

# Introduction: The Digital Evolution of Television

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Television has been evolving since the first black and white TV transmissions. Spurred by relentless technological developments and ultimately embraced by manufacturers, content producers and the business community, television today includes an ever broadening array of content offerings.

A little over 10 years ago, when I mounted my first Digital TV<sup>1</sup> conference at CITI,<sup>2</sup> we had difficulty specifying exactly what digital television was. What after all was digital television in 1996? There was no digital TV broadcast or digital content to speak of. The FCC<sup>3</sup> was holding their public hearings before making their SDTV<sup>4</sup> and HDTV<sup>5</sup> rulings and almost no one had broadband. In the United States broadcast television was- and until February 2009- remained primarily analog. Today vast majority of US consumers receive television programming via cable and satellite set top boxes; so most television viewers can already receive digital SD and HD programming.

This situation was quite different 10 years ago. At that time, Dr. Einav's research turned up a mere handful of companies that were producing videos for the Internet. Dr. Carey examined the position the computer was assuming in the television household and the idea of lean forward and lean back for viewing was articulated. Computer animation and special effects were becoming common in TV advertising and had been used for background TV News graphics for more than a decade. The BBC had experimented with a variety of interactive television program formats as well as the online world called The Mirror.<sup>6</sup> While some of these were fascinating, all proved too expensive to produce. In general; just because one could do something innovative with the new technology did not mean that one was going to be able to turn it into sustainable TV programming. None the less, digital technology was already becoming a disruptive change agent in the evolution of television.

Digitization of audio and video content, which began years before the FCC started its foray into specifying a DTV standard, has now made it practical for telephony to go wireless and television wired. Digital technology, increased network capacity and speed, along with the development of the World Wide Web. New network communications capabilities are responsible for changes occurring throughout the television industry.

With the widespread adoption of cable and the satellite, television programming was no longer the sole purview of the television broadcast industry. Because many households were outside the range of analog broadcast television and since many early cable operators sold television sets, the earliest cable operators started capturing networks' broadcast signals on very large antennas and providing this signal over cable to their customers' homes. Early on, Satellite up and down links, which originally provided broadcast content to cable head ends, went digital. Later satellite companies figured out how to beam broadcast content directly to receptor dishes set up in yards or on houses. In the early days of analog television NBC, ABC and CBS created programs which were often funded by consumer products companies. By converting film to analog video, movies became available for television viewing. Today there are both advertising supported networks and subscription supported cable companies that produce their own programming and license quality content for television distribution.

Traditional TV networks now see themselves as content creators and distributors rather than broadcast companies. They understand it is imperative to provide their content to viewers on a variety of platforms. From their perspective conversion to digital, SDTV and HDTV, is expensive with no immediate revenue increases to offset substantial cost to upgrade their technology. Local TV stations and affiliates also see digital conversion as necessary for survival.

While the computer industry has been talking about the convergence of computers and television for more than a dozen years; the time is finally here. Television content, now digital, is available for viewing on a multitude of devices including a variety of large and small television screens and monitors, via cable or fiber and wireless to laptop computers and mobile services. Not only is this video content being produced digitally with cheaper and better equipment (Moore's Law) but we can now create and upload content for distribution on the web or send it to mobile phones of people in their networks. To add to competition, telephone companies now provide digital television programming over their fiber optic networks and new players, via IPTV, bring digital media content from around the world to computer screens and TVs.

Digital innovation is not limited to broadcast, cable, satellite, telephone and computer industries. Gaming industry and electronics manufacturers all have a role in it. Low barriers to entry enable new entrants to create and distribute content. New interactive devices hook up to televisions and computer monitors as well as mobile devices. All compete for audience time.

Ten years ago no one was talking about user generated content. There was no You Tube and search had not taken off. Today we talk about creating and monetizing content on the internet, new advertising and subscription models along with new audience measurement tools for tracking consumer behavior. When it comes to content, today's mantra is "what, when, where you want it." New mass entertainment paradigms emerge on the horizon: including virtual worlds, holography, 3D TV and greater interactivity.

This book takes a broad look at the digital TV ecosystem. It examines evolving business models and outlines technologies that drive and support this digital

evolution. New content types, consumer behavior and tracking mechanisms are being explored in the effort to build and maintain profitable digital television business. Monetizing content and services, while maintaining copyright protections, is a major challenge. Spectrum allocation and the use of ‘White Space’ will have a great impact on services of the future. Digital Rights Management (DRM) and preserving media content as analog media disintegrates are also important issues.

In the Foreword A. Michael Noll starts us off with a brief history of “Digital Television” from NBC’s first analog efforts in 1939 through the FCC deliberations that have led to the February 2009 digital change over. He grounds us in what digital technology is and gives us a brief overview of how digital television has evolved in the US.

This book is divided into four parts. The first part is The Changing Television Business. In this section’s first chapter, “TV or Not TV: Where Video is Going,” Eli Noam provides an overview of the history of digital television in which he identifies four generations of television picture quality. In “TV on the Internet: The New Screen for Video,” Jon Gibs provides a framework for understanding Internet video audiences and how Nielsen seeks to identify and measure new consumer behaviors. The in depth paper, “The End of Advertising As We Know It,<sup>7</sup>” from the IBM team of Saul J. Berman, Bill Battino, Louisa Shipnuck and Andreas Neus, dissects changes taking place in media advertising, providing insights and recommendations for the future. Finally, in “From the Marketers’ Perspective: the Interactive Media Situation in Japan,” we are treated by Satoshi Kono, to an insider’s view into how a large advertising agency in Japan is retooling its approach to better align its strategy with current audience trends.

In the second part, Technology: Content Creation and Distribution, Kas Kalba provides both anecdotal and analytic information regarding content, devices and audience for mobile TV, in “Adopting Mobile TV: Technologies Seeking Consumers Seeking Content and Cool.” This chapter is followed by “Television Via Satellite,” which reviews the history, including technical underpinnings, of satellite television, by Stephen Dulac and John Godwin. In this section’s final chapter, “Creation and Distribution of 4K Content,” Laurin Herr looks into the future of high end media content over networks. He shows us the next generation of digital 4K movies and gives us a peek into how high end research laboratories, world wide, are already experimenting with huge media files over ultra fast fiber optic networks.

Part three, Content, first approaches the issue of digital content from the perspective of what is happening to traditional television. Gali Einav and John Carey pose the question: “Is TV Dead?” and then, by examining changing audience behavior proceed to look into this question from the point of view of content distributors and viewers. In this section’s second chapter, Jeffrey Hart examines “Video on the Internet: The Content Question.” He asks whether internet video content types will differ significantly from traditional TV content, who will produce it, and who will be the audience. Focusing on new internet companies, Liz Gannes explains how things have radically altered in the last 3 years and why “YouTube Changes Everything: The Online Video Revolution.” Then, while all thoughts are about the future of television, video content, and new companies, Thomas Coughlin reminds

us that our video legacy is in danger of disappearing. Many efforts are underway to preserve analog video content, and in “Digital Archiving in the Entertainment and Professional Media Market,” Coughlin provides a roadmap for this digital conservation.

In the fourth and final part, Legal and Regulatory Issues, three authors address large societal issues facing the US. Ellen Goodman brings her expertise on “Spectrum Policy and the Public Interest,” to bear on who will take decisions and how these will effect us all. She brings us up to date by providing a succinct overview of how spectrum has been allocated and regulated in the past so that we can appreciate how today’s decisions will determine future outcomes. Then, in “Cognitive Radios in Television White Spaces,” Monisha Ghosh provides the technical background needed to understand the importance of what has come to be called “White Space” and how technological innovation can enable better use of this spectrum. Finally, in “Digital Rights and Digital Television,” Bill Rosenblatt takes on the topic of Digital Rights Management (DRM). With the adoption of digital technology and the Work Wide Web, it has become more difficult for content providers to manage copyrights and distribution to control rights usages. Digital rights management seeks to address this situation.

A couple of the chapters in this book are adaptations or reprints of previously published papers. Many of the chapters began as papers presented at the Digital Television: Beyond HD & DTV conference that I organized in November 2007 at CITI. Several of the chapters were written specifically for this book. While it is not possible to cover every topic on this subject in one volume, I hope this selection will be useful. For additional chapters on this topic please see my earlier publications: *The Economics, Technology and Content of Digital TV* and *Internet TV*.

## Notes

1. Digital Television.
2. Columbia Institute for Tele-Information, Columbia University Business School.
3. Federal Communications Commission.
4. Standard Definition Digital Television.
5. High Definition Digital Television.
6. Graham Walker and Rodger Lea, The Mirror: reflections on inhabited TV, International Conference on Computer Graphics and Interactive Techniques archive, ACM SIGGRAPH 97 Visual Proceedings: The art and interdisciplinary programs of SIGGRAPH '97, <http://portal.acm.org/citation.cfm?doid=259081.259284>
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