

allows readers to quickly scan and understand a more than 15-year time frame within the course of a few minutes.

1.5.1 Computer Beginnings

The earliest roots of DVRs are in computers, plain and simple.

Indeed, for several years now, many knowledgeable technologists have thought of DVRs as just another form of a PC. In more recent times, especially as the technical sophistication of DVRs and DVR-like devices increases, it is hard to think of a DVR as anything but a highly sophisticated computer (no matter who is doing the judging). One of Sony's PlayStation 3s, with a built-in DVR, is another perfect example of a device that is not that dissimilar from the basic PC.

The listing for DVR on *Wikipedia* begins with a history section and a brief discussion of DVR-related development in the early 1960s. This includes discussion of television network inventions tied to commercial recording of video and audio programming for rewinding and freeze frames of sports programming in the mid-1960s. It was not until 20 years later, in 1985, that home-based designs were developed and patented by Honeywell employee David Rafner. This device included a hard drive that made ad-skipping and so-called time-shifting possible and was described in patent materials as permitting applications such as "... streaming compression, editing, captioning, multichannel security monitoring, military sensor platforms, and remotely piloted vehicles."

The first DVR-related patent, known in the DVR industry as the Goldwasser Patent [after inventors Eric Goldwasser (father) and Romi Goldwasser (daughter), of Yorktown Heights, NY], was applied for in 1991 and was issued by the U.S. Patent and Trademark Office in late August 1993. In Q1 2005, TiVo's top-level executives, lawyers, and engineers, in the company's 8-K document filed with the U.S. government's Securities and Exchange Commission, described the Goldwasser patent as covering "... devices which permit the simultaneous recording and playback of video material with a variable time delay between recording and playback of a given program segment." This definition would later be shortened to the industry terms "time-shifting" or "time warp." With this patent in place, a great variety of intellectual property began to grow up and around the soon-to-be-developed DVR industry, spread around many different companies, which was to make for some very interesting and very complex business, technical, and legal arrangements during the ensuing years.

1.5.2 TiVo and ReplayTV

Following these early foundational inventions, and dependent on who is asked, the earliest ideas for the development of a business built around sales of DVR devices and services were either (or both) that of Anthony Woods,

who built his DVR company, ReplayTV, during the 1997–2001 time frame and/or of Michael Ramsay and Jim Barton, who built their TiVo business, in the 1997-to-present time frame. Both sets of players would combine their visions and these early inventions with ever-cheaper hard drives and new chip designs that permitted real-time encoding of analog signals into digital signals. In the late 1990s, these were the core developments that jump-started the DVR revolution.

Other DVR roots are found in the process of the telecom industry planning for the development of a telecom infrastructure within the American home of the future. For example, TiVo’s earliest ramblings were based on the idea of a large, server-like device in the garage or attic of a typical home. This “super box” device would then collect signals from many different sources (including fax, TV, telephone, radio, and others) and display those signals in many rooms and via various devices around the home. The idea of a specific set-top box that would be a part of the grander in-home system was the genesis for TiVo’s focus on what it claims was the first commercial deployment of a DVR in late March 1999. TiVo’s deployment of the DVR was preceded by WebTV’s January 1999 Consumer Electronics Show (CES) announcement with partner EchoStar of its new set-top box, which combined DISH Network programming with DVR capability and Internet access from the home TV set. Following TiVo’s March 31, 1999, unveiling of its first set-top standalone box, within a few days or at most weeks (depending on who is speaking and what definitions are used), ReplayTV launched its first set-top DVR in April 1999. Indeed then, the DVR race was on.

Still other DVR roots include the transition from analog to a much more efficient digital carriage of video and audio signals. This evolution was brought to fruition by DirecTV during the launch of its satellite TV system in the early 1990s. The “Technology” section in this chapter further details this analog-to-digital



Figure 1.5 The first-generation logos for the DVR industry pioneers, TiVo (left) and ReplayTV (right). (Copyright 2008. Property of TiVo and ReplayTV, respectively. All rights reserved. Used with permission.)

transitional development. This transition was pivotal for all DVR makers, because the best of DVR technology works best in an all-digital environment.

TiVo

For TiVo itself, it did many things quite well as it battled rival ReplayTV for first—or at least early—dominance of this unique new sector, called DVRs. A list of those well-managed items is actually quite long, as TiVo’s continued presence in the DVR world today signifies. They include the following:

1. Early and ample financing
2. In-the-home upgradeable set-top boxes and software
3. Attractive form factors for both set-top boxes and remote controls
4. Attractive and innovative user interfaces
5. Design of the system to allow subsequent software downloads whenever upgrades were necessary
6. Simple-to-use products and services, without surprises, and
7. Establishing a subscription service fee to go along with the up-front hardware fee.

Indeed, three dominant themes guided the start-up team in the late 1990s, as it rushed to be the first real DVR manufacturer to unveil a consumer-ready DVR. These themes were that the TiVo product and service be reliable, simple, and generally attractive (all as they relate to the consumer). Early agreements were entered into with the large CE manufacturers, Philips and Sony, to build the new TiVo DVR set-top boxes and remote control devices. Bob Poniatowski, the # 4 TiVo employee (just after founders Jim Barton and Michael Ramsay), currently TiVo’s director of DVR services, notes, “Like every new start-up, you have to reach out and collect advice and information, and you have to listen to others. We did that.”

Yet, not unlike nearly every other company facing such challenges, there were a handful of things that TiVo did not do well (or at least such an argument can be made). In fact, *The Wall Street Journal’s*¹¹ Walter Moss, in a 1999 article comparing the first-generation set-top DVRs offered by the Silicon Valley rivals, TiVo and ReplayTV, gave a superior review to ReplayTV, due, in part, to what he described as “glitches” in the TiVo device. Table 1.5 compares TiVo’s first generation of set-top DVRs to those of rival ReplayTV.

Other early TiVo challenges included struggles with trying to inform and educate consumers about both the concept of DVRs and the ease with which a DVR could be used. Additionally, TiVo (and its allies) chose to subsidize the cost of the TiVo hardware, such that consumers could purchase the set-top boxes and remote control devices for less than it took to manufacture and distribute them. Many critics today believe subsidies like this are unnatural ways to encourage markets to deploy new creations. Also, at some points, TiVo

¹¹ See *The Wall Street Journal*, April 8, 1999, page B-1, written by Walter Mossberg, available at <http://www.wsj.com>.

was roundly criticized for developing its hardware based upon a new “open” platform from a Silicon Valley company called Linux, rather than to go with the more accepted but proprietary computer program offered by Linux rival Microsoft. Interestingly, many today believe that this early decision to favor Linux turned out to be one of TiVo’s better early choices in the design of its system. Furthermore, although TiVo did create a very lucrative association in the late 1990s with the then-dominant satellite TV provider, DirecTV, TiVo

Table 1.5 A Comparison of DVR Maker TiVo to DVR Maker ReplayTV, Focused on the First Generation of Set-Top Boxes and Services they Both Unveiled, Late in the First Half of 1999

TiVo vs. ReplayTV: Comparing the Businesses			
Comparative Point	TiVo	ReplayTV	Description/Why it Mattered
1st model launched	Mar-99	Apr-99	First to market is important for internal and later sales goals.
1st model available from multichannel operator	2000	Never	Base of large multichannel operators is important for long term survival.
Later models available from multichannel operator	Yes	No	Base of large multichannel operators is important for long term survival.
Special features	User interface (UI)	Quickskip and instant replay	Attracts subscribers, creates word of mouth.
Financing	Went public earlier, was more aggressive, for example, got AOL money, which was very important at the time.	More conservative about seeking financing	Up-front financing may have made the difference between surviving and not surviving.
Business model	Monthly fees	CE, no monthly fees	Price and perceived price can be make or break important.
Demographic sought	More of a mass market.	Higher end, early adopter stage, more connectors on back of the box	TiVo sought the common man, ReplayTV sought the technophile and early adopter.

(Continued)