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Cards in Health Telematics Applications – Tool or Token

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Abstract

Health Information Systems and Applications depend on the acceptance-based empowerment and involvement of all parties requiring secure and trustworthy communication and co-operation. Separating security services from medical information management allows for benefiting from different technologies including independent evolvement without ignoring their weaknesses. Using cards in healthcare raises the important question on whether a card shall be considered a token -a key to access functionality- or a tool with its own application functionality and data. The presented paper analyzes cards with regard to their usage in health information systems. The preferred way to deal with challenges of modern healthcare requirements shall be a balanced combination of cards as tokens and networks for information and functionality provision.

Keywords:

health card, patient card, security token, health network, health information system

Introduction

Healthcare is turning towards the shared care paradigm providing an integrated care approach. The paradigm change is bound to largely extended communication and co-operation between all healthcare providers involved in the patient's care as the challenge of increasing quality and efficiency requirements in the respective domains needs to be met. Thus, new ways for defining, designing, developing, and integrating future-proof and component-based health information systems are required. In that context, patient involvement and patient empowerment as well as education and training of health professionals are important pre-requisites for overcoming traditional ways of organization-centered treatment towards a person-centered approach called "Personal Health". Using token technology in general achieves an increasing importance. The present paper deals with specific benefits and weaknesses using cards either as a token or as real part of the application in healthcare [1].

Methods

Regardless whether using up-to-date card-related technology for identification, verification, and access purposes -the token functionality- or adding application-related functionality including data storage in terms of tools, both approaches have their specific benefits and weaknesses. For characterizing card usage in modern integrated information systems and networks, different aspects and views on tokens and tools need to be analyzed. Apart from awareness, confidence, acceptance, accessibility, and usability the scope of such an analysis ranges from interoperability, technical and organizational issues up to security, safety, privacy, usefulness, and reliability. At least a part of information stored in modern health information systems is intended to be possessed and used by human beings. Appropriate technical means and media are needed for reliable and liable storage of identity-related information, respective cryptographic keys, administrative and business data structures and even applications providing the functionality required including a directed exchange of data to the respective communication partners. Ranging from implementation of simple hardware tokens for restricted functions such as an identity-related service up to portable information systems carried by the information subject, requirements generally apply [2].

There are a number of basic security requirements which will allow the secure exchange of data in an open and distributed environment such as a network. They include authentication, authorization, confidentiality, integrity, non-repudiation, availability, and auditability. There are several security-related requirements that are also of interest for end users but can partly be met without reliance on symmetric or asymmetric cryptography. Organizations attach different importance to different types of security. In healthcare, however, great importance is attached to both availability and disaster recovery as safety of patients and access to information ranges first.

Results

Several European and national projects have defined scope, motivation and objectives as well as health-political aspects for the use of machine-readable cards in healthcare. As a short-term challenge, the reliable implementation of pilots has been mentioned to demonstrate the possible use of such cards and to rationalize time-consuming administrative work in the context of patient's request for health services. Health-political aspects concern facilities for de-centralized medical documentation, a coincidence with constitutional and data protection rights as well as with ethical principles in case

the Electronic Health Record is held by patients, a significant improvement of data quality, integrity and consistency by a unique document, and finally a significant improvement of quality and efficiency of health delivery procedures and processes in general [3].

Using a smart card as a tool means implementing application functionality along with data on the card. Such card-based health information system is characterized by the chance for optimization of medical and administrative workflow, the improvement of information flow between different healthcare providers within a shared care framework, the enhancement of information security using reliable, valid and in-time as well as in-location available data, the facilitation of emergency care by directly available emergency data set as well as a support of prevention and intervention. However, some weaknesses can be discovered, like the possible lost of information due to the restriction of data caused by storage capacity limitations or some unsolved legal problems of information ownership. Data stored on cards used as tools need to be permanently updated.

Using a card as an access token does mean storing and processing all information within extended networks based on an advanced identification and authentication framework. Such network-based health information system requires the provision of services and the existence of unique identifiers. Advantages can be found in a comprehensive level of interoperability and real interactions between all parties involved into the shared care as well as in the chance for a comprehensive, complete, high-quality electronic health record system. Information stored in networks accessed using smart tokens allow for facilitating emergency care by directly accessible emergency data right in time and an enhanced level of quality, integrity and consistency by provision of appropriate services. Availability, however, aims to be the most important service in this case as tokens only provide reliable authentication of principals. Any other service needs to be provided by the infrastructure.

Discussion

Apart from such plastic cards that are only used to physically access rooms, applications, systems or information sources respectively, smart cards in healthcare can be deployed in several different ways. On the one hand, the card can bear the vital information subset of a health record. In case of a patient data cards designed and used mainly as a storage card, e.g., relevant medical data can be stored there as parts (sub-sets, extracts) of an electronic health record [3], [4]. The card is then a tool.

On the other hand, the card may solely be seen as a pointer providing references and links to information stored in shared-care networked systems. This is true, e.g., for patient identification cards. The token approach seems to be the more promising one as medical data are dynamic data, and current cards can only bear parts of the information that is needed for a comprehensive EHR structure [2]. The card is then used as a token.

Confidence in and acceptance of the healthcare systems depend on the citizens' awareness, which needs yet to be raised. Citizens have to realize healthcare is a concern of theirs at all times. The shift from acute to life-long preventive healthcare has to be enforced and speeded up. Citizens shall and will have to form alliances and associations to advocate their interests.

Conclusion

The concepts of eHealth and personal(ized) Health (pHealth) see the citizen in the center of healthcare and welfare. Patient cards are first line communication tools. They carry limited medical data and improve the accessibility to information on health services as well as to personal data. Or cards serve as authentication token. They enable better health provision [4].

Smart cards are widely used as identification tokens not only in healthcare. Many European countries are scheduling the introduction of citizen cards, insurance cards, or just electronic ID cards. The European Health Insurance Card is being introduced in countries of the European Union. Both possession and appropriate use of cards can empower citizen. Furthermore, a card needs to support the collaboration with network-based systems. For that purpose, link information has been specified.

Cards have an impact on the related security infrastructure, certification of processes, process interoperability, and certification of state and relations of principals in longer terms. The use of cards as tokens and the use of networking systems have to closely be linked to each other. This allows for making extensive use of the benefits of both advanced technologies.

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