
Janis L. Gogan, Ryan J. Baxter, Monica J. Garfield, Catherine Usoff
Bentley University, Waltham MA USA

Abstract
“Relational feasibility” refers to potential participants’ readiness to engage in IT-enabled collaboration, apart from (but interacting with) their organizations’ technical or operational readiness. This paper examines two pilot tests that evaluated prototype systems for IT-enabled collaboration in emergency healthcare: 1) a system that allowed clinicians to draw on multiple data sources to reveal a patient’s prescription drug history and 2) a tele-trauma system by which specially trained physicians guided emergency medical technicians (EMT’s) as they “cared” for smart-mannequin “patients” in an ambulance en route to a tertiary-care hospital. We illustrate what pilot tests can reveal about relational feasibility issues such as interpersonal trust, and its interaction with system acceptance issues. We discuss the implications for the management of pilot tests of emerging IT systems, and offer suggestions for further research on managing pilot test projects in healthcare and other domains.

1. Introduction

In choosing whether to implement new IT systems, managers are advised to first run pilot tests to evaluate the technical, operational, and economic feasibility of each potential solution [9, 11, 31]. Pilot tests reveal challenges that managers can address by instituting appropriate controls and other mechanisms to ensure successful full-scale implementation (or, if a pilot test reveals intractable problems, managers may choose not to proceed with implementation). In this paper we argue that, in addition to technical, operational and economic feasibility, a fourth aspect should be evaluated when interorganizational systems (IOS) are pilot-tested: relational feasibility, which we define as participants’ perceptions of interpersonal trustworthiness and other interpersonal aspects that can affect working relationships within and across organizational boundaries. We further argue that pilot testing can help to reveal how relational feasibility interacts with system acceptance issues.

While many case studies of IT implementation mention pilot testing, few studies have examined issues related to how an organization can learn from pilot test projects, and to our knowledge none have systematically addressed relational feasibility issues. This paper addresses that need by reporting on relational feasibility issues revealed in two projects that pilot-tested inter-organizational systems in healthcare.

2. Pilot Test Projects

A pilot test can be a significant project in terms of both managerial attention and financial resources. In this paper we focus on the project management objective of evaluation as distinguished from project control (which focuses on completing a project on time and within budget and meeting all required specifications). The objective of project evaluation is “to develop lessons learned ....” so that managers can identify pitfalls to avoid and implement appropriate controls and incentives to ensure successful future implementation [20]. Furthermore, we focus on projects that pilot-test interorganizational systems [38, 43].

An IT system pilot test is a time-bound, limited-scope and limited-participation project to evaluate a new system and related processes in a particular context [11]. An organization may choose to run multiple pilot tests to separately examine different aspects (such as technical, economic, and operational feasibility) of a system. “Pilot tests (singly or in combination) should yield valuable information on four aspects: Does the technology work? What changes are needed in our operations and staffing in order to make effective use of this technology? What new risks does it bring, and what economic benefits are we likely to yield?” [11]. Both technical and operational feasibility may be in focus when a pilot test entails end-to-end usability testing after unit and integration testing are completed [8]. Economic feasibility is in focus when a pilot test aims to identify cost/revenue drivers. When an interorganizational system is being piloted, relational feasibility is an additional concern that can be evaluated in one or more pilot tests [11, 10]. When pilot testing reveals issues of relational feasibility, managers can take corrective steps that may increase the likelihood of successful resolution of these issues before full-scale rollout of a new system.
Pilot tests are often employed to evaluate new IT systems in healthcare, especially those involving multiple organizational participants. For example in 2009 the State of Washington pilot tested personal health record “banks” at several providers, to assess privacy and security. The U.S. Social Security Administration is pilot testing a National Health Information Network, and the U.S. Centers for Disease Control and Prevention is pilot testing a GE Healthcare system for urgent public health alerts. Our study examines two pilot tests for IT systems used for collaboration in emergency healthcare.

3. Time Pressure and Interpersonal Trust

In the healthcare context IT systems can be used for a variety of purposes. The two systems that we studied were evaluated in clinical contexts characterized by considerable time pressure (i.e., emergency patient care). When a patient is in critical condition and needs urgent care, clinicians cannot put that patient on hold for a long while they seek help from a device or IT system, or from a source (human or computerized) outside of the emergency department where the patient is being treated. Yet, when a patient is most in need of care, clinicians need a great amount and variety of information related to his/her medical history and current clinical condition. What is her blood type? Is she allergic to penicillin? What medications is she on? What are her vital signs? Critical-need patients may be in an ambulance en route to a hospital or in an under-staffed emergency department. IT systems can link ambulances or rural emergency departments with tertiary-care centers so that crucial information can be exchanged that supports patient care. Clinicians need to work together effectively in order to take full advantage of the capabilities of these interorganizational systems. They need to trust the people that provide vital information or guidance concerning the patient’s past medical history and his/her current condition. Under these circumstances time pressure can be intense. Prior studies report that time pressure is a stressor that affects how people process information; stress sometimes causes people to process less information [40] and perform worse [5, 7, 47, 50]. However, with training and practice, individuals can learn to cope with time pressure [21], [22], [30], [26], [42].

When a new interorganizational system is proposed, the adopting organizations will likely first conduct a pilot test. These pilot tests can reveal aspects of technical, operational, and economic feasibility. For example, a pilot can reveal whether time pressure results in the performance issues discussed above. The pilot can also evaluate organizations’ and individuals’ readiness to participate in IT-enabled interorganizational collaboration, including relational feasibility issues such as interpersonal trust. The rationale for evaluating relational feasibility in a pilot test is so that issues that can affect system use will be identified before significant resources are committed to implementation of a new system for which users are not yet ready.

Trust is “the willingness of a party to be vulnerable to the actions of another party” [32]. Prior studies find that interpersonal trust is affected by both an individual’s propensity to trust and beliefs about the other party’s benevolence, competence, and integrity [34]. When one party in a relationship is a “weak tie” (not well known); perceived competence is more salient to the formation of interpersonal trust than integrity or benevolence [27, 39]. Furthermore, trust may develop swiftly, particularly in those temporary teams in which participants play well defined roles (e.g., Hollywood movie production roles such as cameraman, director, and stunt coordinator; or emergency medicine roles such as paramedic, nurse, attending and specialist physicians, and others). Swift trust may form even though participants lack direct evidence of others’ competence, benevolence, or integrity [36, 18].

The establishment of trust reduces perceived information-sharing risk [41] and increases knowledge-seeking behavior [1, 3, 27]. Over time, experiences with another party cause trust to wax or wane [19, 28, 35, 37]. Among emergency clinicians interpersonal trust is likely to be particularly important, since a great deal of information must be quickly exchanged among participants, sometimes across geographic and organizational barriers. Interpersonal trust is associated with successful computer-mediated collaboration [15, 16, 17], and conversely, distrust has been found to impede telemedicine use [39]. Some studies report that IT systems help foster trust among virtual team members [46], while others find that IT use can hurt interpersonal trust [29].

Thus, because interpersonal trust is dynamic and critical to clinical collaboration it is important to evaluate this aspect of relational feasibility in pilot tests. Furthermore, the interplay between interpersonal trust and system acceptance has received little attention and it is likely to play a significant role in interorganizational systems. In the particular context that we studied (interorganizational emergency healthcare systems) getting the right information at the right time has life-or-death implications, thus it seems likely that time pressure may interact with both interpersonal trust and system acceptance in this context.
Before clinicians will accept and use new interorganizational systems for acute clinical care, they will form judgments about the system’s hardware and software elements. These judgments may result in system trust (defined as “the willingness to be vulnerable to the ‘actions’ of an IT system” [12]). System trust is a controversial construct; researchers disagree as to whether the trustworthiness dimensions of benevolence, competence and integrity apply to a non-human entity. Some argue that the only relevant dimension is perceived competence (perceptions of a system’s functionality in supporting relevant tasks; see [33]). Others report examples of users interacting with systems as if they were human [2]; this suggests that the dimensions of benevolence and integrity might play a role in a system’s perceived trustworthiness. Since these questions remain unresolved, in this paper we avoid the controversy about whether users actually “trust” a non-human entity, by focusing on system acceptance rather than system trust.

An individual’s acceptance of a system is influenced by its accuracy in representing the phenomenon of interest [4, 48, 49]. A nurse will accept vital sign data from a monitor if she believes it accurately portrays a patient’s vital signs. Another clinician will rely on a video or still image if she believes it accurately portrays aspects of the patient’s condition that she is seeking to evaluate. When a system fails to provide an accurate representation, a user is less likely to accept it.

Due to the complexity and cost of interorganizational systems, it is important to learn, through pilot tests, their impact on relational feasibility and system acceptance. Building on prior work, this study addressed the following research questions: In pilot tests of interorganizational clinical IT systems for urgent care, what was revealed about:

1. How specific system features affect clinicians’ system acceptance?
2. Whether and how interpersonal trust interacted with system acceptance?
3. Whether and how time pressure influenced interpersonal trust and system acceptance?

4. Methodology and Findings

We used inductive grounded theory and the constant-comparative method of analysis in our case studies of two pilot test projects [45]. Semi-structured interviews were recorded and professionally transcribed, and interviewers took field notes. Four forms of coding were done: 1) factual coding; 2) comparative coding versus findings from earlier rounds of data gathering; 3) open coding of new themes; 4) interpretation, to understand how separate events, actions or attitudes interrelate [44]. We examined two pilot-test cases: a prescription history system for emergency departments and a tele-trauma service connecting ambulance personnel and trauma physicians. In the next two sections we provide, for each case, an overview, findings, and discussion.

4.1 Prescription History Project: Overview

When a seriously ill patient is unconscious or cannot say what medication he is on, it is difficult for clinicians to make appropriate treatment decisions. Interviews were conducted with seven individuals in three hospitals that participated in a pilot test of a system for obtaining patient prescription histories, and three individuals in a consortium that sponsored the test (total of ten interviewees).

<table>
<thead>
<tr>
<th>Table 1: Background and Purpose for Prescription IOS Pilot Test and Supporting Quotations from Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scenario</strong>: Emergency physicians may need to act under time pressure to decide on various procedures including administration of medications, at the risk of these interacting in a harmful manner with the patient’s existing prescriptions.</td>
</tr>
<tr>
<td>“When a patient comes in... we are required to obtain an accurate list of their medications.”</td>
</tr>
<tr>
<td><strong>Changes in Past Procedure</strong></td>
</tr>
<tr>
<td>“In the past, the primary care physician would be looking at their own chart, from their office and they’d know what the patients were on. Now, hospitalists do most of the admissions to hospitals like this one, and they don’t have any idea what medications the patients are on.”</td>
</tr>
<tr>
<td><strong>Current Procedure and Challenges</strong>: Physicians make phone calls to relatives and primary-care physician and pharmacy clerks to determine the medication profile of the patient.</td>
</tr>
<tr>
<td>“It’s very hard to efficiently write orders that are safe without spending an hour on the phone talking to pharmacies and PCP offices.”</td>
</tr>
<tr>
<td>“That often means many phone calls to their pharmacy, to their adult sons or daughters, or oftentimes to several relatives, and to their primary-care physician trying to figure out what medications the patient is taking. This is a very time-consuming process.”</td>
</tr>
<tr>
<td>“It’s very hard getting a groggy clerk at 3:00 in the morning to fax you the information you need about a patient.”</td>
</tr>
<tr>
<td><strong>IT Solution</strong>: Enable emergency department clinicians to identify or verify medications that a patient might be on, by tapping into the patient’s prescription records in several insurers’ databases through an internet-based system.</td>
</tr>
<tr>
<td><strong>Stakeholder Support for Pilot Test</strong>: A three hospital pilot project was sponsored by a healthcare IT consortium that includes hospitals, insurers, medical schools, and various technology vendors and other interested parties.</td>
</tr>
<tr>
<td><strong>Pilot Test and Anticipation</strong>: Each emergency department prepared for the pilot over several months, during which time they worked out issues such as liability, patient privacy, and workflow, in the context of their existing systems and practices.</td>
</tr>
<tr>
<td>An emergency department doctor at one hospital noted:</td>
</tr>
<tr>
<td>“I think people were pretty excited about the idea. ...if the data is available, you can certainly make better decisions.”</td>
</tr>
</tbody>
</table>
4.1.1 Prescription History Project Findings

Three findings are noted in Table 2 regarding the intersection of interpersonal trust and system acceptance: 1) Clinicians perceive the system as adequate for use with incapacitated patients; 2) clinicians may not accept all the data from the system due to a lack of completeness of information from Medicare, over-the-counter, psychotropics, and antiretroviral drugs; and 3) the system was seen as adequate in confirming a patient’s account of needing pain medication.

Table 2: Description and Key Supporting Quotations of Pilot Test Findings

<table>
<thead>
<tr>
<th>Finding Number</th>
<th>Description</th>
<th>Key Quotations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>An incapacitated patient cannot tell clinicians her medication profile. The system provides a list of recently prescribed medications.</td>
<td>“Only about half of our patients can tell you the names of the meds they’re on – and that’s if they’re conscious. Many more cannot tell you the dosage. [In one clinical encounter] we were working in one of the resuscitation rooms. It was almost like a classic scenario. It was a critical situation and someone said ‘Geez, I wish we had a medications list on this gal.’ I said ‘Why don’t we check [the system] to find out what she’s taking?’ It was like a commercial for [the system]. And we did it. ... We got the patient's full medication list ... and it really helped in this case.”</td>
</tr>
<tr>
<td>2.</td>
<td>Because this was a pilot project many insurers were not participating, including Medicare, which was problematic for a hospital for which 30% of the population was elderly. Over-the-counter drug usage (which can have harmful interactions with prescription drugs) was not part of this system, nor was data on psychotropics and prescriptions for antiretroviral drugs used to treat HIV, due to strict privacy regulations.</td>
<td>“HIV medications are known to have major interactions with other medications that you’d really need to know about if the patient was unconscious. To do a differential diagnosis, that would be a huge tipoff to know they were on those medications. Also, it’s a cruel twist of fate, but psychotropic medications for depression are some of the worst medications to overdose on. ...Those are some key medications we’d really need to know about, and they’re blocked.”</td>
</tr>
<tr>
<td>3.</td>
<td>A doctor is skeptical about a patient’s request for pain medication, but uses the system to confirm the patient’s information.</td>
<td>“Right before the weekend, a patient came in; he lives in a different area and couldn’t get in touch with his own doctor. It had a number of hallmarks of a fishy story, and I couldn’t get in touch with anybody. The patient complained of pain, but ... there was absolutely no objective way to verify it. But he seemed to be in earnest and if he didn’t get pain medication, he would be in a lot of pain for a very long time. His story was that he had run out of these pills; he had gotten the last prescription 3-1/2 weeks ago. I wasn’t comfortable, so I went and used the system. The system confirmed that he got this prescription from this doctor at this time for this purpose with this many pills. That made me very comfortable giving him a generous prescription to get him through this gap until he could get back in to see that other doctor. ...It gives you the confidence you need to aggressively treat somebody's pain, rather than to deny it to somebody you think might be gaming or abusing the system.”</td>
</tr>
</tbody>
</table>

4.1.2 Prescription History Project: Discussion

The organizers’ stated purpose of this pilot test was to understand the operational issues associated with an internet-based system which compiles data from various insurers about patients’ prescription medication use. Yet, even prior to the pilot test we can anticipate possible relational feasibility issues, as the previous procedure required clinicians to place trust in patients, relatives of the patient, primary-care physicians, and pharmacy clerks. They had to trust the competence of these persons and possibly their benevolence when calling a clerk at 3:00 AM.

An interesting contrast is: given that the system’s data were incomplete, as indicated in finding No. 2, why did the clinician in finding No.1 believe that they had “the patient’s full medication list”? Did he have a higher disposition to trust data in a system, making him more likely to consider the new system’s output as complete? Or, was it the ease and seemingly objective information that the system provided, compared to information compiled from groggy clerks, possibly incompetent relatives, and busy, hard-to-reach primary care physicians? Although we cannot answer these questions, they illustrate the importance of using pilot tests to reveal relational feasibility issues such as trust and to learn how these interact with system acceptance.

The third finding illustrates an interrelationship between interpersonal trust and system acceptance. This patient was not incapacitated, so the physician could potentially trust the patient’s competence about their medication profile. However, because the request was for pain medication it was difficult for this clinician to judge the patient’s integrity. Was he “gaming or abusing the system”? Despite the apparent incompleteness of the information provided by the system, when the medication profile confirmed the patient’s description, it in essence confirmed for the physician the integrity and competence of the patient. This finding may point to a disposition of clinicians to rely on confirmatory information, even when it is known that a system’s database is incomplete.

The prescription history project was not fully implemented after the pilot test, but the evaluation did reveal several lessons about this form of “community data exchange” that informed the planning and execution of subsequent projects, including a community e-prescribing “utility.” Its designers assert that some of the challenges encountered in the prescription history system were alleviated in the new e-prescribing project. They also claim that the broader application of the new e-prescribing utility offers greater business value to participants, making it a more likely candidate for subsequent full-scale implementation [13, 14].

4.2 Tele-Trauma Project Overview

RuralHub is in a state with a rural population and difficult travel conditions. Ambulances travel as much as three hours to reach this teaching hospital.
The patient might first be stabilized in a small community hospital emergency room before transfer to RuralHub, or the patient may be transported directly to RuralHub. One problem in trauma care is that EMTs may not have the skills or authorizations to perform certain necessary procedures. Interviews were conducted with a trauma physician and administrative and technical personnel.

### Table 3: Background and Purpose for Tele-Trauma Pilot Test and Supporting Quotations from Interviews

<table>
<thead>
<tr>
<th>Scenario:</th>
<th>Transfer from rural location to emergency department</th>
</tr>
</thead>
<tbody>
<tr>
<td>The physician described a situation that can occur following a serious accident (without telemedicine).</td>
<td></td>
</tr>
<tr>
<td>&quot;The first few hours after a trauma is enormously demanding and complex. You're taking the most critically ill patient, who may not yet be stabilized, and throwing them in an ambulance for three hours. ... Those patients are moving targets; there is an immense amount of change that occurs in those first few hours.&quot;</td>
<td></td>
</tr>
</tbody>
</table>

| Challenges during transport from rural locations to RuralHub: |
| "... Now the EMT ... may be highly skilled and highly trained and superb at what they do, but they are still highly limited in their scope of practice, which is limited by their education, experience, training, and certifications." |
| Data about a patient's changing condition may not be available to emergency physician. |
| "Suppose a patient decompensated en route. Which came first: did they have arrhythmia, and then this happened? Did they desaturate which resulted in this, and then that happened? The order in which things happen is critical in determining what you're going to do to fix the problem. But that order gets lost a lot because so much is happening so quickly, and (the EMTs) are in the back of a moving ambulance doing whatever they can, that they miss that." |

| IT Solution: | An ambulance is wired and equipped with cameras, a laptop computer, audio recorders, and other items. At RuralHub, a workstation with several monitors is available to the consulting trauma expert. One window displays a map and the ambulance's location (using GPS). Other windows could be opened on that screen to show the patient's vital signs, and on the other screen the expert could view video from the two cameras, which he could also pan, tilt and zoom. |

| Pilot Test Funding: | RuralHub obtained a grant to investigate ambulance trauma care using mobile two-way audio and one-way video. |

| Pilot Test and Anticipation: | To test the system, various experiments were run using a "smart" mannequin in the ambulance. The trauma physician was quite enthusiastic about this device: |
| "When you are taking care of it and the alarms start going, and the breath sounds disappear, and the pulse starts fading, and the EKG develops arrhythmias, you become immersed in the realism. Of all the forms of medical simulation that I have ever seen, this has the highest degree of realism, because you're surrounded by your familiar environment and -- even though it's a mannequin -- it's doing everything that a sick person does during crisis." |

### 4.2. Tele-Trauma Project: Findings

The results of the tele-trauma project revealed interpersonal trust issues as well as the need to maintain interpersonal trust between episodes of mobile-emergency situations. Five findings are detailed in Table 4.

| Table 4: Description and Key Supporting Quotations of Pilot Test Findings |
| 1. In one experiment a smart-dummy "patient" was programmed to need a life-saving procedure, needle decompression. EMTs are not authorized to perform this procedure, but in the experiment many residents who served as "experts" did not know this, so they instructed the EMT to do it. |
| "Just so you understand, when it became apparent to the resident that this needed to be done, you were within ninety seconds of patient [the dummy's] demise at this point. The residents were dealing with every method of treating this, short of decompression, until that was the last resort. And, this whole discussion of how to do it was taking place with the alarm 'whoop-whoop-whoop-whooping' and watching the patient's blood pressure and all that stuff, and the ambulance bouncing around; the whole thing. So they guided, both visually and using telestration. You can draw an arrow, you draw the mark, you say, 'Right here' or 'No, over here.' One time, the EMT went to the wrong side and the resident said, 'No, no. It's the right side; not the left,' and they instructed them through the whole thing. ... And they stuck the right size needle in the right location in the right orientation, every time! Twenty two times!" |
| 2. Experts found the system to be adaptable in ways that supported the particularities of the situation, despite its less than ideal video quality. |
| "The video itself is lousy quality. ... But you can dynamically trade off frame rate and resolution. If I want to look at a wound, I can get higher resolution stills. If I want to look at the pattern of somebody's breathing in real time, I will sacrifice resolution to look at the frame rate. You ... can even do it for a region of interest. You could have the whole screen optimized for frame rate and then have a region of interest around the wound that you optimize for resolution; it's really kind of cool. ... there's a data screen where you can scroll through and look at tabular data and look at all the data points that have been in the system." |
| 3. Tracking the location of ambulance via GPS was critical because a physician's decision making is affected by an ambulance's estimated time of arrival at RuralHub. |
| "One [window] is a map with the GPS location of the ambulance on it, which is really important for a lot of reasons. Number one, you can tell when they are going to hit a dead zone, so you don't want to start a procedure if they are going to drop communications in five minutes. It might even be necessary for them to stop. It would be safer for them to actually stop for a few minutes than it would be for them to keep driving. Number two, a lot of your judgment is based on what you think their ETA is, and ... you may have a different impression based upon what progress they're making. You can actually see where they are; so that's useful." |
| 4. Based on the pilot project, the trauma physicians were so optimistic that they decided to place a camera in their own resuscitation room, and to encourage rural emergency doctors to "watch us (working on patients that rural doctors had transferred to Rural Hub) like we watch them." |
| "Look, we fail sometimes and it's not always pretty. A lot of times we have no clue what's going on. It's like we have nothing to hide and we are all on the same team." |
| At first, some rural doctors did watch RuralHub doctors performing procedures on their patients, but (to the disappointment of the RuralHub doctors) usage quickly died off. |
| "There seemed to be initial excitement about that and then they were all too busy to want to watch. (Maybe) by the time the patient got here it would be a different shift (or) they lost interest because they've got other patients, so that really sort of fizzled pretty quickly. We couldn't really get them to be very interested." |
| 5. The doctors also tried to establish trust relationships with the doctors at the rural hospital ERs through face to face meetings. |
| "Even if it's done by videoconferencing, it seems to be very important that they have that face-to-face, even if it's by video, with the people here; just that trust factor ... I don't think you can get away from that human element. I think it's really important that they have a personal comfort with people that they're working within our hospital." |
Over time these relationship ties have to be reinforced.

“Turnover happens in the ERs, so those docs don’t know our docs anymore and sometimes you’ll see that it will slow down [the use of the system]. We talked about it, and partly it is, there’s turnover there and they don’t really know too much about it, or they don’t know the people at the other end.”

4.2.2 Tele-Trauma Project: Discussion

The organizer’s purpose for the tele-trauma pilot project was broader in scope than the prescription history project. The lead physician was both testing the system’s capabilities and examining the relationships between resident physicians and EMTs as they collaborated to care for the dummy “patient.” Based on the findings of the pilot test, the lead physician foresaw a great opportunity to provide better patient care using the tele-trauma system, if regulations were to change to reflect experts’ ability to guide EMTs to perform procedures they are not currently certified to perform:

“If they are five minutes out and I think they’ll make it here, I’m not going to have somebody stabbing a patient with a needle. But if they are still ninety minutes out, and it’s very clear that this patient is within moments of succumbing, tell me, if you were the family of that patient, that you wouldn’t want some doctor instructing the EMT in the ambulance on how to do this.”

The physician appears to have performed a mental calculus: I won’t place my faith in you if there’s a chance that the patient can be saved by a doctor with superior skills. However, if all other options have failed, I definitely would trust you, so long as you are guided by an expert like me, aided by reliable technology.

As the resident guides the EMT, we can see an interaction between system acceptance and interpersonal trust. Using a GPS to track location (Finding No. 3) can become part of the calculus, along with the information provided via video and audio to determine if they have to trust in the competence of the EMT. The decision to trust an EMT will be affected by the confidence that a resident has in the visual, audio and location feedback that the system provides.

Because the “video itself is lousy quality” physicians found that their ability to adapt and control the system was important in shaping the optimal representation for the particular information that they desired. In this way, although the system did not perfectly meet their needs, clinicians could learn to adapt and control it [4]. This is particularly interesting because it appears that a shortcoming in the system (less than ideal visual representation) was compensated for by its flexibility (i.e., trading between resolution and frame rate). If users believe a system is flexible, they may persist longer in attempting to tweak, modify, or work with it before abandoning it. If they perceive it to be inflexible, they may immediately abandon attempts to modify their use of it. In either case, acceptance of the system will ultimately affect whether the clinician trusts the EMT to perform a particular procedure.

Findings 4 and 5 illustrate an important revelation in the pilot test: some RuralHub specialist physicians recognized the importance of interpersonal trust in making telemedicine work. Their attempt to foster trust by allowing rural clinicians to watch them work via video seemed to have three objectives: 1) to be seen as “benevolent,” in that they provided open and transparent access, 2) to be seen as “competent” by letting rural clinicians observe their work, and 3) to help encourage rural clinicians’ system acceptance. Meeting the third objective has a second-order effect: because rural clinicians accept the system, they will therefore trust that experts using the system will provide them with competent guidance. For example, if a rural doctor or nurse observes that the telemedicine system provides an accurate representation, they will trust that the expert will provide appropriate guidance, because they believe that the expert is getting the information they need about the patient’s condition. Even though the rural clinicians’ monitoring of the hub experts declined over time, it seems likely that they did appreciate this gesture and that their trust in the experts increased.

The tele-trauma system pilot test was extended, but the system is not yet in full-scale operation, because various regulatory and financial issues have not yet been resolved.

5. General Discussion

The two pilot tests clearly revealed the importance of surfacing and examining relational issues before new collaborative systems are rolled out. In these two cases we observed ample evidence of one aspect of relational feasibility: interpersonal trust. For example, the pilot tests revealed clinicians’ concerns about the trustworthiness of patients (who could not or would not reveal accurate and complete information about their own use of prescription drugs). Clinicians’ concerns about other parties on whom they relied were also evident, including sleepy pharmacists, busy clerks, inaccessible primary care physicians, and EMTs.
Set in the context of emergency healthcare, the two pilots revealed fascinating issues that illustrate the complex interplay of system acceptance and interpersonal trust under time pressure. Emergency department clinicians using the prescription history system had little time to resolve discrepancies in the information provided by the system versus by humans. Findings from this pilot-test case hint that users may accept a system when it provides data that confirms their beliefs about a patient’s benevolence or competence – even when they recognize that the system’s database is incomplete. The interaction between system acceptance and the relational feasibility issue of interpersonal trust points us as well to interesting questions regarding when and why users decide to trust information from one source over another. It may be that the disposition to trust humans is higher in this particular setting, and therefore system generated information is trusted in its supplementary role. Pilot tests can help to reveal these issues in a particular context.

The two projects also revealed that some users of a collaborative system take a passive approach while others actively engage with the system, and that this has repercussions for both technical and relational feasibility. Consistent with prior research [23, 12], we observed that users’ ability to control an IT system influenced their acceptance of it. Clinicians who used the tele-trauma system discussed various features such as their ability to remotely control the camera to focus in or zoom out. A trauma physician reported that this enhanced his ability to see and understand an episode taking place at a distance. Although he felt the default image clarity was “lousy,” he utilized advanced system features to overcome this limitation. This finding suggests that computer self-efficacy coupled with control over specific system features, can facilitate system acceptance and perhaps improve relational readiness.

Clinicians in the tele-trauma pilot test also reported that the ability to obtain data from multiple sources helped them understand a patient’s condition. Vital signs data (whether sent electronically to a clinician’s screen or viewed by remotely focusing the camera on monitors located near the patient in the ambulance) increased the specialist’s confidence that his assessment of the patient’s condition was reasonably accurate and complete. Also, information obtained via the system provided valuable feedback about the steps EMTs were taking to care for the dummy “patient.” The pilot test revealed that such feedback can increase interpersonal trust; the trauma specialist’s beliefs about the EMTs’ competence increased as he used telemedicine to observe and guide them through complex life saving procedures that they are not normally certified to perform.

While some hub specialists’ trust in generalists improved as a result of telemedicine use, the converse was also true: the use of telemedicine to observe specialists at work (and to verify the impact on patient care) may have increased rural clinicians’ trust in the RuralHub physicians – possibly to the point that they no longer felt the need to use the telemedicine system to observe the specialists at work. After establishing a relationship (via face to face and video conferencing meetings) clinicians displayed higher levels of trust in one another, which appeared in turn to impact their willingness to use the system. Through active engagement with the system and the ability to check the validity of the system data, clinicians appeared to overcome system imperfections, accept the system, and trust their collaborators.

5.1. Practical Implications

These two pilot tests revealed several issues of relational feasibility, and these revelations can help managers anticipate why some clinicians may or may not accept a new interorganizational system. While a pilot test cannot reveal all possible scenarios, understanding in advance that relational and system acceptance issues may be interwoven will, at a minimum, provide an opportunity for project managers to anticipate breakdowns, blind spots in adoption, and opportunities to better exploit system capabilities. Especially in higher risk situations, such as in technology supported emergency medicine, it seems important to help users recognize their hidden assumptions rather than uncritically relying on (or rejecting) an IT system. Because higher risk situations demand more capable and complete systems that accurately depict a patient’s condition and clinicians’ attempts to help them, we wonder if perhaps some new systems are prematurely abandoned without sufficient consideration of how they can be modified to better fit their context of use. Evaluation of relational feasibility issues during pilot testing can help to reveal whether and how the system is meeting or thwarting collaborators’ needs.

In turn, managers can further consider what support mechanisms might be needed. For example, a technical support team might play a vital role, by conducting periodic tests of system functionality and connections and confirming to clinicians that the system is at the ready. Designers can also incorporate features that give users increased control and flexibility in their use, which will facilitate system acceptance (as will appropriate system training). We
noted that in the two pilot tests the users needed practice to establish rapport, both with the system and with clinicians on the other side of telemedicine consultations. Interpersonal trust appeared to improve with even modest investments in activities devoted to relationship building.

5.2 Conclusions and Limitations

Our investigation explored how two emergency medicine pilot tests revealed aspects of relational feasibility, particularly interpersonal trust, and its interaction with system acceptance. Both examples involved clinicians working under time pressure, when decisions to trust people and rely on systems can be dynamic and situation dependent. Further study in other time-pressed contexts may yield additional insights about relational feasibility under this form of collaboration stress and also probe other dimensions of relational feasibility beyond individual trust. For example, prior work finds that organizational trust can facilitate or inhibit collaboration: a study of buyers and sellers in reports that they may distrust one another as individuals and yet nevertheless place faith in the others’ organization [51]. It thus seems likely that prior positive experiences with a prominent hospital might give rise to trust in that organization that transcends individuals’ feelings about one or more clinicians at that hospital. Conversely, negative prior experiences might lead a rural clinician to distrust that hospital even if they like a particular specialist doctor there. This also points to other relational qualities, such as affection or perceived group affinity, which may also be useful aspects to evaluate in a pilot test before full-scale rollout.

Our two pilot test cases differed in several aspects, which generated additional insights. The trauma system directly supported information-rich one-to-one collaboration across a distance, while the prescription history system provided lean information about prescriptions, but from numerous sources. This latter system only supported system queries, yet this seems to have improved clinicians’ face to face collaboration as they cared for patients. The findings point to further avenues for research. For example, was it the access to a variety of data sources via the prescription history system that facilitated clinicians’ system acceptance? For some clinicians the absence of key information categories (such as psychotropic or anti-retroviral drugs) was a “deal breaker” that caused acceptance to decline dramatically. The tele-trauma system supported transmission of rich video information which was augmented with other online data sources about patient condition (blood pressure, temperature, etc.). A hub specialist was able to exert considerable control over the system and make choices that improved his ability to gauge the patient’s condition and observe the EMT at work. We propose that the underlying reason for the increase in system acceptance was because the system’s adaptability enabled the specialist to gain a better representation of the situation; more research could be done to learn whether the perception of control is more important to system acceptance than specific system features that support adaptability. Certainly both active engagement and perceived control seems to have increased both his acceptance of the system and his trust in the EMTs.

A study limitation is that we did not interview patients or directly observe encounters in real time, which would give a clearer picture of relational issues between patients and clinicians. So, we do not have a complete 360° view of stakeholders’ perceptions in each project. Also, although both tests involved systems for emergency healthcare, we cannot as yet offer specific propositions as to the influence of time pressure or the value of pilot tests for overcoming time pressure-specific challenges.

Our findings point to the value of using pilot tests to reveal issues of relational feasibility and its interaction with system acceptance, in addition to technical, operational, and economic feasibility. Conventional pilot tests do little to reveal relational issues. It seems likely that relational challenges may explain why some systems that were successfully pilot-tested yet nevertheless fail to take hold. We contend that when relational feasibility are explicitly examined in the pilot test phase, managers can help to avert such problems during full-scale rollout.

Our examination of these two case studies has led us into two territories that have previously been treated separately in the MIS literature: technology acceptance and interpersonal trust. In our view, this argues for the value of interpretive qualitative research in our field. For practitioners, the conclusion and call for future research is more straightforward: future studies can further examine how, by adapting conventional project management techniques, managers can maximize their learning from pilot tests and improve the chances of system success.

6. References


