

Re-narration as a basis for accessibility and inclusion on the World Wide Web

ABSTRACT

“Designing for Inclusion” is the slogan that captures the world-wide effort to make the web a valuable resource for all seven billion humans, “whatever of their abilities, age, economic situation, education, geographic location, language etc.” (WAI).

In this paper, we introduce the idea of re-narration as the basis for “designing for inclusion.” In the re-narration model, a web page or even an element of a web is rewritten, i.e., *re-narrated*, to make it accessible to a target audience of users in a completely decentralized way. The notion of re-narration is completely general. It could, for example, mean translating a page automatically to another language. Or it could mean creating a more accessible version of a technical document by an expert for laymen, even if it is in the same language by

After motivating re-narration through a series of accessibility related examples, we present an architecture of the re-narration web and its formalization as a transformation on web elements. The social semantic web can form the basis for a decentralized architecture for re-narration.

Categories and Subject Descriptors

H.4.2 [Computers and Society]: Social Issues, Assistive technologies for persons with disabilities—*non-literacy*; H.5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces—*Collaborative computing, Computer-supported cooperative work*

General Terms

Human Factors, Languages

Keywords

Accessibility, Inclusion, Collaborative narration, Localization, Social Semantic Web

1. INTRODUCTION

The issue of accessibility and inclusion has been a concern in the design of the web and will continue to remain so for a long time. In the early days of the web, for those on the other side of the digital divide, one of the issues was one of physical access to the computing device. With the advent of the mobile, the physical device is no longer the barrier to accessibility. For example, India now has 800+ million users of the mobile. However, for more than 600 million of those users, the world-wide web remains mostly irrelevant or marginal because it is inaccessible. The challenge now is to make the Web more accessible to people of all “abilities, age, economic situation, education, geographic location, language.”

Among the challenges is making content delivered to such devices truly accessible. It is one thing for content to be delivered to a device; it is another thing for that content to be productively usable by the observer of that device. Services for rural users have commonly been provided via computer kiosks placed at a village office. Kiosks typically dispense information such as land records or tax information as part of an e-governance service. While this method can effectively transmit government experts and regulations to rural users, it is a one-way flow of official information. We envision the Internet as allowing more expansive, multiple-user experiences. A government document such as the Minimum Wage Act, for instance, is most useful to a non-expert user when it can be accessed along with discussions, debates, translations, and other re-narrations. In fact, bloggers often perform such services, by writing blogs based on something(s) they read on the Web. We propose a structured manner of accessing re-narrations, where the relationship between the source and target are preserved. This involves the design of web applications, filters, and server-supported browser extensions that can enable and enhance localised re-narration of Internet content.

Re-narration activity can be compared to various real-world frameworks that we have been using for centuries. News papers is a good example where people subscribe to a set of narrations that are more suitable for their orientation. An act that is passed in the government is hardly ever directly accessed by people. Various agencies will help narrate it to their subscribers. Then the local news papers will re-narrate to their specific community interest and context. A analog for this on the Web can develop using the idea of re-narration where the same url that is passed around renders

the page content that is most suitable for the user (person who is browsing the page at that url) profile, possibly through subscription to re-narrator listing services.

The activity of Web-accessibility [28] provides guidelines for authoring web pages so that tools can be used to assist a disabled person also access the page, say when a visually impaired person accesses the page using a text-to-speech tool. However, the re-narration activity subsumes the tool aided activity by including a group of narrators who are interested in the community. The *Alipi* framework [9] further develops into a semantic web model that also exploits the social networks of interest into enabling e-inclusion through a mashup of suitable narratives for a target user - including addressing language barriers among the literate.

The major aims of this work are to:

1. Understand the scope, extent and well formedness of Web content re-narration and dynamic rendition based on user profile of the visitor. Is replacement at the level of HTML ids and xpaths the most appropriate unit of re-narration? What should be the name-space management with respect to the new ids that seep-in into the source page?
2. Provide an open source Web 2.0 development platform for authoring narratives and re-rendition as a browser extension. [14]
3. Develop a specification that helps address the various Web data types, that can be used by standards committees, while providing guidelines for paragraphs, videos (subtitles part), images, paragraphs to audio for now.
4. Demonstrate the Web framework model in various contexts such as the delivery of a governments' policy document for its citizens in a country like India.

2. ACCESSIBILITY

According to the W3C website:

The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect.

Tim Berners-Lee, W3C Director and inventor of the World Wide Web

The Web is fundamentally designed to work for all people, whatever their hardware, software, language, culture, location, or physical or mental ability. When the Web meets this goal, it is accessible to people with a diverse range of hearing, movement, sight, and cognitive ability. Thus the impact of disability is radically changed on the Web because the Web removes barriers to communication and interaction that many people face in the physical world. However, when web-sites, web technologies, or web tools are badly designed, they can create barriers that exclude people from using the Web.[29]

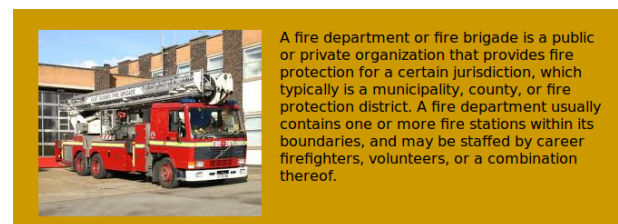
That said, the Web Accessibility Initiative (WAI) focuses on people with disabilities – people with auditory, cognitive, neurological, physical, speech, and visual impairments.

WAI also concerns itself primarily with content/page authoring to make it more accessible to people with disabilities, which in turn also informs the development of user agents (browsers, etc.) used to access such web content.

The first goal of this paper is to go back to the broader goals of accessibility that is not limited to people with medical disabilities. We want to also address accessibility issues that arise because of social, cultural, geographical, and other factors.

The second goal of this paper is to broaden the scope of solutions – to go beyond authoring guidelines to also consider ways in with the web at large can make the web (or specific parts of the web, at least) more accessible to a larger audience described earlier. So, we want to consider ways in which *re-narrations* of a page can be generated, discovered, and presented to someone who visits the page. This is important because it broadens the responsibility of making the web accessible from web authors to everyone on the web.

In order to make this clear, let's take an example and examine the ways in which these two approaches play out on a given web page. Consider a web page, say of fire safety, which is originally authored in English and has a few images, a snippet of which is shown here.



Let us first consider how WAI would approach the problem of making this page accessible. More specifically, let us consider the case of a blind person visiting the page. The WAI provides some guidance as to how a blind person might be able to read this page based on the use of screen-reader software and keyword navigation (citation required).

So, the author of the fire-safety page, say P, would have to make sure that the page has clear structural information with proper headings, image captions, alternative text for image tags, and avoids uses of elements other than their appropriate intended semantic purposes (ex: using tables for presentation – a very common "misuse").

Now imagine, if the page author violated one or more of these guidelines (ex: using tables indiscriminately) which might frustrate a blind visitor, B. WAI has nothing to offer to such a user. What we are exploring here, is enabling someone (say X) other than the web author to provide a re-narration of this page that might be more accessible to the blind visitor. For example, X would create *Blind(P)*, a WAI-guidelines-compatible version of the page and put it on the web. Now, if there were a way for B to know that *Blind(P)* existed when-

ever B visited a page P, then that alternative page could be accessed by B instead of P. There might even be a second re-narration available which might be an audio snippet that reads out the content of the page, which might be even more suitable for B. So, B now has the choice of picking between multiple re-narrations. This example is an illustration of a different approach to solving the problem of accessibility – in a way that is more in the spirit of the Internet.

Let us now look at other accessibility issues that could be solved using this same general approach.

2.1 Language barriers

Imagine that a link to this page P is sent to a person, Kabir, who can read Hindi, but not English. So, when Kabir visits P, if there is a way for Kabir to know that a Hindi version of P $Hindi(P)$ exists, then Kabir would read that page instead. One way for this is to query a web translation service, say Google Translate (however “incomplete” it might be), and present this page instead. But, if Kabir prefers to read human translations or if Google Translate does not cover Hindi (hypothetically speaking), or if Kabir trusts a friend to give him a more reliable translation, Kabir might prefer to read that instead.



Secondly, the image of a fire engine might not be something that Kabir might see around in his town. It might be the image of a fire engine that is seen in the US. So, the renarrated page $Hindi(P)$ might also substitute an image of a fire engine found in India instead. This kind of cultural renarration is something that is harder to achieve with a language translation service.

The other ways in which the re-narration approach might address language barriers are when (a) an audio narration in Hindi is available for the English text on the page, (b) when a Hindi audio track is available for an English video, (c) Hindi textual commentary is available for an English video.

2.2 Literacy barriers

The Web is text-dominated. In countries like India, literacy cannot be taken for granted. Yet, this does not necessarily imply that an illiterate person cannot comprehend complex issues if that content is made available in a different format. For example, audio and video might be more appropriate, especially for those steeped in a oral culture (even if literate) as opposed to a written culture. The internet at large implicitly assumes a written culture. Once again, the re-narration approach provides a good way to address this problem. So, when a Hindi-speaking, but not Hindi-literate person visits the fire-safety page, presenting that person with a Hindi textual translation is not very useful. A Hindi audio or video of fire safety issues might be a lot more helpful to that person.

2.3 Other accessibility issues

Sometimes, a page might be inaccessible simply because of poor writing, or because the writing is too technical. In those situations, alternative narrations that simplify the issues or explain the issues more clearly or succinctly might be helpful. For example, if the Government publishes a new law, the implications or salient features of the new law might not be easily comprehensible to everyone who visits that page. Commentaries about the law might be more appropriate. So, a re-narration service might act as a bridge connecting technical pages with simpler narrations.

2.4 Accessibility in general

We now present a model of the re-narration approach, which we believe captures the various forms of accessibility discussed in the previous sections.

Let G be a directed graph where the nodes are documents that exist on the web. There is an edge from d_1 to d_2 with a label L , if d_2 is related to d_1 in the sense described by label L . Strictly speaking, d_2 and d_1 could reference the same URI-accessible document, where d_2 is a transformation of d_1 . For example, d_2 could be a re-rendering of d_1 where d_2 is WAI-accessible to someone with color-blindness, or d_2 could be accessible to vision-impaired people.

WAI concerns itself with generating relatedness for pages that are appropriately marked up, not with identifying relatedness, i.e. the standard effectively makes it possible to generate d_2 given d_1 , for a subset of nodes in G . This kind of relatedness is primarily presentational (and thus, implicitly semantically related in a somewhat obvious way).

Re-narration concerns itself with more generic semantic relatedness of documents. In addition to generating L -relatedness, it also concerns itself with identifying L -relatedness and possibly, requesting the creation of a L -related document. So, given a document d_1 , it is interested in finding (either by identifying an existing one, or by generating one) a d_2 that is related to d_1 in the sense of L .

This is a hard problem to solve efficiently for different notions of L -relatedness. Given a document d_1 , how will the set of L -related documents be discovered? Will they be generated (ex: machine translation across languages)? Or will they be fetched based on existing semantic markup on d_1 (ex: WAI guidelines)? Or, will they be fetched based on existing semantic markup on d_2 's (ex: RDF, semantic tags)? Or, will a document repository (e.g.: the web) be crawled to identify the set of L -related documents?

Given a candidate document d_2 , what metrics will be used to determine if d_1 and d_2 are sufficiently closely L -related? If multiple d_2 's exist for a given d_1 , will an implementation present all, or pick one? In either case, what metrics are used for ordering d_2 's.

Clearly, different domains and applications will require different standards of L -relationship between d_1 and d_2 , and different ways of computing relatedness and different ways of presenting one or more d_2 's.

Given this model as a way to think about renarrations, we

can identify a few different related sub-problems that need to be solved.

Consider the scenario where A visits a page d .

- How does A specify the desired re-narrations, i.e. the set of L that A is interested in?
- Given a L , how is $L_{related}(d)$ computed? Is it fetched from a server? Is it generated by transforming d on the fly? Or does the service let A order new re-narrations for d which might be fulfilled in the future?
- If $|L_{related}(d)| > 1$, how are the elements in this set ordered? Does A decide the ordering? Or, does the service that A depends on provide the ordering? Is there a hybrid?

From the viewpoint of a renarration service, the considerations are:

- *Renarration domains*: How does it specify L , the set of labels for which it provides re-narrations?
- *Source documents*: Given an L , how does it identify the set of documents for which it provides re-narrations? Does it depend on users to submit documents along with their renarrations? Does it crawl the web looking for annotated documents?
- *Target documents*: Given an L , and a set D of documents for which re-narrations are sought, how does it fetch renarrations for each $d \in D$? Are re-narrations generated automatically? Are they fetched by crawling the web looking for annotated documents?
- *Result ordering*: Given a set of renarrations for a document, how are they ordered? Is it user-specific? Is it user-independent? Or is ordering an additional layer on top of this?

2.5 Document restructuring as an accessibility strategy

So far, we have described the problem of accessibility of a document d_1 in terms of finding (in whatever way) a document d_2 which is a L -renarration of d_1 . However, as described in the previous section, sometimes d_1 and d_2 could be the same document where d_2 is just a DOM restructuring of d_1 .

All the common accessibility issues currently handled by browsers can be recognized as being a restructuring of the document. For example, reading alternate text for images when a blind person visits the page can be seen as a restructuring where images are replaced by the alt-text. Or, if the document provides text captions for a video, when a deaf person visits the page, the document can be restructured to display the text captions directly below the video. Similarly, when a colorblind person visits a page that has red on it, the browser might rewrite the page to replace all uses of red with a different style altogether.

So, making a document D accessible might sometimes require restructuring it so that it is rendered differently without having to fetch a renarration for it. So, L -relatedness in this context requires the specification of rewriting rules. For existing accessibility problems discussed earlier (blindness, deafness, color-blindness), the DOM rewrite rules are more or less hardcoded in the device. In certain cases like JAWS devices, JAWS enables customization via a scripting language.

The traditional solutions for accessibility are designed to work for all pages that a user might visit because they implement a fixed rewriting strategy. However, using restructuring as a model for accessibility frees an implementation from having to implement a specific form of rewriting – all it needs to be able to do is provide support for rewriting a DOM based on a rewriting specification, for example, XSLT transformations. Or, these can be based on standard term rewriting techniques (ref?). But, the important thing is that these rewriting rules might be provided by a user, the page author, a third party, or even the renarration service (which could, if it so chooses, implement a fixed rewriting strategy like existing solutions).

So, we have two seemingly orthogonal approaches: fetching re-narrations of a page from somewhere else on the web, and restructuring a page in place based on a spec without fetching anything externally. However, it is possible to combine these approaches, where rewriting parts of a document requires fetching a re-narrated snippet from an external service.

2.6 Re-narration: a new way of addressing accessibility on the web

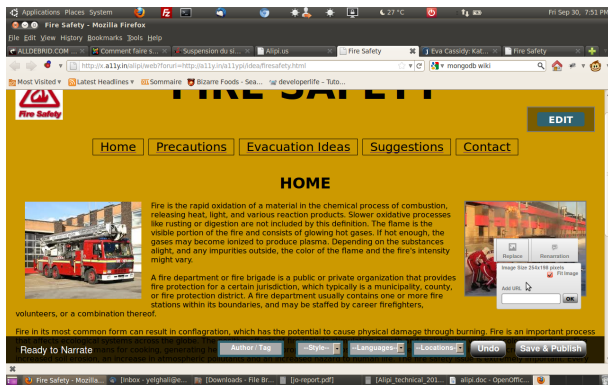
The WAI section of the W3C website, under the *Designing for Inclusion* section says:

Inclusive design, design for all, digital inclusion, universal usability, and similar efforts address a broad range of issues in making technology available to and usable by all people whatever their abilities, age, economic situation, education, geographic location, language, etc.

We believe that the re-narration approach presented here is one way of moving the web towards more inclusivity. It doesn't prescribe a specific implementation or the choices that any implementation has to make. It just helps us think about the problem of accessibility more broadly and move the discussion towards inclusion as quoted above.

3. ALIPI: A PROTOTYPE RENARRATION IMPLEMENTATION

We now describe *Alipi* (alipi as a word means analphabet or text-impaired or illiterate), a prototype renarration implementation that is accessible at <http://alipi.us>. Alipi is supported by a set of tools that demonstrate the feasibility of the renarration approach. It is a "crowdsourced" renarration approach.



Alipi.us is a site that lets a visitor visit any page on the web with the ability to generate renarrations for it. In addition, it also lets the user see any existing renarrations that exist for that page.

When a user visits a page p_1 and generates a renarrated page p_2 , the user can label the edge from $p_1 \rightarrow p_2$ with a 2-tuple $\langle l, r \rangle$ where l is the target language of p_2 and r is the geographical region for which this renarration might be pertinent.

Thus, Alipi does not pre-determine the set of source documents which are renarrated. These are entirely determined by the visitors to the site. The target documents are also not pre-determined and are generated by the visitors to the site. In this sense, Alipi can be considered to be a crowdsourced renarration implementation.

When a visitor visits a page p , if multiple renarrations exist for it, Alipi presents the user with a list of all existing renarrations ordered chronologically. This solution is sufficient for now, given that this is a prototype implementation with a low volume of renarrated pages. But obviously, this is not a scalable solution. In future, we'll investigate other ordering solutions including, but not limited to relying on trust networks, page rankings, etc. An additional problem that would also need to be addressed is one of spam. How do we recognize spam submitted as renarrations? We believe this problem also falls squarely within the ordering problem. For example, if a user chooses to only see renarrations from people in his/her trust network, then spam ceases to be an issue in that context.

In the coming sections, we present additional details about our implementation.

3.1 The authoring-tool

The authoring tool (see Figure 3.1) allows a user to renarrate a web page of choice. It makes the page content (sub-trees/terms in a page) editable by giving the user the possibility to:

- replace a text content with text and/or provide an audio description of it,
- replace an image with another image more suitable for a given target - for example, cabs are yellow while in NYC but black in London,

- indicate the style of the re-narration - example: a summary, a translation...etc,
- indicate the language of the re-narration,
- indicate the geographical localization of the targeted community,
- enter tags - example: the name as the re-narration author,
- and post the narrative as a post on their own blog - which for now has to be a Blogspot blog.

While other implementations may choose to do this differently, Alipi currently requires all renarrations to be publicly accessible pages on the web. It does not store any of the renarrations in a centralized server. A user who authors a renarration can either publish it on their own Blogspot blog (which is currently used as a proxy for a decentralized renarration storage server), or it lets the user publish it on a blog that Alipi maintains for the purpose of publishing user's renarrations. Alipi has chosen this decentralized renarration model for a couple of reasons: (1) it lets users maintain control over their renarrations and edit it and update it at any point (2) it removes a tight coupling of documents with their renarrations and lets renarrations be any document on the web whatsoever.

3.2 The rendering tool

Alipi's rendering tool allows a user to view a list of target for which alternative narratives are available and select one.

In addition, by default, for a chosen target language, Alipi also presents the user with a renarration that is a merge of all existing renarrations for that target language. The reasoning behind the merge is to pick different renarrated fragments (as identified by the xpath id of the source page) from different documents and present the most complete renarration possible. It currently resolves conflicts by picking the fragment from the most recent renarration. As discussed previously, this is just a simple strategy for now. In the future, we'll experiment with other ordering strategies.

3.3 The server support

The posts concerning *alipi* narratives are indexed on an *alipi* server by crawling the content and the meta data in the tags of the posts in blogs. The server also responds by returning available narratives for a given url.

3.4 Plugin, mobile app and tool bar

Alipi Firefox add-on helps in indicating to a user when alternative narratives are available for a url. In the future, this can be configured to indicate only if narratives are available that are suitable for the user. An Android browser app allows a mobile user to select a suitable narrative if available. A tool bar can be included by the site owners to promote, organize and recommend alternative narratives of the content on the site.

The initial version of *Alipi* browser extension is implemented as a Firefox plugin *alipi.xpi* [14].

Groups in South Asia (the nations and governments in the region, as well as service providers) need frameworks that accommodate the semi-literate. It is especially important that such efforts employ collaborative design and use, rather than one-way models of information dissemination. Social science research as well as our own experience in rural development has shown us that in many semi-literate contexts, information is collectively shaped and shared, and transmitted in multiple formats. We have termed these practices “re-narration”, that is, the re-shaping of information for different contexts.

4.2 Accessibility and the Print Impaired

There are several assistive technologies used for web browsing such as screen readers, speech recognition, screen magnification and keyboard overlays. Web-page authoring guidelines developed by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C) help in understanding and implementing accessible content. However, these guidelines do not have a prescription for the semi-literate, or print-impaired, to potentially meet the needs of an ‘oral web’. The issue of Web-accessibility for the print-impaired can be considered as the issue of the next-phase of Internet users - the next billion new users who may not be as literate as the earlier Internet users. This is a large class of people who cannot read the content on Web-pages and will include billions of people who are semi-literate but might soon find it easy to access the Web through their mobile phones. This is also an issue for inter-cultural inter-language inter-contextual communication that the current web is trying to cope with.

On the one hand, we need to look at how to author Web-pages - the structure, appropriate tags and meta-tags, can help. On the other, we must inspect how Web X.0 can be utilized in making content accessible to a wider audience than what the original author could achieve. Such collaborative approaches are promising for making content creation feasible in terms of quantity (the number of re-narrations in various languages/audio/form) and quality (contextualization).

4.3 Schooled Communications

There is a profound lack of appropriate and effective learning opportunities in remote, rural and resource-poor parts of the world. Schools, by and large, do not cater to informal or life-long learning needs of adults and youth. Universities and colleges have at best a limited footprint in rural and remote areas, where courses are rarely framed to meet the livelihood, health or development needs of communities or their members.

4.4 Alipi Culture?

The process of Community Radio promises to play a significant role for assisting in developing a culture of dialogue and sharing information localized to community needs. The penetration of smart phones into developing regions, and the launch of low cost tablets can radically increase the reach of the Internet in developing regions. There are new challenges for designers and users to re-narrate web content in ways that increase sharing rather than shut down collaborative possibilities. One of the most interesting challenges, we suggest, is the possibility for collaborative re-narration of web

content. We have proposed an approach, called Alipi [1][2], whereby users can access re-narrated content while also being able to provide alternate narration, either in a different language script or as an audio segment, in a decentralised manner.

One use of Alipi might be to enable localization and contextualization of laws and policy documents that concern the citizens of a country, such as India, so that these documents become available on the mobile phones of the many print-impaired people. Towards this, we have authoring guidelines that document authors can use. Then the re-narration model can be used as an effective process that can be initiated via the communities of interest or through those who have a mandate towards such activity. [3]

Moderation is via Filters which help identify communities of interest in certain context. For example, in the case of government documents that are put online, it may be natural for the authorities to announce the authorized re-narrators on their web-sites. This becomes a directive to the narration recommendation algorithm using which only the official translations or localizations/contextualizations are provided as choices to a user.

This notion of Filters can also help bring to the Web, a parallel of print and news media organizations. For example, a bangalore.healthren.org can announce a Filter with a list of favorites who they recommend as good re-narrators for health related web-pages for the locality of Bangalore, Karnataka. A user can subscribe to this Filter and choose the narratives from this list over others. However, it can remain as an end-user choice in spite of these suggested or authorized Filters as user can prefer the narrations from a list of friends over that of the authorized or that of the subscriptions, esp., in certain cases. [15, 16]

5. RELATED WORK

Various annotation mechanisms and frameworks have been in the works like Annotea [8]. The Social Semantic Web [5] is a new book that provides an overview of how interplay between semantic web and social networks are natural. Universal Subtitles [21] and TED open translation [24] are examples of community sourced re-narration for subtitling needs. Also [6]. Web Accessibility and Standards [18] [30] [26] [28] are defining the accessibility issues and guidelines for disabled users.

Stumpedia[4] is website in which humans drive the activity of reviewing and ranking web pages and search results are based on personalization parameters. This approach is similar to re-narration in that both rely on user personalization, but different in that use the personalization information to do different things: in the re-narration web, the user chooses a re-narration, whereas in Stumpedia the personalization impacts the search results. Also, in Stumpedia, there is no notion of re-narration (as in page or element replacement).

Alipi related references are Alipi wiki [13], Alipi idea [10], al1y.in [11] and Alipi Report [23].

Readability [22], Aural style sheets [27], semantic tagging [25], Semantic Authoring By Tagging with Annotea Social

Bookmarks and Topics [2], Internet Peer reviewed [17], Active Distributed Social Networks [19], HTML5 [3] and XPATH [1] are relevant to this work.

6. FUTURE WORK

There are many aspects of the proposed approach that need to be pursued. Re-narrations are done for a target community in mind. We are letting users indicate a target community using the attributes language, location and level. We now recognize that a user belongs to a target group by letting them choose a target manually. We are working on identifying targets and recommending the most suitable narrative using an ontology service to identify and match narrations to target users [7].

Assessing trust of content authors requires a trust model for contributors. When there are more than one re-narrations a choice of which one to render must be made. Such choices can be based on author rating or on what most users who identify with a target community choose. Another option is to present alternative views for which a ranking among choices is required. Again, rating or user choice is relevant for this purpose. For user preferences friendship networks based on like, follow or such relations could be utilized. Mapping such friendship networks based on narrators and users will lead to analysis of narrator blogs based on usage stats. For now, we are relying on the *filters* to help deliver narratives that are recommended by communities. We consider this as the beginnings of user subscription to subject and location specific filter maintainers.

The plugin tool for re-narration is a proof of concept tool. The functionality and usability of the tool is being addressed with feedback from various groups of people. This is also being developed as an Android app and tested with mobile users including non-literate users.

Also more detailed examination of mobility as how it relates to content rendering is required. At present, the focus has been on content creation and its composition. Clearly, the composition must be suitable for the devices they are delivered on and the context of the viewer. For example, if they are in a state of movement – as often is the case – content must be organized in a manner appropriate for the attention span of someone in mobility. This might in various cases be quite useful for non-literate users. Another challenge is version consistency of content, and related authoring guidelines such as using more ids in the page.

7. CONCLUSIONS

We consider the accessibility of Web content to as many people as possible to be very significant. Automatic translation or systematic transformations by dedicated persons/machines not very feasible. This is especially true when contextualization comes into play. Fortunately, there are many Netizens who are very capable to perform these tasks. They can identify and articulate content in alternate in an appropriate manner – both in terms of meaning and in form. Socially networked uses of collaborative web design can lead to potentially infinite “re-narrations” of web resources. The new architecture we propose builds on rich ontological structures shared across social networks created in a distributed, decentralized manner, used with browser plug-ins and server-

supported web applications. We build on recent advances in the architecture of Semantic Web; distributed active social networks [19] and Ontology servers [7]; browser based editors for re-narrations [20], HTML5, Web 2.0, browser extensibility, smart mobiles [12].

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