

implications of building viewer or consumer profiles through data mining, within the context of VPM and in light of the reaction it already has prompted [2]. Our intent is not to answer all of the questions here, but rather to outline the issues and to propose a framework within which both academics and practitioners can further explore the issue of privacy. Our analysis centers around three essential issues involving technology and privacy: stakeholder perceptions regarding the fairness of the *process* used by a company for collecting and distributing personal information, including the level of choice provided to the individual regarding whether and to what extent they will provide access to their personal characteristics; stakeholder perceptions regarding the fairness of the *outcomes* of those processes, including the cost-benefit trade-offs inherent in the exchange of personal information for some real or perceived gain; and stakeholder perceptions regarding the *accuracy of inferred personal information*—particularly the differential perceptions of consumers and advertisers regarding

includes less salient technologies such as spyware, which is conceptually similar to the PVR in its PC-based monitoring and reporting capabilities [10]. As we note later, the main difference between the PVR and spyware is that while PVR companies attempt to communicate their data collection and usage procedures in clearly worded privacy policies, spyware often skirts ethical constraints by installing itself on a user's PC with little or no advance warning.

The other major privacy issue in turn involves treatment of the information after it is collected. TiVo, a leading PVR manufacturer and service provider, is selling the viewing behaviors of its customers to Nielsen Media Research, which in turn will use that information to enhance its own collection and analysis of television viewing [6]. The type of information collected can be exceptionally detailed. TiVo was able to determine precisely who watched which commercials during the Super Bowl, the amount of time viewers spent watching commercials, and the number of times a particular viewer might have paused, rewound, and rewatched a particular segment of the game or commercial. Not surprisingly, this simple ability to collect viewing data, combined with the increasing number of PVRs in homes, has raised concerns from privacy advocates [1, 3].

The monitoring-profiling capabilities of the PVR have a direct impact on each of the stakeholders involved in the creation, distribution, and consumption of television advertising. In the domain of PVR-based targeted advertising, the direct stakeholders include television viewers, PVR providers, service providers (for example, cable and satellite companies), content providers (for example, broadcast and cable networks), and advertisers. The impact on these stakeholders can be explored, in turn, in the context of the three privacy issues raised earlier: procedures used to collect and distribute information, the perceived outcomes of those procedures, and the accuracy of inferred personal information. We discuss each of these issues, in part using TiVo as an example when appropriate, and then summarize the issues within a proposed framework for further investigation.

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the impact of accurate versus inaccurate profiles. The analytic capability of VPM adds a layer of complexity to these issues by increasing the ability of a company to gather personal (viewing) information in an exceptionally unobtrusive manner, and then to use that information to infer individual demographic characteristics.

NEW THREATS TO PRIVACY THROUGH VIEWER PROFILING

The new threat to privacy begins with the basic technology of the Personal Video Recorder (PVR), which is able to directly monitor and report the viewing choices of individuals. To some extent, this is a reflection of the increased monitoring of individual behavior through a variety of data-gathering means, including point-of-sale devices, online ordering forms, and product registration requests. It also