An Interdisciplinary Strategy for Fostering Innovation with Mobile Devices

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This article briefly describes an interdisciplinary strategy for pursuing innovation with mobile devices. The core feature of this approach is an organizational structure that incorporate researchers from different sectors of specialization pertaining to digital media: production technologies, digital media distribution technologies, digital media content production, commodification of digital media, and the social function of digital media. The general goals of this strategy are the development of innovative digital media technologies and methods of commodification for mobile devices that will produce technological, economic, and social benefits. The primary purpose of the interdisciplinary team structure is to create a social environment that will foster innovation by overpowering dogmatism.

1. Introduction

The commodification of the personal computer and the Internet has created a restructuring of the mass media and communication industries over the past 20 years, accompanied by significant changes in how the public participates in electronic communication systems. Mobile devices have increased the public's participation within these systems by combining the functionality of a networked personal computer with the telephone, telegraph, television, video camera, photo camera, and music player. Mobile devices are rapidly evolving into the dominant instrument of communication throughout the world, providing users with ubiquitous access to a multitude of media services in addition to telephony and text messaging. The International Telecommunication Union, a specialized agency of the United Nations, recently projected that the number of global mobile-cellular superscriptions will outnumber the world's population by 2014. Although a mobile device is essentially a hybridization of older technologies, significant opportunities now exist in developing new applications that exploit the multi-functional features of mobile devices.

This document will outline an interdisciplinary research strategy for pursuing innovation with mobile devices by describing an organizational structure that is intended to foster innovation on specific topics of research. The term 'digital media' within this document will refer to digital media content and the technologies that enable production and distribution of this content. 'Media content' will refer to the information--including digital imagery, video, music, and text--that are being communicated to users through digital media technologies. 'Media production technologies' will refer to any digital hardware, software, or network technologies that are involved in the creation of media content. 'Media content creation' will refer to the production of media content using digital media production technologies. 'Digital media distribution technologies' will refer to any digital hardware, software, or network technologies that are involved in the distribution of digital media services or content. Examples of distribution technologies include smartphones, Web browsers, the Internet, and cellular networks.

The core feature of this research strategy is an organizational structure that will incorporate researchers from different specializations pertaining to digital media. Because digital media exist within a complex techno-socio-economic system, incorporating the interrelationships between these aspects into a research strategy should increase the potential for innovation. An example of an interdisciplinary approach to innovation with digital media is the targeted advertising that is used within YouTube. Google, the owner of YouTube, has combined its innovative technology with a strategy for commodifying a digital media service that is provided to its users without charge. Google is credited with numerous technical innovations in digital media--including its search engine, Android, and Google Maps--but 95% percent of its revenue for 2012 was obtained through its contextual advertising service. Facebook has also demonstrated innovativeness with the socio-economic aspects of digital media by using personal demographics to commodify a social media service that is given for free to an unprecedented number of users. The popularity of social media demonstrates that digital media can obtain significant social and economic value according to the social experiences they provide to users. It is also relevant to acknowledge that the embedding of advertising within digital media has become a popular strategy of commodification, especially for digital services that are distributed using the Internet or mobile devices.

The research strategy being proposed acknowledges that innovation with digital media is an interdisciplinary pursuit involving digital technology, media content,

commodification, and the social function of media. This strategy will incorporate disciplines related to these components into an organizational structure that is meant to foster interdisciplinary innovation with digital media. The primary goals of the strategy are to develop innovative digital media technologies, media content, and commodification strategies for mobile devices that will produce technological, economic, and social benefits.

2. Structure of Individual Research Teams

An individual research team will be comprised of researchers who specialize in at least one of the following sectors of specialization.

- Media production technologies
- Media content production
- Media distribution technologies
- Economic and social function of media

A research team will be assigned to a specific topic of investigation, but each team will be comprised of at least four researchers, and each member will be responsible for one of the sectors of specialization. Team members within the 'media production technologies' sector will specialize in developing hardware, software, or services that are involved in the production of digital media content, such as video editing software, video cameras, or 3D printers. Team members within the 'media content production' sector will specialize in the creation of digital media content, such as the production of photographs, videos, or music. Team members within the 'media distribution technologies' sector will specialize in developing hardware, software, or services that enable the distribution of digital media content through mobile devices. Team members within the 'economic and social function of media' sector will specialize in developing strategies for commodifying digital media technologies or content for mobile devices and, also, to identify the social consequences that result from these strategies.

The most import aspect of this structure is that team members in each sector will share the same goal, which is to create innovative digital media technologies and content for mobile devices that will produce beneficial social and economic consequences.

Although individual researchers will be assigned to a specific sector of responsibility, each team member will be aware of the activities of every member within their team. This will be accomplished through a social environment that promotes and requires the cross-fertilization of ideas. Team members will work together in pursuit of innovation within any sector, not only in their sector of specialization. Examining a problem from a single or dogmatic perspective may be the greatest hindrance to innovation within any discipline. The primary purpose of this team structure is to create an environment that will foster innovation by overpowering any hindrances to creative solutions that are caused by dogmatism. Because the criteria for evaluating this research are interdisciplinary, solutions to research topics can only be pursued through an interdisciplinary approach. For example, the creation of a new smartphone within this research strategy will be considered successful only if it incorporates innovative digital media technologies and media content that produce beneficial social and economic consequences.

The team members within each sector can be undergraduate students, graduate students, postdoctoral researchers, or faculty members. Potential team members for the 'media production technologies' and 'media distribution technologies' sectors could come from the following programs of study: Computer Science, Electrical Engineering, Computer Engineering, or Physics. Potential team members for the 'media content production sector' could come from the following programs of study: Film/Video Production, Graphic Design, Creative Writing, Theatre, Interdisciplinary Studies, or Music. Potential team members for the 'economic and social functions' sector could come from the following programs of study: Economics, Business Administration, Philosophy, Psychology, or Sociology.

3. Sample Research Topics

The specific topics to be pursued by individual research teams will contain two levels of inquiry. The first level will contain open-ended questions that are meant to provoke the research teams to consider the interrelationships between the four sectors. The second level of inquiry will contain clearly defined research topics.

The questions within the first level of inquiry will include:

- Which media technologies can be used to create media content for mobile devices?
- Which forms of content can be created for mobile devices?

• Which media distribution technologies can be used to distribute content on mobile devices?

• Which social and economic consequences can be produced through mobile devices?

• Which digital media technologies can produce desirable social and economic consequences?

• Which digital media content can produce desirable social and economic consequences?

The second level of inquiry will consist of specific research topics that involve innovation with mobile devices. The following are sample research topics pertaining to mobile devices.

3-1. Appropriate human interfaces for mobile devices

Portability is an important feature of mobile devices, but this feature restricts the use of full-size input devices--such as physical keyboards--that are more appropriate for certain tasks. This research will develop innovative human interface designs for mobile devices that provide a more appropriate correspondence with the physical characteristics of the human body.

3-2. Using augmented reality on mobile devices in foreign environments

The increase in globalization over the past few years has produced an unprecedented amount of interactions between people of different languages and cultures, and this is likely to increase in the future. This research will create augmented reality technologies for mobile devices that enable users to be orientated within foreign environments.

3-3. Multi-user mobile device environments

Individual users typically operate mobile devices. This research will develop hardware and software technologies that enable multiple users to share simultaneously the functionality of a single mobile device.

3-4. Merging the technology of mobile devices with the personal computer and other electronic devices

Personal computers contain some important characteristics that are absent in most mobile devices, such as the ability to connect with large display screens, large capacity storage devices, full-size keyboards, mouse, printers, scanners, and other peripherals. This research topic will pursue innovative designs that merge mobile devices with desirable features of personal computers and other electronic devices, including 3D printers.

3-5. Using pictorial and time based media within formal communication

Significant progress has been made in the production of photographic imagery, moving imagery, computer generated imagery and sound recording over the past 100 years, but formal communication within business, academic, legal, and government institutions still rely primarily on text-based media. This research topic will develop production and distribution technologies for pictorial and time based media that are appropriate for formal communication on mobile devices.

3-6. Using pictorial digital media within global mass media

Although mobile devices and the Internet are providing important functionality that is contributing to globalization, international collaborations of any nature are limited if the partners do not understand each other's language. This research will develop pictorial based communication technologies and content for mobile devices that are not based on a specific human language and, therefore, more appropriate for global audiences.

3-7. New strategies of commodification for mobile devices

The common methods of commodification for mobile devices include the selling of mobile device hardware, selling of connectivity services, rental of mobile device hardware, selling of apps or games, and selling of online services. This research topic will develop innovative commodification strategies for mobile devices that involve new forms of digital media production and distribution technologies.

Any technological innovations that are developed by the research groups will be evaluated according to their practical use and potential to produce desirable economic and social consequences. Examples of digital media and their involvement with undesirable social consequences are the deaths of Rehtaeh Parsons and Amanda Todd, two Canadian teens who committed suicide after being humiliated through online media. An obvious question is

whether these types of tragic consequences should be of concern to developers of digital media. The perspective incorporated into this research strategy is that any form of media has the ability to enhance human communication and direct social behavior. If digital media technology has the potential to be used in a socially damaging manner, the technology should incorporate safeguards to ensure that no one can be harmed.

4. Conclusion

Using the proposed strategy, a specific research topic is pursued by a team comprised of at least four researchers, each specializing in one of the four sectors: media production technologies, media content production, media distribution technologies, or the economic and social function of media. The primary reason for this structure is to overcome dogmatic perspectives that may exist within a particular sector. Because the general goals of the research teams are to identify solutions that fulfill criteria in all four sectors, dogmatic solutions should be averted because dogmatism in a particular sector may be more obvious to researchers in the other sectors. An historic example of overcoming dogmatism in media technology is the development of the boom microphone in 1929 by film director Dorothy Arzner. The first sound films apparently used microphones that were permanently fixed at specific locations within a film set because the sound engineers insisted they could not be moved while recording. The problem resulting from this requirement was poor recordings of the actors' voices when they walked away from a microphone. Arzner's solution to this problem was to attach a microphone onto a fishing pole, enabling the microphone to be moved and held above the actors' heads as they walked around a film set. Affixing a microphone onto a pole was eventually known as a 'boom microphone,' a solution that was created by a film director rather than the sound engineers whose dogmatic approach insisted the solution could not work.

This goal of this article has been to outline an interdisciplinary research strategy for pursuing innovation with mobile devices. The primary purpose of the interdisciplinary team structure is to create a social environment that will foster innovation by overpowering dogmatism.

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