Healthcare Virtualization

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- American InterContinental University
- Western Nebraska Community College

Who is Dr. Byrian Ramsey

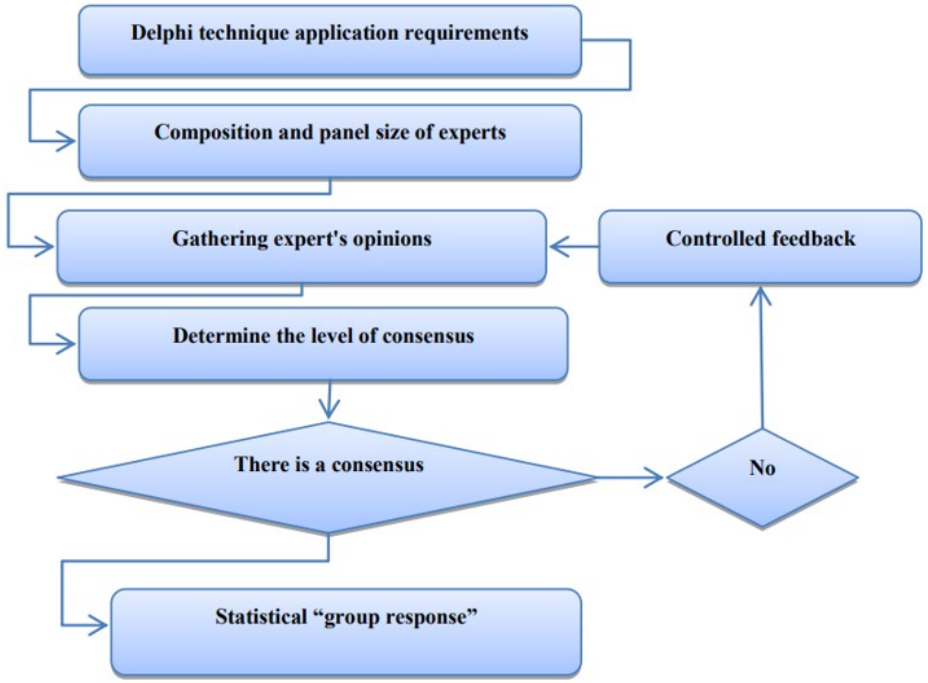
- Raised in Kentucky – Horse Racing Capital, University of Kentucky, Bourbon, and Tobacco country.
- Bachelors in Math, Masters in Information Systems and Management, and Doctorate in Management in Leadership with Emphasis on Information Systems and Technology.
- Full-Time Job – Director/Head of Technology for an American Indian Tribe in Southern Alabama.
- 25+ Year's experience in Technology
- 20+ Years in classroom and online private, college, and university teaching experience
- Love the outdoors, camping, fishing, hunting, hiking, boating.
- Current Full-time Role: Director of Information Technology for PCI
- Adjunct Online Professor for the University of the Cumberlands, New Mexico State University, and the American InterContinental University

Problem Studied

- The general problem is that patient diagnoses are delayed to patients due to unreliable and underperforming server hardware.
- The specific problem is that insufficient empirical evidence on experts' opinion exists on the relationship of software virtualization on the patient diagnosis process.
- Who or What Suffers?
  - Patients' healthcare is reduced
  - Hospitals are liable for medical malpractice
  - Others?

Theoretical Framework

- This study included the principles of qualitative research
- This study aligned with the process for e-Delphi studies.
- The following is the e-Delphi technique followed in this study:



Theoretical framework of Delphi technique in qualitative research (Habibi, Saafrazi, & Izadyar, 2014, p. 9)

Study Purpose

- The purpose of this e-Delphi study was to collect opinions and experiences from a group of expert panel members made up of physicians and virtualization experts on the relationship of software virtualization on the patient diagnosis process. The expert panel answered three rounds of surveys online with SurveyMonkey®
- Round 1
  - Questioned the position, background, and software virtualization knowledge of the expert panel – No consensus emerged.
- Round 2
  - Questioned the advantages and disadvantages of software virtualization of the expert panel – No consensus emerged.
- Round 3
  - Questioned the current and future state of software virtualization and the advantages of software virtualization in healthcare of the expert panel – A consensus emerged.

Round 1 Questions

Table 2

Round 1 Survey Questions

Number	Question
1	What is your occupational role?
2	If physician, on average, how much time do you spend on each patient during the diagnosis phase of interaction?
3	If physician, on average how many patients do you diagnose per day?
4	If virtual expert, does your facility use virtualization? If so, what type (i.e. Microsoft® or VMware®)?
5	If virtual expert, does the software used for medical diagnoses run in virtualization?
6	Do you know what virtualization is in technology?
7	Describe an example of virtualization in technology.
8	If physician, describe your patient diagnosis process.
9	Does virtualization have any relationship on the patient diagnosis process?
10	Explain why or why not virtualization is or is not related to the patient diagnosis process.
11	What are the benefits of virtualization?
12	How might the benefits of virtualization benefit the patient diagnosis process?

Round 2 Questions

Table 3

Round 2 Survey Questions

Number	Question
1	What is your occupational role?
2	What are the disadvantages of using virtualization?
3	How do you believe virtualization can impact the patient encounter process?

Round 3 Questions

Table 4

Round 3 Survey Questions

Number	Question
1	If you are pitching an opportunity to your CEO, what information would you present to remove the issues around having all "eggs in one basket" with virtualization?
2	Where do you believe virtualization is going over the next 5-10 years?

Data Analysis

- Demographics – 17% of the expert panel were physicians, 83% were software virtualization experts
- Round 1 – 11/12 participants completed Round 1 (92%)
- Round 2 – 8/11 participants completed Round 2 (73%)
- Round 3 – 6/11 participants completed Round 3 (55%)
- 100% of those participated affirmed they knew about software virtualization
- 100% of those participated affirmed they worked in a hospital, medical informatics environment
- 62.5% of the panel believe that software virtualization has a relationship on the patient diagnosis process

Results for Research Question/Themes

- **Theme 1: Increased performance with software virtualization**. According to Loveland, Dow, LeFevre, Beyer, and Chan (2008), virtualization is software that emulates hardware. Virtualization does not depend on hardware to operate and operating systems do not require certain hardware to function.
- **Theme 2: Increased data reliability with software virtualization**. Organizations are fearful of placing several servers on one platform because of the "all eggs in one basket" theory. This theory or fear describes the architecture of one hardware platform with several servers building on top of a single platform (Park & Sharma, 2009).
- **Theme 3: Reduction in cost with software virtualization**. According to Bernstein, McCreless, and Cote (2007), there are five constants of information technology that continue to drive success within medical facilities. Those five constants are "budget, supportive leadership, project management, implementation, and end user involvement" (p. 17). Despite these constants, medical facilities continue to slow down on integration and the effectiveness of information technology (Bernstein, McCreless, & Cote, 2007).

Results for Research Question/Themes(Cont'd)

- Themes that Emerged from the Results
  - Round 1 – Availability, System, and Virtual equally emerged out of the scatter analysis – 37.5% equally
  - Round 2 – Disadvantages noted – single node failure, complexity of implementation, incomplete processes and procedures results in inadequate virtual servers, requires specialized knowledge to support, and misunderstand or inadequate knowledge can cause interruption of services.
  - Round 3 – Reduces administration, ease of availability of servers, reduction in hardware costs, disaster recovery and business continuity (high availability) increases with virtualization, increased redundancy through multi-host environments, and high availability.

Implications of Study Results

- Virtualization provides reliable expedient data for physicians for a more informed and responsive diagnosis.
- Physicians can provide diagnoses more quickly.
- Medical facility leadership are more informed on the advantage's software virtualization can bring their organization.
- The benefits for virtualization include high availability, increased reliability, and increased expandability, while lowering the cost of ownership to the organization. The expert panel members affirm that medical facilities would benefit from virtualization; however, the complexity of administration is greater.

Conclusions: Significance of the Study

- Significance of the Study for Research
  - This research study is significant to the field of study for research of medical informatics in medical facilities to continue increasing patient care quality by increasing the delivery performance of patient diagnoses.
- Significance of the Study for Theory
  - This research study is significant for theory in that the study builds upon the theories of virtualization. This research study expands upon the existing theory of virtualization and the relationship of virtualization on patient diagnoses.
- Significance of the Study for Leadership
  - This research study is significant for leadership by providing research information to medical facility leadership and administration to assist in making informed decisions about delivering timely patient care with virtual technologies.
- Significance of the Study for Practice
  - This research study is significant for practice for medical informatic experts and leaders in medical facilities. The research study contains significant empirical evidence that software virtualization can enhance patience care and increase the reliability of data for physician diagnoses.

Conclusions: Recommendations for Future Research

- Results of the findings aligned with the literature review
- Financial and manufacturing fields may benefit from software virtualization – Big Data – better machine learning efficiency
- Artificial Intelligence (AI) may assist in the processing of large amounts of data. Additional research with AI should be performed on how AI has a relationship with software virtualization.
- Expert systems will continue to evolve; however, with a relationship with software virtualization, expert systems may be able to process increased amounts of data under extreme processing speeds.
- Study the relationship of software virtualization on data mining. Data mining manages large amounts of data and virtualization may assist in faster processing and increased capabilities for data mining experts. As more data requirement emerge, systems will need to consistently increase computing power and efficiency.

Reflection on the Research Process

- The research process was enlightening and a learning process.
- The research process successful outcome is dependent upon the dissertation committee and the researcher's understanding and experience.
- The research process was full of trial and error. Designing the surveys, changing the surveys depending upon the previous round with the potential of missing information.
- An effective library of reliable information was necessary to learn the research process and to substantiate the research.
- Requires a plan – University of Phoenix provided planned approaches; however, the process changed many times during the doctoral journey, which results in many changes in approach and strategy.

Plans for Disseminating Research Results

- Journals
- Conferences
- Lead into other opportunities with hospitals and organization to begin implementing software virtualization.
- Studies from this study further research in Big Data, Data Science, Expert Systems, and beyond.

Questions??

Thank You.

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