PERSONALISATION AND USER PROFILE MANAGEMENT

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Abstract. Personalization and effective user profile management will be critical to meet the individual users' needs and for achieving eInclusion and eAccessibility. This paper outlines means to achieve the goal of the new ICT era where services and devices can be personalized by the users in order to meet their needs and preferences, in various situations. Behind every instance of personalization is a profile that stores the user preferences, context of use and other information that can be used to deliver a user experience tailored to their individual needs and preferences. Next Generation Networks (NGN) and the convergence between telephony and Internet services offer a wide range of new terminal and service definition possibilities, and a much wider range of application in society. This broadening of the communication possibilities demonstrates the importance of harmonized profiles for achieving e-Inclusion, in order to suit all users including disabled, young and elderly people - in different situations. The user profile concept is not limited to cover today's ICT market, but also embraces ubiquitous services and applications, and supports interaction with a wide range of devices in intelligent homes. This paper describes the personalization and profile management activities at European Telecommunications Standards Institute (ETSI).

1. Introduction

The concept of a profile usually refers to a set of preferences, information, rules and settings that are used by a product or service to deliver customized capabilities to the user. In practice, many products and services already contain profiles that are specific to that product and unrelated to any other. Commercial and technical constraints will dictate that having profile components associated, and co-located, with each product or service is likely

to remain a common model for profiles. This model is reflected in proposed system architectures such as the 3GPP (3rd Generation Partnership Project) GUP (Generic User Profile) (3GPP 2005, 2007). There will be a number of user characteristics and preferences that will apply independently of any particular product or service (e.g. preferred language or need for enlarged text). Users frequently find themselves moving from one situation to another throughout a typical day (e.g. at home, driving, working). In each of these situations, users will have different needs. At present, an increasing number of products already provide the user with ways of tailoring their preferences to these situations.

ETSI EG 202 325 (ETSI 2005) describes the personalization and profile concept and presents guidelines to manufacturers and service providers in shaping their product and service requirements in ways to maximize human and social benefit. This work identifies how to make it easy for users to specify their situation dependent needs in ways that require the minimum need to understand the potentially wide range of such products. In order to achieve the best user experience, there is a need to ensure inter-operability of services, devices and the users' preferences defined in their profiles. The ETSI Specialist Task Force STF342, funded by EC/EFTA (European Commission/European Free Trade Association) (i2010 2005) under e-Inclusion, will standardize the architecture and objects.

2. Benefits

The output of the project (ETSI STF342) will benefit the personalization of services and devices. From the users' point of view, the benefits are:

- Personalized services and devices provide a better user experience.
- Allowing reuse of users' existing knowledge to help them manage new terminal devices and services, thus leading to faster and easier uptake of new technologies.
- Synchronization and harmonization of profiles across services and devices allowing much faster and easier use of services and devices.
- A profile, that suits a specific situation and that handles many areas, will only need to be defined once. The end-users will not have to re-enter their preferences each time they acquire new services and devices.
- Enhancement of emergency telecommunications, in which the user might allow emergency services to have access to useful information in their profile that would help them to provide appropriate aid to that user.

For manufacturers' and service providers', the benefits are:

- Profiles will be critical to the uptake and success of new and advanced communication services, especially among the larger market of non-technically astute, or non-technically inclined.
- Development costs and time to volume markets can be decreased.
- Larger user segments reached more easily and quickly, thereby ensuring quicker uptakes of key technologies.

3. Past and Ongoing ETSI Standardization Activities

3.1. CONCEPT AND GUIDELINES

ETSI, with funding from the EC/EFTA, has described the concept and developed guidelines (ETSI 2005) relevant to users and their needs to manage their profiles for personalization of services and terminals.

For a single product or service it may be difficult for a user to manage all of the information needed in their profile. They will need to:

- Check what information is in their profile;
- Add to, change or delete information in their profile;
- Know when other entities access their profile;
- Understand how their profile affects the service or capabilities that they experience.

3.2. OBJECTS

Currently, the range of parameters that can be set by users and the values that may be set will not be consistent between different devices or services, or between comparable services and devices from different vendors. Where such diversity exists, it makes it impossible to transfer the settings that have been set for one device or service to another similar device or service in a way that ensures that the same outcome will be achieved. This problem would be overcome if:

- different devices or services of the same type had consistent sets of parameters which had value ranges that produced identical effects;
- settings in one proprietary form on one device or service can be converted to settings in another proprietary form on a similar device or service from a different supplier.

Therefore, the ongoing project STF342 standardizes objects because:

- For terms like "very loud" or "large text" to be useful, the users wish them to always result in the same standardized user experiences. For this to be achieved,

these terms need to map to technical descriptions that have universal applicability across a wide range of usage scenarios and device connections.

- If data in profile components relating to a device or service has been specified by the user, then related profile fields for other devices or services can be directly populated by the same standardized data or data translated to produce the same effects. Users will benefit greatly where mechanisms exist to set many device and service specific settings to values that are based upon the data stored in their profiles. The realisation of this objective depends on standardization of objects and the ways in which these are expressed.

This STF is collecting input from end-users and their representatives, including people with disabilities. The STF is cooperating with relevant projects such as the IST-Simple Mobile Services (IST-SMS) project, see section 5.

3.3. NETWORK AND TERMINAL ISSUES

The ongoing ETSI project STF342 is developing an architectural framework for achieving the personalization and profile management concept described in EG 202 325 (ETSI 2005). This project describes both network and terminal issues, as some of the functionality could be implemented in the network and some in the terminals and SmartCards. New generations of SmartCards (e.g. (U)SIMs) hold an increasing amount of profile data as well as processing capability, which makes them useful for implementation of the profile concept. Also other means such as USB sticks and RFID (Radio-frequency identification) can be useful. In order for a profile to be effective, there is a need for entities to (ETSI 2005):

- store and retrieve the profile data; It is likely that there will be multiple profile storage locations. These locations will probably not store the total profile but only components that apply to a device or service, and the various locations may have different persistence and priority levels. The profile storage agent is the entity that stores information about the profile data and the locations of data repositories of profile data related to users. Users require the data to be stored in a secure manner with user agreed levels of privacy applied to the availability and distribution of that data. Ideally, profile data should always be available, over all networks, from all supported devices and services, including fixed and mobile services allowing service continuity and optimal user experience. Changes of data at different locations should be consistent, which may be ensured by synchronization of data and transaction security. However, although the user's profile data is distributed amongst devices and services, it should be possible to ensure that users can have the concept of centralized profiles which cover all of their devices and services.
- process the profile data and initiate achievement of the behaviour encoded in the profile rules; In order that the rules in a profile can be translated into the behaviour the user desires, it is necessary for the profile processing agent to

operate upon the rules. The profile processing agent is responsible for ensuring that all the operations required by the profile rules are carried out and it will need to initiate operations on a variety of devices and services referred to in the profile. For efficiency and effectiveness it is likely that the processing agent will have functionality distributed between multiple devices and services.

- activate and de-activate the profile in the appropriate circumstances; The profile activation agent is responsible for the activation and de-activation of profiles, when needed. This activation may be rule driven, as a result of a user request or as a result of an event such as when a device is turned on.

Existing standards, such as those described in section 4, will be used as input for this project.

4. The User Profile Concept Implemented in IST Projects

IST-Open Platform for User-centric service Creation and Execution project (IST-OPUCE) has developed a system called User Information Management that treats in a uniform way profile, identity and context information through different subsystems mainly based on open source and standards. Developed as part of OPUCE, the open source implementation (OpenXDM) of Open Mobile Alliance (OMA) XML Document Management (XDM) (OMA-AD-XDM 2006) is used to store and retrieve profile data from different XML repositories. OPUCE has also developed profile schemas extending the ones already specified by OMA XDM profile schema, (OMA 2007).

The IST-End to End Reconfigurability-II project (IST-E2R-II) has investigated the use of OMA Devices Management (DM) (OMA-AD-XDM 2006) to handle profile information coming from mobile terminals. “Device Management” refers to the remote management of the device settings from the point of view of the various “Management Authorities”, including manufacturers, operators and service providers. In the context of 3GPP GUP (3GPP 2005, 2007), DM technology has been chosen as an alternative to having a Repository Access Function inside the end user equipment, as DM allows remote managing of device configuration in an efficient way, especially optimized for wireless and cellular connections. During the project lifecycle, E2R-II also developed four DM “Management Objects” covering user, network, terminal and service profile information; these objects have been registered in the Open Mobile Naming Authority (OMNA) (E2R-II).

The (IST-Simplicity) project has widely investigated the use of a physical plug-in device called a “Simplicity Device” (SD), enabling users to store their preferences in order to make it easier to personalize services and devices. The SD can be seen as an abstraction of a key for the user toward the ICT world; prototypes have been implemented using different technologies such as smart-cards, USB devices, mobile phones with short range

connectivity like Bluetooth or Near Field Communication (NFC), each of them having different processing capability and storage size. In terms of security, the SD has been designed as a combination coupling the proof of possession of a physical token able to mutually authenticate with the network and a simple end user authentication (e.g. user name and password). This mechanism is not new, as it is currently used in traditional telephony; the novelty is in its exploitation for the provisioning of more general communication services than simple phone calls, reusing the same network infrastructure; this is in line with recent works like 3GPP Generic Authentication Architecture and Generic Bootstrap Architecture (3GPP 2007-12).

The (IST-DISCREET) project has developed a number of techniques helping end-users to take care of their privacy in a simple way. Particularly relevant to the current subject, the project has developed a "pseudonymization" algorithm by which users, assisted by one or more of "identity providers", can use telecommunications and Internet services without necessary disclosing their real identity, whilst still allowing legitimate entities (e.g. police) to identify users when they act in non legal way.

5. STF342 and IST-SMS

Collecting relevant results from the Simplicity and DISCREET projects, and in close cooperation with ETSI STF342, the IST-Simple Mobile Services (IST-SMS) project will start a trial in Spring and Autumn 2008. The trial will take place in the campus area of the University of Rome "Tor Vergata" and will provide communications and Internet services to a wide community of mobile phone users, exploiting several concepts related to profile and identity management. This trial will see the University or Rome Tor Vergata acting as a profile provider – thus following creation, storage, processing and maintenance of different profiles – for a meaningful number of users (at least 100 students plus a number of people including teachers, researchers and administrative people). Trial participants will be provided with a special SIM card able to store sensitive profile data, identity information and digital certificates to prove user's identity. The interface toward this SIM card will be based on an implementation of OMA Smart Card Web Server (OMA SCWS) which allows information stored in the card be accessed from the user equipment using https connections.

In order to drive different kind of communications among trial participants (phone calls, emails, instant messaging), according to user defined policy rules, the trial will evaluate the use of an unique user identifier in form of a SIP address mostly compliant with the UCI concept (ETSI

2007). The trial will also develop a prototype implementation of "Profile Objects"; it will evaluate the use of technologies and supporting mechanisms coming from emerging data formats like micro formats (Microformats) and Google Data API (Google gData) in order to access commonly used information like personal information, contacts, groups and social networking, calendars, timeframes, locations, etc. As well, solutions for linking, synchronizing, accessing and translating data expressed in different formats such as the eXtensible Resource Identifier Data Interchange format (OASIS XRI) will be considered.

Possible trial goals also include evaluation of mechanisms for automatic activation, deactivation and processing of profiles; as described in (ETSI 2005), this will be mostly done in a seamless way, requiring knowledge of context information. At least the following categories of context will be considered: presence, location (both indoor and outdoor location information), time, interaction with physical objects in users' proximity (through the use of RFID tags, visual code recognition, Near Field Communication (NFC), Bluetooth), and other kinds of real world context information (e.g. meteorological conditions).

6. Conclusion

Personalization will be critical to the uptake and success of new and advanced communication services. Profiles promise to ease the conflict between the benefits of common technology deployments versus diverse social and cultural demands, and variations in individual physical and cognitive abilities and preferences. In order to achieve this goal, ETSI is standardizing an architecture and objects for profiles.

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