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Risk of Telemedicine Infeasibility: An Evidential Reasoning Approach

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ABSTRACT

The viability of a telemedicine system is the strength of its business continuity. Business continuity can only stand if the telemedicine system remains continuously feasible. This article studies telemedicine risk in terms of its feasibility on all its five components: economical, technical, social, operational, and legal/ethical. Any deficiencies in one or more of the feasibility components will affect the system business continuity risk and can lead to infeasibility and possible dissolution. The telemedicine computing environment is full of uncertainties and ambiguities and it just involves too much background knowledge that Bayesian theory cannot accommodate. Decision theory however offers a basic evidence-based multi-criteria decision mechanism that can tackle those decision problems treating both quantitative and qualitative criteria under various uncertainties including ignorance and randomness. We propose an evidential reasoning model to assess a telemedicine business continuity risk based on infeasibility. This business continuity risk is modelled using Dempster and Shafer Theory as the plausibility of infeasibility of the telemedicine system. A numerical example is provided to demonstrate the working of the proposed risk assessment model.

Keywords: Telemedicine, Feasibility, Evidential reasoning, Belief functions, Dempster and Shafer theory, Risk, Plausibility

INTRODUCTION

While telemedicine is here to stay, its acceptance by the medical community is taking a slow pace. Many stakeholders are pressing different forces that do not let its adoption speed up at the same level of other advances in medical technology, information technology, information privacy and security, and healthcare in general. Not all researchers are optimistic about the advancement of telemedicine and its business continuity. It started low and then gained speed that did not last for long due to many factors that have continuously affected the adoption of telehealth in general [1-3].

Despite all those disruptions throughout the telehealth care system, the trend nowadays seems to be a lot more hopeful. Many major telemedicine networks are very visible, like American Well, MDLIVE, and Teladoc and there are many smaller ones that started occupying mostly regional but less national areas [2,4]. Often patient-centred medical homes, and independent physician practices established online presences and added audio and video-remote functionality to their group websites. None of the above types of telemedicine networks, small or large, could escape the intense scrutiny by state health care controllers and medical boards and the heavier Government regulations [5].

That said, even though this type of business is distance independent and should not have any boundaries that can impede its progress, unfortunately healthcare laws are different from one state to another, and even the definition of the telemedicine concept itself and related regulations are not the same in all states, and health providers will hence suffer from all types of conflicts that can arise in these state laws, regulations, and definitions (Figure 1) [2].

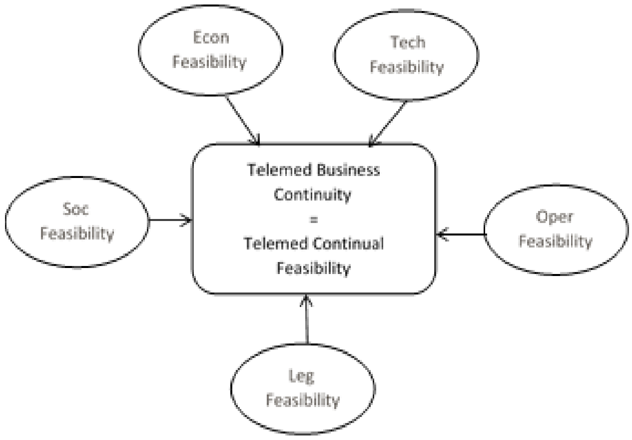

Figure 1 Business continuity framework

Need of Telemedicine

A great addition to healthcare has been the development of telemedicine. This allowed for real-time interactive consulting between a patient and a healthcare provider from a distant, using both audio-video conferencing and medical technologies. Medical and information and telecommunication technologies have enabled doctors to evaluate, diagnose and treat patients remotely [6]. Most often, telemedicine advances have offered great benefits as a complement to traditional healthcare, including reaching rural areas, where the shortage of healthcare providers had led to a lack of accessibility to both basic healthcare and specialty care. With telemedicine advances, patients have become able to get faster and improved healthcare because hospitals can now share expertise despite the geographic maps and because patient medical information can be seen and evaluated by multiple health providers across the telemedicine network. The fast recovery and the accuracy of medical decisions are two great benefits brought by telemedicine. When looking at the whole telemedicine industry, we can see that it has pressed healthcare, in its totality, to aim at value-based care with less and shorter hospital stays, more effective preventive programs, stronger distributed medical decision support, and more reliable healthcare.

Telemedicine is certainly a critical component of the healthcare industry and it is here to stay and advance further. Telemedicine has been accepted by most healthcare providers for the purpose of assuring solutions to solve most of the challenging problems of our current healthcare system, including, in access to fast and affordable healthcare delivery, and bringing quality healthcare despite the shortage in healthcare providers. That is, with affordable computing, networking, and medical technologies, telemedicine has been accepted as greatly needed to accomplish at least the following [6,7]:

- Increase access to healthcare, in general;
- Assure that patients can more easily acquire clinical services;
- Assure that hospitals can provide emergency and intensive care services, from a distance;
- Assure more affordable and improved outcomes;
- Reduce mortality rates, through reduced complications and less and shorter hospital stays;
- Enhance healthcare productivity through improved outcomes and cost savings being achieved by reliable telehealth programs.
- Reduce high cost hospital visits through monitoring programs;
- Make specialists and nurses more available to serve more patients through better computing, networking, and medical technologies.

The National Telehealth Parity Acts

The telemedicine industry is certainly continuing to make technological advancement, but unfortunately these advances seem to be stalled by legal and financial barriers that are diminishing its widespread use and acceptance. The insurance industry continues to oppose most of reimbursement resolutions discussed and looked-for among patients, healthcare providers, and the healthcare community [8]. These payment barriers to state and national telehealth parity acts continue to hinder all efforts made to advance the telehealth industry.

The bill's expansion of telehealth coverage and reimbursement that most of the National Health Parity Acts seem to advance to gain support would be implemented in a sequential manner on several phases and years. It is hoped that at the end, we would achieve an expanded telehealth coverage that can include all national health centers and rural health clinics, and a more extended geographic map with more locations and larger populations.

The telehealth is meant to allow health providers to deliver more services to more patients with better healthcare. The telehealth business depends however on many components, including technology, health providers, insurances, etc. These varied components do not advance at the same pace. While technology advances very fast, the insurance industry is still pulling back the telehealth progress, despite the sequential enactments to achieve parity between face to face and telehealth coverage, and to ease the process of telehealth payments and reimbursements. For instance, the Medicare Telehealth Parity Act of 2015 expanded the list of telehealth services available to Medicare beneficiaries [6,8].

The bill is expected to deliver most healthcare services independently of adverse geographic barriers; expand eligible providers to include more health providers, as specialized therapists, physical therapists, and speech language pathologists; monitor patients with home care and with chronic diseases, and deliver required mental health services. Earlier bills in 2009 and 2013 were successful in expanding telemedicine coverage while later bills offered budget sensitive and strategic improvements, such as for federally-funded community health centers and remote patient monitoring to reduce hospital readmissions. The Medicare Telehealth Parity Act of 2015 was needed to allow for more benefits for the payment and reimbursement of a varied set of telehealth services [6,8]. The complete list of rules constituting the act may be found in the literature on certain websites [9,10].

Review of Dempster and Shafer Theory

Decision theory offers a basic evidence-based multi-criteria decision mechanism that tackle those decision problems treating both quantitative and qualitative criteria under various uncertainties including ignorance and randomness [11,12]. Belief functions are at the basis of evidential reasoning at all stages of the decision model.

Belief functions were introduced in the 70's under a more extended framework called Dempster and Shafer Theory (DST). In the situations of poor or incomplete data, uncertainty management in Dempster and Shafer took a more intuitive approach and deviated from the conventional formalism adopted in Bayesian theory. In a DST setting, we start with the delineation of propositional space called a frame of discernment that contains all possible states, in an exhaustive and mutually exclusive way, so that only one of them can take place in one given time. Let us denote this space as $\Omega=\{w_i\}i=1,|\Omega|$ where w_i, $i=1,|\Omega|$ denotes a possible state of the our frame of discernment Ω.

Uncertainties are represented through a basic belief assignment that produces the m-values given the information on hand [8]. The m-values are only assigned to subsets of the elements for which we have information. We then have:

$m: 2^{\Omega} \rightarrow [0, 1]$

$Bel(A) = \sum X Ɛ A\ m(X)$, A in 2^{Ω}

The plausibility function on a sunset A is defined as the degree to which A is plausible in light of the evidence, or alternatively, the degree to which A is not disbelieved [13].

You may note that, when probability distributions are constructed, probability values are assigned to individual elements of the frame, while the m-values are assigned to subsets of the frame for which we have information. Also, while, in probability theory, the probabilities of complementary events add to 1, the belief values for complementary events in DST may be smaller than 1.

Of course, the decision maker has to come up with the m-values for a frame, for all known subsets. These values can be directly assigned based on their subjective judgment, or the existing information on hand may be interpreted to determine these values.

Dempster's rule of combination is a rule for combining belief functions when these belief functions are based on independent sources of evidence [14-16].

Specifically, the combination is calculated from the two sets of masses m_1 and m_2 as follows:

$m_{12}(\emptyset)=0$

$m_{12}(A)= [m1(+) m_2] (A) = 1/(1-k) \sum B \cap C=A \neq \emptyset\ m_1(B)m_2(C)$, where:

$k=\sum B \cap C= \emptyset\ m_1(B)m_2(C)$ is a measure of the amount of conflict between the two bba's.

The Telemedicine Feasibility Evidential Framework

The business continuity of the telemedicine system is the assurance of its continual feasibility to determine its continual viability [15]. Its objective is to ensure that such a project that was once economically, technically, socially, operationally, and legally/ethically feasible and justifiable when launched is still as fully feasible and justifiable. Figure 2 depicts a reduced evidential reasoning framework, where the rectangles represent the evidence pieces and the rounded-angle rectangles represent the assertions.

The economic feasibility component of a telemedicine system is the assessment of its financial aspects. This assessment should treat the telemedicine system as any other business that has starting costs, running costs, and business continuity costs. This should consider many factors including start-up capital, expenses, revenues, and investor income and disbursements. The purpose of the economic feasibility component, as in any cost-benefit analysis, is to demonstrate the continued net benefit of the telemedicine system for providing e-health care services for all its patient population, taking into consideration the benefits and costs to all its relevant stakeholders.

The evidential reasoning model is described using 18 beliefs structures: 12 belief structures representing the 12 evidence pieces available; and 6 belief structures representing the assertions describing the feasibility of the telemedicine system:

Belief structures for the feasibility assertions

Belief structure on Telemed feasibility: m_0

$m_0: 2^{\Omega 0} \rightarrow [0, 1]$

$\mathbf{\Omega_0}$= {w_{01}='adequate feasibility', w_{02}='inadequate feasibility'}

$e_{01}=m_0(w_{01})$

$f_{01}=m_0(w_{02})$

Belief structure on Telemed economic feasibility: m_1

$m_1: 2^{\Omega 1} \rightarrow [0, 1]$

$\mathbf{\Omega_1}$= {w_{11}='adequate economic feasibility', w_{12}='inadequate economic feasibility'}

$e_{11}=m_1(w_{11})$

$f_{11}=m_1(w_{12})$

Belief structure on Telemed technical feasibility: m_2

$m_2: 2^{\Omega 2} \rightarrow [0, 1]$

$\mathbf{\Omega_2}$= {w_{21}='adequate technical feasibility', w_{22}='inadequate technical feasibility'}

$e_{21}=m_2(w_{21})$

$f_{21}=m_2(w_{22})$

Belief structure on Telemed social feasibility: m_3

$m_3: 2^{\Omega 3} \rightarrow [0, 1]$

$\mathbf{\Omega_3}$= {w_{31}='adequate social feasibility', w_{32}='inadequate social feasibility'}

$e_{31}=m_3(w_{31})$

$f_{31}=m_3(w_{32})$

Belief structure on Telemed operational feasibility: m_4

m_4: $2^{\Omega 4} \rightarrow [0, 1]$

$\mathbf{\Omega_4}$= {w_{41}='adequate operational feasibility', w_{42}='inadequate operational feasibility'}

$e_{41}=m_4(w_{41})$

$f_{41}=m_4(w_{42})$

Belief structure on Telemed legal/ethical feasibility: m_5

m_5: $2^{\Omega 5} \rightarrow [0, 1]$

$\mathbf{\Omega_5}$= {w_{51}='adequate legal/ethical feasibility', w_{52}='inadequate legal/ethical feasibility'}

$e_{51}=m_1(w_{51})$

$f_{51}=m_5(w_{52})$

Belief structures for the feasibility evidential information

Belief structure on the current business continuity plan: m_b

m_b: $2^{\Omega b} \rightarrow [0, 1]$

$\mathbf{\Omega_b}$= {w_{b1}='adequate business continuity plan', w_{b2}='inadequate business continuity plan'}

$e_{b1}=m_b(w_{b1})$

$f_{b1}=m_b(w_{b2})$

Belief structure on Telemed Cost-effectiveness: m_{11}

m_{11}: $2^{\Omega 11} \rightarrow [0, 1]$

$\mathbf{\Omega_{11}}$= {w_{111}='adequate cost-effectiveness', w_{112}='inadequate cost-effectiveness'}

$e_{11}=m_{11}(w_{111})$

$f_{11}=m_{11}(w_{112})$

Belief structure on Telemed profitability: m_{12}

m_{12}: $2^{\Omega 12} \rightarrow [0, 1]$

$\mathbf{\Omega^{12}}$= {w_{121}='adequate profitability', w_{122}='inadequate profitability'}

$e_{12}=m_{12}(w_{121})$

$f_{12}=m_{12}(w_{122})$

Belief structure on Telemed hardware technology: m_{21}

m_{21}: $2^{\Omega 21} \rightarrow [0, 1]$

$\mathbf{\Omega_{21}}$= {w_{211}='adequate hardware', w_{212}='inadequate hardware'}

$e_{21}=m_{21}(w_{211})$

$f_{21}=m_{21}(w_{212})$

Belief structure on Telemed software technology: m_{22}

m_{22}: $2^{\Omega 22} \rightarrow [0, 1]$

$\mathbf{\Omega_{22}}$= {w_{221}='adequate software', w_{222}='inadequate software'}

$e_{22}=m_{22}(w_{221})$

$f_{22}=m_{22}(w_{222})$

Belief structure on Telemed resources: m_{23}

$m_{23}: 2^{\Omega 23} \rightarrow [0, 1]$

$\mathbf{\Omega}_{23}$= {w_{231}=‘adequate resources’, w_{232}=‘inadequate resources’}

$e_{23}=m_{23}(w_{231})$

$f_{23}=m_{23}(w_{232})$

Belief structure on Telemed social benefits: m_{31}

$m_{31}: 2^{\Omega 31} \rightarrow [0, 1]$

$\mathbf{\Omega}_{31}$= {w_{311}=‘adequate social benefits’, w_{312}=‘inadequate social benefits’}

$e_{31}=m_{31}(w_{311})$

$f_{31}=m_{31}(w_{312})$

Belief structure on Telemed social impact: m_{32}

$m_{32}: 2^{\Omega 32} \rightarrow [0, 1]$

$\mathbf{\Omega}_{32}$= {w_{321}=‘adequate social impact’, w_{322}=‘inadequate social impact’}

$e_{32}=m_{32}(w_{321})$

$f_{32}=m_{32}(w_{322})$

Belief structure on Telemed stakeholder’s resistance: m_{41}

$m_{41}: 2^{\Omega 41} \rightarrow [0, 1]$

$\mathbf{\Omega}_{41}$= {w_{411}=‘adequately managed stakeholders resistance’, w_{412}=‘inadequately managed stakeholders resistance’}

$e_{41}=m_{41}(w_{411})$

$f_{431}=m_{41}(w_{412})$

Belief structure on Telemed satisfaction of organizational regulations: m_{42}

$m_{42}: 2^{\Omega 42} \rightarrow [0, 1]$

$\mathbf{\Omega}_{42}$= {w_{421}=‘adequately satisfied organizational regulations’, w_{422}=‘inadequately satisfied organizational regulations’}

$e_{42}= m_{42} (w_{421})$

$f_{42}= m_{42} (w_{422})$

Belief structure on Telemed satisfaction of laws: m_{51}

$m_{51}: 2^{\Omega 51} \rightarrow [0, 1]$

$\mathbf{\Omega}_{51}$= {w_{511}=‘adequate satisfaction of laws’, w_{512}=‘inadequate satisfaction of laws’}

$e_{51}=m_{51}(w_{511})$

$f_{51}=m_{51}(w_{512})$

Belief structure on Telemed satisfaction of public regulations: m_{52}

$m_{52}: 2^{\Omega 52} \rightarrow [0, 1]$

$\mathbf{\Omega}_{52}$= {w_{521}=‘adequate satisfaction of public regulations’, w_{522}=‘inadequate satisfaction of public regulations’}

$e_{52}=m_{52}(w_{521})$

$f_{52}=m_{52}(w_{522})$

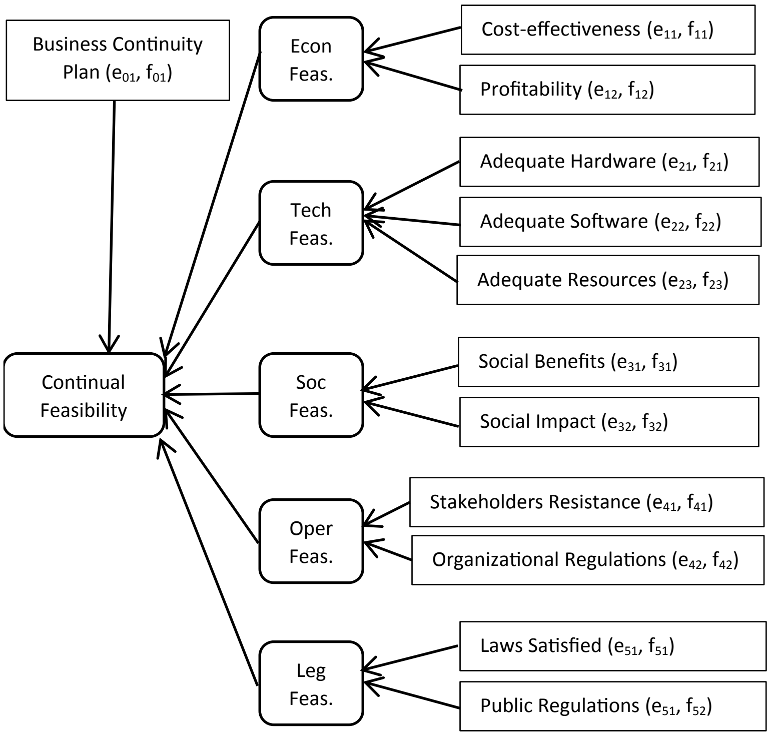

Figure 2 Telemed feasibility framework architecture

Technical Feasibility

The technical feasibility of a telemedicine system is the assurance that the required technology is available to deliver the intended e-health care services and whether or not all required resources are available, including hardware, software, and manpower. The technical feasibility component should continue to justify the telemedicine system in terms of its input, its processes, its output, its control mechanisms, its data resources, and its user interfaces. It is a very effective tool for long term planning and trouble shooting. Moreover, the continual validation of the technical feasibility should identify areas of strengths and weaknesses in any version of the telemedicine system so that owners can know how to plan further resources and support activities. A continual technical feasibility assessment is certainly consequential to identify potential weaknesses and strengths and plan the available opportunities to assure the technical feasibility of the system.

Operational Feasibility

The operational feasibility of a telemedicine system is a measure of how well the current version of this system achieves its goals and objectives, how it solves intended e-health problems as defined in the its prescribed scope, and how it manages all types of resistance to its delivered services. The operational feasibility of the telemedicine system should assure that the system on hand is still viable once change resistance to its current version is overcome. The operational feasibility study should 1) look into the new e-health processes and how users feel about them, 2) assess whether or not the current version of the telemedicine system can and will work, 3) evaluate the resistance by all types stakeholders, including patients and health providers, and how this resistance is managed, and 4) review how the relevant healthcare environment is affected.

Social Feasibility

The social feasibility of a telemedicine system is the assurance that all of its intended benefits reach its intended beneficiaries. Social feasibility aims hence at assessing how the system impact the lives of people that live and work in system's field of influence. Emphasis on social feasibility may need to tackle such problems as distance independence and cross state borders' service delivery and conflicts in state laws and regulations. Important factors that would ensure social feasibility are the patients, doctors, health providers, and insurance's active participation, the presence of the right mental orientation, and the effective management of all system's constraints. This feasibility component may require the design, plan, and implementation of socially feasible involvement of all relevant stakeholders [17].

Legal/ethical Feasibility

The legal/ethical feasibility of a telemedicine system is the assurance that its intended objective and current operations conform the legal and ethical requirements throughout its distributed delivery environment. These feasibility components are concerned with all legal and ethical requirements across state borders. These requirements include all healthcare and e-health regulations including HL7, HIPAA, local and regional data protection acts, and any privacy and security policy designed for the system.

Risk of Infeasibility

Before we provide our definition of telemedicine risk, let us give an example. Assume that we have a belief, for example of 0.38, that the feasibility component in question of the telemedicine computing environment is fulfilled, and that we have a belief of say 0.22 that this component is not satisfied, and that the level of ignorance is 0.40 how much we do not know whether or not this feasibility component is satisfied.

The information in this example is telling us that the plausibility that the feasibility component in question is equal to 0.40+0.22=0.62. The plausibility value of 0.62 is in fact the telemedicine risk representing to what extent we are uncertain that this feasibility component is not satisfied. That is, we have 62% risk that the feasibility component in question is not satisfied based on all available information.

If we however obtain additional information such as safeguards or countermeasures that were implemented to alleviate any deficiencies associated with the feasibility component in question, then we can assess the impact of these remedies on its state of feasibility and combine this information with the earlier assessed belief. At this point, Dempster rule may be employed to obtain the overall plausibility that this feasibility component is not satisfied to obtain a measure of the overall risk on this component.

The infeasibility risk r_0 expressed in terms of the risk of the ineffectiveness of the telemedicine business continuity plan r_b and the risks r_1, r_2, r_3, r_4, and r_5 associated with the infeasibility components: economical infeasibility, technical infeasibility, social infeasibility, operational infeasibility, and legal/ethical economical infeasibility.

Given the belief structures above defined on the assertions a_b, a_1, a_2, a_3, a_4, and a_5, we employ Dempster's rule of combination of evidence as follows:

Recall our frame structure as follows:

Ω_0= {w_{01}='adequate feasibility', w_{02}='inadequate feasibility'}

Ω_1= {w_{11}='adequate economic feasibility', w_{12}='inadequate economic feasibility'}

Ω_2= {w_{21}='adequate technical feasibility', w_{22}='inadequate technical feasibility'}

Ω_3= {w_{31}='adequate social feasibility', w_{32}='inadequate social feasibility'}

Ω_4= {w_{41}='adequate operational feasibility', w_{42}='inadequate operational feasibility'}

Ω_5= {w_{51}='adequate legal/ethical feasibility', w_{52}='inadequate legal/ethical'}

The belief structure of the infeasibility assertion a_0 is computed as follows:

$A \mathcal{E} 2^{\Omega 0}$, $A \neq \varnothing$

m_0: $2^{\Omega 0} \rightarrow [0, 1]$

$m_0(A)$ = 1/(1-k) ∑∩Ax=A x$\mathcal{E}${'b', '1', '2', '3', '4', '5'} $\prod m_x(A_i)$

The risk r_0 on infeasibility which is a function of the risks of ineffective business continuity planning and the risk of infeasibility components r_b, r_1, r_2, r_3, r_4, and r_5, is computed as the plausibility of infeasibility, that is, the degree to which w02 is plausible in light of the evidence represented by the assertions a_b, a_1, a_2, a_3, a_4, and a_5. That is, r_0=Pl({w_{02}}) = 1-Bel({w01}) where w_{01}='adequate feasibility' and w_{02}='inadequate feasibility' are elements of the power set $2^{\Omega 0}$. The telemedicine owners are in a position to take the appropriate actions depending on the value of the infeasibility risk, including taking recovery or correctives actions or even shutting down the entire system.

Model Demonstration

In order to demonstrate the working of the telemedicine risk and infeasibility model, we assume a limited telemedicine environment with limited evidence feed. The evidence feed is limited to 12 evidential inputs. Figure 3 depicts the feasibility architecture of our example. The computations and fusions of belief structures are shown in Table 1. The assertions are processed in Table 2 that gives all component infeasibility risks and the overall telemedicine infeasibility risk which is found to be equal to 2.8%.

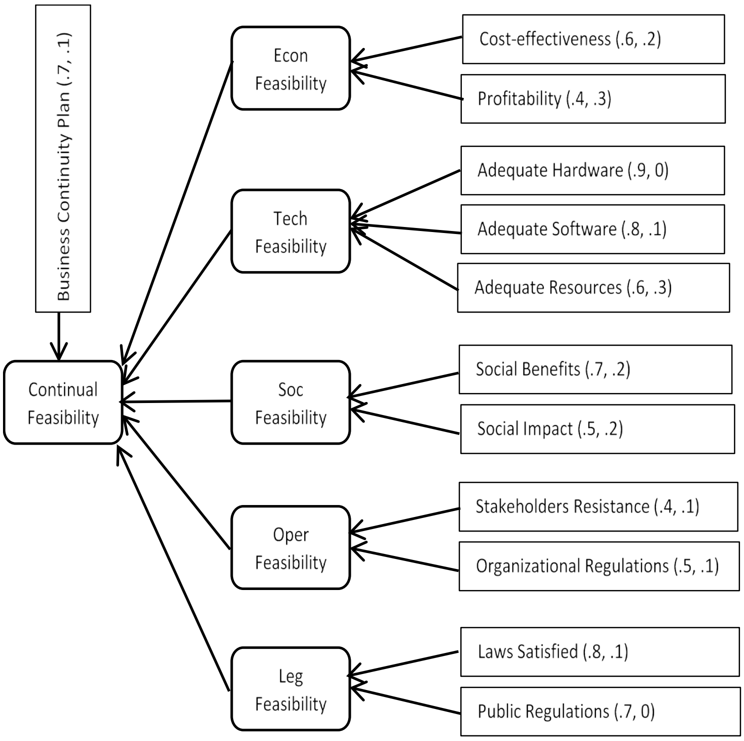

Figure 3 Example of a Telemed feasibility architecture

Table 1 Fusion computations

Variables	Evidence pairs	Fused pairs	Fully Fused pair
(e_{b1}, f_{b1})	(0.7, 0.1)	(0.70, 0.10)	(0.972, 0.001)
(e_{11}, f_{11})	(0.6, 0.2)	(0.49, 0.18)	
(e_{12}, f_{12})	(0.4, 0.3)		
(e_{21}, f_{21})	(0.9, 0.0)	(0.97, 0.01)	
(e_{22}, f_{22})	(0.8, 0.1)		
(e_{23}, f_{23})	(0.6, 0.3)		
(e_{31}, f_{31})	(0.7, 0.2)	(0.64, 0.08)	
(e_{32}, f_{32})	(0.5, 0.2)		
(e_{41}, f_{41})	(0.4, 0.1)	(0.60, 0.11)	
(e_{42}, f_{42})	(0.5, 0.1)		
(e_{51}, f_{51})	(0.8, 0.1)	(0.81, 0.01)	
(e_{51}, f_{52})	(0.7, 0.0)		

Table 2 Computation of infeasibility risks

Assertions	Component Belief structure	Component infeasibility risk
a_0: Ω_0= {w_{01}=‘adequate feasibility’, w_{02}=‘inadequate feasibility’}	$m_0(w_{01})$=0.972	r_0=0.028
	$m_0(w_{02})$=0.001	
	$m_0(\Omega_0)$=0.027	
a_b: Ω_b= {w_{b1}=‘effective BC plan’, w_{b2}=‘ineffective BC plan’}	$m_b(w_{b1})$=0.70	r_b=0.30
	$m_b(w_{b2})$=0.10	
	$m_b(\Omega_b)$=.20	
a_1: Ω_1= {w_{11}=‘adequate economic feasibility’, w_{12}=‘inadequate economic feasibility’}	$m_1(w_{11})$=0.49	r_1=0.51
	$m_1(w_{12})$=0.18	
	$m_1(\Omega_1)$=0.33	
a_2: Ω_2= {w_{21}=‘adequate technical feasibility’, w_{22}=‘inadequate technical feasibility’}	$m_2(w_{21})$=.97	r_2=0.03
	$m_2(w_{22})$=.01	
	$m_2(\Omega_2)$=.02	
a_3: Ω_3= {w31=‘adequate social feasibility’, w_{32}=‘inadequate social feasibility’}	$m_3(w_{31})$=.64	r_3=0.36
	$m_3(w_{32})$=.08	
	$m_3(\Omega_3)$=.28	
a_4: Ω_4= {w_{41}=‘adequate operational feasibility’, w_{42}=‘inadequate operational feasibility’}	$m_4(w_{41})$=0.60	r_4=0.40
	$m_4(w_{42})$=0.11	
	$m_4(\Omega_4)$=0.29	
a_5: Ω_5= {w_{51}=‘adequate legal/ethical feasibility’, w_{52}=‘inadequate legal/ethical’}	$m_5(w_{51})$=0.81	r_5=0.19
	$m_5(w_{52})$=0.01	
	$m_5(\Omega_5)$=0.18	
Telemed overall infeasibility risk = 0.028 or 2.8%		

CONCLUSION

This article studied telemedicine risk in terms of its infeasibility threats on all its five feasibility components: economical, technical, social, operational, and legal/ethical. Evidential inputs were elicited in terms the effectiveness and adequacy of countermeasures employed to resolve identified system deficiencies that were proven related to one or more of the feasibility components.

We proposed Dempster and Shafer theory to articulate and process evidential inputs and the assertions needed to produce the overall infeasibility risk of the telemedicine system. Risk was modelled as the plausibility of infeasibility given the belief scheme adopted throughout the telemedicine system. A numerical example is provided to demonstrate the working of our proposed telemedicine risk assessment model.

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