Innovative Technology for Disaster Area Communications: Adoption and Strategies Proposal

Smokie Lee

Southern New Hampshire University

Innovative Technology for Disaster Area Communications: Adoption and Strategies Proposal

## Technological Phase

Amateur packet radio in the use of wireless communication networks for the transmission of data began in the 1970s, built on earlier digital communication modes such as telegraphy (“Packet radio,” 2015). Initially developed by the military and academia to solve technical challenges presented by this new method of distance communication, early networks such as ALOHANet and PRNET were also used to research use cases and implementation strategies for future consumer adoption (“Amateur Radio History,” 2010, “Packet radio,” 2015). During the late 1980s, the technology s-curve approached the syndication stage and the number of packet radio operators nearly doubled that of the 1970s (“Amateur Radio History,” 2010, “History of amateur radio,” 2015), reaching over 500,000. Today, over 2 million amateur radio operators participate in mentoring, contests and summits in nearly every country (“Amateur radio,” 2015).

Many people might consider packet radio to be in its decay phase with declining utility (“Technology adoption lifecycle,” 2015) because of the recent rise of near-ubiquitous digital wireless networks, but I disagree. Several factors contribute to the maturity of a technology including a continuous incremental improvement cycle (“Mature technology,” 2015), ease of use (Tjendra, 2015), and an easily available supply that is inexpensive to scale (Tjendra, 2015). With incremental improvements over recent years, such as the use of PCs and sound cards to increase processing efficiency and expand transmission modes (“History of amateur radio,” 2015), the low threshold to entrance for beginners (“Amateur radio,” 2015; Dave, 2011) and the extensiveness of radio operations (“Amateur radio,” 2015, “History of amateur radio,” 2015), I believe that packet radio has been used extensively enough to eliminate most challenges to implementation (“Mature technology,” 2015) and reach its maturity phase (“Technology adoption lifecycle,” 2015).

## Adoption Timeline

Because UNICEF is a nonprofit (Tyson, n.d.), the ideal time to adopt an innovation is less formalized than it might be for a commercial business in a competitive market. The factors that contribute to the successful adoption of an emerging technology are greatly influenced by market forces which are not applicable to UNICEF, such as currency values and production costs (Hall & Khan, 2003). In addition, since natural disasters aren't always predictable there are no hard and fast timeframes for implementation to be followed, although some educated guesses can be made. The maturity of packet radio means there is little risk of failure of the base technology, so that is not a factor in the adoption timeline (“Mature technology,” 2015).

Leading organizations such as UNICEF are more likely to incorporate technology into their operations, and as a result are more technologically effective when they implement new technology than struggling organizations (Chung, 2014). Today's technology can scale further and do more on a tighter budget, and with the rise in software-based technology such as cloud computing and database tools, software spending currently surpasses hardware in the nonprofit sector (Chung, 2014). Finally, the hardware cost to implementing packet radio is relatively low compared to other similar technologies (Dave, 2011), and training is readily available (“Amateur radio,” 2015). For these reasons, adopting a hardware-based technology such as packet radio could be a cost-effective move for UNICEF.

## Variables

As packet radio is a mature technology, most challenges to training and implementation have been overcome (“Mature technology,” 2015) and small changes happen over time (Schilling, 2012). In general, the biggest variables that affect the timing and implementation of new technologies regardless of phase are cost of training, cost of implementation, and speed of organization adoption (“10 Technology Adoption And Success Stats From Nonprofits,” 2013; Schilling, 2012; Tjendra, 2015).

Training is vital to the successful implementation of any technology (Exponent Partners, 2014) and the amount an organization invests in training is directly correlated to the speed of adoption (“10 Technology Adoption And Success Stats From Nonprofits,” 2013). Packet radio has many inexpensive or free resources available to help train users (“Amateur radio,” 2015, “Field Day (amateur radio) - Wikipedia, the free encyclopedia,” n.d.) and an effective mentoring system in the United States (Chief of Wireless Telecommunications Bureau & Chief of Public Safety and Homeland Security, 2012; “Mentor-Program,” n.d.) so the cost to invest in training should be low. In addition, there is a large subset of amateur radio operators who focus on emergency communications in an international context (“Amateur radio emergency communications,” 2015), providing an extensive support system.

This low barrier to entrance and the mature nature of packet radio also contributes to relatively low hardware implementation costs (Dave, 2011), although radio communication is only as effective as the hardware used (Chief of Wireless Telecommunications Bureau & Chief of Public Safety and Homeland Security, 2012) so quality materials should still be utilized. In addition, research suggests that mobile communication stations are much more effective in times of emergency particularly during a natural disaster when basic infrastructure is likely compromised (Chief of Wireless Telecommunications Bureau & Chief of Public Safety and Homeland Security, 2012; Fragkiadakis, Askoxylakis, Tragos, & Verikoukis, 2011). Because of this, the current focus of amateur radio enthusiasts on self-contained mobile packet radio stations (“Amateur radio emergency communications,” 2015, “Packet radio,” 2015) will be vital to the successful implementation and usage of any disaster communication system. The biggest implementation cost will be adherence to various bureaucratic regulations on installation and usage which vary greatly between administrative districts (Chief of Wireless Telecommunications Bureau & Chief of Public Safety and Homeland Security, 2012).

The speed with which a technology is adopted in an organization is critical to the long-term success of that technology (Exponent Partners, 2014), although simply diffusing a technology into an organization for any reason typically increases the chances of adoption (“Diffusion of innovations,” 2015). Choosing innovations that align with the organization's current infrastructure and culture require fewer adaptations and therefore result in faster adoption (“Diffusion of innovations,” 2015). Packet radio has a long history of assistance during emergency communications, including natural disasters (“Amateur radio emergency communications,” 2015; Chief of Wireless Telecommunications Bureau & Chief of Public Safety and Homeland Security, 2012) and would be a good fit for UNICEF.

Based on the research presented, I recommend that UNICEF adopt a mobile packet radio strategy to handle emergency communication in areas affected by natural disasters. Mobile packet radio is a stable, mature technology with a proven track record in emergency communications. The relatively low cost of implementation and training is an attractive incentive for nonprofits such as UNICEF who typically have variable annual spending budgets, and as technology improves scalability will be cheaper making packet radio even more effective. While there are some barriers to implementation across governmental districts, experts agree that more international involvement in packet radio will improve the process for everyone.

References

10 Technology Adoption And Success Stats From Nonprofits. (2013, October 4). Retrieved November 9, 2015, from http://blog.techimpact.org/10-nonprofit-tech-stats-on-digital-planning/

Amateur radio. (2015, October 18). In *Wikipedia, the free encyclopedia*. Retrieved from https://en.wikipedia.org/w/index.php?title=Amateur\_radio&oldid=686252249

Amateur radio emergency communications. (2015, August 22). In *Wikipedia, the free encyclopedia*. Retrieved from https://en.wikipedia.org/w/index.php?title=Amateur\_radio\_emergency\_communications&oldid=677244438

Amateur Radio History. (2010, July 8). Retrieved November 9, 2015, from http://www.ac6v.com/history.htm

Chief of Wireless Telecommunications Bureau, & Chief of Public Safety and Homeland Security. Report to Congress on Amateur Radio in Emergencies and Disaster Relief (2012). Retrieved from https://www.fcc.gov/document/report-congress-amateur-radio-emergencies-and-disaster-relief

Chung, E. (2014, July 28). [NEW DATA] Technology Adoption is Key to Becoming a Leading Organization. Retrieved from http://www.classy.org/blog/new-data-technology-adoption-is-key-to-becoming-a-leading-organization/

Dave. (2011, March 17). Ham Radio: How much does it cost? Retrieved from http://dcasler.com/2011/03/17/ham-radio-how-much-does-it-cost/

Diffusion of innovations. (2015, November 8). In *Wikipedia, the free encyclopedia*. Retrieved from https://en.wikipedia.org/w/index.php?title=Diffusion\_of\_innovations&oldid=689660707

Exponent Partners. (2014). *Nonprofit Technology Adoption: Why It Matters and How to Be Successful*. Retrieved from http://www.exponentpartners.com/node/549/done?sid=2786

Field Day (amateur radio) - Wikipedia, the free encyclopedia. (n.d.). Retrieved October 19, 2015, from https://en.wikipedia.org/wiki/Field\_Day\_(amateur\_radio)

Fragkiadakis, A. G., Askoxylakis, I. G., Tragos, E. Z., & Verikoukis, C. V. (2011). Ubiquitous robust communications for emergency response using multi-operator heterogeneous networks. *EURASIP Journal on Wireless Communications and Networking*, *2011*(1), 13. http://doi.org/10.1186/1687-1499-2011-13

Hall, B. H., & Khan, B. (2003). *Adoption of new technology*. National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w9730

History of amateur radio. (2015, August 19). In *Wikipedia, the free encyclopedia*. Retrieved from https://en.wikipedia.org/w/index.php?title=History\_of\_amateur\_radio&oldid=676762049

Mature technology. (2015, November 5). In *Wikipedia, the free encyclopedia*. Retrieved from https://en.wikipedia.org/w/index.php?title=Mature\_technology&oldid=689169273

Mentor-Program. (n.d.). Retrieved November 10, 2015, from http://www.arrl.org/mentor-program

Packet radio. (2015, September 20). In *Wikipedia, the free encyclopedia*. Retrieved from https://en.wikipedia.org/w/index.php?title=Packet\_radio&oldid=681879296

Schilling, M. A. (2012). *Strategic Management of Technological Innovation* (4th edition). New York, NY: McGraw-Hill Education.

Technology adoption lifecycle. (2015, August 16). In *Wikipedia, the free encyclopedia*. Retrieved from https://en.wikipedia.org/w/index.php?title=Technology\_adoption\_lifecycle&oldid=676354176

Tjendra, J. (2015, September 3). 7 Conditions to Adopt Emerging Technology. Retrieved from http://www.sketchin.ch/en/blog/life/7-conditions-adopt-emerging-technology.html

Tyson, M. (n.d.). Is UNICEF a non profit organization. Retrieved November 10, 2015, from http://www.answers.com/Q/Is\_UNICEF\_a\_non\_profit\_organization