

## ABSTRACT

Collaborating for Good: Building a Virtual Reality Simulation to Improve Health Outcomes in the Urban Slums of India

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This research studies a cross-discipline, cross-cultural, and cross-sector collaborative process used to build a virtual reality simulation (VRS). The VRS is part of a social innovation collaboration (SIC) project to improve health outcomes in India's urban slums. The SIC includes a hospital, two universities, two technology companies and the community that collaborated for 15-months to build the VRS. By analyzing data generated from the SIC meetings, interviews, emails, and project documents, we found that these collaborations are wrought with contradictions primarily coming from competing allegiances between each organization's control structure and the goals of the SIC. This study reports on the contradictions and discusses macro- and micro-level mechanisms the SIC team used to keep contradictions from escalating to conflict and thwarting the project. This study offers guidance to creating successful SICs that use technology to address health and poverty in developing countries. Theoretically, we integrate structuration and role conflict theories.

Collaborating for Good: Building a Virtual Reality Simulation to Improve Health Outcomes  
in the Urban Slums of India

by

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A Thesis

Approved by the Department of Information Systems

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## TABLE OF CONTENTS

LIST OF FIGURES .....	vi
LIST OF TABLES .....	vii
ACKNOWLEDGMENTS .....	viii
CHAPTER ONE .....	1
Introduction .....	1
CHAPTER TWO .....	4
Literature Review .....	4
<i>University-Industry Collaboration</i> .....	6
<i>Social Innovation Collaboration</i> .....	7
<i>Culture in IT Development</i> .....	8
<i>Facilitators, Tensions, Culture and Conflict: Structuration Theory</i> .....	9
<i>Mitigating Conflict in Collaborations</i> .....	11
CHAPTER THREE .....	13
Theory .....	13
CHAPTER FOUR.....	16
Methodology .....	16
<i>Data Collection</i> .....	17
<i>Data Analysis</i> .....	22
CHAPTER FIVE .....	23
Case .....	23
<i>Phase 1: Empowerment</i> .....	24
<i>Phase 2: Control</i> .....	28
<i>Phase 3: Quality</i> .....	33
<i>Phase 4: Delivery</i> .....	37
CHAPTER SIX.....	41
Discussion .....	41
<i>Contradictions</i> .....	42
<i>Resolution Mechanisms</i> .....	55

CHAPTER SEVEN .....	58
Conclusion.....	58
APPENDIX.....	62
BIBLIOGRAPHY.....	75

## LIST OF FIGURES

Figure 3.1. Theoretical Framework .....	13
Figure 5.1. Project timeline.....	23
Figure 6.1. Contradiction and resolution mechanisms.....	42

## LIST OF TABLES

Table 1.1. Sampling of relevant literature .....	4
Table 4.1. List of stakeholders .....	16
Table 4.2. Interviews conducted .....	18
Table 4.3. Meetings observed .....	19
Table 4.4. Emails analyzed .....	21
Table 6.1. Dimensions of facilitators and inhibitors for each stakeholder .....	43
Table A.1. Internal stakeholders .....	62
Table A.2. Communication with AppCo .....	68
Table A.3. Communication with AnimationCo .....	70

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## CHAPTER ONE

### Introduction

In the global health community, efforts to combat diseases and improve the health of people around the world have increased over recent decades. Organizations such as the World Health Organization (WHO) have collaborated with governments and other public and private organizations to improve health outcomes in low, middle, and high-income countries alike. Recognizing the important role of information technology in achieving health objectives, the WHO and other health-related organizations have emphasized and encouraged the use of mobile technology in addressing their health priorities worldwide. As such, mobile health (mHealth) initiatives have been encouraged as a means of efficiently delivering health services. mHealth has been described as "medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices...to support the achievement of health objectives" (WHO 2011). In recent years, the access to mobile devices has surged with an estimated 70% of residents in low and middle-income countries subscribing to mobile cellular networks (WHO 2011); in India, this number is estimated at 64% (CBC 2013). However, the use of mobile technology in support of mHealth has been limited in LMICs including India (Sondaal et al. 2016; WHO 2011). With recent data from World Health Rankings (World Health Rankings n.d.) indicating that India ranks 28<sup>th</sup> out of 33<sup>rd</sup> in life expectancy in the Asian region, and

67<sup>th</sup> out of 172 countries overall in deaths due to hypertension, the use of mHealth innovations has the potential for broad impact in improving health outcomes.

Complicating this issue in India however is the prevalence of slum dwellers in the country. In the South-East Asia Region (SEAR) countries on average, the percentage of the urban population living in slum areas has declined slowly over the years (UN-Habitat 2015). However, in a 2011 survey of Indian slums, it was found that over 64 million people live in urban slums (CBC 2013) where diseases like hypertension and diabetes are prevalent (Riley et al. 2007) and of concern as they can lead to diseases such as heart attacks and strokes, which are among the top five causes of death in low-income areas (WHO 2017). Residents in urban slums typically will not seek healthcare treatment until they are dying. By that time, treatment cost increases exponentially and treatment is often ineffective.

To address this issue, a medical researcher from a private university in the southwest region of the United States proposed the development of mHealth technology in the form of virtual reality simulations (VRS) to provide patient education and improve health outcomes. The research reported in this paper describes the collaborative process of the cross-cultural and cross-disciplinary team that was assembled to design and implement the VRS technology with initial focus on improving the education and health outcomes of the residents of slum areas in India. We refer to this effort as a social innovation collaboration (SIC). Our research seeks to answer the following questions in the context of the SIC:

RQ1: What contradictions arise when building a VRS to improve health outcomes of slum residents of India?

RQ2: How are contradictions prevented from escalating into conflicts that negatively impact the building of a VRS?

The next sections are organized as follows. First, we summarize existing literature that informed our research. Next, we describe the SIC and the methodology used to examine our research questions. We then discuss our findings and answer our research questions based on a qualitative analysis of data associated with the SIC. Finally, we conclude with the implications and contributions of our findings to research and practice.

## CHAPTER TWO

### Literature Review

Due to the complex structure of our social innovation collaboration we draw on several streams of literature to investigate our research questions. Table 1.1 summarizes these streams of literature.

We begin by reviewing existing literature examining university-industry collaboration, implementation of social innovation collaborations, and culture in IT development as these qualities are relevant characteristics of our collaboration. After that we examine the use of structuration theory for guidance on understanding and identifying sources of collaboration tensions. Finally, role theory is examined for guidance on strategies for mitigating the potential conflicts arising from collaboration tensions.

Table 1.1. Sampling of relevant literature

Literature Category	Relevant Papers	Relevant Findings
Social Innovation Implementations	<ul style="list-style-type: none"><li>• Dufour 2014</li></ul>	<p>In a social innovation collaboration involving nonprofit entities, facilitators and inhibitors to successful implementation include:</p> <ul style="list-style-type: none"><li>• implementation quality</li><li>• organizational characteristics</li><li>• socio-political issues</li><li>• personal characteristics of stakeholders</li></ul>
University-Firm Collaborations	<ul style="list-style-type: none"><li>• Hwang 2006</li></ul>	<p>Success factors include:</p> <ul style="list-style-type: none"><li>• consensus building among stakeholders</li><li>• trusting relationships through common interests</li></ul>

Literature Category	Relevant Papers	Relevant Findings
Culture and IT Development	<ul style="list-style-type: none"> <li>• Steinmo 2015</li> </ul>	<ul style="list-style-type: none"> <li>• similarity in values among stakeholders</li> </ul> <p>Higher levels of relational social capital more likely to reduce tensions in university-firm collaborations.</p>
	<ul style="list-style-type: none"> <li>• Korpela 1996</li> </ul>	<p>Culture based on nationality is problematic; nations are not homogeneous--many sub-cultures exist.</p>
	<ul style="list-style-type: none"> <li>• Walsham 2002</li> </ul>	<p>Structuration theory should be used to examine differences between groups, rather than using nationality alone.</p>
	<ul style="list-style-type: none"> <li>• Gregory et al. 2009</li> </ul>	<p>“Negotiated culture” is important to IT offshore outsourcing success and requires understanding other cultures, interaction with other cultures, and skills to interact with individuals of different backgrounds.</p>
Structuration Theory	<ul style="list-style-type: none"> <li>• Giddens 1979</li> </ul>	<p>Social structures can be analyzed in terms of individual agents (micro forces) and social structures (macro forces) that interact with each other.</p>
	<ul style="list-style-type: none"> <li>• Orlikowski and Robey 1991</li> </ul>	<p>Structuration theory can be used to study IS development by studying the 3 “modalities” of structures:</p> <ol style="list-style-type: none"> <li>1. Interpretive schemes</li> <li>2. Resources</li> <li>3. Norms</li> </ol>
	<ul style="list-style-type: none"> <li>• Walsham 2002</li> </ul>	<ul style="list-style-type: none"> <li>• Structuration theory can also be used to study cross-cultural IS development.</li> <li>• Tensions/Contradictions in cross-cultural development can lead to conflict (actions)</li> <li>• A “negotiated culture” can prevent conflicts</li> </ul>
Role Theory	<ul style="list-style-type: none"> <li>• Koch and Schultze 2011</li> </ul>	<p>When role actors have overlapping roles, there is more potential for conflict, which can be mitigated by strategies that provide more role “segmentation”. When role groups have distinct roles, "integration" reduces potential for conflict and establishes common purpose.</p>

### *University-Industry Collaboration*

In reviewing prior research on university-industry collaboration it is seen that universities play a unique role in development of IT for community development by bringing some of their assets to the collaboration (Hwang 2006). The assets include human-resources, technology and technical assistance, data, and trusting relationships with the communities. This trusting relationship is developed through various community outreach programs that are often implemented by universities. In the coordinator role, the university initiates the collaboration and coordinates multiple stakeholders to achieve the community development goal; this role is identified to be the most difficult role of a university-industry collaboration. However, Hwang (2006) found factors that are key to collaboration success including: consensus building, trusting relationship through common interest and clear agendas.

Steinmo (2015) also studies university-firm partnerships and supports many of the observations of Hwang (2006). She then introduces the roles of cognitive and relational social capital in reducing tension between partners in a collaboration (Harryson et al. 2007). Cognitive social capital is described as interpretations and systems of meaning that are mutually shared amongst collaboration members. It is also described as shared goals and culture. Relational social capital is described as interaction facilitating closeness and trust between partners in a collaboration. Thus, tensions involving conflicting interests, different time orientations, and different working practices can be mitigated by efforts to improve cognitive social capital (Steinmo 2015). Another key contribution of Steinmo's study is the recognition that for university-private firm

collaborations, building relational social capital will be key in avoiding conflicts as common understanding and shared goals are more difficult in this context.

### *Social Innovation Collaboration*

Phills et al. (2008, p. 36) define ‘Social Innovation’ as “a novel solution to a social problem that is more effective, efficient, sustainable, or just than existing solutions and for which the value created accrues primarily to society as a whole rather than private individuals”. Given the unique role that many universities play in their communities, coordinating collaborations with community organizations, including public and private firms, to improve societal outcomes is a natural role for universities to assume. While assessing the outcomes of such collaborations is vital and necessary to demonstrate community impact, better understanding the collaboration process has emerged as an equally-important area of exploration as these collaborations become more complex and innovative in nature.

Dufour et al. (2014) studied a social innovation collaboration between nonprofit organizations which included community education, health and social services, focusing on the implementation process of this effort. Their research found that in a social innovation project the stakeholders need to be flexible in implementation for the initiative to sustain and be successful; but that too much variation may cause the initiative to deviate from its original purpose (Dufour et al. 2014 p. 69). The authors also emphasized that the partners also need to be flexible with the way they do things.

### *Culture in IT Development*

An established trend of many IT development projects has been the use of outsourcing IT development activities to firms that often reside in different countries. While outsourcing has been in practice for over two decades, challenges remain in successfully coordinating such IT efforts as evidenced by the dozens of articles addressing this topic in the information systems senior scholar's basket of journals. One such challenge is the role that cultural differences play in the successful completion of IT development projects.

Korpela (1996) examined culture in his study of the development of a patient information system to support a teaching hospital in the country of Nigeria. Both the IT development and subsequent use occurred within Nigeria; thus, cultural differences based on nationality was not a factor in this study. However, the IT use did not enjoy the anticipated clinical benefits. Korpela argued that the state of Nigeria as a developing country may have inhibited some success of the IT; however other factors were equally impactful and were not unique to developing countries. These factors included urban lifestyle, the role of women, availability of apprenticeships, hierarchical authority structures, and religious worldviews. Thus, Korpela argues against the use of "nationality-based" identifications of culture such as Hofstede's dimensions of culture (Hofstede 1991), and suggests instead understanding the specific social and political norms of the groups involved in IT development. Similarly, Walsham (2002), and Myers and Tan (2002), note that defining culture based on nationality is problematic due in part to the heterogeneity of many nation-states as well as the complexity of confounding national values with work-related attitudes.



Gregory et al. (2009) examine cross-cultural adaptation, specifically how individual project members in IT offshore outsourcing projects cope with culture-specific behavior, and the role of project member's 'cultural intelligence' for a negotiated culture to emerge. A negotiated culture of cooperation suggests that over time social structures based on cultures can change as individuals learn more about the culture of other partners in the collaboration. Gregory et al. observed that three dimensions of 'cultural intelligence' drives negotiated culture. The dimensions are cognitive understanding of the other cultures, motivation, and behavioral skills to cope with cultural differences.

#### *Facilitators, Tensions, Culture and Conflict: Structuration Theory*

Structuration theory has been an oft-used theory in IS research. Giddens (1979) defined structuration theory as theory that analyzes social systems in terms of individual agents/actors and social structures that interact with each other. Social structures can include society's rules, traditions, norms, and the like. Structuration theory also includes the 'duality of structure' which means individual actions and social structures are 'two aspects of the same whole' (Walsham 2002).

The IT development process can be seen as a study of a social system as this process involves many actors. Orlikowski and Robey (1991) studied how structuration theory can be applied in this context. Drawing from work of Giddens (1979), Orlikowski and Robey describe structures in terms of three modalities: interpretive schemes, resources and norms. *Interpretive schemes* represent "shared stocks of knowledge that humans draw on to interpret behavior and events". In other words, interpretive schemes represent formal and informal knowledge humans accumulate over time that teach us how to behave and how not to behave in different life contexts. *Resources* represent

“means through which intentions are realized, goals are accomplished, and power is exercised”. Included in this dimension of structure is the concept of authority and the understanding of rights and privileges (or lack thereof) that comes with different levels of authority, as well physical resources which allow or inhibit one from acting in a specific way. Finally, *norms* represent “organizational rules...governing legitimate or appropriate conduct”. Norms are also said to include family, socio-economic, and culture-specific rules of conduct. These practices become routine as humans in these groups reinforce the actions over and over.

Walsham (2002) used structuration theory to study cross-cultural software development and use. Similar to Orlikowski and Robey (1991) he used the three dimensions of structure defined by Giddens (1979) to show that they can be sources of conflict in cross-cultural projects. He termed the three dimensions: systems of meaning, forms of power relations and sets of norms. Walsham used structuration theory to identify culture as measures of system or homogeneity within social group rather than considering culture as something that belongs to certain country or region. Walsham also introduced ‘structural contradiction’ and ‘conflict’. Contradictions are tensions or discrepancies between views of social systems, and conflicts are action or struggle as a result of those contradictions. Walsham presented two case studies where cross-cultural collaboration was involved. He used the three dimensions previously mentioned as the mechanism to distinguish the homogeneous social groups in a collaboration, rather than using national culture. He then showed how cultural differences, as identified through structuration theory dimensions, led to contradiction and in some cases, conflicts. In the study Walsham also highlights the support of ‘negotiated culture of cooperation’ (Brannen and

Salk 2000; Sahay and Krishna 2000) within the structuration theory framework.

Walsham asserts that this concept is supported by structuration theory as the theory points out that through constant interaction between individuals and social structure, over time, structures are reinforced or redefined. Walsham's case study of a Jamaican-Indian systems development illustrated this. In that project there were cross-cultural differences in 'structures of the mind' which caused some conflict, but over time, changes in the management structure to better balance the difference led to better performance from participants of both cultures.

Structuration theory can help identify potential inhibitors and facilitators to cross-cultural collaborations, why they arise, and how they can impact the collaboration through creating contradictions that could eventually turn into conflict.

### *Mitigating Conflict in Collaborations*

While structuration theory provides a means for identifying and categorizing facilitators and inhibitors that lead to contradictions in complex social innovation collaborations, it does not explicitly provide guidance on avoiding contradictions or preventing contradictions from escalating into conflicts. Management literature provides a starting point, suggesting the importance of creating shared identity and shared context to moderate the potentially negative effects of geographically-dispersed teams on team conflict (Hinds and Mortensen 2005). Recent MIS research (Nesterkin et al. 2016) also supports the importance of shared identity (referred to as team identity) in limiting the impacts of conflict on team performance.

To summarize, there is a rich body of literature examining different aspects of IT-related collaborations, and factors that facilitate and inhibit the success of these

collaborations. A few of these studies examined these factors in collaborations between universities and other organizations. Many prior studies emphasize the importance of relationship-oriented factors to ensuring successful collaborations. However prior research also demonstrates that cross-cultural IT collaborations can create an additional layer of tensions that need to be managed in order to avoid potentially-detrimental conflicts. There is, however, a gap in research to address "all of the above." That is, for IT-related collaborations that produce innovations impacting social good, and include stakeholders in multiple disciplines, multiple sectors (i.e., nonprofit, and for-profit), and multiple countries, what are potential sources of tensions, and how can these tensions be managed so that they do not escalate to project conflict. Our study addresses this gap in current research and creates a research framework to study these questions.

## CHAPTER THREE

### Theory

We sought a framework to guide our study of the process of working in a cross-discipline, cross-sector, cross-cultural social innovation collaboration to produce information technology for social good. The framework created in this research is shown in Figure 3.1.

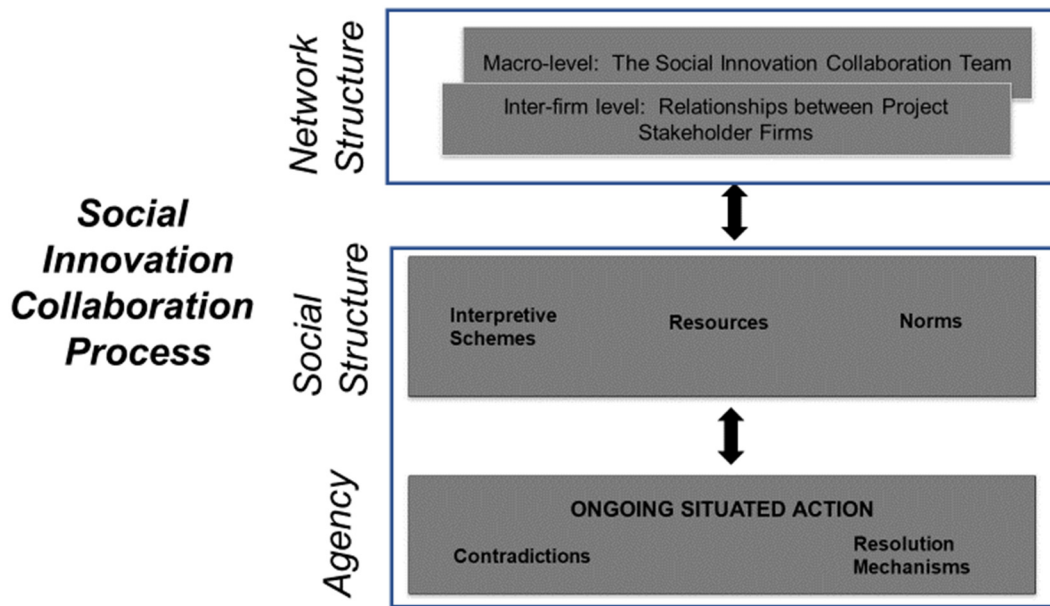


Figure 3.1. Theoretical Framework

While many studies examining collaborations in general, IT development collaborations, university-public firm collaborations, university-private firm collaborations, and culture in IT development exist, no study that the authors could find included those topics and the additional components of both IT for social good and cross-

disciplinary collaborators in both public and private sectors. As such, our research framework gleans guidance from two key theory bases: role theory and structuration theory.

Role Theory (Koch and Schultze 2011) teaches us that role practices are enacted in collaborative structures at both the macro level involving the efforts to coordinate of a group of firms that comprise the social innovation collaboration team, and at the inter-firm level where individuals in the collaboration interact with each other to produce the expected outcomes.

Within such network structure interactions, structuration theory offers guidance on potential sources and ways to mitigate conflict. As described earlier, structure in the context of structuration theory refers to rules, resources, and norms that exist in the mind of agents (groups and individuals), and that allow social practices to exist over time (Giddens 1984; Walsham 2002). Agents draw from these structures of the mind to determine how to act in given situations; i.e., structure serving as the means for action. However, the “duality of structure” as described by Giddens (1984) also emphasizes that structure also serves as an outcome of action as actors’ responses to structures change. Thus, the structures in the mind lead to agent actions (agency) that either reinforce the structures in the mind or create new structures over time. In the context of our research framework, we show the structures in the mind as the three dimensions of social structures as introduced in Giddens (1984) and further described by Orlikowski and Robey (1991): interpretative schemes, resources, and norms. These dimensions inform actions taken by the various role agents, and these actions can be helpful to the collaboration process (facilitating), potentially harmful to the process (inhibiting), or

could be detrimental to the process by giving rise to conflict between role agents.

Regarding the latter, role theory is again informative in offering strategies to prevent inhibiting contradictions from giving rise to conflicts.

## CHAPTER FOUR

### Methodology

To find answers to our research questions we used case study method (Myers 2013; Yin 2003). Case study is appropriate in our study as it allowed us to study a real-world project in detail and find empirical evidence that would enable us to answer our research questions.

Table 4.1. List of stakeholders

Pseudonym <sup>1</sup>	Role
HospitalCo	Healthcare provider in India
AppCo	Mobile application development company in India
AnimationCo	Computer Animation company in India
South India	Location of India-based stakeholders
AcademicU	US-based university; initiated grant to form the Healthy India social innovation collaboration for development of VRS technology to improve health education and outcomes in India
<ul style="list-style-type: none"><li>• Project Manager</li><li>• Creative Director</li><li>• IT Advisor</li><li>• Chief Information Security Officer</li><li>• Internal Review Board</li><li>• Legal Department</li></ul>	

<sup>1</sup> Pseudonyms are used to preserve the anonymity of the actual stakeholders and locations.



We have selected this particular project as we could not find any previous literature which studied a social innovation collaboration between stakeholders from multiple culture, country, university, and industry to develop an IT product for the benefit of society. This allowed us to study a unique IT development project. And, one of the author of this paper is a co-investigator of the project which allowed us to have a very high-level access to the project for observing and collecting data. Table 4.1 lists all the stakeholders involved in this collaboration and their roles.

### *Data Collection*

For our study we used three types of data, transcribed interviews of different stakeholders, emails, and field notes of the meetings. Most of the communication between the stakeholders happened via emails or Skype meetings since most of the key personnel lives in different cities and countries. Table 4.2 lists all the interviews that were conducted and its length and purpose.

For the Skype meetings we took extensive notes rather than recording them. As recording would require permission from all the stakeholders and, it could hamper communication between stakeholders due to trust issues. During the Skype meetings all the researchers wrote almost everything that was spoken. Each researcher would take note on what different speakers was talking. This way almost the whole meeting is transcribed. Table 4.3 describes the purposes of the all the meetings observed.

Table 4.2. Interviews conducted

Stakeholder	Date	Length of the interviews	Purpose
HospitalCo	11/06/2017	43 minutes	To get HospitalCo's perspective on the project and what is their role on it.
Creative Director	11/30/2017	48 minutes	What is her incentive to be in the project? Her experience with the project Her perspective on the process and what was going on
Chief Information Security Officer, IT Department	12/19/2017	52 minutes	To hear the IT Department's perspective on the project. What is their role in research as the university tries to achieve Tier 1 research university status. Understand some of the decisions they took during the approval process.
Project Manager, Nurse	02/01/2018	32 minutes	To get update on what was happening at the site of the implementation. What is the future of the project Her experience so far with all the stakeholders
AppCo	02/19/18	40 minutes	AppCo's experience working with Healthy India Feature to add to the app in the future Flaws with the app Future projects

Table 4.3. Meetings observed

Stakeholder Involved	Date	Length of Notes	Purpose
Healthy India: Project Manager, Creative Director, and IT Advisor  AnimationCo: Project Manager, Animation Director,  Assistant Director	08/24/2017	2 pages	Exchanged ideas regarding length and content of the animation.  How the animation company is going to work and deliver
Healthy India: Project Manager, Creative Director, and IT Advisor  AnimationCo: Animation Director,  Assistant Director	09/07/17	3 pages	Talked about the scripts, the modules that are going to be developed.  Translation of the animation to other languages  Character design
Healthy India: Project Manager, Creative Director, and IT Advisor  AnimationCo: Project Manager, Animation Director,  Assistant Director	09/28/17	9 pages	Feedback on the character design  Ideas about the modules
Healthy India: Project Manager, Creative Director, and IT Advisor  AnimationCo: Animation Director,  Assistant Director	10/12/17	5 pages	Talked about the script, audio and the animatic. Animation company's work process for developing the animatics  Talked about icons  AppCo's contract
Healthy India: Project Manager, Creative Director, and IT Advisor  AppCo: CEO and Developer	10/19/17	7 pages	Exchanged ideas about the app.  What are the features that AppCo needs to build in the app?  What they need from Healthy India and AnimationCo  Deadline for the app

Stakeholder Involved	Date	Length of Notes	Purpose
Healthy India: IT Advisor	11/13/17	1 page	IT Department's advisory meeting.
IT Department: CIO and CISO			University's plan about Tier 1
Administration: Financial managers			
Healthy India: Project Manager, Creative Director, and IT Advisor	11/09/17	4 pages	Content of the animation 3D animation 2 <sup>nd</sup> payment
AnimationCo: Animation Director, Assistant Director			How the animation will be delivered
Healthy India: Project Manager and Creative Director	11/30/17	7 pages	Discussed about future deadlines Final version of animation Icons
AnimationCo: Animation Director, Assistant Director			Asking if the AnimationCo will contact AppCo to discuss about the delivery of the animation Travel and stay in India
Healthy India: Project Manager, Creative Director, and IT Advisor	12/06/17	9 pages	Feedback on wireframe of the app What will be the next deliverable
AppCo: Junior Developer			
Healthy India: Project Manager, Creative Director, and IT Advisor	12/14/17	6 pages	Feedback on the icons Changes on icons Ideas on modules Future deadlines
AnimationCo: Project Manager, Animation Director, Assistant Director			

Table 4.4. Emails analyzed

Stakeholder Group	Number of Emails	Start and End Date	Summary of the communication
Internal Review Board	19	08/24/2017-10/17/2017	IRB was asking for resubmissions. They were asking for clarification regarding an abbreviation, interview protocols, and number of research subjects. Researchers were asked to change from exempt application to full review application.
IT Department	71	08/24/2017-1/19/2018	Get technical and security approval. Pushing the IT Department for the approvals and providing information required.  Android tablet purchasing and maintaining
Legal Department	52	08/17/2017-10/12/2017	Mostly about AppCo's contract and all the problems that they were facing with drawing the contract.
AppCo	97	08/17/2017-2/24/2018	Discussion about contract.  Various information about the app, AnimationCo not communicating. Update on the app development
AnimationCo	113	06/22/2017-2/24/2018	Most of the feedbacks were exchanged via email.  And different parts of the animation were also delivered through emails.

Apart from the Skype meeting majority of the communications happened through emails. Especially with all the internal departments of AcademicU, the doctors from

HospitalCo, the vendors and Healthy India team members. Table 4.4 lists all the emails that were exchanged with all the stakeholders.

### *Data Analysis*

For analyzing the data, we used interpretive case study method. We started with the emails and the field notes of the meetings and Skype conversations to get an idea of what was going on in the project.

How they communicate and who are the correspondent for each stakeholder, what was the process for building the VRS. To get a better understanding of the process we did some initial coding of the emails using NVivo. The purpose of our coding was more to identify patterns rather than to develop a theory, it was more to get closer to the data. The emails and the Skype meetings told one side of the story, so we also conducted interviews of some of the stakeholders to understand their perspective of on the project. From the initial analysis we discover that there are interesting contradictions in the process; control vs empowerment and quality vs delivery. We then looked for more examples of the contradictions.

To get a grasp of the contradictions we then looked for information systems literature on cross cultural innovation, collaboration between academy and industry, and implementation of social innovation. From there we used structuration theory and role theory to develop a theoretical framework to explain our contradictions.

The contradictions could have thwarted the project if they could escalate to conflicts. But some action of the stakeholder allowed the project to progress. We identified what were the resolution mechanisms and how it stopped the contradictions to turn into conflicts.

## CHAPTER FIVE

### Case

In this case a group of stakeholders representing diverse sectors, interests, and countries collaborated to help people in India's urban slums learn how to take better care of their health. Several factors led to the decision to build a virtual reality simulation (VRS) to teach India's slum dwellers about hypertension. One factor was that the number of Indians with such non-communicable diseases as hypertension is growing exponentially (WHO 2016).

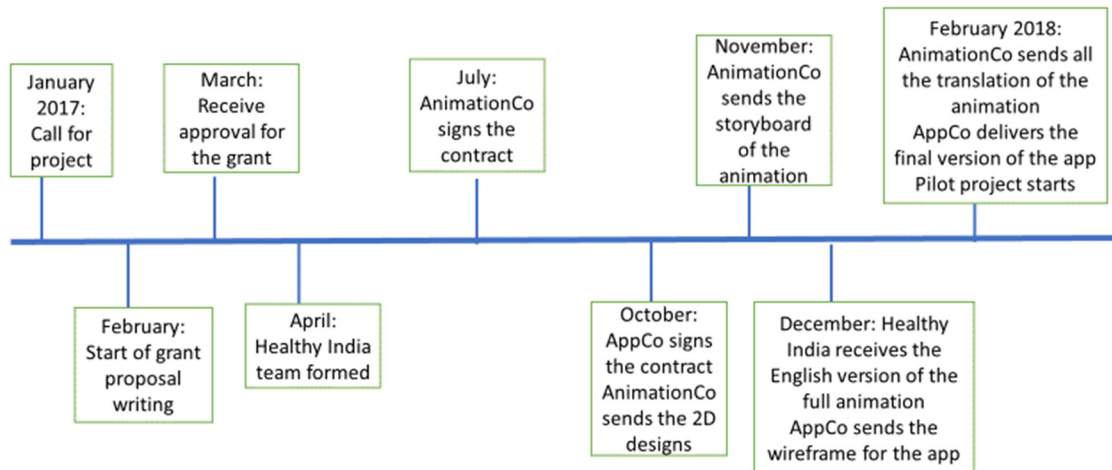


Figure 5.1. Project timeline

The case below describes the collaboration's formation, how the groups worked together to create the VRS, and the norms that ultimately arose in the collaboration.

Figure 5.1 shows the timeline of the project. The project followed four stages: empowerment, control, quality, and delivery.

### *Phase 1: Empowerment*

In January 2017, the Provost's office at AcademicU issued a call to faculty to assist in addressing challenging social problems through a social innovation collaboration. AcademicU is a Research 2 institution with aspirations of becoming a Research 1 university. This requires increasing external funding to support more research activities. The purpose of this social innovation collaboration fund was to provide seed money for projects that could eventually attract external grant money from funding sources like the United States Agency for International Development, the National Institute of Health, and the National Science Foundation.

After reading this call, Project Manager a faculty member at AcademicU submitted a proposal. Project Manager had a long relationship with a hospital named HospitalCo in South India. HospitalCo includes a nursing school. Its revenue model includes private pay, insurance, and subsidized care. Using the Robin Hood model, the hospital appropriates 19% of the money from private pay to subsidize care for the poor and support its outreach to slums and rural villages. HospitalCo depends heavily on external grants, such as the nearly million-dollar federal grant Project Manager had secured to build HospitalCo's nursing simulation center, which was due to open in July 2017. As a result of a collaborative relationship-building nurse, and health system capacity for the past six years through scholarship, teaching and procurement of grant resources, HospitalCo had a great relationship with Project Manager and was quite responsive to her research requests. To complement its private pay services,



HospitalCo's mission included helping the growing population of poverty-stricken individuals and families living in South India's urban slums. This uncoun­ted population faced severe health problems and had limited access to health services. Each summer, the Project Manager's nursing students to do collaborative work with this population. Recognizing their limited capacity to serve the people living in the slum of about 800,000 people, the doctor at the hospital and the Project Manager devised a plan. They wanted to build a mobile-based tool to teach the urban slum population how to prevent non-communicable diseases.

The proposal they submitted to the Provost's office of AcademicU involved a social innovation collaboration to build a health education tool. Which is going to be delivered on mobile phone and tablets that teaches people living in India's urban slums about hypertension, a non-communicable disease growing at a rapid pace among the slum dwellers. The Project Manager envisioned having India's community health workers taking the tool to the slums with them when they visited with families to conduct health assessments and provide health education. HospitalCo was training many of the community health workers in its nursing school, which the Project Manager supported by teaching, writing grants, and bringing students for cultural exchange work.

Securing the grant funding required Project Manager to build an interdisciplinary team. Instead of a simple tablet-based education tool, she proposed building a virtual reality simulation. At the time virtual reality was a new, hot technology trend making its way into a variety of fields. The proposal included: building a mobile-based app to deliver the VRS, an interactive pre- and post-test to assess the VRS's effectiveness at teaching the slum dwellers understand how to prevent hypertension and purchase

electronic tablets to show the VRS to the slum population. The Project Manager would give the tablets to HospitalCo. The tablets served two purposes: teaching the slum population and providing HospitalCo technology it needed. With all of benefits and the established relationship with Project Manager HospitalCo got on board with this project. Money was included in the grant to buy tablets for HospitalCo.

At the outset, AcademicU's Provost office provided a fair amount of training and oversight, assigning two staff part-time to manage the social innovation collaboration teams. To start in March 2017 the Provost Office hosted a population health symposium designed as an outlet for the teams to share their ideas. Then, in May 2017 the Provost Office hosted a half-day design thinking workshop to train the teams on thinking differently to solve big problems. The Provost Office initiated several ideas to help brand the teams, such as choosing team names, creating a website to describe each team's focus and a fellowship program. AcademicU hoped this structure and training would help the teams solidify and raise money. The lead SIC project manager explains, "*We were building the road as we went along.*" Oversight included requiring a detailed proposal, feedback on the proposal, and selecting the proposals to fund.

The project now named Healthy India had potential for additional external federal funding, after many interactions requiring more detail, the Provost office funded the team's proposal. The Healthy India team began searching for vendors. HospitalCo referred Project Manager to AppCo—a South India-based company that built health applications for HospitalCo. AppCo suggested that the Healthy India team contact AnimationCo to build the animated video and VRS simulation part of the project. AnimationCo is a leading animation company in India, producing many animated

cartoons. In July 2017 Project Manager returned to India for the opening of the nursing simulation center she built with a federal grant. During this visit she visited AnimationCo's corporate offices, met with top management and viewed their prior work. Project Manager explained:

*"I didn't know what to expect, it was well above my expectations... When we met with AnimationCo's CEO we learned AnimationCo was not signing up for any financial reason. There is no way they are making money with what we can pay them. AnimationCo wants their name associated with the project and they want to help the people of India"*

To provide the AnimationCo direction on what the Healthy India team wanted, the team provided a script and a story board, leaving the virtual reality part up to AnimationCo. Script development was an interactive process that started with Project Manager developing the script and getting feedback from the HospitalCo doctors on the project: Drs. Rakesh and Anjali.

In July 2017 the Healthy India team selected AnimationCo to build the animation and VRS, and AppCo to build the application that tests whether participants learned from the simulation. There was no negotiation with AppCo regarding the contract amount. AppCo is a small company that was motivated to participate in the collaboration for two reasons: one was the opportunity to participate in a project that involved IT and healthcare; and two, financial incentive. In addition, Project Manager had previously worked with them on a project making the negotiations smoother.

Delighted with the progress of the Healthy India team, including the team writing another grant to a federal funder where they were advanced to the second round of funding, the Provost Office invited the team to discuss the social innovation collaboration at two university leadership seminars. However, in June 2017, shortly after changes in

upper administration at AcademicU, the Provost who initiated the social innovation collaboration resigned abruptly, causing AcademicU to abruptly cancel upcoming training seminars. For the SIC teams, this created concern about what this means for the future of the social innovation collaboration. In a conversation with the SIC project managers, the IT Advisor stated *Those of us invested in the social innovation collaboration would like some communication from you regarding the initiative and the university's commitment to it. Honestly, some reassurance would really make us all feel better.*"

This reassurance did not come, the SIC project manager explains:

*"I'm not sure I've been able to fully feel out what this means for the social innovation collaborative, largely because we don't yet know who will be interim, and then permanent, provost. In the short term, all is well—your funds are in place, and the work has impressive momentum."*

The Provost Office had already appropriated the Healthy India team's grant and the money was safe. After this interaction, the Provost office reassigned the SIC project managers and the team did not hear from them again for eight months.

### *Phase 2: Control*

In phase 2, each project stakeholder brought their resources, interpretive scheme, and norms to bear on the project. The following paragraphs describe the interactions between Healthy India team and the project's stakeholders to build the VRS.

#### *Navigating AcademicU's Bureaucracy*

The following quote from an up and coming AcademicU administrator describes the Healthy India team's experience working with AcademicU's university's administrative departments to secure the necessary approvals to move the project forward

*Here, if you are a researcher, you have to 'know how the electricity works' to get your project off the ground!*

The administrator is explaining that researchers have to navigate a complex bureaucracy to get the necessary approvals for the university to dedicate resources to projects even for approved projects. In the paragraphs below, we explain how the Healthy India team navigated AcademicU's internal review board, contracting, information technology and legal. During the process the team felt the departments were more concerned with following procedures than empowering the team to address big problems. The Project Manager leading the team acted as a boundary spanner through all the hand-offs between departments.

Because human subjects were involved, the project needed internal review board (IRB) approval. After submitting the initial application, the IRB requested revisions which required resubmitting the application twice. After completing those resubmissions, A third combined resubmission was required since IRB policy required single-package submissions.

Before AcademicU would send payments to the vendors, Healthy India needed contracts produced by AcademicU's legal department. The contract request started a chain of approval processes. Because the VRS app collects data, the legal team required IT department approval. IT approval required completion of three forms by the Project Manager, a discussion between the Chief Information Officer (CIO) and the IRB, the completion of a security review document, and a review by the Chief Information Security Officer (CISO):

*“CISO and I discussed the project and he believes we should create a security review document – as we do in all the technology-related requests that come*

*through System1, System2, or System3 – that officially describes the handling of the data so it will be documented for future review.”*

CISO then assigned a Security Analyst to do the security review and review the data collection and transfer process. During this period, Project Manager indicated that AppCo wanted to use an API and link AcademicU’s server with the database they were planning to use. The CISO would not approve that idea since it would involve AppCo to having access to AcademicU’s IT systems *“CISO and I have consulted and we cannot provide programming support to utilize the API to create an interface.”*

The CISO suggested that AppCo use Box, AcademicU's cloud storage system, to store the data. While this decision caused a considerable amount of stress for the healthy India team who needed to get the app developed by their scheduled visit to India in February 2018, to move the project forward Project Manager acquiesced to the IT Department, deciding that because this is a pilot project they would bypass the desired API solution and move forward with Box even though it would require the health worker to perform a manual step to upload data. Using Box for data transfer would speed up the security review process.

Prior to this point there had not been direct communication between the IT Department and AppCo; all communication was through Project Manager. This caused some miscommunication between the US and India IT groups. In the previous example, the Project Manager forwarded AppCo’s idea about using an API address for transferring data. However, because Project Manager is not an IT person, the request was miscommunicated as a request to use an AP address. IT Department thought she was referring to an IP address. But, AppCo was requesting an API (application program interface).

To conduct the security review, the Security Analyst wanted to communicate directly with AppCo. Project Manager introduced Security Analyst to the COO of AppCo at which time the Security Analyst provided a list of questions required for the review *“we perform a Security Review of the project to make sure it meets the security requirements. Below are some questions I need assistance with, so I appreciate your help.”*

After receiving the answers back from AppCo the Security Analyst requested a meeting with AppCo, providing them with availability times. The following email excerpt shows that the Security Analyst had not considered the time zone difference between India and USA *“Recommended meeting date/times to meet: 6 Sept @ 10:00 CST or 7 Sept @ 10:00 CST -- Let me know if these date/times are good for you.”* These times were 9:30 pm in India,

After several follow up emails, within a few weeks, the project received the CISO’s security approval. When the Project Manager followed up with the legal department about the contract status, the CISO needed to grant one last approval *“...the contract request is still pending approval from CISO, he is also listed as the approver for Personally Identifiable Information”*

While the project did not use any Personally Identifiable Information therefore relieving the team from going through another review process, time was nonetheless spent in exempting them from this review and therefore receiving the IT Department’s final approval.

At this point the Legal Department requested further approval from the Project Manager’s department and others from the university administration. Project Manager

had to follow up with each group to ensure they made the approvals in a timely fashion. After all the approvals were received the Legal Department sent the contract to AppCo to sign. After receiving the contract, the Chief Operating Officer of AppCo requested more specificity in some terms. This part of the process lasted for over six weeks. In the quote below, Project Manager expresses her frustration to the contracts department *“I am starting to really panic about the amount of money AcademicU may lose if we don't get this contract executed soon.”* Given the time, this project approval process was taking, Project Manager asked contracts to redo the timeline for the payment as the project has fallen behind. Finally, the contract was executed and signed by both parties and AppCo could be.

The sequence of activities described in this narrative demonstrates that there was no streamlined process for Project Manager to go through to get approvals required for the collaboration. The Project Manager 's experience navigating AcademicU’s internal departments shows a contradiction between AcademicU’s vision and its internal departments’ daily practices. In trying to move from research 2 to research 1 status by empowering its researchers to work on serious problems that attract external funding, the university is somewhat constrained by departmental control procedures that have not yet caught up with the innovative work being promoted by the university, which therefore requires researchers to spend a significant amount of time working through approval processes and spanning boundaries between departments to get contracts and payments executed.



### *Phase 3: Quality*

#### *Healthy India and AnimationCo*

Once AcademicU approved the grant, Project Manager began working on the script for the VRS animation and the Creative Director created an accompanying storyboard. Project Manager shared the drafts with everyone on the team. The doctors from the HospitalCo provided most of the feedback and proposed that AnimationCo translate the script into three languages commonly spoken in the slums: English, Hindi, and Kannada. This required some script modification since many of Hindi and Kannada speakers living in the slums are illiterate. When Project Manager shared this requirement with AnimationCo's U.S. office she offered the doctors consultation on the translation.

After sending the revised script, AnimationCo required the first payment to begin work. Unfortunately, the Project Manager was having trouble getting AcademicU to send the funds, since there was no structure set up to execute foreign transactions. This created a one-month start-up delay. After receiving payment, AnimationCo set up a team in India to make the animation and scheduled their first meeting with the Healthy India team. Recognizing the time difference, Project Manager scheduled the meeting for 6:00 am in the U.S. which was still within the India normal work hours.

While the team had developed a script and story board, they gave AnimationCo creative leeway to develop the virtual reality component of the project. During the first Skype meeting, Project Manager explained to AnimationCo *"We need to brand this as a virtual reality simulation, balance the fun vs. the education, if we want more grant money the virtual reality must be there."*

Virtual reality was a cutting-edge technology and attracted attention on grant applications. Steve, the American liaison for AnimationCo based in San Francisco, was participating in the Skype meeting and responded *“We’ll play around with what we can do within the budget, maybe a character that you can do different things to like lay on the couch and watch TV or eat bad foods and [how] that impacts how the character looks.”* Once the AnimationCo's work on the animation component required considerable discussion with the Healthy India team regarding how much virtual reality AnimationCo could incorporate for the money. The AnimationCo project manager responded, *“I need to check with my boss on whether we can deliver the virtual reality.”* Once the Healthy India team referred the boss to the signed contract, he agreed that AnimationCo would do something to support virtual reality.

Throughout the whole animation-making process AnimationCo would develop some part of the animation, which the Project Manager would share via email with the entire team. Then, everyone from the team and the AcademicU doctors would give feedback on the deliverable. Compiling this feedback, the Project Manager would send the feedback to the animation company to modify the animation. This cycle was repeated regularly. Once the black and white animation was complete in late October 2017, AnimationCo suspended regularly scheduled Skype meetings, preferring to provide deliverables over email and scheduling Skype meetings only if necessary. At this time, AnimationCo was hitting its targets, Indian holidays were approaching leading to irregular works schedules, and the time had changed in America making Skype meetings more challenging because there was now a 12.5-hour time difference. AnimationCo was

unwilling to extend its workday forcing the Healthy India team to conduct 5:00 am Skype calls.

The first major deliverable was the 2D character designs. The Healthy India team was pleased. Initial feedback included “...can we have the lady in saree? Indians don't look too trim and fit in their middle age. I stand for a cuter and plumpy version of the characters Can they make the monkey a little more cute? “After visiting our target group, I believe they are too perfect, I would like to see the attendant wearing sandals, darken his skin considerably.” Project Manager combined all the feedback and sent them back to AnimationCo.

The next deliverable was the revised 2D designs and the English audio track. Again, the team gave their feedback on the audio and the designs. When going through the audio track, the Healthy India team worried about the speed and pronunciations. Given their backgrounds as Americans, the teams focused on the English audio track and left the Hindi and Kannada tracks until the end at the discretion of AnimationCo. Unfortunately, most people living in the slums speak Hindi or Kannada. AnimationCo willingly accepted even the most detailed feedback, for example:

*“I think that the first option on sandals with toe strap is more appropriate, I would like the toenails from option #2 to be included in the first option with the toe strap sandals.” “I wonder, are we using the British version of English or the American version? If it is American I would make several changes in the verbiage.”*

The feedbacks were also important in shaping the animation to be of great quality from a creative standpoint. The Creative Director played an important role on this. “As for the monkey he is generic, is there some feature the animators could exploit to give

*him a unique look. I don't feel he needs to be cuter per say. But I would like to see a selected "monkey" feature individualized to make his presence cuter."*

The Creative Director made sure there are some element of entertainment to the animation. Even though the purpose of the animation was to teach about hypertension some form of entertainment in the animation would make it interesting to a wide range of people. This would also ensure the animation has more clarity. *"The monkeys sweeping gestures are effective, adding interest and just enough entertainment for the viewership to grow fond of him."* While sending the feedback back to AnimationCo Project Manager also expressed her concern regarding cultural and socioeconomic issues of the animation that might offend the target group *"One thing that we want to be sensitive about is that we are not being too stereotypical to one socioeconomic group because that could come off as offensive to others - particularly when funded by Americans."* In this quote she is expressing her concern about Americans, with little knowledge of Indian culture developing content. She was worries about offending the viewers who might perceive that Americans are looking down on India as a developing nation.

From this cycle of delivery and feedback contradictions arose. The project heavily depends on the Indian doctor's feedback because they are the champions of the project and understand the norms of the patient population they plan to use it with. Unfortunately, this crucial feedback often slowed down the project as the Healthy India team had to wait for days for the doctors' feedback before forwarding it to AnimationCo. When the feedback was excessively late, the team would send AnimationCo the feedback they had and then when the doctors' chimed in, it was sometimes inconvenient for AnimationCo to incorporate their ideas. This had the potential to alienate the doctors

making them feel their feedback was not valued. While the project helps the doctors serve their long-term mission of helping their patients prevent hypertension, in the short-term providing medical consultation on the animation adds to the doctors 12 hours days of patient care. The on-going feedback cycle, while making the product better, slowed delivery and increased costs.

#### *Phase 4: Delivery*

##### *Healthy India Spanning Boundaries*

AppCo's portion of the project depended heavily on AnimationCo's products. AppCo was designing an app that included AppCo's animation and a pre- and post-test survey to assess whether the participants learned about hypertension from watching the animation. While this seems simple, as it progressed a lot of tedious work that no one expected emerged. This included: developing icons for the app and developing audio for each question in three languages. Even though this was not specified in the requirements AnimationCo accepted the additional work even though this area was not their strength and the quality waned. Even after several iterations the icons never approached the quality of the animation.

Communication was a problem. Initially, the Healthy India team held a Skype meeting with AppCo to specify the requirements. A few weeks later Healthy India held another meeting which seemed unproductive since the connection was bad and the team's two main contacts from AppCo were not on the call, forcing them to check progress during a 6:00 am conference call with a AppCo customer liaison that was unfamiliar with the project. As a result, Healthy India resorted to email to manage the AppCo project. Furthermore, communication between AppCo and AnimationCo was not happening --all

the communication flowed through Project Manager. Early on AppCo made requests to AnimationCo, asking for the video and icons, unfortunately AppCo preferred contacting a top manager instead of the project team. The requests never filtered down to the AnimationCo team, creating delays in the project and making it appear as if AppCo was unresponsive. Several factors may explain the lack of communication between the vendors. One, chain of command is very important to AppCo, they felt they needed to work with Project Manager rather than skirt her authority and contact AnimationCo directly. Second, AnimationCo is a significantly larger more successful vendor than AppCo and they may not have been as responsive since the icons and audio questions were not part of their creative vision for the project.

The flow of communication mediated through the Project Manager slowed the project considerably. As of the time of the scheduled roll out of the VRS, AppCo still needed audio files to complete the project, leaving the Healthy India team wondering if they app would be ready to roll out when they arrive in India.

Rolling out the project during the Healthy India teams' scheduled visit to India required reassessing the deliverables. Because communication with and between the vendors had grown spotty, the team didn't know how close the VRS was to completion. Therefore, the team scheduled face-to face- meetings with both AppCo and AnimationCo, hoping they could move things along and ensure a successful roll out of the VRS during their India trip.

AnimationCo completed their animation in early January and the team was thrilled with its quality. Given the length of time it took to build the animation with all the feedback cycles, and the struggle to get AnimationCo to deliver the necessary audio

files to AppCo for the app, the Healthy India team decided to remove the virtual reality component of the technology. Since the team specified virtual reality in AnimationCo's contract, they could have enforced this; however, the team decided not to, in an effort to deliver the project and build goodwill with AnimationCo for future collaborations.

The issue with AppCo was that the application they developed only ran on Androids, a popular mobile device vendor in India. However, Android is not as popular in the U.S., the home country of the Health India team. As a result, when AppCo emailed the Healthy India team deliverables, the non-Android Healthy India team could not open them and therefore did not know what the app looked like nor how it functioned. In addition, AppCo was going back and forth with AnimationCo who had still not delivered a few audio files needed for the App. This made AppCo look incompetent, even though these factors were beyond their control. In hopes of seeing the app and rolling out the project, the team scheduled a meeting with AppCo as soon as they arrived in India. To their surprise, the application worked, and the entire issue was a few missing audio files for the pre-test and post-test questions. The Healthy India team wanted a few changes to the app within 48 hours, AppCo corrected the issues.

Feeling some pressure from an upcoming scheduled meeting with Healthy India, the Healthy India team needing to roll out the initiative, and final payment pending, AnimationCo delivered the missing audio files. Within a few days, AppCo had the Androids loaded with the app so that health care workers could use it during their community visits. The first effort to use the technology was frustrating. Although HospitalCo promised to have the Androids for AppCo, the devices had no battery charge rendering them useless at this time. It was later learned that because HospitalCo was

strapped for IT infrastructure, it was using the Androids at a community tent screening camp. Within a few days, AppCo returned to load the Androids. The hospital hosted a community viewing of the VRS and after some training the community health workers began using the app to educate their patients.



## CHAPTER SIX

### Discussion

The purpose of this research was to understand how to build a virtual reality simulation app that educates people living in India's urban slums about hypertension through a social innovation collaboration. The stakeholders of this collaboration were a hospital, a university, an animation company, and an app development company.

In the previous section we discussed the stages about how the team built the app. Figure 6.1 summarizes the process and what were the facilitators, inhibitors, and their dimensions. From the case study we can observe some interesting contradictions was showing up as the team built the VRS. The two major contradictions were Empowerment vs Control and Quality vs Delivery.

We use the theoretical framework we showed in Figure 3.1 to identify the facilitators and the inhibitors. Table 6.1 summarizes all the dimensions of the facilitators and inhibitors that we have identified for the stakeholders. This section is designed as follows, we define the contradictions, then the facilitators and inhibitors and the dimensions for those. After that what were the resolution mechanisms used to avoid those contradictions from turning into conflicts.

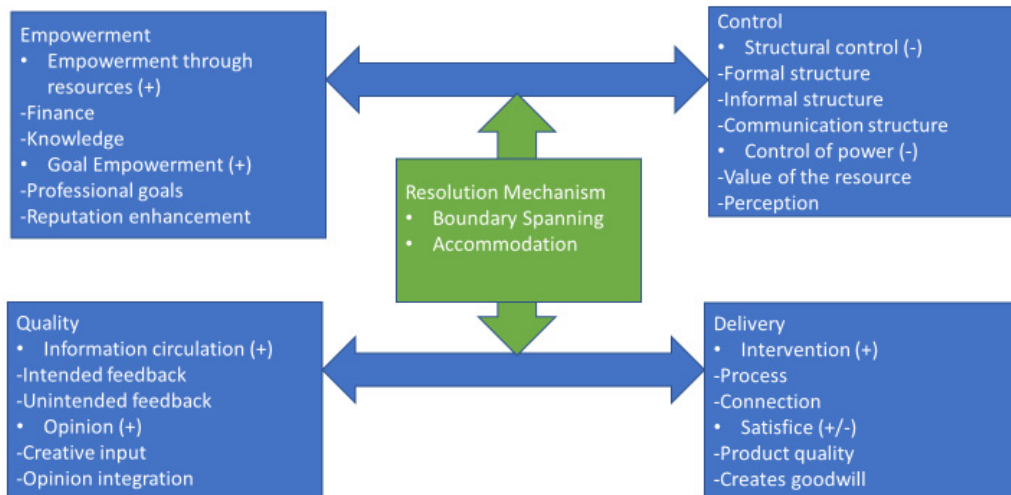


Figure 6.1. Contradiction and resolution mechanisms

As we have defined before the three modalities of structuration theory; interpretive scheme, resources, and norms. We will be using these three modalities to identify the facilitators and inhibitors and the dimensions.

### *Contradictions*

#### *Empowerment vs Control*

The stakeholders try to empower each other through various actions but on the other hand they also try to control each other. This contradiction occurred between the stakeholders meaning in one hand a stakeholder would try to empower another stakeholder but on the other hand the same stakeholder would try to control the stakeholder.

Table 6.1. Dimensions of facilitators and inhibitors for each stakeholder

Dimensions	AcademicU	Healthy India	HospitalCo	AnimationCo	AppCo
Empowerment through resources- resources each stakeholder contributed to the collaboration	Grant money	Managing the collaboration	Knowledge on the culture and population	Animation development	Mobile app development
Goal empowerment- each stakeholder's goals	Achieve Tier 1 university status- position researchers to seek additional grants	Grant money to support research, publications	Community outreach- Helping Indians prevent health problems	Corporate social responsibility	Financial gain and relationship to expand their health care technology practice
Structural control— (are you defining these in the text or here, might be good to define here and switch the table so it displays landscape)	IRB, Technical reviews			Deciding the deadlines and how much to deliver	
Control of power	Grant money	Contract with AnimationCo and AppCo		Minimizing cost by limiting interaction- collaboration	

Dimensions	AcademicU	Healthy India	HospitalCo	AnimationCo	AppCo
Information circulation		Using email to share deliverables with all stakeholders			
Opinion		The story, character development, pre and post tests, and app design	The story and character development and language translation	Animation look and feel	Icons
Intervention		To manage hand-offs and information sharing between the stakeholders			
Satisfice		Delivering the project with the VRS components missing and unsatisfactory question			

*Empowerment.* Empowerment can be described as lowering the organizational barriers and giving the employees the means to achieve its goals (Elmes et al. 2005). All the stakeholders in the collaboration are in it for some type of incentives. The stakeholders work together and try to empower each other to achieve their intended goals from the collaboration. Empowerment can be divided into two major types; empowerment through resources and goal empowerment.

*Empowerment through resources.* One stakeholder provides resources the other stakeholder needs to achieve its intended goal. Two types of resources are employed in this project, financial and knowledge resources. One stakeholder provides another stakeholder the financial support required to succeed in the project. Another resource that the stakeholders bring into the project is their knowledge on a specific field.

*Goal empowerment.* Sometimes just resources are not enough to build the product. The stakeholders also need some type of motivation to empower them as well. Which can be setting some type of goal which in itself motivates the stakeholder to collaborate with one another and build the product. Two types of goal can be seen here, professional goals and reputation enhancement goals. Professional goals are the goals for which the stakeholders are in that specific profession. But in this project a more important goal is the reputation enhancement goal. Reputation enhancement is pursuing goals which when achieved will enhance the reputation of the stakeholder.

*Control.* Kayas et al. (2008) defined control as the mechanisms an organization places to make sure that an individual behaves certain way that provides the organization

with the highest chance to achieve its goals. The stakeholders put a lot of control mechanism in the process of building the VRS to control another stakeholder.

*Structural control.* The stakeholders created some control structures to make sure that the other stakeholder follows some procedure. This would ensure that they can control other stakeholders and the process. Three types of structural control can be seen in this case, formal structure, informal structure, and communication structure. Formal structure are the pre-existing structures placed by the stakeholders not just for this project but also for other projects as well. Informal structures are placed to control the work process of the collaboration. The controls are not pre-defined or formally stated, they are created and enforced as the project moved on. Communication structures are placed to control how the communication happens between the stakeholders.

*Control of Power.* The stakeholders were trying not to give up any type of control. They wanted to show their dominance over one another to ensure they have the control over the process of achieving their goals. Having control of power would also ensure that the stakeholder gets what they desire from the other stakeholder in future. There are two factors to the control of power, value of the resource and perception about another stakeholder. The more valuable the resource provided by the stakeholder the more power they hold.

To provide the readers with a better understanding of the dimensions of the facilitators and inhibitors we will illustrate some scenarios from the case. Where we will use the three modalities of structuration theory to identify the dimensions.

*Scenario 1: AcademicU, Healthy India and AppCo.* The Provost Office of AcademicU used their financial resources to provide Healthy India with the seed money required to fund the social innovation collaboration (Empowering through financial resource). Interpretive scheme of AcademicU in this event was that with the seed money the project would attract external fund and an increase in research activity this would help the university move towards its goal of tier 1 research institution (Reputation enhancement). AcademicU also organized workshops and symposium for the teams in social innovation collaboration projects and planned to create websites to market their projects (empowerment through knowledge resources).

The contradiction arises when AcademicU placed some mechanisms to control the team. AcademicU placed all types of review procedures for Healthy India team. This is the norm of AcademicU, and they have it for all the researchers who are in the university not just Healthy India. The team had to get IRB approval, technology, and security approval, and clearance from Legal Department (Formal structure). When AppCo wanted to use API to transfer the data IT Department of AcademicU did not allow it (Informal structure). They made the team switch to Box instead. The interpretive scheme of IT Department in this event was since this was a pilot project they did not want to setup the API as this would require a lot of their resources. All the communication between the stakeholders goes through the Project Manager. This was the norm of this project, at least most of the time. Her interpretation of this behavior was since all the communication goes through she would be able to address any complication that arises at any stage of the project. AppCo and the IT Department were communicating with each other through Project Manager at first which caused some confusion

(Communication structure). But the communication structure was not an inhibitor only, this was also acting as a facilitator also. When Security Analyst wanted to set up a meeting with AppCo he didn't consider the time difference between India and USA. The interpretation behind this behavior was since AppCo is from a developing country and they are a US organization they can control them (Perception of power). And, since AcademicU funded the project they were controlling the resource (Value of resource). This had a potential to cause some conflict, but the Project Manager was able to intervene and made sure nothing negative happens.

*Scenario 2: AnimationCo, Healthy India and AppCo.* For the app Healthy India contracted AnimationCo to build the animation. The contract amount was not significant enough for AnimationCo to make any profit from it. The interpretive scheme in this event for AnimationCo was to show the people that this is a way to give back to the society. They wanted to convey the message that they are not only about money, they wanted to do good for the society too (Reputation enhancement). In this entire project AnimationCo is providing the most valuable resource, creating the animation (Knowledge resource). And since they are providing the most valuable resource and not making any profit from it, this was also a source of power for them. And they have leveraged it to control the process. The meeting times were set up to their convenience, it was 6:00 AM in USA, which is an inconvenient time for Healthy India team. And when the daylight-saving time ended the meeting shifted to 5:00 AM, AnimationCo was not willing to change the time. The interpretive scheme explaining this behavior is since AnimationCo has the most valuable resource they knew that Healthy India would comply with their demands and



Healthy India was willing to do so since they did not have any alternative source of the resource that AnimationCo brought to the collaboration.

Another example of this was setting up deadlines and delivery of animation components. The norm in this project was AnimationCo would create some of the component and give them to Healthy India team for feedback. The deadline and how much of the content to be delivered, AnimationCo decided that (Value of resource). The Creative Directors request for early delivery or more access to the animation creation process was always denied. All these were stemming from the resources, the more valuable resource you bring the more power you can exert.

This phenomenon can be seen between the vendors also. AnimationCo made the icons and was supposed to deliver them to AppCo, but they were not sending it to them initially the project manager had to intervene to connect these two vendors. The interpretive scheme of AnimationCo for this behavior is AppCo don't have any power over them and since they are a small firm and AnimationCo is a big multi-national firm they could get away with this type of behavior (perception of power). Healthy India were able to exert some power in this situation and get the process moving. The source of Healthy India's power was also one of the resource they hold, the contract. They did not make the final payment until everything was delivered by AnimationCo (Value of resource). Another reason for the lack of communication between AnimationCo and AppCo was norm of communication. AppCo were trying to communicate with the top leadership of AnimationCo. They thought this was appropriate since they were doing the same with Healthy India team. But Healthy India is a small team of researchers, whereas

AnimationCo is a big corporation and the top leadership does not handle day to day business activity of every project.

### *Quality vs Delivery*

The stakeholders want to make sure the product is of good quality, but they also need to make sure it is delivered timely. But having both was causing a contradiction to emerge. The previous contradiction of empowerment vs control was between the stakeholders but this one is within the stakeholders. Meaning the same stakeholder who focused on quality at one time later switched their focus to delivery of the product.

*Quality.* Naturally any collaboration or business process would want to build a high-quality product with the resources available. Some of the mechanisms to ensure this high quality are: information circulation, expert opinion, and opinion integration.

*Information circulation.* In a social innovation collaboration all the stakeholders have a role to play. But to perform in that role they need to possess adequate information. So, if all the stakeholders circulate the information amongst each other all of them will be well updated on the status of the project. This will enable them to perform which will translate to high quality product. There are two dimensions to this facilitator, intended and unintended feedback. Intended feedback is received when the feedback is provided by the intended stakeholder for whom the information was circulated. Unintended feedback is when feedback is received from stakeholder who is usually not supposed to provide the feedback on the subject matter. And this is important since a stakeholder might misjudge the situation and might miss the feedback from a stakeholder.

*Opinion.* Like information circulation the stakeholders needs the opinion of the stakeholders to make the quality of the product high. There are two dimensions of this facilitator, creative input, and opinion integration. Creative input is taking the ideas of creative professionals who are working in this project and implementing them. As the heart of this project is the animation so creativity is very important in it. Opinion integration is stakeholders need to prioritize the opinions of stakeholder whose expertise lies in that field and incorporate them in the app. This would provide the product with features that would enhance the quality.

*Delivery.* The product needs to be timely delivered to achieve its intended goal. And the factors that ensure the delivery are intervention and satisfice.

*Intervention.* When the project gets stuck at a certain point, stakeholders needs to get involved to get things moving. There were two reasons for intervention, intervention in the process and intervention to connect. During the review process almost at all of them there was a time when the project came to an impasse. To make the process faster intervention was required. Intervention for connection, is when an intervention was required to connect two stakeholders. Sometimes the stakeholders were not communicating among themselves and not exchanging information. This makes things difficult for some stakeholders.

*Satisfice.* A stakeholder sometime needs to settle for less. The situation may not be something as expected but the stakeholder needs to move on to get the final product on time. This acts as both a facilitator and an inhibitor to the collaboration. Facilitator in a sense that as the stakeholders are settling for this makes the progress faster, but it also

acts as an inhibitor as this also makes the quality of the product poor. Dimensions for this inhibitor/facilitator are product quality and goodwill. As the stakeholders settle for less the quality of the product deteriorates. Settling for less also means providing some leeway to the stakeholder. This acts as sign of goodwill also. The stakeholder will consider this act and will repay it in future collaboration.

To get a better understanding of this contradiction we will describe two timelines of the case where these quality and delivery was most prevalent. The first timeline is between the time when the building of animation started to the delivery of the first version of the icons. And the second timeline would be from the delivery of the icons to the pilot of the project. Like the first contradiction in this one also we would be using the framework shown in Figure 3.1 and use the three modalities of structuration theories to identify the dimensions of the facilitators and inhibitors.

*Timeline 1: August – Mid December.* With all the updates in the project the norm was the Project Manager would collect all the necessary updates and circulate them among most of the stakeholder. The interpretive scheme behind this behavior was this would allow the stakeholders their feedback on whatever new information they get and give suggestion what to do in the future. At this point there was a strong focus on making a very high-quality product with the resource available. AnimationCo would deliver components of the animation and the Project Manager would circulate it among Healthy India team members and the doctors from India all of them would give their feedback on it (Intended feedback). Intended feedback was very important since this was a multi-cultural collaboration. The users of the app are from India and Healthy India team consists of people from USA. So, to the team members the feedback from the doctors

were very important. The interpretive scheme in this situation was since they are not too familiar with the population and the culture, some of the elements in the animation might show that they are looking down on the people from the slums. So, they asked the doctors to point out any culturally inappropriate thing that they might have in the animation.

One of the unique resource of this collaboration was the creative professionals who collaborated in this project. To be more specific AnimationCo and the Creative Director of Healthy India. Their input in the animation is what made it very high quality and interesting. One example of it would be when one of the characters were being developed she provided some interesting feedbacks on them. One of them was to give more importance to the monkey that was in the animation. This proved to be a great success when the pilot project was implemented (Creative input). The interpretive scheme behind this idea was to add an element of entertainment to the animation. This would also enable to keep the users' attention on the animation for a longer time, just an educative animation would mean a lower span of attention. The animation company was also able to add to it. The most valuable resource they brought in was their knowledge about creating animation for entertainment.

The other factor that made the quality high was opinion integration. The example of that would be incorporating all the feedback that everyone gives on the app. One of the norm of the Healthy India team was to circulate the information they have. The Project Manager would send out the updates to the animation and everyone would give their feedback on it. When the 2D characters were first developed they weren't too realistic for the animation. The doctors from India and the Creative Director suggested some suggestion that could make it better. AnimationCo was very open to the suggestion and

made the incorporated all the ideas that were suggested by the Creative Director and the doctors from India (Opinion Integration).

*Timeline 2: Mid-December – February.* By this time some changes could be seen among the stakeholders now the focus has started to shift from quality to delivery of the app. And this started to affect the quality of the app. When AnimationCo delivered the first set of icons they were not up to the standard that Healthy India were expecting. Some of them were even difficult to understand. The team suggested some feedback but still it was not good enough. The team decide to move on with this since they didn't have enough time (Satisfice). Then AppCo also suggested some ideas regarding the design of the icons (Unintended feedback). That was not the norm in this collaboration. Till now AppCo didn't suggest or provide any feedback on the work of AnimationCo. The idea was not implemented. This was an important event in a sense that if feedback was gather from all the stakeholder it could have made the product even better. This was also resonated in the interview with AppCo they suggested that had they been more involved since the beginning they could have assisted in making the product even better.

A significant problem with delivery in this stage was AnimationCo was not providing all the deliverables to AppCo. The norm till now was AnimationCo would send all the components to Healthy India. The project manager had to intervene to connect the two vendors and have them communicate with each other for the components.

To ensure delivery Healthy India had to leave out the VRS component from the pilot project. The interpretive scheme for this action was settling for less also means providing some leeway to the stakeholder. This acts as sign of goodwill also. The stakeholder will consider this act and will repay it in future collaboration. In the project

the team did not have any VRS component in the final app. But it was in the contract that AnimationCo will provide the VRS component and in the initial discussion. This is a pilot project so there is a possibility that AnimationCo can also be a part of future collaboration. And they can also go more than what is in the contract in that collaboration like providing more access to the development of the animation or be more acceptable to the changes in meeting time.

### *Resolution Mechanisms*

The contradictions could have turned into conflicts if not prevented. Which could have turned the project into a failure. The stakeholders employed some resolution mechanisms to prevent the contradictions from turning in to conflicts. The resolution mechanisms were accommodation and boundary spanner. The following section describes the resolution mechanisms and some of the examples of when they were employed.

#### *Boundary Spanner*

As defined by Williams (2010, p. 2) “actors whose primary job responsibilities involve managing within multi-organizational and multi-sectoral arenas.” In a collaboration when things are not going the way it is planned or they face an adverse situation a stakeholder had to play the role of boundary spanner to mitigate the problem. In this project where multiple organizations from multiple sectors are collaborating the Project Manager is acting as the boundary spanner. Our first contradiction between empowerment and control we can see that the stakeholders are placing some controls in

the collaboration. This is causing some problems; the Project Manager is trying to prevent them from turning into conflicts.

AcademicU empowered Healthy India with financial resources to pilot the project but then again placed the structural controls. AcademicU placed some formal structure in the form of IRB, technical and security reviews. The process was also not streamlined, Project Manager had to act as the boundary spanner and go to each individual department to get all the approvals. The stakeholders were fighting for control of power. The Security Analyst was stating the terms for the meeting with AppCo. His perception of the vendor was he can show dominance over them and dictate the terms since the vendor was from a developing nation. Project Manager had to get involved in this and made sure no conflict broke out of this.

In the second contradiction of quality vs delivery where the project was facing a dilemma of selecting between quality of the product or delivering the product on time she had to intervene to solve it. Project Manager was circulating the information regarding the development of the project to everyone for feedback. But if any of the stakeholders were late in providing them she would intervene and ask the animation vendor to incorporate it even though sometimes they were in the next stage of the process.

### *Accommodation*

The stakeholders were taking actions that they were not supposed to take to make sure the project is progressing and successful. And it is better if all the stakeholders show this behavior. In our case there were multiple times when the stakeholders accommodated for the success of the project.



When Healthy India partnered with AnimationCo, the animation vendor empowered them by bringing their knowledge resources of making a world class animation. But they were also trying to have control of power. When the time zone changed in USA, AnimationCo was not willing to change the time, Healthy India agreed and accommodated to their demands, the time of the meetings were not a pleasant time for the Americans to begin with.

The IT department placed some informal structural control when they did not want to support the data transfer method proposed by AppCo. Healthy India team had to accommodate to IT Department's demand and switched to the method suggested by them.

Other stakeholders also show this behavior. AnimationCo when they find out that due to slow internet it was not possible to transfer the animation to HospitalCo they sent out the animation in a flash drive. A lot of the time the feedbacks reached the AnimationCo in an untimely manner, but they were ready to accommodate and integrated the feedbacks to the animation. Even if they were working on other deliverables. AppCo also accommodated when AcademicU was taking a lot of time to create the contract, and then sending it out without consulting them about the verbiage on the contract.

This shows that the more stakeholders participating in accommodating others the less there is a chance of conflict happening. And it also makes better use of resources.

## CHAPTER SEVEN

### Conclusion

Youtie and Shapira (2008) discuss the roles of universities evolving over time from "accumulators" of old knowledge to producers of new knowledge to, more recently, a knowledge "hub." In the latter role, universities foster new development and innovation within their local regions to promote economic development. These university "hubs" require interdisciplinary collaboration, funding often from federal agencies, as well as the adoption of "boundary-spanning" activities that promote transfer of information and communication between organizations within the university, and between the university and external organizations.

Our study has some interesting implications for future research activities. In IS literature there are not many studies on the impact of having creative professionals on the planning and implementation phase. But from our study we can identify that they can have significant impact on a IT product. In the planning and development phase incorporating creative professionals' idea would enable significant success with the final product. Which is illustrated on our case the impact some of the character had on the users of the app. They can also bring very valuable resources that an IT professional does not possess, like what the animation vendor brought in this project.

Our study also adds to the IS literature on dimensions of quality of IT products. To ensure high quality of IT products, intended and unintended feedback both play a crucial role. There have been many works on feedback on IT product development but

there aren't any on intended and unintended feedback. Especially in a collaboration sometimes stakeholders who were not supposed to provide feedback can give some crucial feedback to make the product better.

Our study adds to the growing body of literature on multi-cultural IT projects (Gregory et al. 2009; Myers and Tan 2002; Walsham 2002). The unique thing about this project was its multi-cultural stakeholders. Having such diverse stakeholders means there would be some unique complications which was evident in our case. But it also means they would be able bring resources that is only available to them. One thing to also look out is that there could be different culture in the same organization. So, in future research could be done to investigate that if there could be different culture in the same organization. Our study gave some hint there might be some, but we didn't have enough evidence to investigate it.

One of the implications for academic researchers are a gap in research like we stated in the literature review to address some gap in IT-related collaborations that produce innovations impacting social good. Collaborations that include stakeholders in multiple disciplines, sectors, and countries, what are potential sources of tensions, and how can these tensions be managed so that they do not escalate to project conflict. Our study addresses this gap in current research and creates a research framework to study these questions.

A note for the IS professionals would be to lookout for misalignment between strategic initiative and business processes. From our case we can observe that there was some misalignment between strategic initiatives and business processes and those were

causing some problems in the collaboration. IS professionals should watch out for this and try to mitigate them.

Our study has some limitations. The first one is that this is only one case. So, if we study some additional case some of the findings may be different or there could be some additional findings. Our findings generalize to theory (Lee and Baskerville 2003). Another one is since this is a qualitative research there were interpretation of many actions and behaviors of the stakeholders. So, there is a chance of discrepancy between this study and the actual events, but we presented this study to some of the stakeholders and they agree with the interpretations provided in this study.

Our study has contributed to the understanding of these interdisciplinary, boundary-spanning efforts by presenting a case study of one university college's movement into the role of a knowledge "hub". Our research explored the process of implementing a virtual reality simulation innovation to improve the health of residents in the slum areas of India, by using a cross-discipline, cross-cultural, cross-sector collaborative effort.

## APPENDIX

### Communication between stakeholders

## APPENDIX

Table A.1. Internal stakeholders

Stakeholder	Time	Actions	Supporting Quotes
Internal Review Board	8/2017	Project Manager preparing to submit IRB application in USA	
	9/2017	PM asked Officer1 from IRB to change the minimum age to 15	“One of the physicians who is a PI on the project asked if we could include 15 as the minimum age because this is the age of adult consent in India” -Project Manager
	10/2017	<p>IRB told the application is not complete. They told PM to submit some additional document.</p> <p>Again, asked for revision</p> <p>IRB again asks resubmission as the modification PM submitted is in a different package.</p>	<p>“Before the package can be reviewed by the board, the following documents are needed” – Officer2</p> <p>“Our office “unlocks” for <i>corrections</i> from the PI but a response to <i>modifications</i> required by the IRB is submitted in a new package” – Officer3</p>

Stakeholder	Time	Actions	Supporting Quotes
Procurement	08/2017	The IRB finally gave the approval in USA	
		Applied to procurement to draw up a contract for AppCo	
		Assistant Director, Legal from Procurement asked if ITS needs to be involved in the process. Project Manager said yes. Now procurement needs approval from ITS.	“I need your assistance in determining whether IT is applicable.” – Assistant Director, Legal
		AD, LEGAL asked SH to contact with ITS for approval.	“Please coordinate with Officer4 to verify if a specific request needs to be submitted through ITS” – Assistant Director, Legal
		AD, LEGAL started the draft contract. And got stuck with some elements of regarding IT	“I have the Contract request drafted up in TCM” – Assistant Director, Legal
			“I am unsure how to complete this section at this time because if the answer is YES it involves IT then there are additional steps that have to take place/forms to complete or further

Stakeholder	Time	Actions	Supporting Quotes
			justification to provide.” – Assistant Director, Legal
		Initiated contract request and waiting for all reviewers to approval	“Once the request is approved by all reviewers then I will create the actual contract that gets sent for final review with our General Council” – Assistant Director, Legal
		Waiting for approval form CISO regarding Personal Identifiable Information	“the contract request is still pending approval from CISO (ITD), Jon is also listed as the approver for Personally Identifiable Information” – Assistant Director, Legal
	9/2017	Got security approval form CISO now Assistant Director, Legal told Project Manager to get approval from Officer 4 and Officer 5.	“Please check with Officer 4 and Officer 5 as the Contract Request is Pending their approval.” – Assistant Director, Legal
	10/2017	AppCo asked to change some of the clauses in the contract.	“Pls find below the inputs from our Legal team after review of the Contract” – CEO AppCo
		Since the whole process is taking up	“I am thinking the entire timeline needs



Stakeholder	Time	Actions	Supporting Quotes
		too much time Project Manager asked to redo the timeline of payments.	to be redone in the addendum along with the verbiage” – Project Manager
		Finally the contract was executed and both parties have signed the contract	“I have uploaded the Contract after signoff to Docusign today” – CEO AppCo
Information Technology Services	8/2017	ITS was first brought into the project after Project Manager made a contract request for AppCo	“Yes - this will include IT in the sense we will be collecting research data in India electronically using an app created in India and it will be transferred to us at AcademicU.” – Project Manager
		ITS stated they need to conduct a security review	“ITS will proceed with a technology/security review based on the information they have been provided.” -CIO
		Project Manager gave IT Department AppCo’s idea about transferring data	“AppCo recommended we use an AP address.” - Project Manager
			“I think they are referring to an IP address.” -CISO
		CISO assigned Security Analyst to work on this project	“I have asked one of my Security Analyst copied to work on

Stakeholder	Time	Actions	Supporting Quotes
		and get the security review	this question and get the security review documented.” -CISO
		Project Manager clarified AppCo was talking about API	“They were speaking of an API - Application Programming Interface, which can be used to link our servers with the database on the tablets directly and access can be provided only to the PIs or PI and Co-I.” - Project Manager
		CIO discarded the idea of using an API	“CISO and I have consulted and we cannot provide programming support to utilize the API to create an interface.” -CIO
		Security Analyst sent Project Manager the forms required for the security review	“can you please complete the attached forms send them to CIO and cc me in the message” - Security Analyst
		PM introduced Security Analyst with AppCo so that they can exchange required info for security review	“Security Analyst is with IT security review at AcademicU and Director and CEO AppCo are the technical points of contact at AppCo, in India, the company

Stakeholder	Time	Actions	Supporting Quotes
			developing our app.” -Project Manager
		AppCo provided the answers to Security Analyst’s questions	
		Security Analyst said he will look into the answers and discuss with his boss	“I will brief my boss on the information provided and will suggest dates/times.” - Security Analyst
		Security Analyst suggested meeting times and sent the agenda for the meeting	“Recommended meeting date/times to meet: 6 Sept @ 10:00 CST or 7 Sept @ 10:00 CST -- Let me know if these date/times are good for you.” - Security Analyst

Table A.2. Communication with AppCo

Time	Activity	Supporting Quote
8/2017	Project Manager offered the contract to build the app to Director of AppCo	“Would AppCo be interested in taking the contract for the \$5000?” -Project Manager
	Director from AppCo accepted the offer	“We could definitely work on developing the program.” -Director
	Project Manager sent AppCo the form required to be filled up to set up the payment account	“Attached is a form we will need completed by AppCo to get you set up in our electronic accounts system so that we can do an electronic transfer when the contract is executed.” -PROJECT MANAGER
	Project Manager asked for AppCo’s banking information	“we need their bank wiring instructions. Account holder name, Bank Name, address, account number, swift code, etc” - PROJECT MANAGER
9/2017	AppCo asked for requirements for the app	“It would be good if we can get a requirements write up for the app that we have to develop.” -CEO AppCo
	Shelby asked AppCo to prepare an invoice for the first payment	“could you please prepare an invoice for the first payment of \$1666 so that upon signing we can send a transfer of funds” - PROJECT MANAGER
	Project Manager provided the requirements for the app	“attached are the requirements and corresponding attachment 1 and 2” -PROJECT MANAGER
10/2017	Project Manager made request to pay the installment of the contract fees to AppCo	“The contract with AppCo was executed today and we are ready to send our first payment” -PROJECT MANAGER
11/2017	The payment to AppCo was still not made	“Can I get an update on the electronic payment to AppCo?” - PROJECT MANAGER
	AppCo sent an email about their concern of still not hearing from AnimationCo	“We are yet to hear from AnimationCo and you about the icons for assessment app.” - Director

Time	Activity	Supporting Quote
	<p>The first payment was made</p> <p>Project Manager also contacted AnimationCo and confirmed they will send the icons to AppCo the next day</p> <p>Director from AppCo provided some ideas regarding app design</p>	<p>“I’m glad the payment finally went through!” -PROJECT MANAGER</p> <p>“I’ve contacted AnimationCo so hopefully you will get something by tomorrow.” -PROJECT MANAGER</p> <p>“I was thinking if you have thought about branding this and have some colors thought for that we could mirror that in the app too.” - Director</p>
	<p>AppCo provided a sample of how the icons and the app might look</p>	<p>“we would like to suggest the following link which provides guidelines for designing icons” - Director</p>
	<p>AppCo informed Project Manager that they are working on the wireframe</p>	<p>“We are working on the wire frames for the app and will get back to you by the end of this week.” - Director</p>
	<p>AnimationCo sent the icons to Project Manager and AppCo</p> <p>AppCo gave an update that they will soon share the wireframes with Healthy India</p>	<p>“Please find the link for the icons below.” -Animation Director</p> <p>“We will be able to share that with you over the weekend for your review.” -CEO AppCo</p>
12/2017	<p>AppCo shared the wireframes with Healthy India</p>	<p>“Pls find attached a set of wire frames (depicting a few screens) of the VR Assessment App being developed for AcademicU.” -CEO AppCo</p>
	<p>Project Manager provided the feedback on the wireframe</p> <p>Project Manager submitted the 2<sup>nd</sup> payment</p>	<p>“Here is a bit of feedback from the team.”</p> <p>“I sent the 2nd invoice to our billing office for processing.” - PROJECT MANAGER</p>

Table A.3. Communication with AnimationCo

Time	Activity	Supporting Quote
6/2017	<p>Dr. Rakesh and Dr. Anjali provided feedback on the script</p> <p>Project Manager proposed that the script be produced in 3 different languages English, Hindi, and Kannada</p> <p>Project Manager also introduced Creative Director to Dr. Rakesh and Anjali</p>	<p>“You all offered great feedback on the last round of scripts for the patient education hypertension animation project.” -Project Manager</p> <p>“We are planning to produce the script in English, Hindi, and Kannada” -Project Manager</p> <p>“Also, Anjali and Rakesh - let me introduce Julia - she is from AcademicU and is a professor of Art. She will be our "Creative Director" for the project.” -Project Manager</p>
8/2017	<p>Project Manager sent Steve from AnimationCo the revised script</p> <p>Project Manager also told Steve that they have sent the first payment</p> <p>Animation USA Manager from AnimationCo confirmed that they have received the first payment</p> <p>Steve put together the initial crew for the animation and asked for a meeting</p> <p>AcademicU have executed a contract with AnimationCo and sent them the script</p>	<p>“Please see our attached script for the English version.” - Project Manager</p> <p>“I emailed our accounts office today to find out the status of the 1st payment.” -Project Manager</p> <p>“I received the check yesterday.” -Animation USA Manager</p> <p>“I spoke with Steve this morning. He has put together an initial crew in the India studio and would like to have a creative meeting” -Animation USA Manager</p> <p>“We have executed a contract with AnimationCo and sent them the script.” -Project Manager</p>
9/2017	<p>COO AnimationCo from AnimationCo proposed what the whole animation is going to be like and interactive modules in the end</p> <p>Project Manager sent her feedback on the proposed modules</p>	<p>“We will add 3 or 4 game modules in the end” – COO AnimationCo</p> <p>“I like this idea and think this will be a good point of discussion for our Skype meeting tomorrow. We need</p>

Time	Activity	Supporting Quote
	She was still waiting on feedback from HospitalCo doctors	to refine the details of the modules.” -Project Manager “Sorry for my delay in responding. I was waiting for input from my physician partners in India and other research partners.” -Project Manager
	AnimationCo sent the final version of the script and was waiting for BU’s approval	“Please find attached the script with one point of feedback highlighted in yellow.” - Animation Director
	AnimationCo sent the 2D character design	“Please find attached the character designs in 2D.” - Animation Director
	Dr. Anjali sent her initial feedback to Project Manager	“I personally feel the characters look too modern... and have very sharp features as compared to 'cute' features..” - Dr Anjali
	Dr Anjali provided her detailed feedback on the design	“Shade is fine, but size looks very uniform. Too trim and thin than you would expect in a real setting.” -Dr Anjali “May be little more plump, normally how a middle aged couple would look like.” -Dr Anjali “Indians don't look too trim and fit in their middle age.” - Dr Anjali
	Creative Director provided her feedback	“The look seems more Brooklyn Hipster.” -Creative Director “I would like to see the attendant wearing sandals, darken his skin considerably.” -Creative Director “I would like to see her with more body weight and the jewel on her forehead.” - Creative Director

Time	Activity	Supporting Quote
10/2017	Project Manager combined everyone's feedback and sent it back to AnimationCo	"I am summarizing what I believe is the most important here in the bullet points but am also including all of the feedback from each team member." -Project Manager
	AnimationCo sent the revised design to BU	"Please find attached the revised character designs." - Animation Director
	Dr Rakesh gave his feedback on the character design	"These characters look too slick to me !!" -Dr Rakesh
	Project Manager gave the final approval on the character design	"We give final approval on the character development with option II for the Monkey, Aditya and Rahim." -Project Manager
	AnimationCo sent the English audio track to AcademicU	"Please find below the link for the English audio track and the script with our feedback" - Animation Director
	AnimationCo sent updated version for one of the character	"Please find attached the options for the footwear that Rahim should be wearing." - Animation Director
	IT Advisor provided her feedback on the audio track	"I love the voices and variety. I enjoyed listening to it and found it entertaining. In addition to learning a few things." -IT Advisor
	Creative Director gave her feedback on the audio track and one of the character.	"I think that the first option on sandals with toe strap is more appropriate, I would like the toenails from option #2 to be included in the first option with the toe strap sandals." - Creative Director
Project Manager compiled all the feedback and sent it back to AnimationCo	"We all agree we like Option 1 with the toe strap on the sandals but please include the toenail detail as is drawn on	



Time	Activity	Supporting Quote
	Dr Rakesh and Anjali gave his feedback on the audio track	the 2nd option.” -Project Manager “Sorry for the delay in sending us our comments.” -Dr Rakesh and Anjali
	Project Manager sent the list icons AnimationCo needs to make for AppCo to start working	“Attached is the list of ICONs that we will need to send to AppCo for them to start working on the application.” - Project Manager
11/2017	AnimationCo sent the first animatics and the first version of icons	“Please find below the link for the animatics. Also, attached is one version of the icons.” - Animation Director
	IT Advisor gave her initial feedback on the Icons	“I don’t love the format and background but I don’t have a solution for it.” -IT Advisor
	Creative Director gave feedback on both the storyboard and the icons	“The storyboard is fantastic.” “the colors seem a bit too "candy crush" and I could see a more desaturated dedicated color palette as a way to maintain a good visual transition.” - Creative Director
	Creative Director gave some suggestions on what they can do to make the icons better	“This is a possible solution to creating a more clear button color system where a distinction is necessary for individuals that are young, ill or are illiterate” -Creative Director
	Dr Rakesh gave his feedback on the storyboard	“I'm not sure if we are late, but I've been able to view the video and here are some of my comments” -Dr Rakesh
	Project Manager conveyed all the feedback for the storyboard and the icons	“Please see the feedback below and attached from Creative Director and our team on the button design.” - Project Manager
	AnimationCo provided the 3D character designs	“Please find attached the characters in 3D.” -Animation Director

Time	Activity	Supporting Quote
	Creative Director gave her thoughts on the designs	“The characters are outstanding! Feedback... Continue as planned, they are all unique and have their own personality.” -Creative Director
	AnimationCo provided the final version of the icons	Another examples of conflict resolution: positive encouragement “Please find attached the revised icons.” -Animation Director
	Healthy India submitted the 2 <sup>nd</sup> payment to AnimationCo	“Here is the 2nd invoice from AnimationCo that needs to be processed and will come from the SIC grant funds.” -Project Manager
	Project Manager gave a quick update on the project to AnimationCo and AppCo and what will be done in the future	“I just want to review our timeline and discuss a few issues” -Project Manager

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