Common Terms Registry

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Abstract. This paper will focus on the rationale behind and the work to date on the Common Terms Registry, a database that improves the ability to articulate Assistive Technology needs and solutions by providing a common vocabulary of clearly defined terms.

Keywords: assistive technologies.

1 Introduction

The growing networked and technologically advanced society in which many of us participate is not all-inclusive. Most mainstream devices, applications, materials, media and web sites make dozens of assumptions about their users. For example, most assume that users can see and hear well, and have the ability to operate a mouse, keyboard or touch screen with high precision.

For users who do not meet these assumptions, the simplest tasks can be difficult or even impossible. These users rely on assistive technologies (AT) to meet their needs. These solutions close the gap between the assumptions made by mainstream developers and manufacturers and the reality in which users with disabilities live [1].

When a need is first identified, AT users and the people who support them (therapists, caregivers, family members, etc.) must find the right combination of tools, adaptations and adapted materials/devices/software for each individual. Users and the people who support them need tools and a common language or vocabulary to help find solutions to meet their needs [2].

The process of selecting solutions to meet a user's needs is not a one-time event. With the rapid development cycles and short working lifetimes of modern technologies, a user can expect to replace or at least upgrade their educational materials, resources or assistive technologies every few years [3]. Even minor changes can make for a painful adjustment. Users need tools to translate their existing needs and preferences for use with new technologies.

Users can also expect to encounter technology in public areas in their daily life (such as library computers or airline self-check systems). As a result, users need to continually reassess their needs against what is available that will either be able to meet their needs directly or to adapt media, materials and devices so that they are able to use them.

This matching process is enormously aided if the people identifying the user's needs and the people creating solutions can use a common vocabulary. This is the role of the Common Terms Registry.

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Each of these needs continues to grow. The concept of disability is expanding beyond health conditions alone to include a wider range of mismatches between individual needs and the constraints imposed by their physical and societal environment [4]. The global population is also aging, which increases the number of people affected by age-related disabilities [5].

2 The GPII

The Global Public Inclusive Infrastructure (GPII) exists to address these growing needs. The GPII is creating an infrastructure to simplify the development, delivery and support of access technologies and to provide users with a way to instantly apply the access techniques and technologies they need, automatically, on any computers or other ICT they encounter [6].

The Cloud4All project, a project funded under the European Union's FP7 program is working to build the GPII and meet its objectives. The Common Terms Registry and Unified Listing support the goals of the Cloud4All project by bringing together existing data sets regarding needs and solutions, and by standardizing the vocabulary used to describe needs and solutions.

Another challenge is the high cost of producing Assistive Technologies. The Prosperity4All project, another European Union funded project, is working to lower the costs of producing AT and to expand the ability of AT manufacturers to reach a wide enough base of global customers to scale their business models and provide affordable solutions. The Common Terms Registry and Unified Listing support the goals of the Prosperity4All project by helping users find AT solutions and by helping AT producers find customers.

This paper will focus primarily on the rationale behind and the work to date on the Common Terms Registry. We will also discuss the future of both the Common Terms Registry and Unified Listing.

3 Common Terms Registry and Use Cases

The Common Terms Registry (CTR) is a database of common terms related to user needs and AT solutions. Each common term can have many aliases, translations, and transformations (see section 2.1 for definitions). A common vocabulary has many applications, which will be described in more detail in this section.

Imagine that you as an end user currently own a screen magnifier on your personal computer, which you use with programs that do not provide large enough fonts. For programs that provide large enough fonts, you prefer not to use a screen magnifier, which limits how much of the user interface you can see at a single time. You want for that preference respected on every new device or public resource you use, and for it to be applied as intelligently as possible.

To make this possible, you first need to be able to clearly describe the fact that a program (or operating system feature) provides the ability to magnify the screen. You also need to clearly describe whether the currently running program has the ability to change the size of the fonts onscreen, to describe the current font size, and to describe the maximum font size available. In all cases, you need a single way of describing the underlying

concept (a *term* in the Common Terms Registry), and an awareness of the way in which the term is described within the application (an *alias* in the Common Terms Registry).

To decide whether to change the font size or to use the screen reader, you would need some way of describing the conditions under which to use each solution (a series of *operators* in the Common Terms Registry, such as "greater than").

If the font size common term is described as being measured in pixels and your program uses ems, you need some way to convert from "16 point" to "1.3 ems" (a *transformation* in the Common Terms Registry).

Once we have a way to represent the needs and preferences of a user and the features and settings of an application, things like a matchmaker to help users find new solutions or a preferences service that configures public resources to adapt to user's needs and preferences are possible. Those are the core use cases required by the GPII (finding solutions, and representing user preferences in various contexts).

These are by no means the only use cases for this common vocabulary. The Common Terms Registry is ultimately a resource owned by its community. Beyond any initial or planned use case, the Common Terms Registry will grow to meet the changing needs of AT users, caregivers, researchers, manufacturers, and anyone else who wishes to contribute.

3.1 Proposed Data Structures

In its initial state, the Common Terms Registry contains the following records:

- Terms
- Aliases
- Translations
- Transformations
- Operators

Record: All records have the following common fields.

Table 1. Fields common to all record types in the Common Terms Registry

Field	Description
Type	The type of record, i.e. term, alias, translation, transformation, operator.
Permanency	An indication of how likely a field is to change over time.
NameSpace	The namespace to use in combination with the UniqueID to construct a URI that refers to the record.
UniqueId	A completely unique identifier for this record.
Notes	Any additional information associated with this record.
Status	The review status of this record.

Term. A term is a single canonical way of describing a need or solution. For example, users who require high-contrast schemes may be concerned about the ability to set a high-contrast background and foreground color. Each of these would be a common term, identified by a persistent ID such as backgroundColor or foregroundColor. In addition to the common fields described above, term records have the following fields.

Table 2. Fields used by the "Term" record type in the Common Terms Registry

Field	Description
ValueSpace	A description of the values allowed for this term.
TermLabel	A short label for this term as it would appear in a menu or listing.
Definition	A description of the term.
ApplicationUniqueFlag	Whether this term is unique to a particular application.
Uses	A description of other systems that use this term and how they use it.

Alias. An alias is another name for a standard term, with no other differences. When describing system settings and other user preferences, the difference may be simply a matter of formatting. For example, one program might have a registry entry or setting for max.volume and another might have a registry entry or setting called max_volume. Other examples may simply be a matter of alternate wording. For example, one developer may use “loudness” instead of “volume” when describing their settings. In addition to the common fields described above, alias records have the following fields.

Table 3. Fields used by the "alias" record type in the Common Terms Registry

Field	Description
AliasOf	The uniqueID of the parent record this record is an alias of.
TermLabel	A short label for this term as it would appear in a menu or listing.
Uses	A description of other systems that use this term and how they use it.

Translation. A translation is representation of a term in another language with no other differences. For example, in US English, the preference for a particular background color might be presented as “backgroundColor”. In Commonwealth countries, that might be presented as “backgroundColour”. In addition to the common fields described above, translation records have the following fields.

Table 4. Additional Fields used by the "translation" record type

Field	Description
TranslationOf	The uniqueID of the parent record this record is a translation of.
ValueSpace	A translation of the terms used in the parent record’s value space.
TermLabel	A translation of the short label for the parent record as it would appear in a menu or listing.
Definition	A translation of the definition of the parent record.
Uses	A description of other systems that use this term and how they use it.

Transformation. Translations and aliases present a term using different words or formatting, with no meaningful difference in the values used to describe a user’s needs or preferences. For example, two devices may have a volume control that can be set from 0 to 10 in increments of 1. If those two devices have the same maximum volume and each of their corresponding volume levels are the same loudness, then a user who prefers (or requires) for the volume to be set to 10 would have the same experience in having that preference applied to each device. It wouldn’t matter if one device called the control “volume” and the other called the control “loudness”. On the other hand, if two devices have a different maximum volume, are adjustable using different increments, or have a different perceived loudness when set to the same value, then something else is required.

For these cases, the Common Terms Registry provides a transformation. A transformation provides a bidirectional lossless algorithm for converting from one way of describing preferences and needs to another. To continue the previous example, the common term describing volume preferences might be expressed using a decibel scale. For an implementation that uses 0-10 to indicate volume, the transformation record would provide an algorithm for converting from decibel to 0-10 values and from 0-10 values to decibel values. In addition to the common fields described above, transformation records have the following fields.

Table 5. Additional fields used by the "transformation" record type in the Common Terms Registry

Field	Description
ValueSpace	A bidirectional lossless algorithm for converting to and from the values used by the common term.
TermLabel	A translation of the short label for the parent record as it would appear in a menu or listing.
Uses	A description of other systems that use this term and how they use it.

Operator. There are some preferences that are conditional, and depend on the environment and the content an AT user is interacting with. For example, an AT user may wish to have two different color schemes, one for daylight hours, and one for nighttime.

Operators are terms that can be used to clearly identify what settings should be applied under what circumstances. For example, “greater than”, “less than”, and “in the following range” are all operators. The conjunctions “and”, “or” as well as the adverbs “not” and “only” are also operators. Operators can be combined to describe complex conditions.

In addition to the common fields described above, operator records have only one additional field.

Table 6. Additional fields used by the "operator" record type in the Common Terms Registry

Field	Description
Definition	A clear definition of the operator.

Relationships. Terms and Operators are unique records that do not refer to another record implicitly. All other record types (aliases, translations, transformations) must refer to a single parent term (see the aliasOf, translationOf, etc. fields proposed above).

3.2 Proposed Review Structure

The Common Terms Registry is an open registry. Its operation and the process for accepting and curating new terms will be defined by the currently-under-revision ISO/IEC 24751. Anyone can sign up for an account that will allow him or her to submit new entries for the Registry; the only requirement is a valid email address. There are currently three types of users defined: Contributors, Moderators and Administrators.

When users sign up for a new account, they become Contributors. Contributors can create new records, which are stored as “unreviewed” records. These unreviewed records are only visible to the Contributor who created them and to moderators.

Contributors can submit, view and edit their own entries (only) until the entries are "passed" by a moderator to the "Candidate" status. At this point, the contributor is no longer able to edit the record.

Moderators have all of the abilities of Contributors but are able to see all contributions. In addition, Moderators can view "unreviewed" records and use annotations (comments) to engage in a back and forth discussion with the Contributor submitting the record. When Moderators involved in a review are satisfied with the quality and completeness of a record, they can change its status to "candidate". Moderators can also promote Contributors to become additional Moderators as a part of the "meritocracy" model of the Common Terms Registry review process.

Administrators have all of the abilities of Moderators and Contributors. In addition, Administrators have final approval of changes to the database. An administrator can promote a "candidate" record to and "active" record, at which point it becomes visible to the public. Administrators can also directly edit active records (a history and audit trail of changes is stored).

The database includes both canonical terms and terms that are used by individual manufacturers. A single Administrator can move a manufacturer's term for a concept into the Registry. Deciding and dubbing a term as the canonical term for the concept is only done after considerable study and action by an Editorial Team.

In addition to the curation role(s) above administrators also provide oversight over all levels of the community. For example, they can promote Contributors to Moderators and Moderators to Administrators. They can also demote Administrators or Moderators based on feedback from the community. This kind of oversight is common to community-managed sites and is part of the meritocracy mode of the Registry.

The curation process is only tentatively defined and partially implemented (as the 24751 revisions is still in process). Currently the editorial group is working as a committee of the whole to clean up existing entries and create the technical mechanisms for submission of new entries. As the community of contributors grows, the workflow will be formalized so that the progression from "unreviewed" to "candidate" to "active" record will be enforced. The full range of permissions and user classes will also be implemented.

3.3 Provenance and Information Flow

The Common Terms Registry and particularly the Unified Listing will be updated based on information found in a number of existing sources. A key goal of both projects is to make clear the source of information, and to preserve the flow of information between systems. Value added by an upstream authority or community should be incorporated into the federated record wherever possible. Value added by contributors to the Common Terms Registry and Unified Listing in updating federated records should be fed back to the original sources wherever possible.

4 Current Status and Work Plan

The initial data set used to populate the Common Terms Registry was taken from the ISO/IEC 24751 standard augmented by all of the terms used by different companies in building solutions as part of the Cloud4all project. During this project the need for

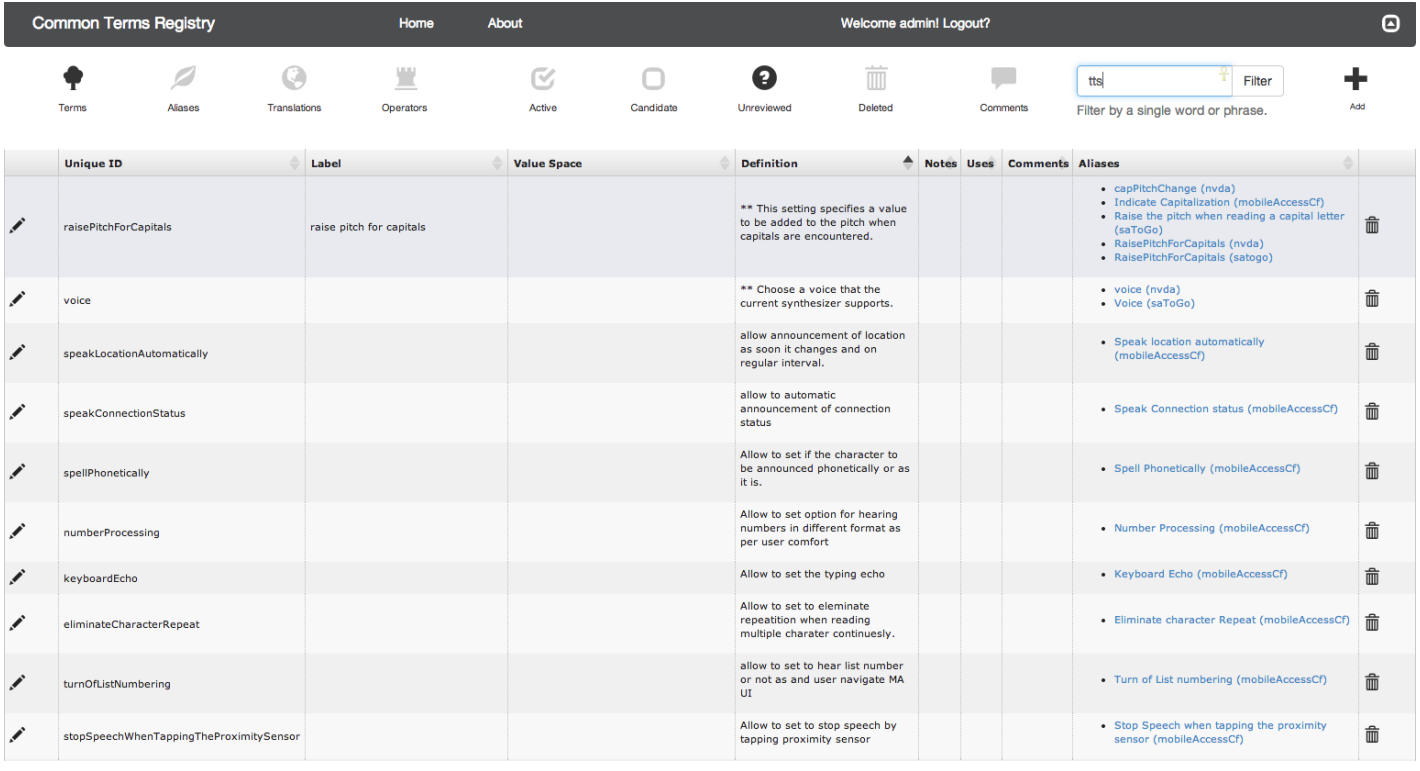

Fig. 1. Screen shot of the initial "review" interface to the Common Terms Registry

an expandable model (which is proposed for the ISO/IEC 24751 standard) rather than the fixed model of the current ISO/IEC 24751 became abundantly clear.

We are now in the process of reviewing the collection, remove duplicates, adding definitions, value ranges and other required fields and addressing other quality concerns.

5 Future Work

The initial Common Terms Registry prototype is geared towards data review. A more mature set of user requirements for the Common Terms Registry will be fleshed out and the developer, manufacturer, and contributor interfaces for the Terms Registry will be built in the next year.

Planning work is currently in progress for the Unified Listing, including fleshing out user requirements. The prototype database that powers the Unified Listing and the initial user interfaces will be built in the next year. A shopping aid to assist AT users and the people who support them in finding solutions will then be built that relies on the Unified Listing and Common Terms datasets.

5.1 Call for Participation

The Common Terms Registry is an open collaborative effort that relies on the participation of the larger accessibility community. If you would like to become involved as a contributor to or moderator of the Common Terms Registry, please send an email to CommonTermsRegistry@GPII.net. The Common Terms Registry will be released as a resource for developers by the end of 2014.

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