# Issue paper on interoperable personalization standards

## Fundamentals

Personalization involves tailoring aspects of the user experience to meet the preferences (or needs) of the user.

## The ideal personalization scheme

All personalization schemes can be said to benefit the user of the products or services being personalized. Users are likely to gain the maximum benefit if they are seen as the owners of their own preferences and when they have the ultimate right to modify those preferences. Where such rights exist, users should be able to apply many generic preferences to a range of products and services. Although some preferences may only be applicable to individual products or services or to categories of products or services, many preferences will be universally applicable.

## The status quo

At present there are no real examples of successful interoperable personalization schemes that have the ultimate benefit of the user as their main aim. Most personalization schemes in widespread use are provided by organisations offering products and services. Such schemes have been designed to maximise the commercial benefits for those providing the service. Even though the primary motivation of the service provider is to maximise their profits, users often highly value this symbiotic relationship with the service provider because of the improved personalized service that they experience. Frequently users are willing to compromise their privacy by using services that sell their preference data to third parties.

Ultimate control and ownership of preferences is a critical factor. Commercial service providers usually see considerable benefit in being the ultimate owners of user preferences and they limit the users' ability to completely alter those preferences. Where a service provider is the owner of a user's preferences they can maintain a commercial benefit over their competitors by preventing those competitors from using those preferences to provide their own fully personalized service to that user. They can also restrict users from modifying preferences in ways that they believe will lessen the commercial benefit that the company derives from exploiting those preferences. For example, the service may personalize the advertisements that a user receives but they would be unlikely to offer or encourage a preference not to receive advertisements.

One category of personalization that is somewhat different to the norm described above is the encoding of preferences on a smart card. The European Standard EN 1332-4 specifies how user requirements related to card-operated devices like ATM machines should be encoded on cards. This is in day-to-day operation in some limited deployments but it has not yet been universally adopted across the range of card-operated machines. The stored user preferences relate to how the user interface to the device should be adjusted to meet their individual needs. It includes things such as timeouts that would be important for many users with cognitive disabilities.

## Populating user profiles

The issues associated with how preferences can be entered and modified by users is discussed in the issue paper "Gathering User Preferences" <https://www.w3.org/WAI/PF/cognitive-a11y-tf/wiki/Gathering_User_Preferences> .

The use of custom templates of default preferences for particular groups of users is one method by which members of those groups can be immediately provided with potentially useful settings across a wide range of products and services as a starting point. The task for individual users would then be greatly reduced as they would only need to adjust those default settings that did not match their own personal preferences or needs. The ETSI work [ETSI1] suggests that organisations that represent such groups of users could develop and promote the use of such user profile templates to their client groups.

## Inferring Preferences

Commercial services frequently use inference algorithms to infer preferences from user behaviour. Such inference methods can also be of value in non-commercial personalisation schemes that are solely designed to benefit the user. However, inferred preferences will always be wrong, even if they only fail to capture minor individual quirks. It is therefore important for users that they are able to correct inaccurate inferences.

Service providers do not always have a shared interest in allowing users to modify preferences. Whereas a person who is addicted to shopping may wish to edit their preferences so that they can avoid being bombarded with tempting offers of things that they cannot resist, the shopping service will be highly motivated to refine the preferences so that they can intensify the attractiveness and volume of offers that they make to that customer.

## Contextual personalization

One important factor in optimizing the personalization of a product or service is to ensure that the personalization is appropriate for the current context of use. For example, settings that will suit the user of a mobile phone in their office or home will not be well suited to that user when they are driving a car. In their home or office a typical user would probably prefer to send and receive text messages using the keyboard and screen of the mobile phone. However, in the car, voice input and text to speech output would be the most appropriate. In this car context, the profile settings of a typical user might be very similar to those that a blind user would use in all contexts.

The concept of context in personalization can be very broad and it can cover geographic location, type of location, the presence or absence of other people, time of day, ambient lighting conditions, the noise environment, etc. Wherever possible, the determination of context should be done automatically to avoid the user having to continually adjust their settings or manually invoke different context-dependent user profiles.

## Interoperable personalization schemes

Where users want or need products and services to be personalized, they would prefer or need this to happen across the widest possible range of products or services. Personalization schemes that delivers this ideal will only succeed if they are standardized and if that standard is adopted by the widest range of product and service providers.

Critical issues for any personalization scheme to resolve are:

* Who will provide the infrastructure supporting the personalization scheme?
* How will that infrastructure be funded?
* How many users will value the personalization scheme sufficiently to bother to use it?
* How many providers of products and services will incorporate configurable options into their products and services to enable them to be configured by the personalization scheme?

Many of these factors are highly interdependent and ultimate success is only likely to be realised if there are favourable resolutions to all of these issues.

There is no motivation for commercial service providers that currently personalize their own service to extend their personalization schemes to support such usage. In fact, as stated above, there is a strong commercial disincentive for them to do so.

For personalization to be possible, the providers of products and services must provide multiple options for several aspects of the user experience of that product or service. The provider of the product or service can offer their own mechanism to allow a user to select their preferred options. Such solutions can be proprietary and are not inherently interoperable. Such a scheme could well give the product or service provider a competitive advantage over their competitors.

For interoperable personalization schemes to succeed, it is necessary for the provider of a configurable product or service to either:

* 1. provide an interface to those options that is compatible with the standards supported by an external personalisation service or;
  2. publish an API to their own personalization scheme or offer some other means for an external service to select the relevant options.

When the provider implements either of these changes, they immediately lose control of the part of their competitive advantage attributable to personalization.

Any third party that can access the configurable options of a product or service using either of the above options could offer their own service to personalize the use of that product or service. If implemented well, users might acknowledge the provider of the personalisation scheme as the organisation that has given them the enhanced personalised user experience that they love, and not the provider of the product or service. Also, if the standardised personalisation scheme becomes widely adopted, competitors of the product or service that originally provided their own in-house personalisation offering could more easily deploy personalisation of their own offerings by exploiting the services of a third-party open personalisation service. Such a scenario could rapidly erode the competitive advantage of the first-mover. This logic might mean that those companies that currently deploy good personalization of their products and services are likely to be reluctant to support any interoperable personalization services.

## Candidate interoperable personalization schemes

The most well-known current candidate for an interoperable personalization scheme is GPII (<http://gpii.net/> ). It is primarily concerned with accessibility of the Internet as stated on its web page:

"The purpose of the Global Public Inclusive Infrastructure (GPII) is to ensure that everyone who faces accessibility barriers due to disability, literacy, digital literacy, or aging, regardless of economic resources, can access and use the Internet and all its information, communities, and services for education, employment, daily living, civic participation, health, and safety."

It has a very large community of organisations and research projects participating in it, again to quote:

GPII is a project of Raising the Floor, a consortium of academic, industry, and non-governmental organizations and individuals.

Although the interest in the project is high, it is not yet clear that there GPII can provide clear answers to the four key questions in the "Interoperable personalization schemes" section above. Without clear answers to these questions, the amount of mainstream commitment to GPII and the means to provide and maintain the necessary infrastructure are still uncertain.

A much less well-known approach to personalisation is that proposed by ETSI [ETSI1], [ETSI2], [ETSI3], [ETSI4]. This is an approach that focuses on providing comprehensive context sensitive personalization of a wide range of information and communications products and services. This is designed for any user and it does not have a specific accessibility focus - although several accessibility related settings and use cases are used in the ETSI documents.

This personalization work came out of other ETSI work on a Universal Communications Identifier (UCI) which is a third-party verified authentic identity that can be used in all communication contexts. A UCI identifies the person and not their devices. Such an identifier could be helpful in protecting vulnerable users (e.g. some Down syndrome users) from online impersonation-based fraud.

Although, the standards behind the ETSI personalisation and UCI:

* have been approved by the major industry players who are the ETSI member companies;
* are technically detailed and were designed to be compatible with and able to exploit the features of today's mobile telephony networks (e.g. using existing presence servers in the networks to host and distribute user profile data);
* are extremely scalable by permitting very flexible distribution of profile data and processing across products, services and a centralised repository and processing engine;

there has be no known implementations of these standards. Again, an inability to provide commercially convincing answers to the four key questions in the "Interoperable personalization schemes" section will be a major reason why no deployment has taken place. Also, a lack of ongoing funding has meant that it has not been possible to run the types of test bed implementations that GPII undertakes.

## Conclusion and actions

GPII is a widely trialled but still evolving instance of an interoperable personalization scheme and the ETSI scheme has not progressed beyond the standards development stage. In neither case are there clear answers to the four key questions in the "Interoperable personalization schemes" section and, without clear answers to all of these questions, there can be no certainty that such personalization schemes will be widely supported, widely deployed and continuing for the foreseeable future.

It is clearly recognized that personalization is the answer to providing specialised and individualised support for many of the people that the Cognitive Accessibility Task Force is trying to benefit. For this reason, it is important that solutions that rely on personalization are explored, even if the means of activating such solutions may still be undecided.

The following is a suggested approach for a robust future-proof approach to how personalization-based solutions can be proposed by the Task Force:

1. Identify and document every instance where experiencing a facet of a product or service in a way that is different from the commonly accepted default way would help that user (within the set of users we are trying to support) to interact with the product or service in an effective way. That facet of a product or service is a personalization item candidate.
2. For each of these instances, try to identify the range of ways that this facet of the product or service needs to be changed. This could be allowing the user to set a value from a set of values (e.g. screen brightness or contrast), or allowing them to select one item from within a set of items (e.g. language in symbols, or spoken English or written French).
3. Identify whether existing personalization standards already address this particular personalization item. GPII looks to the currently accessibility in e-learning focussed ISO/IEC 24751:2008 for user profile items whereas [ETSI2] and [ETSI3] give many examples of general user profile items that are expressed in an implementation-free way and that reference external standards where possible for data value ranges.
4. Wherever possible re-use existing proposals rather than further fragment the already weak personalization space. Also use existing standards, schemas, ontologies etc. that define the parameters that require to be configured by user profiles.
5. Ensure that the user profile items are documented in an implementation-free way and that they are not tightly tied to (and hence dependent on) one personalization approach or scheme. This will allow a range of different ways of offering these configurable options to be developed.   
   The Task Force could propose a range of alternative techniques to provide the required configurability. In parallel, those trying to develop the ultimate global interoperable personalization scheme can take the proposed user profile items, map them into their own profile specification schemas, and utilise them in their developing platforms.

## References

[ETSI1] EG 202 325 "Human Factors (HF); User Profile Management" at <http://www.etsi.org/deliver/etsi_eg/202300_202399/202325/01.01.01_60/eg_202325v010101p.pdf>

[ETSI2] ES 202 746 "Human Factors (HF); Personalization and User Profile Management; User Profile Preferences and Information" at <http://www.etsi.org/deliver/etsi_es/202700_202799/202746/01.01.01_60/es_202746v010101p.pdf>

[ETSI3] ES 202 642 "Human Factors (HF); Personalization of eHealth systems by using eHealth user profiles (eHealth)" at <http://www.etsi.org/deliver/etsi_es/202600_202699/202642/01.01.01_60/es_202642v010101p.pdf>

[ETSI4] TS 102 747 "Human Factors (HF); Personalization and User Profile Management; Architectural Framework" at <http://www.etsi.org/deliver/etsi_ts/102700_102799/102747/01.01.01_60/ts_102747v010101p.pdf>