relationship between stakeholders (Duncan & Moriarty, 1998). Therefore, effective communication is significant to any organization, especially collaborative work.

The E3 (E3: Economy - Energy - Environment, 2015) program is a federal technical assistance framework that design by EPA and other federal government agencies to help communities, manufacturer and manufacturing supply chains to identify best practices, assessment approaches, and efficiency improvements solutions while gain access to new markets (E3: Economy - Energy - Environment, 2015). In the process, E3 is boosting local economies and benefiting the communities with creation of “green jobs” and reduced environmental impacts (E3: Economy, Energy, and Environment, 2014). The program provides manufacturers with hands-on assessments of production processes and assists with the implementations of energy saving solutions. The E3 program also encourages the relationship development among collaborative organizations and targeted industry sector.

In this research, it was discovered that there is a lack of communication among projects stakeholders during the initiation stage, the E3 round table meeting. The meeting was conduct to identify objectives of the project and determine key stakeholders. During the meeting, the analyst acknowledged the lack of an efficient communication structure. Therefore, the goal of this research is to identify a communication structure to help achieve a common end results for the collaborative work using Soft System Methodology in conjunction with CATWOE. Soft Systems Methodology (SSM) as the guiding methodology to develop a theoretical framework to create an E3 communication collaborative structure. SSM is selected because it provides a platform to create consensus between diverse stakeholders. The contribution in this research is replacing stage 2, rich picture, of 7 stages of SSM by using a set of questionnaires to capture information regarding the diversity of stakeholder's perspective. The resulting alternate methodology should be capable of identifying CATWOE elements which lead to the design of communication structure in the collaborative organization.

BACKGROUND

This section identifies and describes the history and nature of the systems and applications used in this research. It serves the purpose of understanding the concepts used to analyze systems in large organizations as well as applications that focus on the social sciences that model human activity system.

Collaborative Organization

It is unlikely that there is no collaboration taking place in the organization if people are talking to each other, discussing opinions on particular activities or events in the meeting,

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or working together on a projects or documents with the culture of openness, honestly, and trust. Katz and Martin identify collaborative as "an intrinsically social process and, as with any form of human interaction, there may be at least as many contributing factors as there are individuals involved" (Katz & Martin, 1997). Collaborative groups often consist of stakeholders from different area of expertise and provide competitive advantages to the groups in the project. Katz and Martin states the benefit of collaboration includes sources of communication, information, and perspectives such as transfer of knowledge, skills, and techniques, explore other stakeholder into a wider network, and enhance the potential visibility of the work (Katz & Martin, 1997).

Collaboration can re-invigorate organization by fully engaging employees, improving retention, and increasing innovation (Kelly & Schaefer, 2014). Not only collaboration can be seen as an activity that involves team stakeholder, it also is a process with associated behavior that can be taught and developed. According to Kelly & Schaefer, collaboration is the way a group of people collectively explore ideas to generate solutions that extend beyond the limited ability of an individual (Kelly & Schaefer, 2014). In the collaborative environment, all stakeholder can truly contribute to the group, where everyone has voice. This can be translated into a high level of engagement since everyone understand how their contribution fit into the organization's structure; people want to feel a sense of belonging (Kelly & Schaefer, 2014).

Collaboration can occur in many forms ranging from offering general advice to providing information or services. According to Hord, the beginning process in collaboration model includes organizational agree on an exchange of tasks, products, or service, organizations join focuses to plan and execute the design of shared project, and organization agree upon project results and outcomes (Hord, 1986). Corley, Boardman, & Bozeman (2006) mention the success in the interdisciplinary collaboration includes setting collaboration goals. However, when coordinating and collaborating among multiple stakeholders across domain of expertise, it shown that communication across discipline is impeded. The differences between stakeholders can present significant obstacles in the collaborative work within organization. Thus, communication roles are established and definite channels are created for interaction across organization concerning the joint project.

E3 Program

The United State Environmental Protection Agency (EPA) is an agency of the US federal government that established with the purpose of protecting human health and the environment by enforcing regulations based on environmental laws (EPA, 2015)

E3 is a federal technical assistance framework created by EPA and other federal agencies in 2009 to help manufacturers across the country to understand and adopt sustainable business strategies to reduce pollution and energy use while increasing productivity and profits (E3: Economy - Energy - Environment, 2015). The program models for collaboration among manufacturer, federal agencies, utilities provider, and local government to address energy and sustainability challenges and to provide valuable technical training and assessments in three sectors: energy, environmental, and economics.

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Soft System Methodology

Soft System Methodology (SSM) is a methodology framework for action research developed by Peter Checkland and colleagues at Lancaster University. It offers a great fit for complex problem context and ill-defined problem situations (Checkland, *Soft Systems Methodology: A Thirty Year Retrospective*, 2000). SSM is built around the concept of human activity systems that attempts to incorporate all points of view from stakeholders, which is necessary in developing a communication framework that will connect multiple organizations towards one common goal.

There are two main approaches in SSM that utilized to solve real world soft systems problems: four main activity principles and seven stages model as shown in Table 1 below. SSM is a process of analyzing human activity system to gain a better understanding and to propose explanation that can improve the current problem situation (Hanafizadeh & Aliehyaei, 2011).

Table 1: Soft System Methodology (Calvo-Amodio, Ng, Galindo, & Temblador, 2010).

Soft System Methodology	
Four Main Activities Principles	Seven Stages Model
1. Figure out about problem situation in all point of view	1. Enter unstructured problem situation
2. Formulate relevant purposeful activities models	2. Express the problem situation
3. Debate the situation based on the model to seek changes that would accommodate and improve the situation	3. Formulate root definition of relevant human activity systems
4. Implement actions and changes to improve the situation process	4. Build conceptual models from the root definitions
	5. Compare models with real world
	6. Define desirable and feasible changes
	7. Take action in problem situation

The seven stages model of SSM helps to explain its flexibility and make it easy to understand the process logistically. In this research, the SSM seven stages model is preferred for this research because it better aligns with the expected framework for the E3 project.

Survey Research

Survey is a powerful tool used to accumulate data. Data collected from the survey provides critical information to researcher in order to construct a solution to the research

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proposal where it has led to extensive use of quantitative human activity systems survey to collect, analyze, and formulate strategies to the problem (Barlett, Kotrlik, & Higgins, 2001).

Survey researchers employ a variety of techniques in the collection of survey data. While there are many forms of human activity system surveys, the web survey seems to provide the most benefits compared to others. According to Kaplowitz, Hadlock, and Ievine, the web is increasingly looked at as a means of surveying the public (Kaplowitz, Hadlock, & Levine, 2004). The advantages of using human activity web survey include time and cost saving associates with printing and mailing of survey instruments. The greatest benefit of web survey is the access to the population of individuals (Schmidt, 1997).

CATWOE

A CATWOE technique was defined by Peter Checkland as part of Soft System Methodology (SSM). CATWOE is used to view a problem from different perspective (Bergvall-Kareborn, Mirijamdotter, & Basden, 2004). It allows researcher to focus on six key elements (customer, actor, transformation, weltanschauung, owner, and environmental constraints) where it identifies the people, processes, and environment that contribute to a situation, issue, or problem within the system. CATWOE stands for:

- C – Customers – The beneficiaries or victims of the transformation process
- A – Actors – Those participants who will carry out the activities
- T – Transformation – The conversion of input to output
- W – Weltanschauung – The world view that determines transformation significance
- O – Owner – The entities that could stop the process
- E – Environmental Constraints – Any outside elements that impact or limit the system

According to McLucas, “CATWOE is the mnemonic of the six crucial characteristics which should be included in a well-formulated root definition” (McLucas, 2003)

CAPTURING WELTANSCHAUUNG USING A CATWOE SURVEY

Based on the contribution in my previous research, Soft System Methodology was used as a guiding methodology in an E3 case study to generate root definition, following the first three stage of SSM. The methodology is presented through a case study to explore the strategic design of an organizational structure to assist E3 (Economic, Energy, and Environment) practices and principles. The identification of beliefs, motivators, and barriers to work with project stakeholders are the main constructs of the survey, where the questions are generated using CATWOE analysis tools.

To begin the Seven Stage Model of SSM, the first stage is accomplished in tandem with the goal of turning an unstructured problem into an expressed problem situation (Checkland, 1985). In the research, the communication problem was recognized during the first E3 project began at the kick off regional E3 roundtable meeting in Portland,

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Oregon. The meeting was conducted to develop the project's objectives and identify key project's stakeholders. All information gathered in stage one is then brought together by the analyst to form a rich picture in stage two, where it defined as the expression of a problem. However, in the research, the human activity system survey form was used as an alternative method to rich picture.

Creation of Human Activity System Survey

The survey was used as participative tool to collect data to develop root definitions. The survey was developed as an alternative approach because conducting a rich picture will be time consuming and impractical for stakeholders. In this research, an alternative approach to a rich picture is proposed in human activity system survey form. CATWOE is applied during stage 2 to express the problem situation where a special focus must be placed on all aspects of the problem. Each element of CATWOE is applied to a set of human activity system survey questions for stakeholders of the E3 project. The survey questions were organized into four main sections. These questions are used to explore information such as the understanding of the E3 project, project deliverable, organizational technical specification, as well as the internal and external affected factors. The human activity system survey questions also seek the challenges that stakeholders may encountered during the E3 project. These questions expose aspects of the organization that are paramount to maintain and nurture. Since the data collected by the survey are used to build root definition, it is important that the human activity system survey instrument interpreted similarly by each respondent, and collected data must be accurately represented the diversity of stakeholders' perspective on the E3 project.

Table 2 lists each human activity system survey question and its corresponding CATWOE categories. Transformation and Weltanschauung constructs are the largest concerns where concerns by most questions connected since it is considered the most important aspects in SSM (Checkland, 1981).

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Table 2: Human Activity System Survey Questions and Associated CATWOE Categorization (Chongvilaiwan, 2015)

Survey Questions	C	A	T	W	O	E
Section 1: Project Background						
My organization has a clear understanding of the E3 project goals						X
My organization knows the needs of the E3 project						X
Being part of an E3 team will be beneficial to my organization				X		
My organization is interested in improving performance				X		
The use of performance metrics improves the performance of my organization						X
My team will be an active partner in the E3 project		X				
Balancing short and long term goals is important to my organization				X		
My organization provides an assessment for customers			X			
My organization provides training for customers			X			
My organization provides recommendation reports for customers			X			
My organization provides solutions related to energy problems			X			
My organization provides solutions related to economic problems			X			
My organization provides solutions related to environmental problems			X			
Section 2: E3 Project Stakeholders						
Industry clients will benefit from the E3 project	X					
EPA will benefit from the E3 project	X					
My organization will benefit from the E3 project	X					
My organization will work closely with other stakeholders involved in the E3 project		X				
My organization will work closely with EPA		X				
My organization will work closely with the customer		X				
Section 3: Challenges						
Lack of commitment and support from other stakeholders involved in the project			X	X		
Lack of effective communication among project's stakeholders			X	X		
Unsupportive organizational culture for change			X	X		
Misunderstanding of E3 project's goals			X	X		
Section 4: Organizational Technical Specifications						
The program director is in charge of my organization					X	
A State agency is in charge of my organization					X	
My organization is a non-profit organization						X
My organization is a government service agency						X
My organization has expertise in economic assessment and/or analysis				X		
My organization has expertise in energy assessment and/or analysis				X		
My organization has expertise in environmental assessment and/or analysis				X		

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The information gained from each CATWOE categories helped identify the key human activity system, where useful perspective to build root definitions can be extracted. After receiving results from each stakeholder, the information collected from the human activity system survey was being validated for each CATWOE construct using Cronbach's alpha method to measure the internal consistency of the human activity system survey construct.

Stage 3 was built upon information discovered in stage 1 (roundtable meeting) and stage 2 (the human activity system survey) by developing the collected data into clear and concise verbal statement, root definition. The root definition is important to the research as it lays a baseline for the entire project (Flood & Jackson, 1991). The following root definitions are constructed around an expression of Weltanschauung and a purposeful activity as a transformation process (Chongvilaiwan, 2015).

Root Definition 1

The E3 is a communication system owned by state agencies that provides activities such as assessment, training, and/or recommendation report by stakeholders involved in the E3 project who specialize in energy, economics, and/or environmental aspects for the industrial and state client, while the activities are carried out with a limited understanding of project goals and needs.

Root Definition 2

The E3 is a communication system owned by a program director that provides activities such as assessment, training, and/or recommendation report by stakeholders involved in the E3 project where they believe that the program is beneficial to project stakeholder and the client, while the activities are carried out with a limited understanding of project goals and needs.

Root Definition 3

The E3 is a communication system owned by profit and non-profit state agencies that provides activities such as assessment, training, and/or recommendation report by stakeholders involved in the E3 project where they believe that the program is beneficial to project stakeholder and the client, while the activities are carried out with a limited understanding of project goals and needs because of the lack of communication within the system.

CREATING COMMUNICATION FRAMEWORK USING SOFT SYSTEMS METHODOLOGY

In the previous research, three out of seven stages of the Soft System Methodology have been completed: defining the project, producing human activity system survey to collect data, and creating root definitions. As a result, the information collected by the human activity system survey is accurate and is capable of identifying different stakeholder views. Furthermore, the information collected confirmed that communication presents the largest obstacle to create a successful E3 structure.

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Stage 4: Deriving Conceptual Models

In stage 4, the root definitions created in stage 3 are developed into the conceptual model, which is what the system must accomplish to fulfil the requirements of the root definitions (Flood & Jackson, 1991). The models were created by listing the activities in a logical order to result in a visual diagram per root definition. The conceptual model consists of named activities linked together by arrows that demonstrate some form of logical dependency between those activities. During the models generation, all activities include in the model were using verbs in the imperative write down activities necessary to carry out the Transformation (T in CATWOE). Figure 1 provides the definition of symbols used in the diagrams and Figure 2 shows an example of root definition 1 conceptual model diagram, the purposeful activity system from public entity perspective. The conceptual model diagram based on the root definition 2 and 3 are listed in the Appendix A and Appendix C.

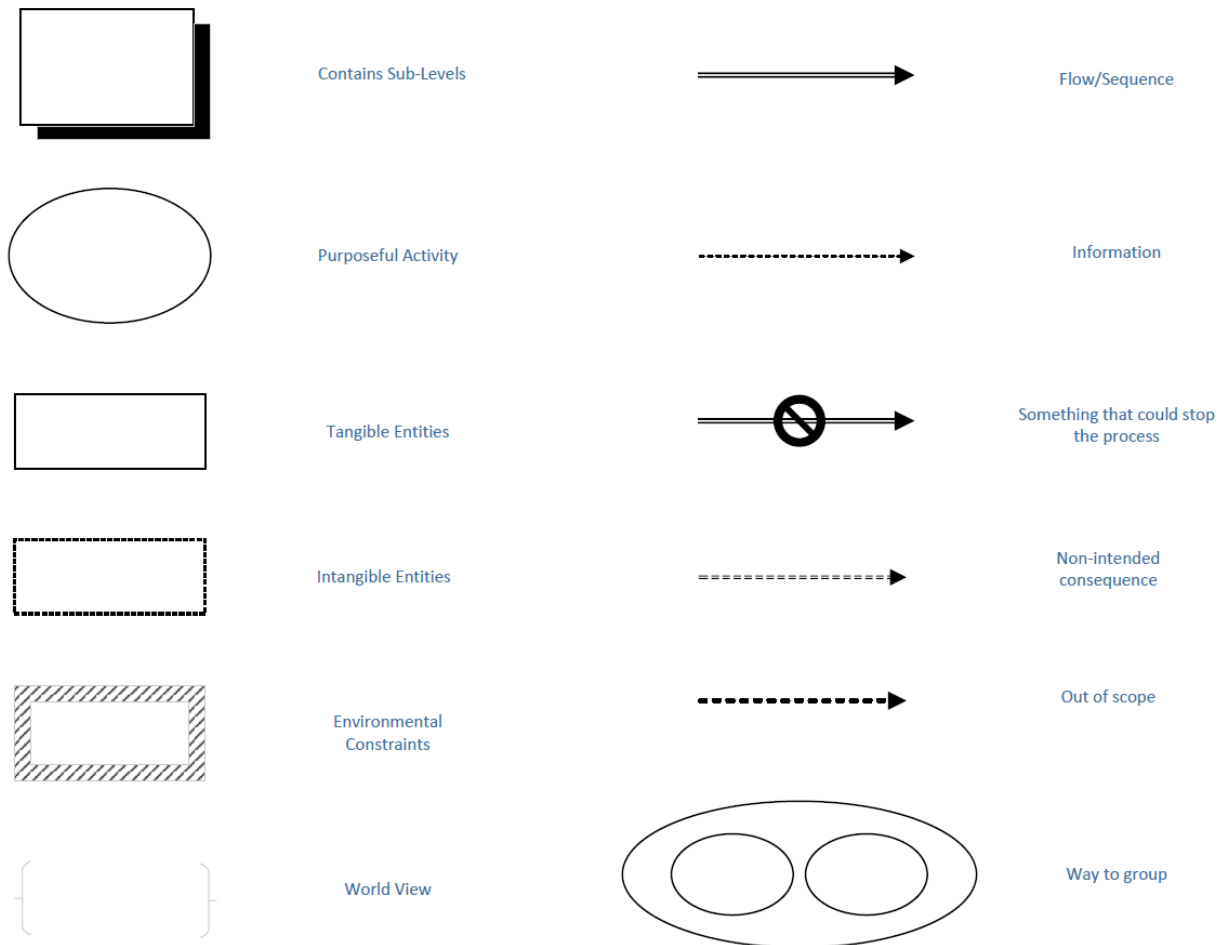


Figure 1. Symbols Definition

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Root Definition 1 – Purposeful Activity System from Public Entity Perspective

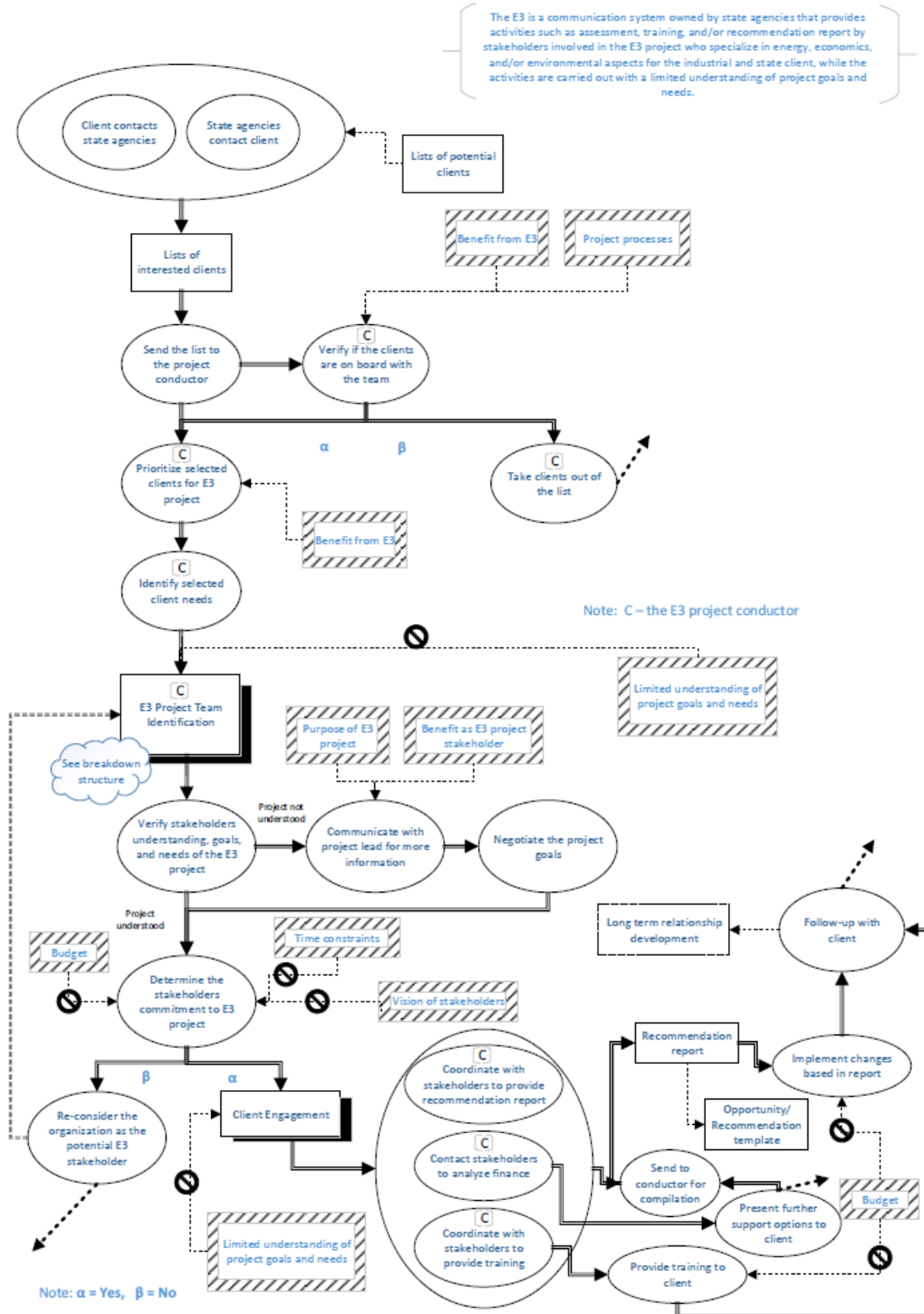


Figure 2. Root Definition 1 – Purposeful Activity System from Public Entity Perspective

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Figure 2 shows the conceptual model diagram based on the root definition 1. The diagram provides process flow procedure from the public entity perspective where some activities contain sub-levels of activities or process. The root definition 1, root definition 2, and root definition 3 have slightly different process, sub-levels activities, flow, information, and environmental constraints. These sub-levels of activities or process are shown in Figure 3 and Figure 4.

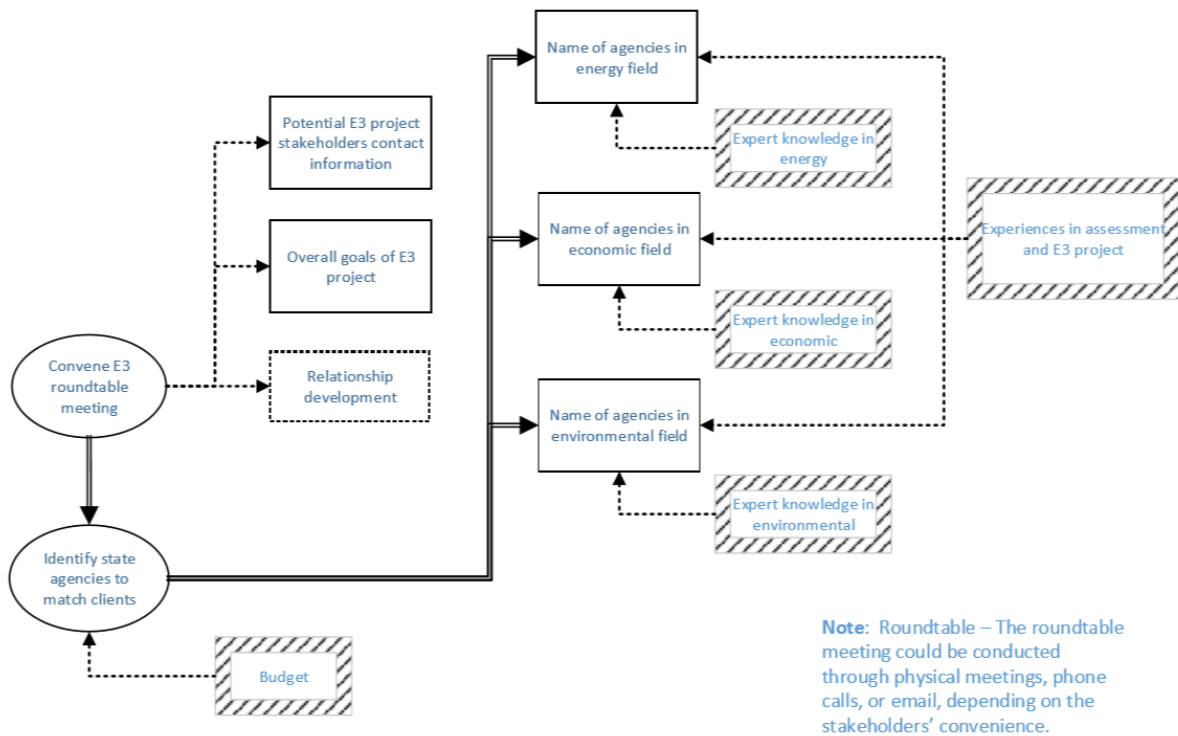


Figure 3: E3 Project Team Identification

All conceptual model diagram based on root definitions created in stage 3 contain sub-system levels of activities or processes. The E3 project team identification as shown in Figure 3 is the one sub-level process that identical in the three root definitions. Tasks are to conduct E3 round table meeting to determine the potential stakeholders in each expert knowledge fields and identify state agencies to match clients' needs.

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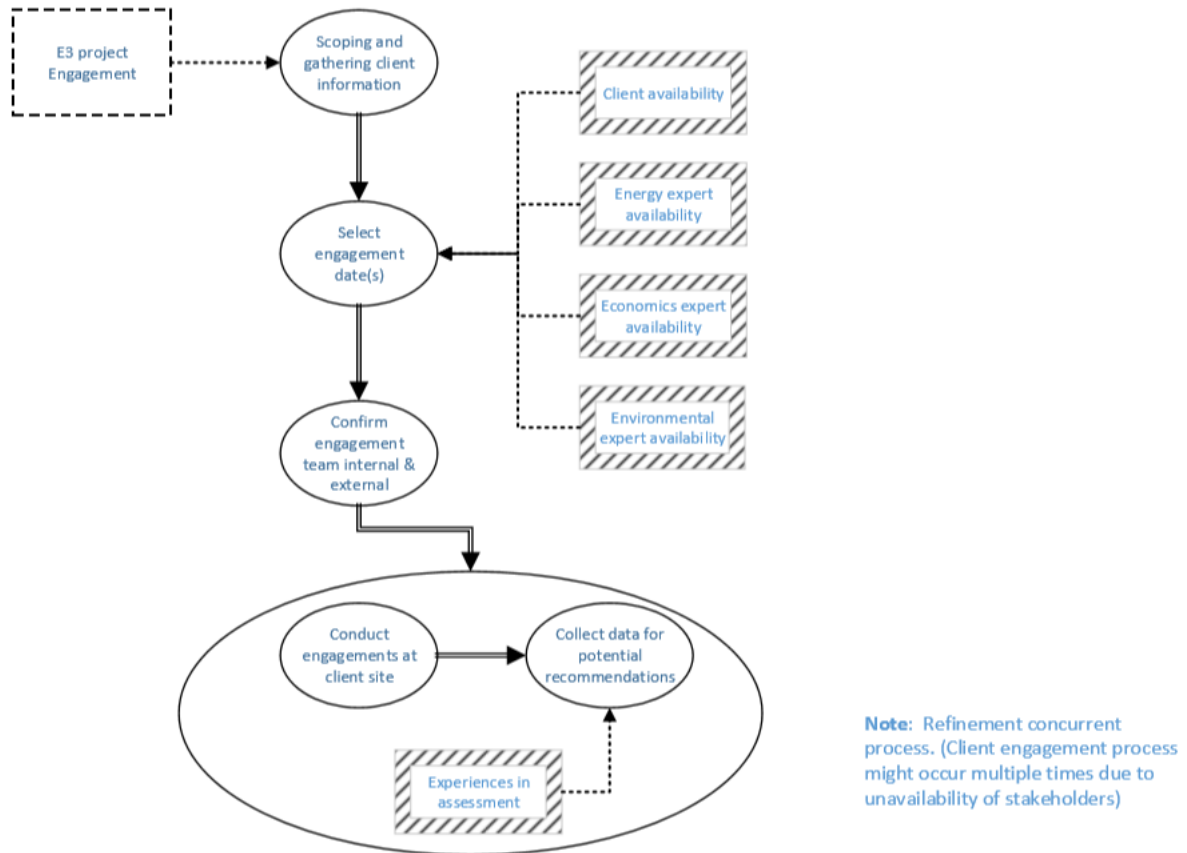


Figure 4: Root Definition 1 - E3 Client Engagement

Figure 4, E3 project client engagement sub-levels activity can be different between three root definitions based on individual stakeholder's availability and the detail assessment approach. However, the initial process of client engagement among three root definitions is identical. The process begins with scoping and gathering client information, select engagement date, and confirm engagement internal and external. Afterwards the actual engagement with clients depends on the date select and assessment approach. The E3 project engagement conceptual model diagram based on the root definition 2 and 3 are listed in the Appendix B and Appendix D.

Once the assessment and data collection processes are completed, the conductor will coordinate with each stakeholder to compile recommendations report and training opportunities to propose the clients for further review and implementation changes.

Stage 5: Comparing Conceptual Models with the Real World

Stage 5 is a comparison between the resultant conceptual model of stage 4 and the current stage description (Chilvers, 2000). The primary issue lying with stage 5 is to recognize when to stop the creation of the conceptual model and move onto comparison (Checkland, 1981). For this research, a gap analysis was performed to understand where the major

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variability is within the two systems. The comparison was completed through meetings with the program stakeholders. The model was revisited as new information or knowledge is obtained as commonly results from the comparison of stage 4 and stage 2. The outcome of this stage result in a list of communication activities and process changes that are different in the two system.

The information gained from many iterations of creating conceptual model diagrams lead to the key solution. The conductor role is identified to be necessary for the system. The conductor will act as a champion to the project. The responsibilities of this role include identify and prioritize selected clients, identify E3 team, coordinate with stakeholders to provide recommendation and provide the clients the complete report, it is the communication point of contact person who organize all the communication channels.

CONCLUSION

The task-orientated soft system approach concerns itself with complexity and interaction of activities. It is a sensible choice for examining to capture stakeholder's perspectives in the collaboration communication structure, which principally involves activities and process carried out by people to people.

Whilst the results discussed above is similarly in many aspects align to the soft system methodology. The E3 project is a project that mainly involves human activity and can be describe as a complex system which is difficult to manage due to communication breakdown that often exist in collaboration organizations. Based on this research, a participative approach is used in conjunction with the soft systems methodology in the E3 collaborative organization, which provide a unique survey approach method to capture stakeholders' perspectives. The outcomes show how a lack of communication can have negative impacts on the E3 project. This research indicates that a participative approach can be integrates into SSM's stage 2 to captures stakeholder weltanschauung to create root definition, derive conceptual model diagrams, and compare with the real world.

This research study presents the first five stages of the design of the collaborator organization through the application of SSM's stage one through five, resulting in conceptual model diagrams derived from root definitions and real world concept that fulfil the communication requirements of all interested entities. The conceptual model diagrams will then be used to analyze the feasible and desirable changes, as well as implementation to the system.

Stage 6: Analyzing Feasible and Desirable Changes

This stage is closely tie to stage 5 where it uses the differences recognized in the gap analysis to warrant a discussion about the feasibility of implementing changes (Checkland, 1981). The changes from stage 5 attempt to mitigate the variance between the conceptual model and the real world situation. As stage 6 proceeded, the work from previous stage were revisited and updated based upon new information. The product of stage 6 is a compilation of changes that need to be implemented to convert the real-world to the

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conceptual model where special attention was paid to those changes that make the most impact with the least effort required.

Stage 7: Taking Action

Stage 7 is simply the implementation of those changes identified in stage 6. Ideally, stage 7 should be carried out methodically to create the most impact to the system with the least effort. An implementation schedule can be developed that lists the changes in terms of both implementation ease and feasibility. Checkland describe the possible changes within three categories: changes in structures, in procedures, and in attitudes (Checkland, 1981). This stage can be done through the management's team and the E3 project stakeholders. Nevertheless, the outcome of SSM should be the implementation of desirable and feasible changes.

This research serves as a case study within a boarder range of work around the topic of Soft System Methodology. Interacting with multiple entities can be dysfunctional and complex due to diverse assumptions about the collaboration, beliefs, and interests that can be result in poor communication. The research work has developed a methodology to capture evidence from potential stakeholders to the creation of communication conceptual model diagram that can be used by a collaborative project leader. The conceptual models give the project leader an insight of the underlying assumptions, interests, belief of each stakeholder to help the leader find the focal point for all entities to collaborative.

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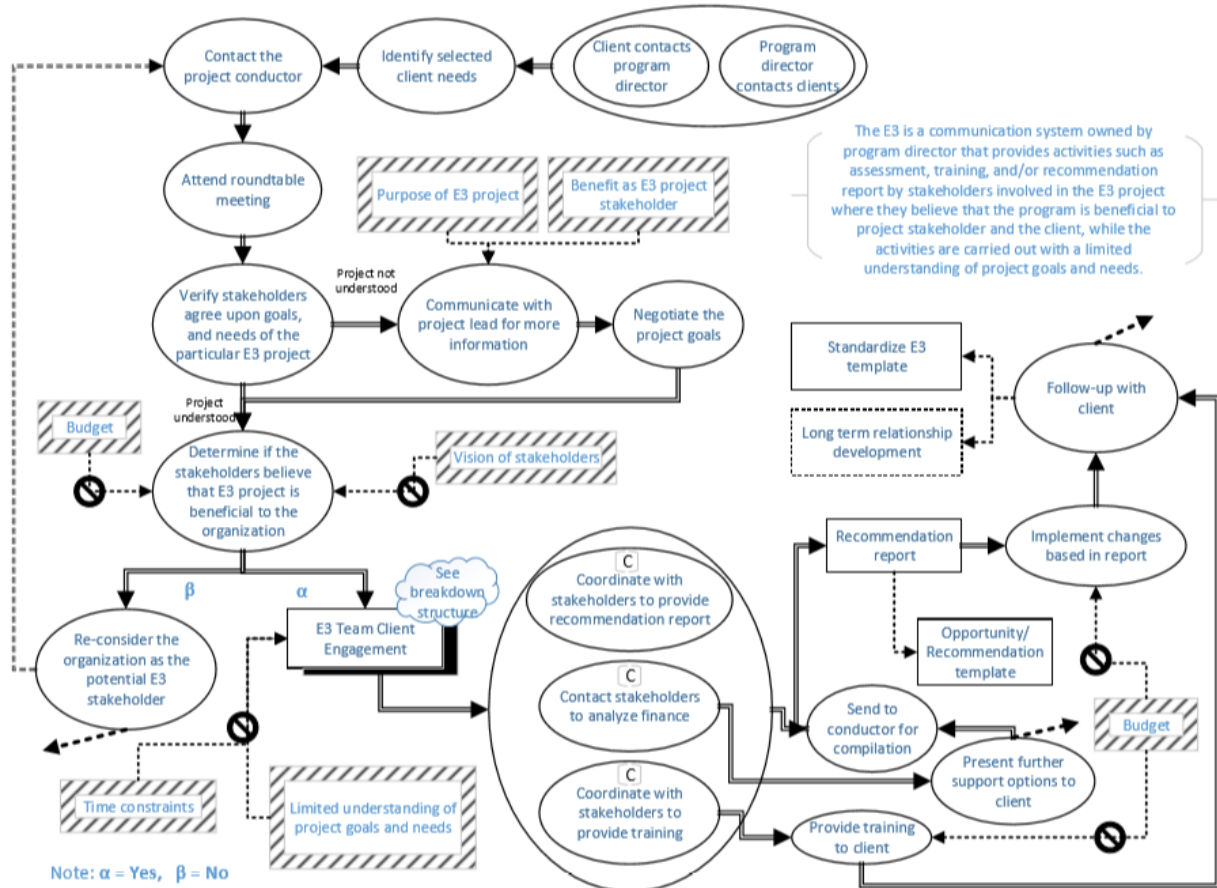
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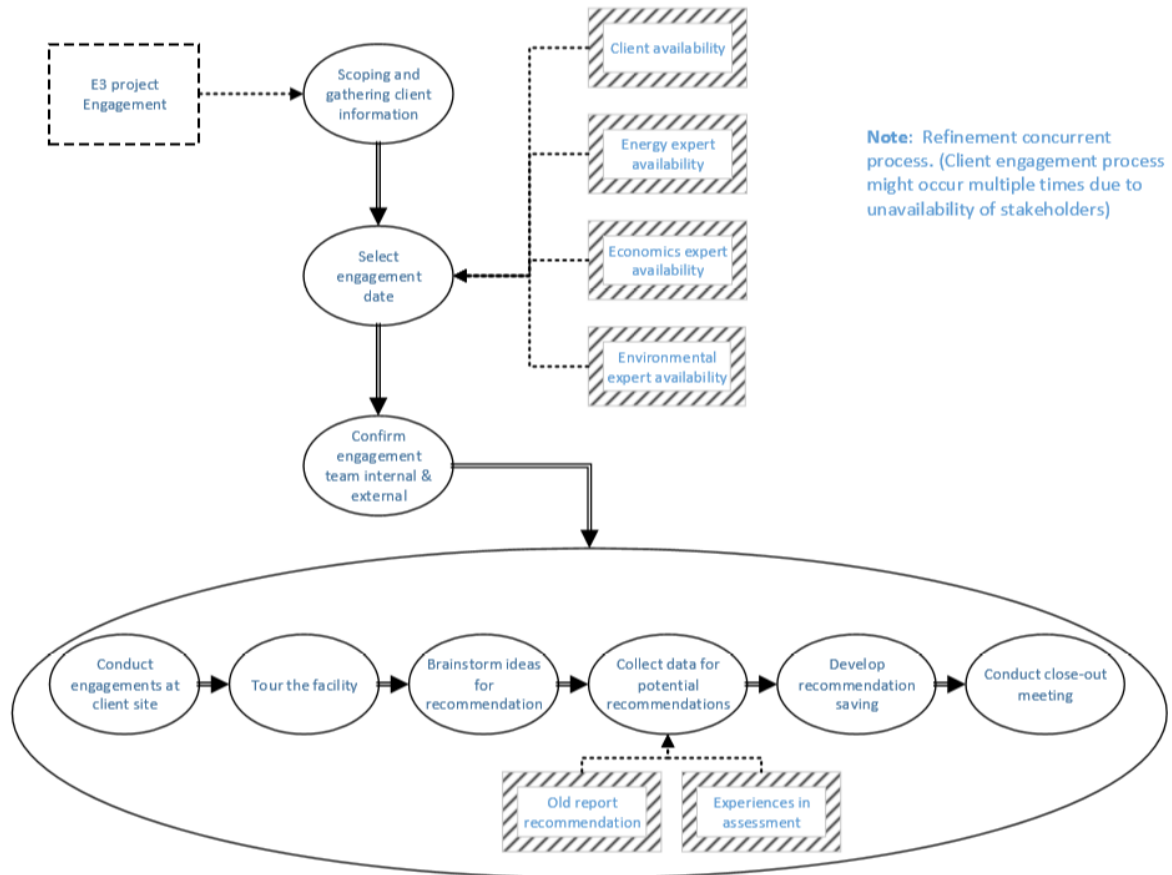
APPENDICES

Appendix A: Root Definition 2 - Purposeful Activity System from EEC Perspective



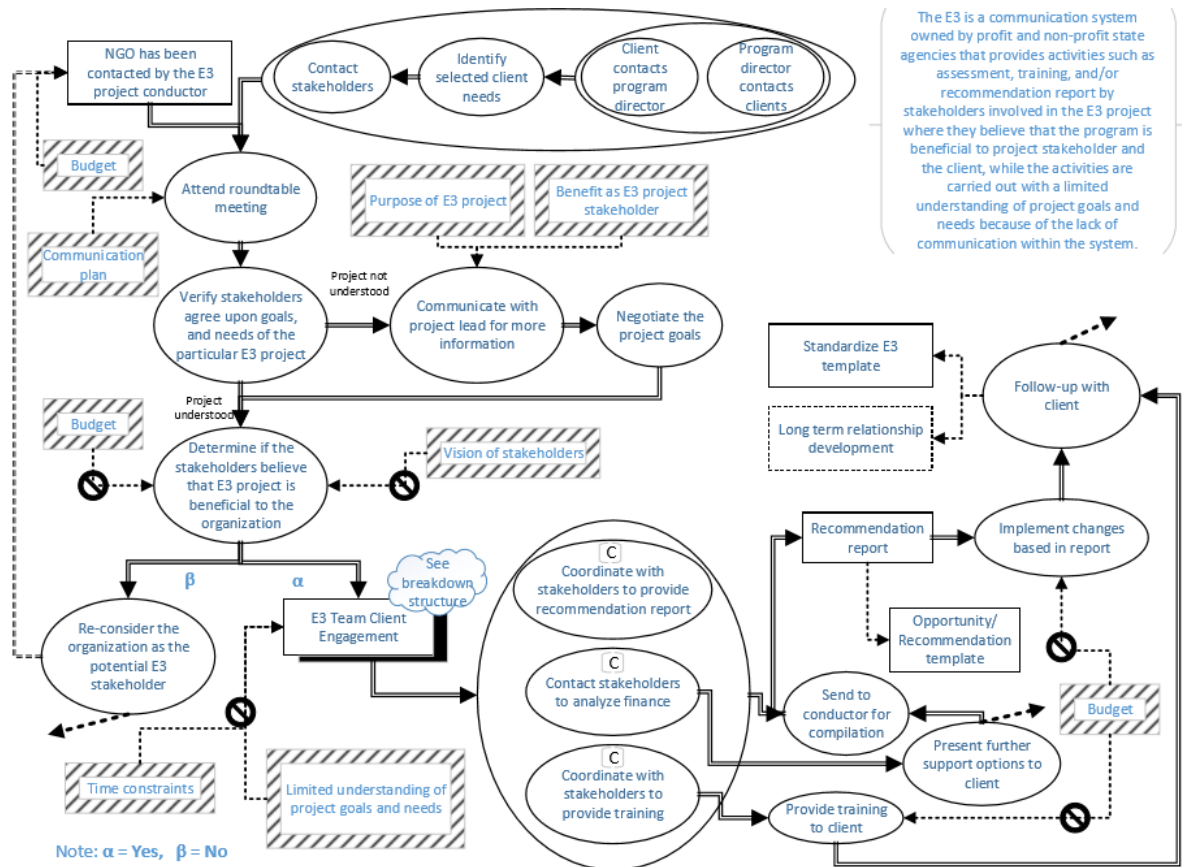
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Appendix B: Root Definition 2 - E3 Client Engagement



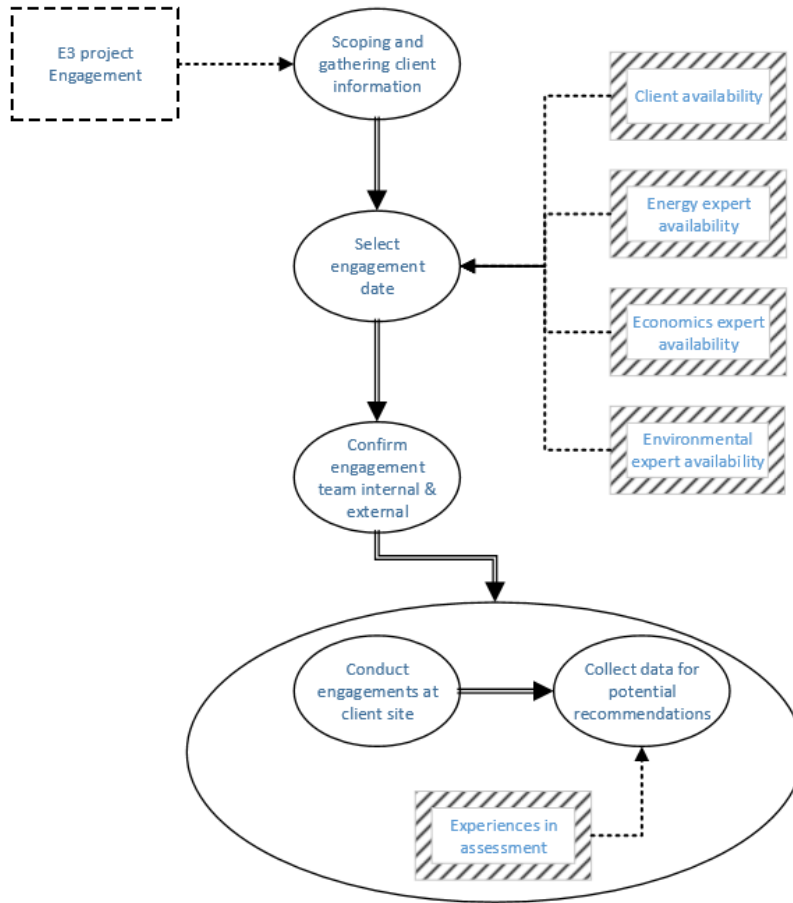
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Appendix C: Root Definition 3 - Purposeful Activity System from NGO Perspective



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Appendix D: Root Definition 3 - E3 Client Engagement



Note: Refinement concurrent process. (Client engagement process might occur multiple times due to unavailability of stakeholders)