Development of Personal Information Privacy Concerns Evaluation

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INTRODUCTION

Personal data collection and utilization are increasingly taking place today as a part of the application of personal data intensive systems and services. Both individuals and data collecting organizations benefit from this. Personal data are collected and processed by private companies and public organizations for various purposes, for example, for delivery of more personalized services and for marketing. Despite its usefulness, extensive personal data collection raises privacy concerns among data subjects, and these concerns are also discussed in public very often. For example, vehicle GPS tracking-based kilometer taxation has been recently under debate. This debate has shown that vehicle tracking data can also be used for purposes other than taxation, and that it can be combined with other data, for example, for producing traffic information services by private or public organizations. Information privacy concerns derive from data subjects' desire to not be monitored, and their worries about the consequences of the use of their data. Privacy concerns often decrease data subjects' willingness to disclose their personal data or to use services that require personal data disclosure. For this reason, privacy concerns may lead to non-adoption of new services and technologies, dropping out of them, or a decline in data disclosure (i.e., omitting data or providing false information). To address these issues, we need to understand how to evaluate privacy concerns in current and future evolving service development contexts. We need insights into how privacy concerns have been evaluated in earlier contexts in order to adapt evaluations to new contexts.

In many countries, legislation sets the foundation for protecting personal data privacy and provides a framework for implementing privacy protection methods and technologies. However, it does not really suppress privacy concerns of the data intensive services' users. People's privacy concerns need to be understood to apply legislation in present-day data collection contexts, characterized by rapid technological change, expanded data collection, diverse uses for collected data, and possibilities to monitor individuals' behavior and combine data from different sources. This understanding can be gained with well-designed *privacy concerns evaluation instruments*. When privacy concerns are evaluated and analyzed, their negative effects on personal data disclosure can be mitigated. In this way, more efficient promotion of personal data intensive services and realization of their benefits for both service users and providers can be reached. In practice, privacy concerns can be addressed by various means based on their evaluation. First, the means of privacy protection and the real risks of data disclosure can be communicated to the data subjects and the general public. Second, data subjects can be given control over their information, and benefits can be offered to them for disclosing information.

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Third, privacy-preserving systems and service design can be facilitated by taking service users' privacy concerns into account.

Several researchers have contributed to development of information privacy concerns evaluation instruments since the beginning of the 1990s. Due to evolving technologies and new data collection contexts, the existing instruments do not necessarily match data subjects' privacy concerns anymore. Therefore, the validity of these instruments should be examined for their subsequent development and use. We have addressed this challenge by carrying out an analysis of the most widely used privacy concerns evaluation instruments. Through this analysis, we have gathered information specifically on different aspects of individuals' privacy concerns (referred to as privacy concerns' *dimensions* in the instruments) and how they should be taken into account in the instruments' development. We have identified both privacy concerns' core dimensions that have remained unchanged in the evaluations with time and the types of context dependent dimensions to be incorporated into evaluation instruments. When summarizing the results of our analysis, we pay attention to the fact that in addition to being valid and up-to-date, evaluation instruments should also be made easy-to-use enough. In this way, they can be applied to the practical development of personal data intensive services.

In this article, an overview of the existing privacy concerns evaluation instruments will be given and complemented with an outline of their future development. At first, the historical development of privacy concerns evaluation instruments is described, and the most widely used key evaluation instruments from different decades are introduced. Next, an analysis of these key evaluation instruments is presented, focusing on the privacy concerns' dimensions and their changes with technological development and evolving data collection contexts. After this, recommendations on how to utilize the existing evaluation instruments are given, as well as suggestions for future research dealing with validation and standardization of the instruments.

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BACKGROUND

Opportunities for automatic processing of personal data for business purposes have evolved from the first electronic records in the 1950s to present-day comprehensive data collection and processing systems with different data sources and diverse uses. With technological development enabling this change, companies are showing increasing interest in personal data use for developing their products and services and making their operations more effective.

The rapid progress of information technology in the 1960s enabled big enterprises to, for the first time, establish extensive databanks for their customers' personal data. Later on, data warehousing type systems made it possible to easily combine, process, and analyze the collected data for corporate decision making. Along with these changes, discussion on information privacy was evoked, bringing out the need for personal data protection (cf. Westin, 1967). With the launch of e-commerce and other Internet-based services in the mid-1990s, again, new and expanded opportunities for collecting and utilizing personal data of these systems' users appeared. For example, compared to traditional customer records, customers could now be profiled and their preferences could be identified in more detail based on their clickstream. A few years later—specifically, after the introduction of smart phones—development of location and mobility data-based services gained momentum, creating possibilities for gathering even more detailed and extensive data on individuals and their behavior. As a whole, nowadays, the current technology makes possible large-scale personal data collection, integration of data sources of different types, and combination of separate data pools for diverse uses of the collected data. This enables the production of big data that is highly