Abstract

Web Content Accessibility Guidelines (WCAG) and the Accessible Rich Internet Applications (WAI-ARIA) constitute core accessibility resources for Web designers and developers. To explore their deployment, I conduct interviews with 10 practitioners who use WCAG and WAI-ARIA in their work. Using techniques derived from grounded theory and situational analysis, I develop the concept of conformance work. Conformance work refers to how designers and developers develop harmonized interpretations of WAI-ARIA and WCAG, and the Websites these specifications are meant to instruct. Conformance work is the upstream work designers and developers engage in to invest categories such as “standards compliance” and “Web accessibility” with meaning.
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Introduction

The World Wide Web Consortia’s Web Accessibility Initiative (WAI) (W3C, 2009) responds to Web inaccessibility to many disabled people that has arisen coeval to the Web’s evolution. It is both a remedial and proactive infrastructure, providing technical specifications such as the Web Content Accessibility Guidelines (WCAG) (W3C, 2008) and the Accessible Rich Internet Applications suite (WAI-ARIA), a new standard for so-called “Web 2.0” applications (W3C, 2009b). These texts provide rules towards the aim of producing content that is interoperable with user agents such as assistive technologies (ATs) and authoring tools. Towards the goal of interoperability, the WAI also includes User Agent Accessibility Guidelines (UAAG) (W3C, 2002) and Authoring Tool Accessibility Guidelines (ATAG) (W3C, 2000). According to the rhetoric of the WAI, when these texts are implemented by all the parties invoked by the WAI, Web content can be claimed to be robust and flexible enough to account for the range of ways that people experience the Web.

As a part of my research, I conducted a study to explore how WAI-ARIA and WCAG affords for Web designers’ and developers’ practices. Inspired by grounded theory (Strauss & Corbin, 1998), I asked how Web designers and developers from multiple sites put the WAI to

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1 Disability is a contested space. In my study I assume some basic positions on disability. I use the language suggested by the social model of disability (Oliver, 1998) which reflects my understanding of “disability” as a group united by shared oppression (Linton, 2006). However, I also understand disability as a space for questioning (Titchkosky, 2003; 2007), for example, of norms of information technology.

2 WCAG 2 refers to an AT as “hardware and/or software that acts as a user agent, or along with a mainstream user agent, to provide functionality to meet the requirements of users with disabilities that go beyond those offered by mainstream agents” (W3C, 2008). Seelman (2005) notes there is no internationally recognized standard or definition for what an AT is, but suggests the term deserves critical attention. I suggest technology that is not inscribed as “assistive” might be probed for how it is that ability is produced.
use in their jobs. I interviewed 10 practitioners. My study was initially motivated by the fact that different orientations to Web accessibility represented in HCI literature, such as contextually-based (Kelly, Nevile, Sloan, Fanou, Ellison & Harrod, 2009) and “Social Accessibility” approaches (Takagi, Kawanaka, Kobayashi, Itoh & Asakawa, 2008) utilized the same sets of WAI texts to different ends. Bowker and Star (1999) observe information systems inherit the base inertia of the systems they are installed upon. This raised the question of what influence the WAI’s texts have on the work of individuals and teams. (My work focused primarily on individuals.)

The main contribution of my study is the category of *conformance work*. This category explores how practitioners realize standards and guidelines compliance for Web accessibility, through developing understandings of what “conformance” and “accessibility” entails. Conformance work explores how harmonized interpretations of WAI-ARIA and WCAG, and the webpages these texts are meant to instruct, are developed. I find an array of social and technical contingencies are implicated in the work of crystallizing what conformance ought to be. These include the practical and working arrangements developed on the job, articulation of end users and user agents, enrolled tools, and various recording practices that indicate how harmonized interpretations have been developed.

### 1.1 Assumptions and key terms

I now articulate some of the main assumptions of my study through outlining some key terminology I use. I begin with “infrastructure” which is often referred to in a strictly technical sense (Star & Ruhleder, 1995) for example, as the hardware or software needed to keep a system running (Reitz, 2004). Such purely technical accounts are troubled by Clement and Shade (2000), who conceive of access to information communications technology as encompassing
several socio-technical layers (e.g., governance, literacy/social facilitation, services/access provision, content/services, software tools, devices, and carriage) (p. 37). I adopt Star and Ruhleder’s (1995) conception of infrastructure as something that emerges in relation to organized practices: “an infrastructure occurs [emphasis added] when local practices are afforded by larger-scale technology, which can then be used in a natural, ready-to-hand fashion” (p. 6). This definition is a key concept in infrastructure studies, which sees infrastructure as being comprised not only of software and hardware but also of organizational arrangements, people, technologies, classification, and standards (Bowker, Baker, Millerand & Ribes, 2009).

Infrastructure studies’ intellectual lineage is in science and technology studies (STS). STS sees concepts such as “technical” and “social” as co-constitutive and its approaches involve “thinking about technologies not as singular objects but as heterogeneous assemblages of socio-material practices” (Wajcman, 2006). Sociological studies of work, for example explorations of visible and invisible work (Suchman, 1995) are also influential to infrastructure studies.

My study draws from infrastructure studies’ understanding of infrastructure in a number of ways. Firstly, because standards are a way infrastructure “takes on transparency” (Star and Ruhleder, 1995, p. 5), infrastructure can be followed through tracing the work practices of individuals and how these practices articulate with its standards. As recent studies of scientific cyberinfrastructure indicate, it is inadequate to think of IT practitioners as the “means” to accomplish other work because of the profound influence of IT in the curation of scientific data (Ribes, 2005). This observation is portable to studies of Web infrastructure, because practitioners themselves, rather than merely “implementing” WAI-ARIA and WCAG, actively shape how people experience the Web and invest accessibility with meaning. The view that infrastructure becomes encompassed by arrangements of people, technologies, and values poses a methodological challenge of how to meaningfully address complexity. Towards this end, in
addition to using basic grounded theory procedures as analytical tools, I employed situational mapping (Clarke, 2005) as a heuristic to ask how nonhuman actors, extant discourse, and social worlds make themselves consequential in my research. The methodological imperative is to try to reconstruct the messiness of working with Web technologies, which allows for the exploration of how accounts of negotiating with clients (and others) and making tradeoffs – as well as the efforts that aren’t “visible” or quantifiable to compliance metrics – become implicated in conformance work.

Taking a different line on the theme of visibility, disability studies scholarship is not usually placed in conversation with information systems studies of WCAG (Adam & Kreps, 2006) or of IT and “new media” (i.e. the Web, mobile telephony, and digital broadcasting) more generally (Goggin & Newell, 2003). Disability studies perspectives also shape my study’s understanding of how Web accessibility infrastructure can be addressed through a critical understanding of “disability” (as well as categories such as “ability” and “normal” and terms such as “inclusion” and “accessibility”). In Western contexts, disability as a category is usually invested along narrow bio-medically defined norms (Oliver, 1998; Linton, 2006), a move I wish to avoid. In terms of grappling with accessibility theoretically, researchers Titchkosky (2003; 2007) and Goggin and Newell (2003; 2005; 2007) provide useful tools. The former pursues disability as a discursive space for probing questions of normative citizenship (2003) and accessibility in the academy (2007). The latter understand disability as a contested socio-political space that (like IT) is socially shaped. Both pursue research conversant with Foucauldian perspectives and the latter with science and technology studies. These and other disability studies research provide theoretical context and cross-fertilize with infrastructure studies approaches that avoid painting Web accessibility problematics in strictly technical terms. Certainly, Web inaccessibility is connected to a number of technical barriers. Lack of keyboard navigation, small
text, overlapping text, improper color combinations, lack of alternative text, distracting animations, uncaptioned video, and non-semantic markup are some examples of design that presumes non-disability. These and other circumstances create incompatibility problems for ATs and prevent content from being accessed in ways that are agnostic towards the diverse ways people experience and contribute to the Web. Inaccessibility also puts an onus on disabled people to “adapt” to inadequate Web design. This creates what Goggin and Newell (2003) refer to as the “double bind” of disability and the Web: whereby disabled users have to know additional skills and workarounds – above and beyond what nondisabled users require, to access content (if that content can be accessed at all). It also underscores the importance of attending to the social contexts of design, since design does not occur in a social vacuum (Imrie & Hall, 2001).

2 Literature review

The inclusion criteria for my literature review is as follows: sociologically or culturally informed accounts of disability, technical rules (e.g., standards and guidelines), and the WAI. The first two sections of the review provide a general intellectual background for exploring standards. Section 2.1 explores critical perspectives on disability and technology, and section 2.2 outlines some accounts of standards that are informed by sociology and science and technology studies. After this background is provided, section 2.3, the last part of my review, historicizes the emergence of the WAI. This section also describes the basic features of WAI-ARIA and WCAG, two key texts my participants use, since readers may not be familiar with these texts.
2.1 Disability, technology, and preoccupation with “standard” bodies

Many critical perspectives on disability are germane to studies of Web infrastructure. In this section I touch on but a few, including the social model of disability and literature that explores the socially and culturally contingent ways in which meanings of normalcy are produced. However, there is a lack of disability studies-informed research on Web accessibility-related work practices.

A dominant way of conceiving disability in Western cultures is through particular individualizing discourses that locate the “problem” of disability within the individual (Oliver, 1996). Through this frame, disability stems from the “functional limitations or psychological losses which are assumed to arise from disability” (Oliver, 1996, p. 32). The pathologizing gaze of medicalization, as Oliver (1996) argues, forms a component of individualizing discourses, which do little to dispel popular notions of disability as tragedy or a thing to be measured or eradicated against non-disabled norms. For Linton (2006), a consequence of the medicalization of disability is that certain forms of human variation are cast as deviance from the norm, “as pathological condition, as deficit, and, significantly, as an individual burden and personal tragedy” (p. 162). For Stienstra and Troscuk (2005), the relationship between technology and individualized conceptions of disability is “corrective”, whereby technological interventions are employed on a case-by-case basis to rehabilitate those “compared unfavorably” with tacit norms.

Ellcessor (2010) and Goggin and Newell (2003; 2007) link the genesis of Web accessibility concerns to efforts from Western disability civil rights organizations and activists. Starting around the 1970s, such individuals and groups began to seek legal and policy frameworks to remedy inequities, establish rights, and promote social change. During this time the social model of disability arose (Oliver, 1996). It frames the cause of disability as social oppression, whose effects result in exclusion from mainstream society (Oliver, 1996). The social
model perspective reinvests the category of disability with the meaning that disability lies not in an individual’s impairment, but in “society’s failure to provide appropriate services and adequately ensure the needs of disabled people are fully taken into account in its social organization” (Oliver, 1996, p. 32). It argues disability and impairment are different, allowing for the conception and re-inscription of disability as a social/political category that binds common social/political experience (Linton, 2006); this has been immensely important for rights movements. For Stienstra and Troschuk (2005), a social model perspective on IT suggests understandings of disability and technology are socially constructed and sustained through oppressions within society. Social model perspectives also ask which organizations claim authority on disability (Oliver, 1996). This is reminiscent in some ways of Goggin and Newell (2003) who analyze how state- and industry-funded AT and equipment purchasing schemes, and various professional groupings such as those of medical practitioners, wield powerful influence over which citizens receive disability products or concessions.

While it proves an effective political tool, the social model is claimed not to be social theory, although it is often used as if it is one (Oliver, 1996; Shakespeare, 2006). As a theoretical account of disability, Shakespeare (2006) critiques the social model for its “neglect of individual experience of impairment”; its definition of disability as oppression, and claims that in terms of the lived experience of disability, “social and individual aspects are almost inextricable” (Shakespeare, 2006, pp. 200-201). As Tukala (2009) suggests, the social model is problematic in that categorical reinvestment also masks difference; classification can be a two-edged sword (see also Bowker & Star, 1999).

Moving to theoretical accounts of disability, meanings of normalcy can be understood as emerging from particular cultural and historical contexts that speak to the constitution of and situated states of normalcy. As Wendell (2006) observes,
Not only the “normal” roles for one’s age, sex, society, and culture, but also “normal” structure and function, and “normal” ability to perform an activity, depend on the society in which the standards of normality are generated. Paradigms of health and ideas about appropriate kinds and levels of performance are culturally dependent (p. 244).

In England, the idea of the “norm” - as a word and concept related to notions of the body, nationality, race, criminality, sexuality, and morality - emerges in the mid-eighteen hundreds, alongside the rise of industrialization (Davis, 2006). The development of the ideal of a normal or standard human was bound to the emerging discipline of statistics which in turn had strong ties with the idea that the development of state and managerial policies should be rooted in numbers (Epstein, 2009; Davis, 2006).

Many categories by which we think about people and determine the actions that are open to them gain significance through statistics (Hacking, 1991). From a Foucauldian perspective, the isolation, correction of, and surveillance of deviance is seen in the context of the disciplinary techniques that emerge in the penitentiary, but extend beyond their walls as a “carceral archipelago” to the wider social body in Europe beginning in the eighteenth century (Foucault, 1977, p. 298). Bio-power - control over life - manifests in discipline of individual bodies (“anatomo-politics”) and the social body (“regulatory controls: a bio-politics of the population”) (Foucault, 1978, p. 140). For Foucault, state and administrative concern for “population” - with specific phenomena and particular variables - is one of the techniques of power that emerges (1978, p. 25-26). Germane to bio-power is the idea that disability can become known through numbers and categorization. It is not coincidental that as state counting practices arose, the term “the disabled” became a variable for the management and control of people through providing a foundation for programmatic attempts to “solve the problem of disability” (Titckosky, 2003, p. 520). Categories also create invisibility (Bowker & Star, 1999); in addition to shoring up the notion that disability is a variable organically attached to a population, it silences more radical
ways of knowing disability (Titchkosky, 2003) as well as other facets of self-identity. One result of making people known through fields of comparison is, as Titchkosky articulates it, a liminal positioning of disability, where:

disabled people are situated between 1.) the possession of an abnormal thing that leads to a departure from normalcy and 2.) the desire for inclusion in an abstract version of normal citizenry detached from bodily, sensorial, or mental differences... What is to crystallize are “citizens with disabilities” who are those types of selves able to adapt to and live with such cultural contradiction. These citizens with disabilities, if they become the abled-disabled, can now serve the normative social order (2003, p. 537-538).

Normativity, as it relates to notions of the “standard human” and the conditions governing citizenship, has thus been characterized as an instrument of discipline used to support the cultural and social norms of the historical moment in which it operates. The idea that Web accessibility work can constitute “good business”, as I explore in section 2.3.6, is connected to the idea of disability as a population that can be marketed to, although this representation has stark limits.

Cultural preoccupation with standard bodies manifests through designs presuming “users” as youthful, non-disabled, and free of illness or injury or other needs and preferences. In his studies of architecture, Imrie (1998) finds these assumptions operating in collusion with a variety of conditions – modernist aesthetics, preoccupation with a (certain kind of) form over function, professional elitism, and corporate economics (pp. 130-134). Architecture and Web development have obvious dissimilarities. For instance, remedial access directives for buildings can be much more costly and involved than fixing software. Moreover, code – especially if it is free or open source – is much more malleable in comparison to concrete. However, Imrie (1998)

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3 I thank Jutta Treviranus for this observation.
4 Likewise in both architecture and software it could be argued that accessibility is dominantly constructed as an “add-on”; disability is similarly constituted and even included as “exclude-able” type (Tichkosky, 2003; 2007).
and Imrie and Hall’s (2001) observations do lend themselves to the analysis of how Web design and development practices put WAI infrastructure to use: Designers (be they architects of concrete or Web content) do not design for “standard” humans in a social vacuum. Several critiques of software design suggest the prominence of design for non-disability. Goggin and Newell (2005) borrow on Foucault (1978) and illustrate how, vis-à-vis the social shaping of disability, mobile telephony and telecommunications act as the “vascular network” of governmentality. They place their argument within the context of Western de-regulation of telecommunications infrastructure, where businesses are thought to be in the best position to deliver mobile telephony and where citizens are constituted as consumers (strong parallels to Gandy (2002) are evident). In this sphere, disabled people see their participation in the expansion of telecommunications technology and globalization governed and disciplined by very narrow norms (Goggin & Newell, 2005). Within a network of mobile government, Goggin and Newell argue, disability and ability can be conferred and regulated. For example, through mobile telephony, Deaf and hard-of-hearing people became strong users of text messaging and yet GSM phones were also designed in a way that was obstinate towards hearing aids (Goggin & Newell, 2005). Goggin and Newell connect both of these “unexpected” uses and problems with technology to disability’s exclusion from development processes, but coeval to this, they develop a critique of inclusion. Power works at a variety of levels in the calling up of disabled people and the disability movement to become active as consumer-citizens, to help formulate the “choices” about the IT products and services they receive; to regulate professional expertise and help form policy and regulations (Goggin & Newell, 2005, p. 271). They argue this calling up works to sustain the idea of disability as an “add-on” requiring “special solutions” whereby disability

\[5\] This calling-up occurs despite the fact that disabled people are not typically considered “active” citizens.
(construed as deficit or deviancy) is included in the accepted and unchallenged social order (Goggin & Newell, 2005, p. 272). For Goggin and Newell, governmentality works as a way to frame telecommunications as a system of power governing disability and not “merely” technology (2005).

One element to narrow in on is how designers and developers – and “information professionals” of all stripes, for that matter – are trained with respect to what Stienstra and Troschuk (2005) refer to as the “bare minimum of accessibility knowledge” – technical standards and guidelines. Eyadet and Fisher’s (2007) study of the California State University Information Systems curriculum revealed poor awareness among students of WCAG, Section 508 and the WAI. This study indicates the importance that educational interventions could have on the work practices of future professionals. Good Web design is often conflated with visual aesthetics (Chaudhry & Schipp, 2005) and the adoption of “innovative” technologies such as AJAX, JavaScript and Flash (which are discussed vis-à-vis the rise of the WAI-ARIA in section 2.4.6). This reflects the powerful assumption in the West that vision is the dominant sense (Howes, 1991, in Titchkosky, 2007) and thus that visually presented and structured information is “universally accessible” (Chaudhry & Schipp, 2005). This is one example of how meanings of normalcy are culturally and historically contingent and can act to produce “standard” technology that precludes the use by some. Now that I have summarized some critical accounts of disability and accessibility, I will next turn to some analytical characteristics of standards and guidelines, which are very often assumed to be outside the “social order” because of their technical or mundane nature (Star & Lampland, 2009).

2.2 Standards and guidelines

This section of my thesis reviews literature on how standards and guidelines are developed and enacted, and discusses some of their basic properties. It suggests preliminary analytical ways
Guidelines resemble Bowker and Star’s (1999) and Star and Lampland’s (2009) accounts of standards, and focuses on some of the implementation difficulties and controversies surrounding WCAG. In the Pragmatist tradition (see Bowker & Star, 1999) I take a broad view of standards so those things that can be seen to be doing the work of standards (but not technically definable as standards) can be explored as such.

2.2.1 Standards
A theme through much social science literature about standards is that standards are not neutral technical vehicles. The Dictionary of Computing defines a standard as a “publicly available definition of a hardware or software component, resulting from international, national, or industrial agreement” or “a product, usually hardware, that conforms to such a definition” (2008).

Described by Star and Ruhleder as the way infrastructure “takes on transparency” (2005, p. 5), standards are an important component of information communication technology infrastructures. In their study of large-scale classification systems, Bowker and Star (1999) provide an analytical framework for understanding standards. This study adopts their idea that a standard is a “set of agreed-upon rules for the production of (textual or material) objects” (Bowker & Star, 1999, p. 13). Additionally, Bowker and Star (2000) offer that standards can encompass a number of related dimensions, which I will now summarize and relate to extant supporting literature. First, standards have spatial and temporal aspects (Bowker & Star, 1999). A canonical example is that of Greenwich Mean Time, which purports to allow people to connect across different geographical sites and times to get work done.

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Thévenot (1984) describes GMT as almost universally stable; he also discusses the heavy investments that were required to give standard time its form (they included technical/scientific instruments, communications mechanisms, legal definitions, and international agreements and negotiations).
Second, standards have the ability to make things work across heterogeneous metrics (Bowker & Star, 1999). One example is how large-scale information infrastructures like the Internet and Open Systems Interconnection could not exist without standards because hardware and software need common languages to communicate (Hanseth & Monteiro, 1996). Another example is of the European Union, which Barry (2001) argues can be thought of not only as a political, geographic, or economic entity, but also as a shared technological formation. In the EU, shared and harmonized technical standards are used with the goal of reducing social and economic discrepancies between member states (Barry, 2001).

Third, standards are very often enforced by various bodies, such as states, legal rules, or professional or commercial organizations (Bowker & Star, 1999). This is because, as Barry (2001) observes, “a standard or a regulation does not have any natural force or intrinsic momentum. It is an authority which may be obeyed, ignored, or opposed” (p. 75). A famous example of standards enforcement in the Web accessibility realm is that of Bruce F. Sexton, a Californian who along with the US National Federation of the Blind launched and won a class action suit against the Target department store (Disability Rights Advocates, 2009) because of the Target website’s inaccessibility to screen readers. Among the stipulations of the settlement were clauses outlining how Target would be monitored and assessed according to compliance to a set of accessibility guidelines and standards (Disability Rights Advocates, 2009). Stienstra, Watzke and Birch (2007) argue that unless accessibility standards are referenced in legislation, it is unlikely that affected products will be “age and disability sensitive” (p. 157).

Fourth, in terms of standards development and implementation, “there is no natural law that the best standard shall win” (Bowker & Star, 1999, p. 14). Further, the notions of “better” and “best” are obviously normative here, often relating to overly simplistic norms. This is starkly evident in the inaccessibility many disabled people experience with technology. I will expand
upon this dimension of standards shortly in relation to accessibility problems that arose between GSM telephones and hearing aids (Goggin & Newell, 2005) and the standardization of OOXML (Hockema & Treviranus, 2008). Section 2.4 below, on the emergence of the WAI, will also illustrate some of the politics of the development WCAG and WAI-ARIA.

Finally, standards themselves have significant inertia, and can be difficult and expensive to change (Bowker & Star, 1999). For instance, Pargman and Palme (2009) describe the prevailing approach to the development of new character encoding standards as conservative and risk averse so older email clients can still work when newer standards are created.

### 2.2.2 Implementation and compliance

While a standard itself is a set of agreed upon rules (Bowker & Star, 1999), a standard’s implementation is another issue. There is a difference between a formalized standard, and the way in which that standard is implemented (Pargam & Palme, 2009). In practice, software vendors tend to implement the parts of a standard that are necessary for their product to work or compete with other vendors (Pargma & Palme, 2009). As Barry (2001) suggests, the meaning of a technical standard, its use, and its political significance are “in the hands of its readers” (p. 75). The relatively new standard of WAI-ARIA has been adopted, to varying degrees in the most popular Web browsers (such as Firefox, Internet Explorer, and Safari). But while each browser says it supports WAI-ARIA, the degree to which each browser implements the standard varies significantly.

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7 Of course, what it means to “implement a standard” is the concern of my thesis, and I will return to this throughout what follows. I thank my advisor Dr. Steve Hockema for helping me articulate this point.
Busch describes testing for standards compliance as symmetrical: Both the standard, and the thing that the standard purports to do, is tested simultaneously (2000). For instance, the *Common Look and Feel for the Internet* (CLFI) is an accessibility standard that Canadian Federal government websites must meet (Canada, 2007). Testing whether a Canadian government website conforms to the *CLFI* tests the website’s adherence to the standard, but also the suitability of the standard itself as well as contextualizing and operationalizing the notion of *adherence* for that particular standard (cf. Wittgenstein, 1953). The relational (Star & Ruhleder, 1995) quality of infrastructure suggests that the “success” of a compliant implementation is highly context-dependent. Who or what is the “user” of an allegedly conforming webpage, and under what circumstances does their relationship with the webpage occur? Does the standard itself address the right issues, and through appropriate vectors? Moreover, who decides what the “right” issues for the standard to address are, and what conformance means?

### 2.2.3 Standards of and at work

The object of standards, and standardization processes is not limited to material artifacts and extends to work itself. As Star and Strauss (1999) observe, the concept of “work” is relative – its definition depends on who is being asked, “both in the relative sense of frame of reference, and in the brute sense of who gets to define the work’s meaning” (1999, p. 13). For instance, technicians and support personal play a crucial role in the creation of scientific knowledge, but their work is usually not recognized or afforded authority (Shapin, 1989). The emotional dimensions of nursing work are often rendered invisible in health care institutions that are highly rationalized; this work nurses perform can be lost in the “interstices between clinical and documenting tasks” (Clarke, 2005, p. 92). The Nursing Intervention Classification (NIC) was an attempt by nurses to design a system that would recognize the multifaceted aspects of nursing work (Bowker & Star, 1999). In terms of the design of information systems, exclusion of certain
forms of work can mean “a displacement of that work and a distortion of the representations of that work” (Star & Strauss, 1999).

As organizational re-orientation towards re-engineering and restructuring have resulted in jobs that are more “fully describable” (Star & Strauss, 1999), one vector through which describability can be achieved is through standards and benchmarks of workplace achievement. As Busch (2000) argues, thorough Talorization also standardizes workers themselves. He points out cases in industrial agriculture in which work practice becomes so standardized, it no longer matters “who” performs the labour. A parallel can be drawn from this example to website development work. In her account of the Fluid project, an open source initiative, Treviranus (2009) suggests a variety of uneasily quantifiable approaches that can be used in design, including distributed development (requiring the ability to work with multiple stakeholders), attention to context, and usability testing. It is claimed that work entailed in approaches to development that describe themselves as holistic (Treviranus, 2009; but see also Kelly et al., 2005; and Kelly et al., 2009) cannot be validated through WCAG compliance metrics. Indeed, it may be a common assumption that Web developers and designers can “achieve” or “arrive at accessibility” by achieving compliance with WCAG guidelines or WAI-ARIA (Hockema & Coppin, 2009).

2.2.4 The standards development process
While a standard may appear to be fixed or to have resolved an issue, standards development is a process that is never completed (and the same can be argued for guidelines). New technology can destabilize an existing standard, creating conditions for a new standard to emerge (Barry, 2001); I touch on the themes of destabilization and emergence in section 2.4, and here focus on access to the standards development process itself. This is an important issue because a standard has the
power to discipline that which does and does not conform to the model of the world it puts forth (Busch, 2000). And despite the ubiquity of standards, those outside of technical fields (and disabled people in particular, e.g., Goggin & Newell, 2003; 2005; 2007) tend to have little influence in their design (see also Busch, 2000; Barry, 2001; Pargman & Palme, 2009). The disciplinary power of standards was implied in Hockema and Treviranus’ (2008) critiques of the technical inaccessibility of the OOXML document format, which was developed by Microsoft for their proprietary office suite of applications. Hockema and Treviranus define an “accessible IT standard” as one that facilitates without undo burden “the creation of compatible assistive technology” and argue that OOXML’s inconsistency, reliance on other proprietary Microsoft standards, and incompatibility towards ATs meant the document format was inaccessible (Hockema & Treviranus, 2008). Apart from these technical obstinacies of OOXML, Hockema and Treviranus (2008) criticized OOXML’s standardization, pointing out that disabled stakeholders and technologists with AT expertise were not involved in the standardization process itself and that these exclusions had consequences for the nature of OOXML. As I mentioned in section 2.1, similar exclusions happened in the development and implementation of the GSM standard for mobile telephony. GSM became a site of contestation between hearing aid users and telecom companies because the technology created a buzzing interference in hearing aids, and Goggin and Newell (2005) argue this was directly related to how GSM’s standardization didn’t involve input from Deaf and hard-of-hearing people.

2.2.5 Guidelines and best practices
It is worth noting that WCAG is a recommended guideline of the W3C (whereas WAI-ARIA is considered a standard for Internet applications). According to the Online Dictionary for Library and Information Science, guidelines may be defined as: “recommended procedures for
accomplishing a given task or achieving a set of goals and objectives, formulated by a body with authority to speak on the subject but less binding than the formal standards used in evaluation and assessment...” (Reitz, 2004). The Concise Oxford English Dictionary defines a guideline as “a general rule or piece of advice” (2008). A minor contribution of my research will be to develop an understanding of guidelines through exploring how WCAG is implicated in participants’ work practices, and thus WCAG’s analytic similarities to a standard.

2.2.5.1 Tools for working with guidelines
As with standards, software designers and developers often use tools for working with guidelines during the life cycle of the development of an application or website (Cohen et al., 1991). Tools for working with guidelines come in various forms including online documentation, and support tools that aid in inspection and evaluation. “Best practices” provide practical examples of how the principles encoded in guidelines (e.g., WCAG) and standards (e.g., WAI-ARIA or Section 508) can be implemented (Gunderson, Rangin & Hoyt, 2006, p. 269).

Many protocols can be used to evaluate compliance with WAI guidelines. Very commonly, automated and semi-automated tools are used to gauge “compliance”. Automated tools include WAVE (WebAIM, 2009), the Web Accessibility Checker (ATRC, 2008), and the W3C’s various markup validation services. These tools have in common the use of automated software to gauge such factors as whether the markup of a webpage appears “correct”. There are advantages (speed, technical correctness) and disadvantages (possibility of error) of using such software (Sloan, 2008). However, tools do not replace human judgement. For example, an automated tool may be able to detect the presence or absence of an ALT text string, but not whether the text is meaningful (Sloan, 2008; Howell, 2008) or appropriate/helpful given the

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8 By tools I am referring to specific technologies to aid in development, e.g. (X)HTML validators, compilers, integrated development environments, etc.
intended context of use of a website (Kelly et al., 2007). Semi-automated heuristics emerged, such as “barrier walkthroughs” (Brajnik & Lomuscio, 2007) that combine “live” human judgement with the use of automated checking software. With both automated and semi-automated tools for evaluating compliance, layers of complication are added to the questions of both a standard’s suitability, and of the quality of its implementation. Evaluation tools and the specifications on which they are based (e.g., WCAG, ATAG, UAAG) are highly nested and imbricated (Star & Lampland, 2009).

While a possibility of error is indeed a key drawback of automated protocols, other critiques on the use of such tools have been premised on the notion that “Web accessibility” cannot be thought of solely in technical terms. Adam and Kreps (2004) argue automated protocols can remove disabled people from the design and testing of Websites, deputizing the question of “accessibility” to machines. Much research argues manual testing and consultation with disabled Website visitors is considered an ideal way for soliciting feedback (see for example Sloan, 2008; Howell, 2008; Farrelly, 2009; Goggin & Newell, 2007; McEwan & Weerts, 2007). While the W3C maintains its own list of compliance checkers (WAI, 2006), it does not endorse any of these tools (Adam & Kreps, 2006). Having addressed many issues entailed in the development and implementation of standards and guidelines, I will now explore the development of the WAI and the characteristics of two of its key texts, WAI-ARIA and WCAG.

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9 I am not suggesting that automated software does not embody human judgement as well.

10 See also Imrie and Hall (2001) for a discussion on the limits of taking a solely “technical” approach to accessibility in architecture and industrial design.

11 An alternative reading of such calls for feedback is made by Goggin and Newell (2005). They argue governmentality in telecommunications encompasses the summoning up of disabled people and disability organizations so that they may participate as active consumer-citizens. In this manner, disability remains sustained as an add-on because the status quo remains unchallenged.
2.3 The Web Accessibility Initiative and its key texts

WCAG, ATAG, UAAG, and WAI-ARIA are guiding tools that can be used in self-regulatory, custodial, and directive/authoritative ends. Like all W3C specifications, they are intended to be compatible with one another (Chisholm & Henry, 2005, p. 32). A key goal the WAI attempts to address is how to give user agents (such as browsers and ATs) a means to scrape content for semantic information so that Webpages can be more perceivable, operable and understandable. A problem in achieving that goal arises from the ecological manner in which the WAI must be implemented. Thus, a central constraint of the WAI model is the interwoven way in which authoring tool, user agent, and Web content authoring conformance (Kelly et al., 2005) must be achieved.

This section outlines provides partial historical background for the emergence of the WAI, WAI-ARIA and WCAG. This section also sketches out the main features WAI-ARIA and WCAG they codify that are available for programmers to use. Section 2.3.1 discusses how the WAI as an infrastructure for accessibility emerged, and section 2.3.2 discusses its specification development process. Section 2.3.3 provides both historical background on WCAG and describes basic features of this specification readers of this thesis need to be familiar with. Section 2.3.4 does the same but focuses on the WAI-ARIA standard. Finally, section 2.3.6 outlines key extant discourses on Web accessibility. Some participants are referenced because they were or are involved with the WAI specification development in some official capacity (see Appendix C for more details) and because there is a lack of published academic literature documenting the WAI’s history and that of its key texts.
2.3.1 The rise of a standard body for accessibility

The WAI is an immensely prominent infrastructure; the place one goes when one wants to “do” Web accessibility. The idea that within bio-power, the law is not replaced by but embodies norms (Foucault, 1978, p. 144 in Goggin & Newell, 2005) is germane to why the WAI is taken up in so many places. In the ongoing ways in which the WAI is put to use it links together ecologies of heterogeneous interests and concerns, and has become a key reference point for not only Web developers and designers; but also software industries; governments; law and policy makers (e.g., Canada, 2007; New Zealand, 2009); and organizations and individuals that do disability rights related to IT access (e.g., D’Aubin, 2007). The WAI’s key guidelines are referenced by de facto and de jure standards.

Disability rights movements and that laws they helped bring about can be connected to the rise of the WAI (Ellcessor, 2010). These include Britain’s Disability Discrimination Act (1995) Australia’s Disability Discrimination Act (1992) (see also Goggin & Newell, 2007), and in the US, the 1990 Americans With Disabilities Act (ADA) and the subsequent Section 508 Amendment to the Rehabilitation Act of 1973 (the latter which mandated, inter alia, that US Federal agencies procure accessible technologies for their employees). During the 1990s, disability rights advocates were also lobbying telecommunications companies charged with providing universal telephony, broadcasting, and cable television (Goggin & Newell, 2003).

The 1990s saw the World Wide Web become popularized (Ellcessor, 2010). Personal computers were becoming more common, and technologies such as GUIs, the computer mouse, and the Mosaic graphical Web browser meant people could access the Internet without needing to understand UNIX (Ellcessor, 2010; Goggin & Newell, 2003, p. 109-110). While the Web’s popularity was increasing, it was also creating new barriers for many disabled people. At the second World Wide Web conference, held in Chicago in 1994, this began receiving attention
from people at the center of the Web’s technical custodianship (“Peter”, 2010). The Trace Research and Development Center, an American AT research unit, had organized a pre-conference panel on disability Web accessibility (Ellcessor, 2010). This brought the issue to the attention of Tim Berners Lee (widely credited as having invented the World Wide Web) who then addressed it in his keynote and changed his presentation slides by hand (Peter, 2010). Soon after this conference, Trace released what may have been the first set of Web accessibility guidelines, “Design of HTML (Mosaic) Pages to Increase their Accessibility to Users with Disabilities: Strategies for Today and Tomorrow” (Vanderheiden, 1995). Trace released several guidelines throughout that decade but ceased doing guidelines development autonomously after the launch of the WAI (which Trace was also involved with, although as a part of the larger effort) (Ellcessor, 2010). The WAI officially launched in 1997, buoyed by funding and support from White House (Peter, 2010).

2.3.2 The WAI and its specification development process
The WAI falls under the umbrella of the W3C, the organization that describes itself as the Web’s technical guardian; an industry consortia whose mission is to “to lead the World Wide Web to its full potential by developing protocols and guidelines that ensure the long-term growth of the Web” (W3C, 2009c). Membership in the W3C is limited to organizations (businesses, governments, non-profits, and educational and research institutions). In numbers, 37% of organizations in the 333-member consortia are based in the US; followed by the UK, Japan, and Germany (at 8.6%, 7%, and 6.4% respectively) and other countries (W3C, 2009e). The dominant sectors represented are consultants and systems integrators (17.3%); university research and

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12 My convention for citing my participants is as follows. The first time a participant is introduced, their name is placed in quotations. After this, they quotations are no longer used.
development (17%) and software (15.2%) (W3C, 2009e). As I hinted at earlier, considering the disciplinary power of technical protocols, the question of what substantive participation avenues less powerful groups (and individuals) have had in shaping the WAI is a relevant, although under-explored, research question.

The W3C’s salient subworlds could be conceived of as delineating along the lines of the W3C’s many technical specifications. Although each specification has a distinct mandate, the work of its development comes together with other specifications through the process of the specification reaching a W3C Recommendation status. The WAI inherited the standards development process of the W3C, which is consensus-based and iterative. When the W3C decides a new specification ought to exist, it launches a Working Group which contains “W3C Member Representatives”, “Invited Experts” and “Team Representatives” (W3C, 2005). The Working Groups themselves generally create the specifications and guidelines that become revised and reviewed before they can finally advance to being a (stable) W3C Recommendation (W3C, 2005) – a “finalized” specification.

The array of standards and interests represented combined with the W3C’s consensus-based standardization process means the time to develop a Recommendation can be drawn-out. For instance, WAI-ARIA was created in 2006 but still has Candidate Recommendation status as of 2010.

And part of the reason is, first you have to get the [Working Group] committee to all agree... Then you have to get the W3C at-large to agree. Like the SVG working group [could] come in and say “No, this won’t work”. Then you finally have to get the board members to agree. I mean it takes forever. And you keep getting bigger and bigger and bigger and you have to get consensus among these huge amounts of people (“Mark”, 2010).

Thus, one of the reasons “time-to-spec” (“John”, 2010) can be lengthy is that agendas and interests both within standards Working groups and across competing and cooperating standards
must be negotiated. It can be further complicated because many represented in the standardization process “have to solve problems that their companies are trying to solve” (John, 2010). Although time-to-spec is lamented by those within and outside the W3C standardization world, an advantage of the process is that a specification is well-polished by the time it becomes a W3C Recommendation.

13 Similarly, Pargman and Palme (2009) point out that standardization becomes more complex when commercial actors enter the arena. Commercial actors may develop their own standard, or dominate a standard’s development (as the OOXML case illustrates). As well, depending on the product and its market share, a vendor’s choice to not adopt a standard can have a significant impact. Microsoft used a strategy of bundling Internet Explorer (a “browser”) with Windows (an “operating system”), both technically and conceptually, in an attempt to overcome Netscape’s market dominance during the “browser wars” of the 1990s. Microsoft’s involvement with the W3C’s HTML standards development process – and near full implementation of HTML – also played an important role in the company’s capture of the browser market (Wang, Wu, & Lin, 2005). The key point here is that commercial actors are usually key stakeholders wielding significant authority in standardization efforts.
2.3.3 WCAG 1 and 2

Figure 1. Excerpt from WCAG 2

Figure 1. Excerpt from WCAG 2. This image illustrates the Success Criteria of Guideline 1.2, which includes Success Criteria 1.2.1 to 1.2.9. These various Success Criteria are hierarchically valued. As an example of how this Guideline might apply, consider the following scenario: you are building a Website that contains pre-recorded video. As a baseline you would always have provide an alternative that presents equivalent content (Level A, Success Criterion 1.2.1). However, you would have the choice of whether to provide Audio Description (Level AA, Success Criterion 1.2.5) or Extended Audio Description (Level AAA, Success Criterion 1.2.7). As I will later suggest in my analysis, configuring users (Grint & Woolgar, 1997) is at work in deciding what “Levels” to aim for, and presumably these upstream (Bowker & Star, 1999) choices have real effects on how people experience the accessibility of your Website.

In 1999, WCAG 1 became a W3C Recommendation. 14 guidelines were provided, organized around the design themes of ensuring graceful transformation (e.g., across modalities), and making content understandable and navigable (W3C, 1999). Nearly a decade later, WCAG 2
became a Recommendation in 2008. WCAG 2 purports to be technology-agnostic, unlike WCAG 1, which mandated using W3C technologies. WCAG 2 is organized around four principles: perceivable, operable, understandable, and robust (W3C, 2008) with 12 guidelines provided. Conformance to both WCAG 1 and 2 is organized by satisfying the Success Criteria of different levels (A, AA, and AAA for WCAG 2 and Priorities 1, 2, and 3 for WCAG 1) (W3C, 2008b). “Satisfying” a criterion means that a website’s content functions as the Success Criterion dictates it should function (W3C, 2008b). Satisfaction is fluid and perspectival in the sense that it relies on judgement calls. According to the WAI, conformance checking involves a combination of automated testing and human evaluation “by those who understand how people with different types of disabilities use the Web” (W3C, 2008b). WCAG’s intended audience is Web content developers (page authors, site designers, etc.), Web authoring tool developers, evaluation tool developers, and “others who need a technical standard for Web accessibility” (W3C, 2008c).

A difference between a W3C technical standard and a guideline emerges in WCAG’s use of Levels. The developers of a W3C standard have the “liberty” to include all aspects of a specification they reckon might be used. Guidelines, on the other hand, may form the basis of regulations or standards themselves. As Peter remarks,

> you have to figure out whether [a guideline] is always doable. And so one of the things we developed was levels. There are things that you really ought to do [Level A] and they’re doable. There’s things that are a little harder to do [Level AA], and then there’s things that are even harder to do [Level AAA] but if you really want to make a great website then you should do those (2010).

The levels of WCAG, some of which are always meant to be “doable”, were also developed with forming the basis of policy or law in mind. This also indicates a similarity between WCAG and standard, since WCAG’s arrangement – which assigns hierarchical value to Levels – implies a system of meeting classifications (Bowker & Star, 1999). This is reminiscent of Bowker and Star’s study of the International Classification of Diseases:
Digging into the archives, and reading the ICD closely through its changes, reveals some of the upstream, design-oriented decisions informing the negotiated order... At the same time, we have been constantly aware of the human suffering often occasioned by the apparently bloodless apparatus of paperwork through which these data are collected (2000, p. 26)

Two important analytical questions\(^\text{14}\) emerge with respect to studying how WCAG is put to use. Firstly, how is determining whether something is “doable” negotiated by “upstream” designers and developers? Secondly, and especially given the social fact (Titchkosky, 2007) of inaccessibility, what are the ethical consequences of hierarchical valuation of accessibility in design?

Ellcessor (2010) suggests WCAG 1’s development resembled a “user-centered design” process\(^\text{15}\), through incorporating the voices of its target audiences, and creating guidelines meant to be proactively implemented by Web designers, a variety of interests were represented in the WCAG working group: industry reps, academic researchers, accessibility organizations, disability advocacy groups and disabled individuals who worked for organizations with stakes in WCAG’s development (John, 2010; Ellcessor, 2010). The mix of stakeholders also included sizable representation from corporate actors. As John, who was involved in the development of WCAG 1, remarks:

> You get a lot of agendas that come in from the corporate space... How is this specification going to benefit my company? Some things will be driven by that. So maybe you don’t always do the best thing, but you do something that’s good enough because it requires less work for your company to implement the specification (2009).

\(^{14}\) The first question is the major subject of this thesis. In my analysis, I also delve into the second question (very incompletely) through an exploration of accessibility as “good business” and an “add-on,” and through an exploration of how using WCAG can ostensibly configure (Gring & Woolgar, 1997) end users.

\(^{15}\) Inclusionary rhetoric aside, I suggest the meaning of “user-centered design” lies in its beholder: user-centered for whom, when, and under what circumstances?
Aside from the challenges of coming to consensus in the midst of competing industry agendas, other points of contestation centered on which “end users” WCAG was intended to benefit. This is where the “practical politics” (Bowker and Star, 2000, p. 44) of building infrastructure emerge – what will be visible and invisible in categories or standards (or guidelines)? For example, WCAG conformance, inasmuch as it encompasses using semantic markup and other techniques to enhance transformability, brings with it multifaceted benefits, such as improved usability by older people. WCAG 2 was also cited by the mobile industry as the best guidelines to enable mobile computing (“Peter”, 2010). During WCAG’s development process, notions of access, usability, and accessibility were fought out. “Universal usability,” which emphasizes human variation and the range of circumstances (e.g., age, functional abilities and contexts of use) was considered, arguably at risk of erasing the specific needs and experience of disabled people (Ellcessor, 2010). The eventual definition of accessibility crystallized to resemble something closer to usability: In the context of WCAG 1 and 2, “Content is accessible when it may be used by someone with a disability” (W3C, 2003b).

I underscore the WAI’s different definitions of accessibility and conformance for a very specific reason: they are usually conflated. Yet as Adam and Kreps (2006) suggest, accessibility “is not an independently measurable attribute [and] even to talk of Web accessibility implies a tacit theory or theories of what counts as accessible or inaccessible to particular groups of people” (p. 209). Conformance involves satisfying a category of technical criteria. Yet the discursive conflation of conformance and accessibility is a major assumption of much research I have found (e.g., Zaparyniuk & Montgomerie, 2005; McEwen & Weertz, 2007; Takagi, Asakawa et al., 2002; Bigham & Ladner, 2007; Takagi et al., 2008).
2.3.3.1 Low WCAG compliance by Web designers and developers

Numerous studies\(^\text{16}\) suggest the reception and implementation of the WCAG by designers and developers has been far from ideal. High levels of WCAG noncompliance can be found on higher education websites (e.g., Zaparyniuk & Montgomerie, 2005); on global scales (e.g., McEwen & Weertz, 2007); and as an artifact of technological change (Hackett & Parmanto, 2005). A 2007 meta-review of 10 conformance studies on WCAG 1 found lack of ALT text (Checkpoint 1.1), title-less frames (Checkpoint 12.1); and use of absolute sizing and positioning (Checkpoint 3.4) as the most commonly-overlooked Success Criteria (McEwan & Weerts, 2007)\(^\text{17}\). The chronic underuse and misuse of these Success Criteria constitutes a “bell-weather” for designers’ and developers’ awareness and attitudes towards WCAG (McEwan & Weerts, 2007). Chronic underuse and misuse of WCAG can also be seen in the context of (X)HTML validation, since most Websites have imperfect markup\(^\text{18}\).

The nature of WCAG guidelines themselves are often singled out as the cause of widespread nonconformance. Kabir (2008) argues developer and designers have poor commitments to WCAG 1 for a range of reasons including: the ambiguous nature of guideline interpretation (see also Farrelly, 2009); the difficulty that many people have interpreting textual representations and generic directives; and the lack of practical implementation techniques that WCAG 1 provides. As a response to poor implementation levels, a number of methodologies have been proposed for designers and developers to use. These include using goal-graphs to support development (Kabir, 2008); and adopting approaches that reject the so-called “one size

\(^{16}\) A limitation of all these studies was that automated checking was centrally relied upon to judge conformance levels. Adam and Kreps (2006) critique of protocols that remove human judgement from testing applies to these conformance studies as well.

\(^{17}\) In most of the studies McEwen and Weerts (2007) sampled, automated checking was relied on alone, and frequency (rather than severity) of error was the focus.

\(^{18}\) I thank my participant “Peter” for this observation.
fits all” entailed in WCAG/Universal Design approaches in favour for design for “context of use” and “personalization”, especially within educational contexts (Kelly et al., 2009; Kelly & Nevile, 2008; Treviranus & Roberts, 2006; Treviranus, 2009). Other researchers locate conformance barriers in societal lack of disability awareness and education (Farrelly, 2009) and in the lack of disability studies perspectives interrogating the WAI (Adam & Kreps, 2006) and so-called “digital divide” problematics more broadly (Goggin & Newell, 2003; 2007).

2.3.4 WAI-ARIA

WAI-ARIA is a W3C working draft standard that provides an ontology of roles, states, and properties that can be added to widgets, structures, and behaviours on the Web (W3C, 2009b). To give one idea of how the roles ontology could be applied, consider the example of a DHTML slider that acts as a thermometer widget representing temperature. This slider could be given the WAI-ARIA role of “slider”. It would be given the WAI-ARIA states/properties of aria-valuemax (the maximum temperature), aria-valuemin (the minimum temperature) and aria-valuenow (the current temperature) in order to comply with the standard. Additionally, it could inherit other properties or states, such as the aria-labelledby property to provide the widget with a programmatically labeled identification\(^{19}\). WAI-ARIA would be used to communicate this information to ATs, which use the “accessibility APIs” of operating systems. WAI-ARIA is designed to provide semantics to Internet-based application in such a way that are interoperable with these (traditionally desktop-oriented) APIs (Schwerdtfeger, 2009) (the parallel with Lampland and Star’s observation that standards are nested (2009) is clear). WAI-ARIA is

\(^{19}\) My example is a highly impoverished representation of what WAI-ARIA can do, so please consult the WAI-ARIA website (http://www.w3.org/TR/wai-aria/) for more detailed information.
primarily targeted at a range of audiences: user agent, AT, authoring tool, conformance checker and Web content (W3C, 2009b) developers.

As with other standards (e.g., Barry, 2001) as well as with WCAG (“Peter”, 2010), WAI-ARIA emerged amidst the evolution and introduction of new technologies. The Web evolved from an infrastructure oriented around the retrieval of static documents to a platform that supports and mediates social engagement, collaboration, and user contribution of content (Kelly & Nevile, 2008). Technologies such as the JavaScript scripting language and AJAX (Asynchronous JavaScript and XML) played a central part in these changes, but also in rising rates of WCAG (Hackett & Parmanto, 2005) nonconformance.

As Mark (who participated in WAI-ARIA’s standardization) recounts, these technologies created two problems for many disabled users: lack of keyboard navigation (CodeTalks, 2009), and incompatibility with ATs (2010). With respect to the latter issue, JavaScript’s use to create content or trigger changes on Webpages can go unnoticed to an agent designed to look at (X)HTML. JavaScript began to be used, along with CSS and (X)HTML to create desktop-like environments where the use of “widgets” (e.g., sliders and other complex input elements; uploaders; video players, etc.) forms a dominant component of overall interaction designs. The raw (X)HTML of such environments and widgets is usually semantically insufficient as to giving indication of the function and purpose of a widget. AJAX, which allows small pieces of content to be fetched from the server as opposed to having the browser (re)render an entire document upon a notification or state change, increasing the response times of Webpages (Flanagan, 2006, pp. 493-494), created similar semantic barriers. The early response from organizations and those dealing professionally in disability accessibility was that site creators should either avoid the use of JavaScript entirely, or create alternative, non-JavaScript forms of Web pages that give the website visitor that same effect (“Mark”, 2010).
Meanwhile in the Web development world, scripting and AJAX were being heralded by industry and practitioners as technologies that could make Websites both more responsive to interaction and richer (because desktop-like UI components could be created) (“Mark”, 2010) – although as just indicated, these technologies could only be used by some people and created new problems for others. And within a regulatory framework where disability Web accessibility was mandated by law and policy, enterprise businesses providing Web services to government and industry had high stakes in ensuring their wares could be sold. A variety of interests coalesced to create WAI-ARIA. According to “Mark” (2010), user agent and software developers, operating system vendors, and members from the W3C were other primary stakeholders represented during WAI-ARIA’s development.

Suchman and Bishop’s (2000) unpacking of the rhetoric of innovation is portable to the two connected strands of W3C standards (WAI-ARIA) and technological change (JavaScript, AJAX). Firstly, in terms of WAI-ARIA, innovation can serve conservative ends, “concerned with the extension of existing activities into additional, and/or different markets” (Suchman & Bishop, 2000, p. 331). “Mark” describes why the need for WAI-ARIA crystalized:

We have to take the bull by the horns and say: “Ok. People are going to use JavaScript, and DHTML, and AJAX. What can we add to the HTML that will be useful from an accessibility point of view?” (“Mark”, 2010).

Viewed from this perspective, the development WAI-ARIA could be interpreted as an activity extending the scope and reproducing the technical authority of the WAI and its various key stakeholders.

Turning to some of the technologies WAI-ARIA is meant to co-exist with, another way of viewing innovation and change is that they constitute “indigenous aspects of technologies-in-use, work practice and organizational life” (Suchman & Bishop, 2000, p. 332). Innovation in this sense hinges on the adaptation and appropriation of discursive and material resources. In the case
of DHTML and AJAX, these technologies were dominantly represented as *more responsive* and *richer* than their “static” or “plain” HTML counterparts; as technical, “innovative”, and a managerial necessity. Parallels to Titchkosky (2007) are apparent; she argues that justifications are one way of making exclusion reasonable, though explaining inaccessibility in the everyday language of causality. The limits of these representations that emanate from industry and developer professionals emerge as far as disability becomes constituted. JavaScript and AJAX could be seen as controlling and regulating technologies systematically positioning certain people as “other” (Goggin & Newell, 2003).

2.3.5 Extant representations of accessibility

Following Clarke’s (2005) call to situate grounded theorizing within matrices of power, it is important to highlight some of the more prominent ways of representing accessibility work, which are firstly, that it constitutes “good business”, and secondly, that it embodies Universal Design methodology.

Starting with the first extant representation, Goggin and Newell (2003; 2005; 2007) have historicized the idea that disability accessibility in IT constitutes good business, and located it as a phenomena that emanates from a variety of countries that I just touched on (e.g., USA, Canada, UK, New Zealand) and institutions within those countries. A key way it has gained prominence is through the actions of various disabled individuals and consumer advocacy groups in the above referenced states (Goggin & Newell, 2007). Although rights-based advocacy helped bring about legislation and legal redress measures which in turn brought disability onto the radar of IT vendors, telecommunications companies, governments and businesses (for example, in the form of the WAI), for many individuals and advocacy groups, the pace of change has been too slow. In fact, as D’Aubin argues in a 2007 position statement from the Canadian Council of
Disabilities arguing for a human rights based approach to accessibility, some even argue that “...business and government are suffering from ‘rights fatigue’ and rights arguments should be abandoned” (p. 193). There has thus been a strong interest from some disabled people and consumer advocacy groups in dealing with those “designing, making, implementing, and distributing technology” (Goggin & Newell, 2007, p. 161). From government, the idea that accessibility is good business emerges in talk relating to “steering” and “facilitating” industry, rather than directly owning or regulating (Goggin & Newell, 2007). Goggin and Newell (2003; 2005; 2007) locate the idea that IT accessibility constitutes good business within what they refer to as the emergence of the citizen-consumer amidst global pushes towards market deregulation.

The second extant way of talking about accessibility is through the lens of the Universal Design methodology, which WAI texts embody (Treviranus & Roberts, 2006; Kelly et al., 2009). Universal Design is a methodology whereby products and environments are designed “to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design” (Connell et al., 1997). WCAG resembles Universal Design because it takes what Treviranus and Roberts (2006) call the “accessibility compliance approach,” whose underlying claim is that a single resource can be created, which will then be made universally accessible if it meets a set of guidelines. Various critiques of this methodology have highlighted its limits. Firstly there is the loaded notion of “universal”, which suggests singular designs can cater to whole ranges of human variation (Imrie & Hall, 2001) and seems to run counter to the idea that notions of universality, normalcy, and disability are produced in culturally and historically contingent ways (see for example Wendell, 2006; Davidson, 2006; Titchkosky, 20).

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20 The notion of a citizen-consumer also resonates in Gandy (2002), who frames so-called “digital divide” debates in terms of a widening gulf between consumers and citizens. Gandy locates this gap within the context of the rise of neoliberal discourse in the academy and governments. For Gandy, neoliberalism challenges welfare state assumptions about what constitutes basic human needs. Within the context of the nation-state’s erosion “access to information” by citizens is no longer guaranteed, and instead replaced (if at all) by a “pay for play” model.
Secondly, Universal Design has been critiqued for its commercial orientation that sees end-users active only as consumers (Imrie & Hall, 2001). Accessibility becomes contingent on the economic circumstances – or perhaps the moral or ethical orientations of designers and developers, if they are not being paid to do conformance work – as opposed to being represented a vital human rights issue (Davidson, 2006). This is also the core critique of the idea that Web accessibility constitutes good business. Finally, the core philosophies of Universal Design in their capacity as technical guidelines have been critiqued as apolitical, unquestioning of the power relations entailed in what Goggin and Newell frame as disability and technology’s social shaping (2003; 2005; 2007). Or in Imrie and Hall’s (2001) words, “there is no or little recognition of the interrelationships between the social, technical, political, and economic processes” undergirding design (p. 16).

These discussions of extant representations of accessibility work suggest that even though the WAI is pragmatically a crucial infrastructure, it also makes issues of disability matter in certain ways (Titchkosky, 2003). For example, disability emerges as a population – constituted in part through the deployment of technical specifications – that can be targeted by business, or through methodology that may problematically presume universality.

2.4 Conclusions of literature review
My review of literature surveyed a variety of research that suggests that the development and use of standards and guidelines can be considered socio-technical phenomena. It discussed the social shaping of disability and technology, and how normativity can act as an instrument of discipline producing disability. It overviewed some general analytical characteristics of standards and guidelines. It also provided partial perspectives on the WAI’s development and the emergence of two of its key texts – WAI-ARIA and WCAG – as well as key concepts that are harnessed in
related discourses, such as conformance and accessibility. I suggest that while there are no studies of WCAG and WAI-ARIA use informed by infrastructure studies perspectives (e.g., Star & Lampland, 2009; Bowker et al., 2009; Bowker & Star, 1999) and few privileging critical lenses on accessibility (e.g., Adam & Kreps, 2006; Goggin & Newell, 2007), that it is necessary to develop comprehensive socio-technical accounts working with these specifications.

3 Procedures

3.1 Research question and overview of research procedures taken

I now provide a general overview of the procedures taken in this research, and how the research question evolved. In the grounded theory tradition (Strauss & Corbin, 1998), I set out asking a general question: How is the WAI put to use by Web developers and designers in their work? Since time constraints precluded doing comparative case studies, I decided that individual Web designers and developers who identify as WAI users would be recruited via mailing lists and my professional and academic network21 and that these individuals would be asked to discuss the approach they take to using the WAI. (I elaborate on the theoretical foundations behind the inclusion criteria, recruitment procedures and data collection in section 3.2). The recruitment script and informed consent process let potential participants know they would participate in an approximately one hour long interview in the location of their choosing (most occurred over Skype, but please refer to Appendix C for location details). The recruitment script informed

21 In two cases, participants (Mark and Joe) were peers of mine since we all engage with Web accessibility communities. However with these peers there were no obvious pre-existing power differentiating relationships.
participants that over the course of the interview, they would be asked to share their views on how and when (if at all) they incorporate accessibility guidelines, standards, and policies in their design and development work, as well as to possibly share documentation materials. All information gathered from participants (recorded interviews, transcribed interviews, and in some cases documents) remained confidential and was stored on my password-protected computer. The names of the participants and the organizations they worked for were given pseudonyms. Ten people were interviewed in total, eight over Skype, and two in person. Interviews occurred between December 2009 and February 2010. Some participants elected to review and comment on their interview transcript and/or analytic summary of their interview. Their feedback was fed back into the analysis.

Data collection for this study was an extended process. Interview transcripts, some documents such as spreadsheets from participants, the resource Developing a Web Accessibility Business Case for Your Organization (WAI, 2009e), as well as WAI-ARIA and WCAG themselves, constituted the sample analyzed, although mainly interview data was analyzed. The literature reviewed (summarized above) provided exposure to extant theory on the topics of access to IT infrastructure and the nature of guidelines, standards and infrastructure itself.

Interviews occurred between December 2009 and February 2010. Questions (Appendix A) addressed such topics as:

- The professional backgrounds of participants and the nature of their jobs;
- How WAI-ARIA, WCAG, ATAG, UAAG and how various W3C standards (e.g., HTML & XHTML) were implicated in the context of their work;
- What tools participants used to do their jobs;
- Clarification of the definition/operalization of Web accessibility in the context of their jobs;
- What Web development and design work would be like if the WAI didn’t exist;
- How or if “end users” factored into the design process.
• The social stakes of using the WAI (e.g., who benefits, under what circumstances)
• If participants participated on WAI or W3C standardization committees, they were asked what work a standard or guideline was intended to do in the world and what its development process was like.

Interviews were semi-structured to broaden the scope the interview would take and increase the richness and likelihood that interesting connections among practices and rhetoric would be made.

As the interview data collection process progressed, I refined the research question to a focus on the use of WAI-ARIA and WCAG by participants recruited from multiple sites. Finally, I narrowed the focus again to the central conceptual category of conformance work and ordering of related categories. Analysis was inspired by, but not catholic towards, grounded theory (Straus & Corbin, 1998; 2008) and situational analysis (Clarke, 2005).

3.2 Delimitations and limitations

My study’s scope was as follows:

• Since recruitment occurred in forums where Web accessibility was a topic, participants had strong professional stakes in WAI-ARIA and WCAG. This is to say participants were active users of theses texts (in some cases contributing to their development\textsuperscript{22}) and advocates of Web accessibility and W3C standards compliance. Thus, results may be biased in favour of active WAI-ARIA and WCAG users and advocates. It was beyond the scope of my study to address those who have low awareness of WAI-ARIA and WCAG.

• Among the array of possible WAI-ARIA and WCAG stakeholders only designers and developers participated as interviewees in this research.

\textsuperscript{22} Appendix C details participants’ affiliation with W3C and/or WAI standard or guideline development efforts.
• Although there are several WAI guidelines, this study focused on Web content specifications (WCAG and WAI-ARIA).

• I examined what participants say they do and (for the most part) not what they do. Most interviews with participants (8/10) were conducted over the phone. This was primarily because participants who responded to recruitment invitations lived outside of Toronto or preferred to be interviewed on the phone. Ergo, my study analyzes participants’ reported work practices and opinions on WAI-ARIA and WCAG, as it was beyond scope to conduct in-depth in-person observations or ethnography.

• Participants did not give feedback on higher level categories of my analysis.

3.3 Methodology taken and implication for methods
My study analyzed data in two ways. The first unit of analysis was the interview transcript, with each participant’s interview text analyzed as a standalone unit. Interview data were coded manually using spreadsheets using grounded theory (Strauss & Corbin, 1998) tools. Grounded theory is an approach to building theory through systematically gathering and analyzing data throughout the research process (Strauss & Corbin, 1998). However, my approach was not to build theory, but to use grounded theory tools to take an iterative and inductive approach to data collection and analysis, using coding, constant comparison, and theoretical sampling to create conceptually ordered categories. Coding refers to the process of deriving and developing concepts from data; constant comparison is the process of comparing different pieces of data for similarities and differences; and theoretical sampling is the process of sampling from data based on theories (Corbin & Strauss, 2008, p. 65). Theoretical sampling was not exhaustively used but
open sampling (Corbin & Strauss, 1998) during data gathering occurred as my sensitivity to emerging concepts increased over the course of interviews.

The second analysis undertaken was inspired by situational analysis (Clarke, 2005). Conducted as a supplementary heuristic exercise, I used situational mapping to ask how collective actors, extant discourses, and individual actors (human and nonhuman) make themselves consequential in the situation of research. In what follows, I will briefly highlight the epistemic roots of both of these methodologies in relation to how I conducted my analyses.

Clarke (2005) describes grounded theory as a symbolic interactionism theory/methods package with strong roots in American pragmatism. These theories offer resources to the study of infrastructure from a social constructivist perspective through the Thomas’ theorem: “Situations defined as real are real in their consequences” (in Clarke, 2005, p. 7). Grounded theory’s development constituted an attempt by Strauss and Glasser (1967, in Strauss, 1991, p. 22) to develop the methodological implications of the sociological theory of action driving much symbolic interactionist research. Its orientation towards analyzing data for social processes is bound to the methodology’s roots in the Pragmatist Theory of action, which holds that individual and collective acts “do not simply unfold but are shaped in interaction between actors and environments” (Strauss, 1991, p. 25). In grounded theory, methods are attuned towards elucidating process:

an individual’s, organization’s, and group’s ability to give meaning to and respond to problems and/or shape the situations that they find themselves to be in through sequences of action/interaction, taking into account their readings of the situations and emotional responses to them (Strauss & Corbin, 2008, p. 98).

The root metaphor of grounded theory is of basic social process. Clarke (2005) critiques this orientation, arguing it strains towards oversimplification through attempting to create “pure”
cohesive theory (e.g., through negative cases) and is silent on issues of reflexivity. The methodology of situational analysis is Clarke’s (2005) attempt to address what she characterizes as grounded theory/symbolic interactionism’s obstinacies towards postmodernism.

In this study, I used grounded theory tools, but following Clarke (2005), I put to them to use both to (1) develop a conceptually integrated understanding of how WAI-ARIA and WCAG are used by Web content developers and designers and (2) to explore what discourses, institutions, and actors (human and nonhuman) are constitutive in my research. Both strands are connected, although not in the traditional grounded theory sense that sees action (e.g., at the individual level) conditioned by concentric levels of context (group/interactive/collective; sub-organizational / sub-institutional; organizational/institutional; community; national; international) (Clarke, 2005). Clarke assumes there is no such thing as “context”; but rather the question becomes how various elements (individuals, social worlds, discourse, actors human and nonhuman, etc.) make themselves consequential in the research.

I conducted situational mapping (Clarke, 2005) after I coded data provisionally. Undertaken as a cartographic, heuristic exercise to provoke analysis, I used situational mapping as analytical scaffolding. I found mapping qua mapping not helpful to writing but rather as a “messy” way to represent work with ideas. For this reason I did not include maps in my finished manuscript. However, situational analysis inspired both avenues explored in the literature review and analysis undertaken in chapters subsequent to this one.

Situational maps lay out all the most important human, nonhuman, symbolic, and discursive elements broadly conceived of (Clarke, 2005, p.87) and as framed by those in it and by the analyst. This map-making process is also an opportunity to address “silences” in the data - for example, implicated actors (Clarke, 2005, p. 47) for whom WAI work is being performed, and who are addressed discursively, but who are not fully agentic in the research. My mapping
process was framed by questions (Clarke, 2005) such as: who and what are the analytically pertinent elements in this situation? What elements “make a difference”? What nonhuman things are important, and to whom or what? What discourses are circulating?

Clarke’s methodology has a group of key theoretical influences turning on social worlds theory; discourse studies, and taking nonhuman actors into account. With respect to the first root, from symbolic interactionism, Anselm Strauss’ social worlds theory (Strauss, 1991; Clarke, 2005) is drawn upon. A social world is a group with shared commitments to certain activities, where resources, ideologies, and practices are generated, adapted and adopted to achieve goals (Strauss, 1991; Clarke, 1991). Social worlds are heterogeneous, porous and overlapping and a social world is a “substantive area”, for example, an occupation, a theoretical or artistic tradition, or a recreational group (Strauss, 1991, p. 236). Social worlds contain activities, memberships, sites, technologies, and organizations (1991, p. 235). In a social world, there is a primary activity clearly evident (Strauss, 1991) that is learned in the process of gaining membership (Bowker & Star, 1999, p. 294). However, a social world is not a monolithic entity and contains heterogeneous tensions and commitments (Clarke, 2005). I viewed Web design and development as a social world, which meant I could recruit participants from multiple sites. Inclusion criteria centered on self-identification with this broad occupation. I posted recruitment emails (Appendix D) on mailing lists where WCAG and WAI-ARIA were a common topic of discussion and some participants were contacted by word-of-mouth through my academic

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23 Following Bowker & Star (2000) I interpret the term “social worlds” as if it is interchangeable with Lave and Wenger’s (1991) concept of communities of practice.

24 I realize it is problematic to refer to “Web designers and developers”. Who exactly counts? My working assumption was that participant self-identification with the occupation, and as a user of WAI-ARIA or WCAG would be sufficient. I am not interested in meting out the boundaries of what constitutes “design” or “development” or work with WAI-ARIA and WCAG, however I note a spectrum of activities can be entailed in this work: writing/editing content, coding, testing, evaluating, implementing content management systems, etc.
My study’s recruitment script called for “designers” and “developers”, but I also extended participation to those who conducted Website evaluations and educational and advocacy activities. Use of one or several WAI texts (WCAG, ATAG, UAAG and WAI-ARIA) were inclusion criteria.

Clarke’s second theoretical influence arises from discourse studies and specifically the work of Foucault. Foucault developed an analytics of power that challenged the Western juridical notion of power as top-down, conceiving of “power without the king” (1978, p. 91; 1976). Power emanates from many directions, and individuals are power’s vehicles, “not its points of application” (Foucault, 1976, p. 96). Knowledge is power “put to work, through certain technologies and strategies of application, in specific situations, historical contexts and institutional regimes” (Hall, 2001, p. 76), and discourse creates the conditions for particular knowledges to exist. For example, in The History of Sexuality (1978), Foucault reframes the question of whether sexuality is a “natural given”, or whether it is a thing to be prohibited or permitted, to an orientation towards exploring sexuality’s constitution through discourse. Clarke understands discourse as a system for representing a socially or culturally recognizable theme; the system includes practices, language, and nonhuman/material cultural objects (2005). A key assumption here is that language is not a neutral vehicle for carrying information but that it is constitutive: a site where meanings are created and changed (Taylor, 2001; Wittgenstein, 1953).

25 I am especially grateful to Jutta Treviranus for providing me with contacts.

26 Designing, developing, and creating for the Web are not necessarily autonomous activities. The emergence of what Goggin and Newell (2007) call the “produser” (sic) or “user-producer/consumer-producer” in Internet technologies and cultures (p. 161) is evidenced in re-mix cultures (Jenkins et al., 2009); site-wide annotation (Takagi, Asakawa, et al., 2002) and “social accessibility” projects (e.g. Takagi et al., 2008); and collaborative scripting frameworks (Bigham & Ladner, 2007). People participating in such emerging practices could indeed be counted among those practitioners who “use” the WAI, but it was beyond the scope of this study to recruit these participants.
Clarke (2005) advocates that analysts undertake discourse analysis to “de-center the knowing subject”, however, my study did not undertake discourse analysis and as such I am hesitant to say I was all embracing of situational analysis. This being said, my research is conversant with literature taking discourse analysis approaches to accessibility and disability. This meant I tried to resist the idea that WAI is an “innocent” infrastructure or that “accessibility” has obvious metrics. Contextualizing the WAI’s emergence, for example, through identifying extant representations of Web accessibility as I did in my literature review27, has helped me adopt this stance. In my analysis I took the position that WCAG and WAI-ARIA and “standards and guidelines compliance” cannot be understood in pre-given or unproblematic terms with an eye towards understanding how local meanings of conformance are developed.

The third new root of symbolic interactionism Clarke wants to impart is the importance of taking nonhuman actors explicitly into account, a stance heavily influenced by STS through its analytical resources for “seeing” the agency of nonhuman elements. In this research, Grint and Woolgar’s (1997) study Configuring the User and Latour’s (1992) study Where are the Missing Masses were important reference points for developing understandings of the agency of standards, guidelines, user agents, and ATs.

Throughout my analysis, I paraphrased and attributed quotes to participants. However, I stress that the representations of participants in my thesis were all heavily mediated by me. Moreover, as Clarke (2005) points out, participants’ representations of themselves are also likely narrow (p. 15). I did not assume a participant’s talk “represented” his or her stance or “underlying” beliefs or opinions. Rather, I assumed a participant’s answers constituted one perspective he or she wanted to share at the time our interview. Similarly, when I put accounts of

27 As I will show in my analysis, some of these extant representations do make themselves consequential in my study.
work practices in conversation with ways of representing accessibility, I was not suggesting these representations somehow emanate from a particular participant or “stand in” for their views.

4 Results

4.1 What is conformance work?

In this thesis, I introduce the category of Conformance Work, arising out of my analysis. Conformance work encompasses the work entailed in developing harmonized interpretations of rules (such as guidelines and standards) and the things those rules apply to. Conformance work is constituted through a variety of elements. It entails practical design and development approaches; can implicate imagined users and user agents; enroll tools; and encompass practices that seek to make work visible. Ongoing interpretations (of both rules and the things they instruct) are situated within particular work contexts, but also in wider discourses, in this case about Web accessibility, including the prevailing representation of accessibility and Universal Design as a business concern; and the foregrounding of “progressive enhancement” discourse.

Conformance work often frames itself in the following terms: “Has a state of harmony between a guideline or standard and what it refers to been achieved?” While this is one way of talking about accessibility, in addition to this I find that heterogeneous contingencies play into conformance work, creating a space where claims can be made (e.g., about accessibility, standards compliance, virtuous design practices, and so on, and the meaning of conformance itself). In other words, conformance work involves the articulation of what conformance and accessibility is about. A focus on conformance work allows for the examination of how technical understandings are sustained by practitioners who claim WAI-ARIA and WCAG expertise.

The analysis section is organized along the themes of conformance work explored:
• The negotiated and interpreted character of applying WAI-ARIA and WCAG
• Representations of WCAG and WAI-ARIA
• Articulating end users and user agents
• Tools enrolled or not enrolled in work
• Imperatives to document

Each theme is described through reference to my participants’ work and in relation to conformance work. Although themes are separated for the purpose of analysis, they are not meant to be thought of in isolation because they are related and run through each other. Bowker and Millerand (2009) observe the importance of attending to the contexts that mediate the enactment of standards, so for each element I try to sketch out the conditions in which WCAG and WAI-ARIA are “perceived, conceived, and used in practice” in particular contexts (p. 152).

Firstly, I present a brief overview of my participants.

### 4.2 Snapshot of participants

Participants had training in computer science, engineering or information systems related domains or were self-taught developers and designers. Five operate as independent consultants, providing contract-based services to clients (e.g. performing accessibility evaluation work and testing; or conducting general design and development work). The other five work for organizations with an explicit accessibility mandate. “Mark” and “Clare (2010)” work for a Canadian research and development unit located at a large university. “John” works for a US-based open source assistive technology project funded by a major software corporation. “Arnold (2010)” works for a US state-level accessibility and rehabilitation unit. The research and development unit that “Peter” works for is a highly regarded institution that has played a
formative role in shaping IT accessibility and the Web through its contributions to the WAI. Several participants contributed to open source development initiatives (e.g. Drupal, and “Open Source AT”).

As Appendix C details, four of my participants have been involved in some capacity in standards development with the W3C. I drew on these informants’ accounts of the W3C and WCAG standardization processes as I constructed my literature review.

4.3 The interpreted character of conformance work
My analysis begins by elaborating on the theme of the interpretive character of conformance work. The key concern of this theme is how harmonized interpretations are developed and sustained by participants, with particular attention paid to what factors mediate the crystallization of an interpretation. How does a designer or developer figure out how a rule ought to apply to their website? Strauss et al.’s (1991) observations on the negotiated character of rules are also salient: Far from being disembodied from human arrangements, rules themselves are negotiable. These analyses also attempt to attend to the difference between formal rules and their interpretation (Pargman & Palme, 2009), or what Ekbia (2009) refers to as standards’ “interpretational flexibility”.

The interpreted character of conformance work runs through out other themes explored in my analysis. For example, in later discussions on the representation of WCAG conformance as “good business”, as well as in reference to individual cases, I show how economic factors come into play into determining how conformance will work. From theme to theme, through attending to the particular work settings, goals, and practical design and development approaches that participants describe, I elaborate on the interpretive character of working with WAI-ARIA and WCAG.
I begin my discussion on conformance work’s interpretive character through exploring the role WAI-ARIA and WCAG can play as communication artifacts. Firstly, I show that the need for communication can be triggered when breakdowns occur between people or groups, or in the expected behavior of a system itself. One way this need can be resolved is in best practices or previously made “accessible examples” that provide readymade interpretations of how to realize an abstract rule with a technology. Secondly, I show that framings of conformance work and controversies about “correct” implementations hint towards conformance work’s interpretive contingencies, such as financial support available.

As the technical lead of the “Open Source AT” (OSAT) project, John (2010) says his work requires ongoing interaction with a variety of OSAT stakeholders. These stakeholders include: the project’s end users and user-developers, GNOME Linux, the parent software corporation that finances OSAT, and other software developers. These stakeholders, especially end users and developers, come together in the online forums of OSAT - its mailing list, bug tracker, and the lists and trackers of related projects. Standards are often at the nexus of bugs (mismatches between the expected and observed behavior of a system) that are reported in these forums (Ekbia, 2009). One area where standards come clearly into play is in interactions with developers at Firefox, OSAT’s “browser of choice” because of its support for various accessibility APIs (e.g., ASTPI, WAI-ARIA, etc.) (John, 2010). And when something isn’t working,

…what we have to do is dig into the spec and say “Well, ARIA says it should be doing this and Firefox isn’t doing this.” So we log a bug, and the Firefox guys can say, “Yep, it’s not adhering to the spec and we’ll change it.” Or, they’ll say, “Well, you’re interpreting the spec incorrectly, this is what you are getting and why you’re getting it and… you should be doing something else!” (John, 2010).
WAI-ARIA acts as a communication artifact as different worlds – Firefox developers doing their job, and OSAT developers doing their job – work to construct a common ground. One of the crucial conditions mediating his negotiations with Firefox and other worlds are economic contingencies\(^\text{28}\). An ongoing responsibility for John is to facilitate and maintain relationships between developers like Firefox in an economic climate where when money gets tight, “accessibility can be the first to go” (2010). Ergo, money may be implicated in the interpretational flexibility of how bugs are filed, assigned, “squashed”, or left open. Another place where economic contingencies come into play are in negotiations with clients about what parts of WCAG ought to apply to a website (as I explore in section 4.6).

Apart from economic factors, interpretational flexibility is also at work in applying WCAG in terms of how accessibility becomes defined. Coordinating work across a large, distributed team of developers can be difficult, especially when competing ways of operationalizing accessibility (in the code/markup sense) are at play. Clare does development work on a lecture capture distribution system. Tensions have been high because the accessibility deliverables\(^\text{29}\) of her project conflict with Flash, the platform chosen for the video aspects of the project. She suggests serious problems are emerging vis-à-vis the use of Flash, which also happens to be “the bread and butter” and chief programming expertise of the majority of programmers working on the project (Clare, 2010). Flash has built-in features (i.e. as found in the “Accessibility Panel”) that provide developers with ways in which multimedia content can be enhanced and presented in multiple modalities (WebAIM, 2010). Even still, these features can only be accessed by certain proprietary platforms, which jeopardizes her ability to make

\(^{28}\) See also Treviranus (2009) for a discussion of accessibility as a “precarious value” in open source.

\(^{29}\) Clare defines an accessible system as one that is usable and meaningful to all people. For instance, with screen readers, “Not only does it have to work, but it has to make sense. When you click on a slider if it says “zero zero zero zero zero zero zero zero”, that works, but it’s not usable. It’s frustrating.” (2010).
conformance claims to WCAG 2 guidelines (for instance “2.1. Keyboard Accessible”, and “4.1. Compatible” (W3C, 2008)). Thus, competing ways of conceptualizing accessibility, according to Clare, are at the center of her conflicts with other developers. Charged with offering support and guidance to the other developers on the team, her approach for approaching negotiation with co-workers has been to find specific examples of what she “means by accessible”:

Ohio University tweaked JW Player to make the buttons HTML buttons. They’ve also included a lot of features for screen reader users and keyboard users. You load up their player and it says, “Player”; “Player controls”; “Play”, which is ALT P; “Stop”, which is ALT S”. I can hear and understand what that means and it makes sense. I’m telling the Flash people that they need to do something like that (Clare, 2010).

People tasked with implementing a WCAG guideline face the challenge of how to take an abstract rule, and figure out how to practically apply it. Finding and building on examples of related things that have been built “to spec” is a way to handle with the ambiguity of a design task. The implemented examples one finds become illustrations of how to “do” the guideline.

Both Clare and John’s stories show how breakdowns between systems and humans act as events that can trigger the need to develop harmonized interpretations of standards and guidelines. WAI-ARIA or WCAG rules can emerge in the process of fixing these breakdowns, through aiding and abetting communication (e.g., between or inside communities), or through “practical implementations” of those rules (e.g., in a specific technology).

Best practices, which suggest what to do (“add ARIA attributes programmatically as opposed to hard coding them into markup”) and what not to do (“avoid access keys, even

30 In *Philosophical Investigations* (1953), Wittgenstein undertakes a philosophical exploration underlying this practical problem.

31 To paraphrase “Barry” (2009)
though they’re in WCAG 1, they don’t work\textsuperscript{32}) are also instructive of ways in which harmonized interpretations can be created. In online forums such as list-serves and websites, communities of WAI-ARIA and WCAG users share, debate, and create repositories of implementation techniques or practices to avoid. As readymade practical interpretations, best practices are resources that can be called upon in/for conformance work, but that may or may not be deemed suitable for a particular situation – and determining suitability is a part of conformance work.

Broadly speaking, conformance work was framed in my participants’ talk in two ways. The first framing is in yes/no terms, along the lines of: “Does this example on a Website indicate a Success Criterion violation?” In other words, in this framing there are accessible ways, and they can be achieved (or not achieved), according to the designer or developer. The second framing was that conformance work is the stuff of judgment calls. For instance, “Joe” (2010) and “Sam” (2009) both touched the controversy of how to nest headings, which is often the subject of much contestation on mailing lists. How many H1 elements ought to be on a page? For some, it’s only one, and for others, more than one H1 is fine. Which interpretation is right? Controversy about how to interpret a guideline suggests the roles personal judgment, experience, and group norms (for example, as mediated on a mailing list) play. For example, Sam (2009) indicates best practices on the WebAIM mailing list can be an important reference for him. As the headings example, but also Clare’s Flash example indicate, the “right way” to interpret a rule is often contested. Also, these examples indicate that in addition to interpreting the spirit of a rule, the context where the rule applies is also contingent.

\textsuperscript{32} To paraphrase “Sam” (2009). Sam is referring to WCAG 1 Guideline “Design for device-independence”, in which access keys (keyboard shortcuts) were a Priority 3 checkpoint. Not using access keys became a best practice in part because authoritative online communities such as WebAIM, which provides resources for interpreting WCAG, were noting the “almost complete failure of the idea to take hold in Web development practices” (2010).
I have now briefly illustrated some ways in which conformance work has an interpretive character. This character highlights the need to situate conformance work at a “local” level (e.g., how is accessibility operationalized by a particular participant in a given project) but also within broader discourses about accessibility that condition (Clarke, 2005) of conformance work.

4.4 Representations of WCAG and WAI-ARIA

How do participants conceive of the work WCAG and WAI-ARIA are meant to do in the world, and in their work? Participants describe WCAG and WAI-ARIA as serving as the base for range of interests, including interoperability (e.g., between content, user agents and authoring tools); disability civil rights work; standards-compliant, semantic design; and economic interests. Here I outline some dimensions of these representations, as well as make connections to the extant characterization of Web accessibility as “good business” and Universal Design.

Implementing WAI specifications is considered by some to serve the interests of technical interoperability. For example, John (2010) and Arnold characterize WCAG and WAI as preventing interoperability challenges such as those that arose during the so-called “browser wars”. Arnold suggests without WCAG, “what we would be facing is a lot of issues with, where things have not been implemented in a standard way, and so different ATs might work entirely different from [each] other” (2010). Similarly, John characterizes the WAI as providing a “lingua franca… both in terms of the user agents and the content providers” (2010). “Tim” (2009) offers the specific point of how to hide text for sighted users. When he doesn’t know the semantic way to do something, he avails himself of WAI application notes to hide text in “a cross-browser way” (Tim, 2010).

WCAG is discussed as serving civil rights end. Arnold describes his work where in the climate of Section 508, WCAG and 508 compliance is “a civil rights issue. People have the same right to access the same services and the same information“ (2010). He describes his job as the
IT accessibility coordinator of a US state-level service as a part of a larger system that prevents disabled employees from encountering barriers to employment. Similarly John, who is also working in the American context, notes the open source AT he works on has the potential to be taken up widely (e.g., in universities and by government employers) because of US civil rights legislation.

You have a company like Acme that wants to sell equipment to the US federal government. We need to have accessibility provisions in there for our UI. Same goes for... anybody selling to some sort of institution that has some sort of accessibility provision in place (John, 2010) Sam (2009) characterizes the implementation of WCAG as preventing his exclusion from the civil sphere, describing a human rights complaint he filed against his small Ontario city because his screen reader couldn’t access the city council’s PDFs. Joe (2010) and “Alice” (2010), also screen reader users, have both been solicited to evaluate Websites in the wake of various legal standards. For example, Alice (2010) evaluates banking Websites against CLIF and Section 508. Even though its ICT standard does not yet apply, Joe (2010) is impressed when one of his clients pays him to do “core accessibility work” on a website in anticipation of the Accessibility for Ontarians with Disabilities Act rolling in.

Clare (2010) and “Earl” (2010) show similar orientations towards the deployment of WCAG, describing compliance being key for disability accessibility but also for ensuring semantic Web sites. For example Earl uses the Universal Design metaphor of the “curb cut”, noting that semantic information embedded in code benefits disability accessibility as well as a variety of technologies. Clare says “forcing people to validate their code is useful not just for accessibility, [but also] for properly working Websites” (2010).

At the same time as being described as a guideline that delivers a variety of techno-social benefits, accessibility was described as contingent on economic factors as well, for example in
whether an organization is willing to pay a developer to evaluate a Website and the time allotted for the evaluation (e.g., Earl (2010), Joe (2010)), and in whether software organizations as a whole dedicate resources (e.g., John (2010), Clare (2010)). When negotiating with a client for a contract, Joe suggests claims about the competitive and technical advantages of WCAG can be made.

The most persuasive argument for accessibility and semantic markup in general is that Google is a screen reader. Anything that a Blind user can’t access, Google can’t access (Joe, 2010).

In this example, Joe suggests that the business benefits of accessibility could be stressed in negotiation with a potential client. Search engine optimization (SEO) works like a screen reader. Both agents benefit from conformance techniques, but between SEO and screen reader users, the argument for SEO can be “most persuasive.” This comment suggests that SEO and Google’s stake in conformance is ostensibly more persuasive than claims of the right of a blind person to access Web content. And while it is technically true that a variety of agents benefit or are “stakeholders” in accessibility, such a framing is not necessarily consistent with a human rights stance (c.f., D’Aubin, 2007). What if Google didn’t “work like a screen reader” or if there was no market imperative for semantic markup? It is worth noting that Canada has existing human rights commitments to disabled people (e.g. equality rights guarantees in the Charter of Rights and Freedoms and the recently adopted UN Convention of the Rights of Persons with Disabilities33) and that the Canadian Council of Disabilities has argued that rights-based approaches are needed to make markets address accessibility barriers (in D’Aubin, 2007). Joe, in fact, advocates for a rights based approach (2010), along with other participants who indicate

33 Canada adopted the convention in March 2010.
multiple alternatives to a technical or market-based framing of accessibility. Joe along with Sam (2009) and Arnold (2010) depict Web accessibility using the language of civil rights.

Several participants describe the competing interests entailed in WCAG deployment as being possible to reconcile through advocating a progressive enhancement (Sam, 2009; Joe, 2010; Tim, 2009) approach to both coding in negotiations with clients. Tim and Sam (2009) do not use the term “progressive enhancement” but the practices they describe are identical to those Joe uses in describing the method. For Joe, progressive enhancement refers to technical practices where the priority becomes providing a “foundation” of WCAG conformance before enhancements (e.g., WAI-ARIA support, JavaScript, and Flash) can be added. Joe describes this as a Universal Design tactic, because the code base is easier to manage when a foundation of valid and semantic (X)HTML is built, (e.g., from an economic / time perspective), and people in a variety of normative circumstances (e.g., AT users, people with dial-up connections, mobile phone users) can be reached. By claiming the multiple benefits of Universal Design (WCAG conformance), notions of disability accessibility become bound with business concerns, and even further, a variety of techno-social benefits.

The drawbacks of voluntary, business-driven approaches to standards compliance tend to be identified as those things that are easily sacrificed when there is not a convincing economic argument. The WAI clearly bills itself as an umbrella infrastructure that serves a variety of interests. For example, the WAI resource Developing a Web Accessibility Business Case for Your Organization (Henry, Arch & WAI, 2009e) provides texts that spell out ways that corporations, governments, NGOs, and small businesses can create customized “accessibility business cases” for themselves. Developing a Web Accessibility Business Case for Your Organization is organized into five Webpages spanning the following themes: social factors (Henry, Arch & WAI, 2009f), technical factors (Henry, Arch & WAI, 2009g), financial factors
(Henry, Arch & WAI, 2009h), and legal and policy factors (Henry, Arch & WAI, 2009i). In these resources, accessibility is claimed to be a multi-faceted techno-social problematic, with benefits not limited to “people with disabilities”, but extending to people with temporary impairments, the elderly, and those using various nonstandard user agents (for instance, mobile phones) (Henry et al., 2009e). Developing a Web Accessibility Business Case for Your Organization exists because although it is claimed that organizations “can realize substantial return on investment (ROI)” from conformance, “In order to be willing to make the initial investment, many organizations need to understand the social, technical, and financial benefits of Web accessibility and the expected returns” (Henry et al., 2009e). The implication for conformance work here is one of contingency: that organizational objectives, costs, expected and projected outcomes, etc., can be aligned to create a business case that documents conformance work’s “value” (Henry et al., 2009e).

However, such approaches are not consonant with social justice or civil rights-based arguments (e.g., Davidson, 2006; Imrie & Hall, 2001; Goggin & Newell, 2003; 2005; 2007) for disability accessibility, or the assertion by the UN Convention on the Rights of Persons with Disabilities that Web accessibility is a human right (UN, 2006). Yet as my analysis shows, economic factors play into conformance work, such as the “Level” of WCAG conformance that a client and a conformance worker will negotiate to work towards.

4.5 Articulating user/agents
In this section I discusses the role that design for user agents plays in conformance work, as well as the orientation of participants to “end users”. The theme platform compatibility describes an element of conformance work where design and development is oriented towards specific user
agents. Its work is characterized by certain commitments to (articulated) end users and their user agents, emerging, for example, because of a project’s goals, or the need to create workarounds to get particular platforms to work. Coeval with a discussion of platform compatibility, I borrow the idea that *configuring the user* (adopted from Grint & Woolgar, 1997) occurs in part through how WCAG and WAI-ARIA are applied is adopted. I reckon platform compatibility could constitute a resistant practice, for example, to constructions of new technology being “better”. As I will now show, platform compatibility entails “conforming” with user agents instead of with WCAG or WAI-ARIA.

A platform compatibility orientation towards WCAG and WAI-ARIA surfaces in the work of Tim and Joe, who collaborated on the development of a Drupal-based social networking site with features similar to Digg, Delicious, and Facebook. In this project, “platform accessibility” (Tim, 2009) took precedence over claiming conformance, which meant the Website was intended to be fully usable to all, but it was to be especially compatible to screen readers. They had been hired by human computer interaction researchers who wanted to create an online forum that would also enable the study of the behaviour of Blind people with respect to a particular information evaluation process. As Grint and Woolgar (1997) remind us, “configuring the user” occurs as users are defined and parameters for their behavior and actions are set. The design of technology, from genesis to production, entails the creation of users; so too did the design of the researchers’ agenda in its positioning in response to the occulcentricity of HCI. A participatory orientation towards development was claimed to have been undertaken, with Joe, a screen reader user, playing a central role in the site’s development and evaluation,

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34 The working understanding of “usable” was that “any visitor should be able to operate all significant features of the site” (Barry, 2009)

35 Of course, “Blind” is a highly dynamic and heavily invested category. Towards the end of section 4.4 I make some preliminary suggestions as to how standard and guideline use can articulate the category.
and leading testing with an array of platforms, as well as Tim, who is sighted, also performing testing. I view the user boundary building as a process that occurs throughout development, and one that is intimately tied to how WAI-ARIA and WCAG were invoked by Tim and Joe.

One of the first tasks that Tim and Joe took on was figuring out which WAI specifications could apply to their project. At the time of the Drupal community’s development (2008-2009), WAI-ARIA had been released by the W3C as Working Draft. As a standard as opposed to a normative set of design guidelines, WAI-ARIA had already been implemented in various ways by a variety of platforms. WAI-ARIA was on their radar, but they also had to look at what’s practical, that AT users are actually using day-to-day... The problem is [the WAI-ARIA] spec does things one way, but you’re really relying on what JAWS\textsuperscript{36} does. That’s the platform (Tim, 2009).

Addressing platform compatibility, which prioritized screen readers and especially JAWS, meant taking a restrained approach to WAI-ARIA. In practice this meant they first attempted to create valid and semantic XHTML, and then added enhancements with WAI-ARIA if the time could be found after the fact (Joe, 2010). Of the 70-odd WAI-ARIA roles theoretically available to Joe and Tim, only landmarks (regions of a page that are denoted for navigational purposes) were implemented (2009e). Why was only one role chosen this one, and how was it deployed? In their case, “the sections of the page that were landmarked also were marked with an [(X)HTML] heading” (Joe, 2010). Platform compatibility was characterized here through delineating what

\textsuperscript{36} JAWS is a closed source screen reader for Windows that enjoys unsurpassed “market dominance” although no hard figures exist. The yearly but methodologically questionable WebAIM voluntary screen reader survey (available at http://www.webaim.org/projects/screenreadersurvey/#demographics) also suggests JAWS’ dominance.
platforms “mattered” and through deploying WAI-ARIA accordingly, but through a progressive enhancement approach.

This strand of action can be connected to how standardization and ATs have co-evolved. One of the constraints of working with older browsers and screen readers is that these platforms do not generally support newer standards (i.e., WAI-ARIA) and the technical practices those standards are meant to enable. As Mark (who is involved with WAI-ARIA’s standardization) suggests, older ATs, including screen readers, were developed when the dominant paradigm for using the Internet was reading (X)HTML as opposed to more “dynamic” interaction (2010). Even without AJAX and DHTML, from an accessibility API point of view, (X)HTML has limited semantic capacities (Mark, 2010). One consequence is that older platforms are not equipped to receive technical access to the semantic enhancements WAI-ARIA attempts to provide. For Tim and Joe, looking for meaningful ways to structure data without WAI-ARIA roles – “If you already have a working [(X)HTML] checkbox, then just use that” – was a central component of work (Tim, 2010).

Thus in addition, when there were clashes between standards, “siding with users” became a working arrangement for navigating out of a problem. At one point in their project, Joe and Tim found they wanted to implement WAI-ARIA landmarks. An interesting clash occurred between two specifications – WAI-ARIA and WCAG – that both fall inside the scope of the same (official) infrastructure. Here, conformance to WCAG was affected, because of a conflict between the WAI-ARIA and (X)HTML standards. HTML 4.x, 5 and XHTML 1.x DOCTYPE (Document type declarations) do not recognize WAI-ARIA roles, states, and properties. Mark (2010) suggests two reasons for this conflict. Firstly, document type declarations for (X)HTML standards were developed before the WAI-ARIA effort had begun, and secondly, WAI-ARIA is not yet a W3C Recommendation. Currently, various efforts are underway to supply document
type declarations that acknowledge WAI-ARIA by the time the standard reaches this point (Mark, 2010).

For Joe and Tim, the current technical contingencies of (X)HTML and WAI-ARIA were nonnegotiable. They found themselves in a space shaped by the various trajectories of various standardization processes and bodies that were far removed from the local goals they wanted to address:

We both wanted to write valid HTML. That’s never sat well. If you use ARIA your site won’t validate – you can’t get agreement between these political bodies... you have to be pragmatic and say, “look, what we’re really doing is targeting platforms” and what works on them (Tim, 2009; emphasis added).

In this case, the product of negotiation – what working arrangement should be made vis-à-vis WAI-ARIA and (X)HTML? – was the understanding that HTML’s technical validity (and meeting WCAG Success Criteria 4.1.1.) would be traded off in favor of implementing WAI-ARIA roles.

Given the conditions of incongruent standards, this tradeoff need not necessarily be made. As a workaround, WAI-ARIA can be used programatically (as opposed to being “hard-coded”) so that markup can validate. As someone with experience in the W3C SVG standardization endeavor, Tim appreciated the negotiations and conflicts that occur between bodies, but was somewhat hesitant to adopt workarounds needed to be up to spec with several standards. In the context of a project where platform accessibility was a goal, what Tim refers to as “playing the game” (“I’m gonna get the check mark for the validator and for WAI, AAA compliance”) aligned too closely with the agendas and processes of standards bodies. “We want users to be able to use the site. Given the choice of the two, I have to side with the users” (Tim, 2009; emphasis added).
Turning to another project, Arnold, the accessibility coordinator of a large US state-level assistive technology and rehabilitation agency, has a similar orientation towards platform compatibility, quite heavily influenced by working within the jurisdiction of Section 508. His employer, “Accessibility Services” (AS) is one of five state-level health and human resources departments, providing training, consulting and testing services to the four other state agencies. At AS, compliance work is oriented around Section 508, a standard that maps closely to WCAG 1 (Thatcher, 2007). Arnold has to “make sure things work with the standard ATs” that AS and the other four departments provide their staff: across the five state agencies, 175 people use ATs (2009). “Making things work” surfaces in testing applications and Websites to make sure they work with a suite of “standard ATs” provided by AS, some of which include: JAWS (screen reader); Zoom Text (screen magnifier); Kurzweil (character recognition); Dragon Naturally Speaking (speech recognition); and various systems for converting text to Braille. Testing is a process very much oriented to isolating where exactly it is “conformance problems” arise: Is it in the browser? In an application? In the way a person interacts with their hardware, software, or AT? In the AT itself? Much like the work of participants Tim and Joe, Arnold takes a pragmatic approach, creating workarounds if necessary so that “things can work” for one of AS’ standard platforms:

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37 Here, Arnold was referring to the suite of ATs that AS can offer its employees, and I do not wish to take his comment out of context. But I think there are two salient issues the phrase “standard ATs” evokes. First, how do computer manufacturers and operating systems developers determine what features will be “standard”? This question surrounds how it is that normative ideas about computing platforms are developed and sustained. Grint and Woolgar explored this through the boundary work of configuring the user (1997) and much work by Goggin and Newell surrounds disability’s co-shaping with technology. Secondly, there are indeed “standard ATs” from the point of many in the Web content designer/developer world, inasmuch as people with vision loss are assumed by many to be the main “user group” to be addressed. As Jennison Asuncion, a Toronto-based accessibility IT consultant puts it: “There are still common misperceptions out there... [such as] the only Web users with disabilities needing consideration are blind JAWS screen reader users” (Grobschmidt, 2010).
For example, Zoom Text does not recognize form field labels. It relies on the title attribute for its speech engine to report what the form field label is. And so because of that, [in] internally developed applications here, we have to put the form field label both inside of a label element for JAWS and inside of the title attribute in the input for Zoom Text (Arnold, 2009).

Where conformance to Section 508 is not straightforward, the standard’s functional criteria (USA – how to cite?) trump semantic arguments. The interconnected nature of WAI and W3C specifications (Chisholm & Henry, 2005; Kelly et al., 2005) means if one technical component is not “up to guidelines”, other components have to compensate. Arnold’s alteration of markup by hand is a common example of the workarounds (Chisholm & Henry, 2005) needed when a user agent’s vendor doesn’t implement UAAG but when platform conformance is placed at the foreground.

Platform compatibility has been explored thus far in two related ways surrounding design for specific platforms. Another way of looking at platform compatibility is that it pushes back against pressures emanating from standards, industry, developer and platform vendor worlds to adopt newer technologies, when there are still other users “out there” who are using older technology. In fact, several of my participants (Sam, Joe, Tim, Earl) adopt practices such as putting in skip links before ARIA landmark roles. This comment from Sam is illustrative. He couches his hesitancy towards WAI-ARIA in terms resembling progressive enhancement:

So many people are jumping the gun, you know, they can’t even get basic accessibility right. You know, let’s get the foundation built first. I’ve come across some [WAI-ARIA implementations] and I’m not quite familiar with it. Actually the most recent one that I’ve seen is the role landmarks, just the way I have things set up I can use them, but yeah they’re only available to…, I actually just updated my equipment. I was using 4.1 JAWS and IE 6, now I’ve got a whole new setup. So now that these new [WAI-ARIA] role landmarks are available to me because I use JAWS 10 and IE8. But I still use skip links at the top for people
who don’t have that yet. It’s also good for mobile devices, if you click on a link at the top it takes you right to content (Sam, 2009).

Providing a “foundation” (e.g., of skip links) before deploying WAI-ARIA landmarks strongly resembles a progressive enhancement approach, and thus a concern for people who would be “left behind”. Sam also laments the lack of “basic accessibility” (harmonization with WCAG), pointing out the difference his newer platform makes in accessing role landmarks. Commitments to an approach resembling progressive enhancement surface in how the different standards are implemented: the “base” or “foundation” of semantic (X)HTML must be in place before enhancement (for example, via a WAI-ARIA enabled widget) is added. This not only benefits AT users, but is also claimed to benefit mobile phone users who will be visiting Sam’s sites as well. In other words, a variety of the benefits of progressive enhancement are suggested to be at work here. In a follow-up email to our interview, I told Sam that I could read a progressive enhancement as taking a stance for disability rights. Sam’s replied that my assessment was “fair” adding that he “never really thought about it much, just that Accessibility is for everyone and anything I can add to my sites to make it more accessible I'll do” (2010).

Practices entailed in platform compatibility could constitute resistance to dominant representations of Web accessibility as good business. This discourse’s emphasis on the power of the consumer supposes a range of normative WAI-ARIA users. These include, for example, AT users with the finances to purchase newer technology and technical savvy to learn new technical features, and vendors and developers who have chosen to funnel resources into creating ARIA-

38 The specific question I asked was: “I’m curious as to whether you think using progressive enhancement tactics - getting “basic accessibility” done first - is a kind of political act (or at least shows a deep political awareness of disability rights issues). The way you develop is clearly showing a concern for people who have older platforms/technology (and many disabled people are economically marginalized and unable to afford new equipment, so this is significant). Is this a fair assessment, what are your thoughts here?”
enabled toolkits and platforms. Progressive enhancement done well can conceivably address those users construed as lagging behind; industry “encouragement”\textsuperscript{39}, legal pressures, or the threat of obsolescence might spur those on the development side. The way in which WAI-ARIA deployment occurs provokes questions about what normative computing entails in a given moment. As Goggin and Newell (2003; 2007) suggest, questions of power relations emerge considering the resources it takes to purchase or be subsidized for the purchase of a new AT/computer set-up. Consider, for example, in the Canadian context, the range of economic barriers and medical/bureaucratic navigations those falling outside of the realm of the “standard” consumer can face when acquiring new technology (D’Aubin, 2007).

As a resource that can be put to use in conformance work, platform compatibility articulates assumptions about people and their platforms. This occurs through the process that goes into interpreting how a standard or guideline works (or doesn’t work) with a choice platform, and then figuring out strategies for making the platform “work”. In Tim and Joe’s project, since the principal investigator addressed usability testing, an obvious silence is end users themselves, who are made present in development through choices about what parts of standards and guidelines will be implemented; through what platforms are deemed standard; through what is said to be semantic for the intended sighted and Blind users of the community. Joe and Tim have the authority to decide such matters\textsuperscript{40}. In this case I suggest user and platform configuration, occurring in part via the implementation of specifications, is implicated in

\textsuperscript{39} A list of “Who Supports WAI-ARIA” outlines accessibility champions and provides reminders of toolkits that still “need encouragement” is available here: http://wiki.codetalks.org/wiki/index.php/Who_Supports_WAI-ARIA. This page is not up-to-date for 2010.

\textsuperscript{40} I am reminded of Goggin & Newell (2007) who suggest that remedial R&D efforts tend to invest in disability the “taxonomic enterprise” of knowing the truth of people via impairment labels (p. 167).
conferring ability and disability (from a social shaping perspective) as well as harmonized understandings of how conformance ought to take shape.

Moving away from Arnold and Joe and Tim’s projects, on the question of getting feedback from people outside the scope of design and development, participants responded in a variety of ways. Sam says he deals with feedback (e.g., from clients) as soon as possible when it arrives but suggests that “it’s somewhat of a myth” that when a person finds a problem with a page that they will let a Webmaster know (2010). He argues that a visitor may find no problems, or alternatively, may not be able to find the statement of who to contact when a problem is found. OSAT’s mailing list is a central way John communicates with OSAT users (and users who go on to become developers, since OSAT is an open source project). At the time of our interview, Clare (2010) said her captioning system was not ready for a thoroughgoing round of usability testing but that she was communicating informally and getting feedback with potential users through a Twitter account. She is planning to test later when the system matures.

4.6 Enrolling tools
Here I develop the idea that an array of tools can be implicated in conformance work. Some claims for why they may (or may not) be taken up are explored. By tools, I take a narrow view: Tools refer specifically to markup validators and automated conformance protocols. These systems are made possible by the existence of codified software standards and guidelines. Through their black-boxed logic, conformance protocols are pre-packaged interpretations a designer or developer can use to check how a website measures up to a standard, for instance HTML, guideline, or law. While WCAG emphasizes manual and technical assessments, the use

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41 I realize many of the issues I explore in this section could also apply to user agents, ATs, operating systems and hardware, etc., but I have drawn a line for reasons of scope and how I collected data.
of automated tools that enable snippets of webpages to be checked for conformance is very prominent by developers and designers. The array of available tools to designers and developers highlights the ways in which the WAI, as a large-scale infrastructure, affords for the distribution of trust and authority (Bowker et al., 2007, p. 7) across human and nonhuman agents.

These tools are deployed in various aspects of conformance work, for example day-to-day work of either solving conformance problems during the development process (e.g., Arnold, 2010), or in website evaluations (e.g., Alice, 2010; Earl, 2010). One way of approaching these tools is that they are used alongside manual inspection. In these cases automated tools act as a “way in” to code and markup. For instance A-Checker alerts its users to both potential problems (e.g., “you should double check if this link text seems meaningful”) and known issues (e.g., “your markup does not validate”).

As a way into websites, automated protocols can be used to help streamline bug triage. People often come to Arnold’s office at AS asking for help with an accessibility problem. Arnold frames triage in the following way: Is the problem with the AT or user agent? With the way the webpage or application was developed? Or is it the skill level of the user? Arnold puts automated protocols to work alongside manual inspection to determine whether the problem lies in the content. If the problem lies somewhere else, then a workaround must be found. Alice, whose work involves evaluating government and banking websites against CLIF, WCAG 1 A and AA, and Section 508, describes a similar use of human/automated judgment, arguing that one helps the other:

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42 Unfortunately, it was beyond the scope of my study to explore the ways in which people who are not WAI experts contribute to the enterprise of conformance work. However, I don’t think conformance work is an individualistic enterprise. Its work - e.g., finding problems, creating bug reports, reporting issues, filing accessibility complaints, etc. - is important and needs to be reconstructed (e.g. Shapin, 1989; Suchman, 1995; Strauss & Star, 1999).
I used some validation tools, but I also felt that a combination of both evaluation tools and the human touch was what was necessary. I don’t think it was a fair assessment to use just the evaluation tools or just the human touch or vice versa. I think one helped the other (2010).

A related component of her work is performing usability evaluations as a JAWS 7.1 and IBM Homepage Reader user: Can links be navigated with ease? Is relevant information easily found? Is language easy to understand? Are ALT descriptions meaningful? This three pronged approach to evaluation – expertise with an AT combined with manual and automated inspection – complicates triage, but also makes finding the source or sources of an error more certain. For instance, an agent might poorly implement UAAG, or conversely, could itself be designed to workaround common errors due to widespread WCAG noncompliance. Relying on one agent alone could miss a problem that would have consequence for other agents, signaling the value a manual inspection of markup (which may or may not be supported through the W3C’s own validation service) brings to evaluation.

Another way of approaching guideline evaluation or implementation is through a more thoroughly “manual” approach. For example, Earl says he simply knows what valid markup is, and suggests he’s gained this knowledge through years of experience writing it. The manual inspection process might seem to demand more time given the need to systematically determine if a checkpoint is relevant, then practically determine how to implement a formal principle in context (or whether an implementation ‘measures up’ to the spirit of a guideline). Joe claims a manual checking process is actually more economical than deputizing checking to a machine. Given “[conformance] is always going to be a judgment call,” and the possibility of automated error, “for somebody who actually knows how to assess a site, particularly as an AT user, I don’t really see that those tools necessarily save all that much time” (Joe, 2010). In the context of client work where accessibility must be operationalized as a clear deliverable, Joe argues manual
checking becomes a way of representing oneself to one’s client as a trust-worthy or authoritative practitioner, but also a way of preventing “feature creep” before it starts. An automated checker’s unreported issues can come back to bite a developer, who will pay in terms of time and money lost doing retrofitting (Joe, 2010; Earl, 2010). Finally, enrolling human judgment in conformance work need not be singularly consigned to a developer him or herself, as Clare’s use of Twitter friends and Arnold’s ability to network with a large pool of users indicates.

From an Actor Network perspective (Latour, 1992), one could argue that human judgment factors into both “automated” and “non-automated” conformance work. Do you discipline people (who are unreliable) or do you delegate the matter at hand to nonhuman agents (Latour, 1992)? With the latter tact, the prescriptive ways in which machines push back onto human behaviour (Latour, 1992), for instance through reporting false negatives (Sloan, 2008) can be countered with explicitly enrolling personal judgment into the equation – which saliently, is the orientation my participants who use automated tools describe.

Although my research does not directly analyze the particular logics of conformance protocols, it remains extremely important to discuss the affordances and limitations of these tools. The literature review summarized some of this ground but this data suggests deeper analytical accounts of how these tools are developed and used are needed for the following reasons. Firstly, performing thorough manual inspections is not always feasible for a designer or developer for contextual reasons. To illustrate this point, it was suggested that digging into code requires prior experience (Alice, 2010; Sam, 2009; Joe, 2010; Arnold, 2009; Earl, 2010) a commitment to ongoing learning about “best practices” (Sam, 2009) or even the security of a full-time job whereby dedication to conformance is rewarded (Clare, 2010). Secondly, aside from where someone is “at” with respect to their skills and experience, manual inspection takes time and money, which again underscores the way economic factors mediate conformance
claims. Earl suggests that lone designers or developers do not have the same resources in terms of money, time, personnel, and outreach to clients that larger organizations have (2010). For these reasons of context, I suggest that rejections of automated tools (i.e., Adam & Kreps, 2006) do not fairly apply to the realities of my participants’ accounts of working with Web technologies. Moreover, content management systems such as Drupal (Joe, 2010; Tim, 2009) and Wordpress (Sam, 2009) and frameworks such as jQuery (Tim, 2001) can be used to provide valid code and are densely imbricated with other technologies. Sam, Joe, and Tim describe working with content management systems in much the same terms as other participants described working with conformance checkers. In other words, a CMS can be trusted but it also must be manually assessed.

It becomes apparent that another question in this account of enroll-able tools points to how to agents other than designers and developers become enrolled in design. It is out of the scope of this study to empirically address this, although I have suggested ways in which these other agents – clients, “end users” and/or “people with disabilities”, user agents, organizations – make themselves present, or are made discursively present by “knowing” authorities on accessibility.

4.7 Putting it all together? The imperative to document
If Web design and development can be considered creative enterprises, then spreadsheets that document WCAG compliance are their (seemingly) dull underbelly. From an analytical perspective, documentation practices, for example using spreadsheets, provide interesting windows into the ways that conformance work is made visible (and commercialized) and that accessibility claims are sustained. Such documentation practices can be viewed as connected to the various conformance enterprises that are emerging in the wake of Web accessibility laws and
policies. Several of the participants conduct Website evaluations for clients as a part of their paid work for organizations located in affected jurisdictions. Representations of Web accessibility as a business or legal concern are at work: For example, people and organizations seeking evaluation services may be doing so through preemptive or remedial action vis-à-vis an accepted standard (e.g., WCAG Level AA or Common Look and Feel for the Internet) for accessibility. Disability is also made to matter inasmuch as codified and institutionalized standards enable particular evaluation practices. One can claim conformance, disability, and/or accessibility expertise and make it a “selling point.”

The following example is derived from Joe’s past work. It shows the standard Excel spreadsheet he uses to facilitate client work and contains some data to that effect.

43 For privacy reasons Joe has not provided the Website he was evaluating.
<table>
<thead>
<tr>
<th>WCAG 2</th>
<th>A</th>
<th>AA</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4.1 A mechanism is available to bypass blocks of content that are repeated on multiple Web pages. (Level A)</td>
<td>Pass</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>2.4.2 Web pages have titles that describe topic or purpose. (Level A)</td>
<td>Pass</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>2.4.3 If a Web page can be navigated sequentially and the navigation sequences affect meaning or operation, focusable components receive focus in an order that preserves meaning and operability. (Level A)</td>
<td>Needs Review</td>
<td>N/A</td>
<td>Pass for Screen-reader, Needs Review for visual keyboard only user: “For example, a screen reader user interacts with the programmaticaly determined reading order, while a sighted keyboard user interacts with the visual presentation of the Web page. Care should be taken so that the focus order makes sense to both of these sets of users and does not appear to either of them to jump around randomly.”</td>
</tr>
<tr>
<td>2.4.4 The purpose of each link can be determined from the link text alone, or from the link text together with its programmaticaly determined link context, except where the purpose of the link would be ambiguous to users in general. (Level A)</td>
<td>Pass</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>2.4.5 More than one way is available to locate a Web page within a set of Web pages except where the Web Page is the result of, or a step in, a process. (Level AA)</td>
<td>N/A</td>
<td>Fail</td>
<td>Some pages are only accessible from the home page. We need a quote on providing this added functionality.</td>
</tr>
</tbody>
</table>

**Figure 2: Sample from Joe's manual WCAG 2 checklist**

Figure 2. Sample from Joe’s manual WCAG 2 checklist. This was originally formatted in a Microsoft Excel document and I have highlighted a sample in this table.
Following closely with the way WCAG 2 is organized – each Success Criterion is lifted from the WCAG 2 spec – this table provides a point-by-point way for Joe to record his evaluations into categories Pass, Fail, Needs Review or Not Applicable. It indicates that the client is seeking compliance to and will pay for Levels A and AA but not AAA. Furthermore, where there is an A or AA Fail (e.g., Success Criterion 2.4.5) Joe and his colleagues can provide the “added functionality” of turning the Fail into a Pass (providing they are compensated). Categories of conformance levels are monetized in this manner, with attendant implications for how the website’s users are configured, by virtue of what A and AA does not include. Joe is contractually not required to ensure, for example, that information about the user’s location within the website can be found (WCAG 2.4.8), or that sign language interpretation is provided for prerecorded audio or video content if that content exists (WCAG 1.2.6), or that there are mechanisms to identify “unusual words” and jargon (WCAG 3.1.3) or abbreviations (WCAG 3.1.4) should they be found to exist. Sam (2009), who performs evaluations for clients through his small business, uses a similar system. Although it is database-backed, it articulates with WCAG through providing a series of checkboxes that can be checked or unchecked. Sam sends the completed HTML page the database system creates to his clients who then decide what to do with the results.

Earl, who occasionally conducts audits against various standards, uses a similar system and complements it with a written report to his client that follows the W3C’s recommended Template for Accessibility Evaluation Reports (W3C, 2002b). I read this report as a means for establishing a truth claim about a website’s compliance, through articulating the various elements in the trial the website undergoes: the URLs excluded and included; the date range; the
review process undertaken; the results structured according to WCAG’s structure; the recommended next steps to take, etc. One striking feature is the array of software tools Earl uses in his evaluations.

These examples show how particular forms of interpreting and codifying websites and WCAG can be used to support commercial work. Conformance claims are documented through categories that indicate whether or not something meets or fails a set of Success Criteria at a point in time. I suggest categorizations (e.g., “Pass”; “Fail”; “Needs Review”) position accessibility in a substantive place that can be arrived at (Hockema & Coppin, 2009; Titchkosky, 2007) through meeting successive Levels. These categories align with the configuration of users that occurs through drawing the line between bugs/conformance categories (“This isn’t up to spec”) and exclude-able features, suggesting how conformance can be made to work through monetization or meeting a certain guideline (which aligns with a particular law or policy). This work is made visible and surveilable – and in this sense underscores the degree of attention and complexity that can be entailed in development. At the same time, there is much that such forms do not capture. For instance, Earl showed me that when he became interested in WCAG, he developed a fairly involved style sheet that simulates a linear rendering of a website (Earl frames accessibility mostly as a concern that affects screen reader users and as an issue surrounding semantic markup). He uses this to indicate to his sighted clients why it was worthwhile to invest in his conformance services, because his clients often do not grasp why it is they should care about listening to a website. Coeval to this, he has amassed an intricate system of documenting

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45 E.g.: A-Checker used along with manual inspection; WCAG 3.1.5. (Reading Level) calculated using the “Standards Schmanders” readability index calculator (http://www.standards-schmandards.com/exhibits/rix/index.php); code manually inspected with Firebug Firefox extension; Focus order (WCAG 2.4.3) inspected using WebAIM’s WAVE toolbar (http://wave.webaim.org/toolbar); and colour contrast (WCAG 1.4.3 & WCAG 1.4.6) was inspected using Juicy Studio’s Luminosity Colour Contrast Ratio Analyser (http://juicystudio.com/services/luminosityconstrastratio.php)
best practices he finds, and describes a commitment to learning more tips and tricks. As Earl describes it, the maintenance and creation of such resources are antecedent to the “results” of his conformance work (2010).

5 Discussion
My discussion centers on the observations that there is a crucial need for robust implementations of WAI-ARIA and WCAG, and also that using labels such as “accessibility” or “standards compliance” masks a great deal of interpretive work, negotiation, and contingency on the part of designers and developers. I will build my discussion by exploring the relationship of WCAG to a standard, in illustrating how conformance work can act as a lens for grappling with WAI-ARIA and WCAG use, and by suggesting some further areas of research.

Like standards, WCAG, embodies part of a larger infrastructure, helping make device interoperability happen (Hanseth & Monteiro, 1996; Pargman & Palme, 2009; Bowker & Star, 1999). As with the socio-technical realization of standards (both in terms of standards development and implementation) WCAG “in use” is nested and imbricated with other technologies and norms (Star & Lampland, 2009). These include the representation of conformance as having multiple stakes starting for many as personal or human rights stakes but also encompassing “side” benefits (e.g., as in progressive enhancement or as a business concern, presumably because equity or rights-based stances do not literally have “currency”? ) that could be brought to bear on negotiations with clients or coworkers. Working arrangements between clients and conformance workers (e.g., “only test to Level AA”); the decision to design with a particular platform in mind (e.g., as in platform compatibility), and design with a particular best practice in mind indicate the interpretive flexibility of putting WCAG to use. Just as one doesn’t deploy all the elements available in (X)HTML when one makes a webpage, so to can provisional understandings of WCAG conformance be developed. Economics, best practices, practical
policies or laws, or the desire to design with a particular user/agent make themselves
consequential in such negotiated understandings, which may or may not correspond to WCAG’s
Levels system – or to an individual’s experience of accessibility.

WCAG has implications for invisibility and visibility, as do standards. This is both in
terms of design and development work, and in the wider implications of WCAG for participation
online. To draw from Foucault, the political metaphor of panopticism (1977), which lies in how
discipline becomes distributed throughout the prison but also extends throughout the social body,
has portability to conformance work. Briefly, panoptic architecture, through making visible the
inmates of its prison, allows for the de-centering and sustenance of power independent of those
who architected it; through the way it distributes “bodies, surfaces, lights, gazes,” it de-
individualizes power (Foucault, 1977, p. 200). WCAG and WAI-ARIA, as a system for
*technically* representing accessibility, are allied with a bigger infrastructure – and its legal and
cultural authority – used to create knowledge claims about disability accessibility in the domain
of the Web. In the WAI more generally, accessibility is invested through bio-medically informed
notions of disability (Kelly et al., 2009), where disability is construed as being attached to
individuals (“Web accessibility focuses on people with all types of disabilities - visual, auditory,
physical, speech, cognitive, and neurological disabilities” (Henry et. al, 2009e). The points of
application I have been concerned with are designers and developers, who derive their authority
as those with expertise in the various ways that websites may be made to harmonize with the
WAI’s prescriptive texts. Enrolled tools and the various conformance procedures (including an
ever growing body of best practices, practical steps, communication mechanisms, and working
arrangements) is a part of the disciplinary apparatus through which official knowledge about
accessibility is reproduced, reworked or contested (as in the case of Tim and Joe’s orientation
towards platform compatibility). At the same time that the WAI provides a system through
which conformance work can operate through disciplined designers and developers (and provide a means to articulate their subjectivity), the configuration of agents outside of the sphere of development and design is also at work, with great consequence for not only what participation online comes to mean, but also for how disability comes to be invested with meaning.

From an infrastructure perspective, WCAG – like standards – privileges certain aspects of design and development and hides others. This has implications in terms of surveillance (e.g., of individuals on the job, or of an institution or organization); may not account for contextual needs to develop specific working arrangements; and also leaves out uneasily quantified work. Moreover, claims of WCAG conformance may be observed to “reward” unfairly. Sam comments:

You talk about these organizations that say they know Web accessibility and then you go to their websites and they’re not accessible. A [charity group for Blind people] has a site check program. They have an article up there about [a large bank] and how it’s got an accessible website. And I went there and it was crap… you know it makes it very difficult, you get somebody saying, “I did this, and it’s accessible”, and I’ll say well no it’s not. Well I’m sorry, they may have found it accessible, but here’s where you’re not meeting guidelines (2009)

Anecdotally, my participants indicate deep dissatisfaction with the degree to which designers and developers more broadly deploy WCAG and the exclusions this generates. UAAG and ATAG’s under-use is coeval here, since they are implicated, for instance, in whether or not ATs can interoperate with software development tools (Tim, 2009). As a remedial infrastructure more generally, the WAI plays “catch up” with new technologies. Accessibility in this sense is added on to design and development work, and arguably disability is constituted in ways that resonate with Titckosky’s discussions of include-able and exclude-able types (2003; 2007).
Conformance work does not suggest accessibility does not exist nor deny the materiality of barriers to life online. It is meant, however, from an analytic perspective, to remove the focus from talking about accessibility and inaccessibility as if they could be understood in unproblematic, pre-given, or dichotomous terms. In this sense I hope to avoid the sort of phenomenological violence (which the above quote from Sam (2009) suggests) that could be entailed in declaring websites accessible or inaccessible. I think this goes hand-in-hand with the discursive conflation of “conformance” or “compliance” with “accessibility”, a feature of most research in this area but also of many of my participants’ talk. Thus, besides the idea of conformance work, my thesis is also in conversation with dialogues on “access” issues. This perspective owes many intellectual debts, including to a relational account of infrastructure (Star & Ruhleder, 1995) as well as the idea that accessibility is not a substantive place to be arrived at but a place to ask questions about citizenship, and investment in disability and the production of normalcy in a historical moment (Titchkosky, 2003; 2007). Designers and developers are some of the “invisible technicians” (Shapin, 1997) at work here. I have shown how practitioners implicate a variety of elements in making conformance work and that practices for representing people, work, and technology muddy the ostensibly easy to understand phenomena of how WCAG and WAI-ARIA are taken up (or most commonly, as much research suggests, not taken up). A strength of my study has been an analysis suggesting the everyday ways – work practices, conventions, working arrangements, etc. – in which ideas of conformance to WAI-ARIA and WCAG are stabilized. I am less certain of the practical value of exploring conformance as something that is “made” since organizations, governments, and individuals will always need and make standards, de facto and de jure.

Departing from some of the limitations of my research that I identified in section 3.2, I would like to suggest further possible opportunities for inquiry. The advantage of a “multi-sited”
study such as this has been the ability to draw from several different accounts of projects. This thesis can thus be seen as an exploratory study suggesting some preliminary ways in which work with the WAI may be further unraveled.

Although it probably made sense given the scope of a master’s thesis study and my research interests at the beginning, I realize now that it is not sufficient to only study Web designers. It was not that I had the assumption that this social world was “autonomous”, but at the same time, I only collected data from such people. Ecological analyses of communities of practice implicated in the WAI are needed, perhaps from a robust situational analysis (Clarke, 2005) standpoint. Taking an Actor Network approach and following a very banal tool, such as a markup validator, the WebAIM “Wave accessibility checker” (WebAIM, 2010), or an “ARIA enabled” UI toolkit such as jQuery⁴⁶, through its networks might be another way of conducting such an analysis, especially in terms of unearthing some of the design decisions entailed in codifying conformance.

There is an urgent need for critical histories of Web accessibility specifications and investigations of how disability is conceived of in these specifications. These include histories not only of WCAG but of ATAG and UAAG, and the co-shaping of HTML5 and WAI-ARIA.

In their discussion of the social relations of architecture development, one of the points Imrie and Hall (2001) make is that while regulatory controls are important for the fostering of accessible built environments, that these regulations often reinforce individualized or medicalized views of disability. Many disability activists reject such narrow (and ostensibly “apolitical”) views of disability. And from another angle, technology that assumes a “compensatory logic” (Moser, 2006) can be examined through a queer angle of how normalcy and difference is handled (see

⁴⁶http://www.paciellogroup.com/blog/?p=566
also, McRuer, 2006). If the WAI is said to embody medical/individualistic notions of disability (e.g., Kelly et. al., 2009) then this is an important claim that requires more investigation because it means standardized technologies and bodies are “disappearing into the background” (Moser, 2006, p. 388). The lack of such critical histories and investigations (a gap Ellcessor (2010) and Adam & Kreps (2006)) identify) means there are many opportunities for further research.

Another starting point for future research is that of the “misfits” (Star, 1991) that arise between individuals and standardized technologies. Phenomenological or action-oriented inquiry would be one way of restoring the work that occurs when a marginal actor does not “fit” with a standard. As I have identified in my analysis, the work of “nontechnical” people who contribute to conformance work – e.g., filing bugs, reporting (or not reporting) accessibility complaints, as well as filing human rights complaints and conducting activism – is important, but a gap in my research design. As I have been completing this manuscript, Torontonian Donna Jodhan has been engaged in an ongoing Charter challenge with the Canadian Federal government (Jodhan, 2010). She has found that as a screen reader user, it has been impossible for her to access Federal employment websites – even though the Common Look and Feel for the Internet (Canada, 2007) applies. To me this underscores the import of attending to accessibility standardization (including its limits, its affordances and breakdowns) from standpoints that privilege disabled people, including “misfits” and dissenters.

6 Conclusion

My research drew from different “domains” of inquiry – infrastructure studies, disability studies, and to a lesser extent, HCI – for an intellectual background for grappling with use of WAI

\[^{47}\text{McRuer’s book “Crip Theory: Cultural Signs of Queerness and Disability” fused many ideas from disability studies and queer theory, for example, the notion of “compulsory able-bodiedness” and how it is allied with heteronormative ideals.}\]
specifications. My thesis study developed an analysis of how Web designers and developers determine what conformance to WCAG and WAI-ARIA means. In this study, I showed that although it can be treated as an obvious technical question, conformance work also involves crystallizing a harmonized interpretation of these texts and the websites they are supposed to apply to. This illustrates designers and developers play a central role in investing categories such as “standards compliance” and “Web accessibility” (and by extension, disability) with meaning, and moreover, that the various agents and representations of accessibility that can be brought to bear on this work need attending to. My discussion suggested that WCAG analytically resembles a standard. In addition, I suggested that understanding how it is that conformance claims are put together is helpful for avoiding the analytical pitfall of conflating the “satisfaction” of Success Criteria with the moving target of accessibility. Aside from the idea that conformance is something that is “made” through an array of techno-social elements, I hope my suggestions for future inquiry will be considered by researchers interested unraveling the complexities of work with the WAI.
References

Interviews


“Sam”. Personal interview. December 11, 2009


Published works


December 31, 2010 from
http://www.oxfordreference.com.myaccess.library.utoronto.ca/views/ENTRY.html?subview=Main&entry=t23.e28509


Appendices

Appendix A: Interview Protocol

My Master’s thesis explores how Web designers, and developers use accessibility guidelines and standards - particularly under what conditions, when in workflows, why particular standards or guidelines are used or not used, and what parts of the texts themselves are used.

I have a general interview protocol to follow during our session today. But, please feel free to ask me questions, or to take this interview in any directions that you feel would be appropriate. I would appreciate it if whenever possible, you could show or tell me examples of your work.

You may decline to answer any question, and you are free to leave this study at any time.

First off, I’m wondering if you tell me a bit of background about your design and/or development work.

*If this contextual information hasn’t been mentioned:*
How long have you been doing this for?
What kinds of projects are you typically working on?

*If the participant has been involved in guideline or standards development work:*

I have a few historical questions for you.
Please tell me how the [WAI, guideline, or standard] came about.
What work was it intended to do in the world?
Around what years was this?
Under what circumstances did it come about?
To your knowledge, who were some of the stakeholders involved in the initiative?

The term “web accessibility” is very commonly used. In the context of the work you do, how do you define accessibility?
*If it hasn’t been mentioned:*
Who is affected by or benefits?
Is your concept of accessibility defined in any documentation? Would you be willing to share that documentation with me?
When you say that a website is not accessible, what exactly do you mean?

Please tell me how you use accessibility guidelines and standards in the work that you do
How did you learn about them?
Do you use them in your work? If so:
Can you briefly describe the purpose of the projects you’ve used these guidelines and standards in?
Why were these standards/guidelines deployed?
How did you deploy them?
At what stage in the design/development process do you use them?
How do you know if you’ve used them correctly?
How do you facilitate or maintain compliance?
Is there any formal documentation of them? Would you be willing to share this with me?
Do you ever use automated protocols to validate your code and markup? If so which ones?

Apart from WAI accessibility standards and guidelines, are there other policies or protocols related to accessibility that you use?

What stakeholders are involved in the development of [ ]. Can you describe their involvement?

Have you ever received feedback on your designs from your users?

In my next few questions, I’m going to ask you if you have found any strengths or weaknesses in the Web Accessibility Initiative. If these questions aren’t relevant to you or you have no opinions on them, we can skip over them.

As you see it, does the Web Accessibility Initiative have any limitations?
*If it is relevant:* In your opinion, why do these limitations exist?
*If it is relevant:* How do you work around these limitations in your design and development work?

In your opinion, what are the strengths of the Web Accessibility Initiative approach?
*If it is relevant:* In your opinion, why are they strengths?
*If it is relevant:* In your opinion, does the Web design and development work you do benefit from these strengths? If so, how?

The next question I’m going to ask will involve a little bit of imagination on your part. I would like you to imagine that suddenly, the Web Accessibility Initiative never existed, what would your design and development work be like?

How would this affect your work?

I want to ask you a question about your overall approach to IT development. Do you use any formal or informal methods to guide the work you do? By methods I’m referring to approaches to development, for example agile or iterative approaches, or the waterfall method.
Is this guided by any formal or informal documentation (e.g., guidelines, standards, wikis, community conventions)

In your opinion, what social issues do you think are most at stake in the accessibility work that you do?
Why are these issues important?
Who is most affected by these social issues?
What stake do you think you have in these issues?

Those are all of the questions I have. Do you have any questions for me?
Is there anyone else you think I should contact who might be interested in participating in my study? Would you mind forwarding him/her my email recruitment letter?

Can you suggest any mailing lists I might recruit potential participants on?

Thank you for your time.
**Appendix B: Concepts / Coding spreadsheet**

I used the following table to code interview data:

<table>
<thead>
<tr>
<th>Code or Concept</th>
<th>Question / Answer or Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Appendix C: Participants

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>How / where recruited</th>
<th>Job title / Description of work discussed in interview</th>
<th>Involved in W3C standards/guidelines development?</th>
<th>Location of interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Tim”</td>
<td>Word of mouth</td>
<td>Independent consultant; specializing on Drupal.</td>
<td>SVG</td>
<td>Skype</td>
</tr>
<tr>
<td>“Sam”</td>
<td>WebAIM mailing list</td>
<td>Independent consultant and Wordpress developer</td>
<td>No</td>
<td>Skype</td>
</tr>
<tr>
<td>“Arnold”</td>
<td>WebAIM mailing list</td>
<td>Accessibility coordinator of a large US state-level assistive technology and rehabilitation service. Provides accessibility training, consulting and testing to other state agencies and developers.</td>
<td>No</td>
<td>Skype</td>
</tr>
<tr>
<td>4 “Joe”</td>
<td>Word of mouth</td>
<td>Independent consultant and Drupal contributor</td>
<td>No</td>
<td>Skype</td>
</tr>
<tr>
<td>5 “Alice”</td>
<td>Word of mouth</td>
<td>Performs freelance evaluations of government and banking Websites</td>
<td>No</td>
<td>Phone</td>
</tr>
<tr>
<td>6 “John”</td>
<td>ORCA-list</td>
<td>Tech lead of an open source AT project</td>
<td>WCAG 1</td>
<td>Skype</td>
</tr>
<tr>
<td>7 “Clare”</td>
<td>Word of mouth</td>
<td>Developer of lecture/capture/captioning distribution system</td>
<td>No</td>
<td>In-person (private room at her office)</td>
</tr>
<tr>
<td>8 “Earl”</td>
<td>Word of mouth</td>
<td>Information architect &amp; Web designer</td>
<td>No</td>
<td>In person in a public location</td>
</tr>
<tr>
<td>9 “Mark”</td>
<td>Word of mouth</td>
<td>Developer at large university’s accessibility research unit</td>
<td>WAI-ARIA</td>
<td>Skype</td>
</tr>
<tr>
<td></td>
<td>Word of mouth</td>
<td>WCAG 1 &amp; 2; played a central role in starting the WAI</td>
<td>Skype</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---------------</td>
<td>----------------------------------------------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>“Peter”</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix D: Recruitment script

Note: appeared on Faculty of Information letterhead

Hello,

My name is Alison Benjamin, and I am a Master’s of Information candidate at the Faculty of Information at the University of Toronto. I have received permission to post to this mailing list from its administrator, [Insert name of administrator here].

I am seeking participants for a study I am conducting as a part of my thesis work. My study is entitled: Unconventional approaches, conventional standards: How alternative approaches to Web accessibility use W3C standards and guidelines.

As a Web developer or designer, you may be familiar with the W3C’s Web Accessibility Initiative (WAI). If you have ever used WAI standards and guidelines (e.g., WCAG, ATAG, UAAG, WAI-ARIA, HTML, CSS), you may be interested in participating in my study, which explores if and how Web developers and designers incorporate aspects of the WAI in their day-to-day work.

Participating in this study involves taking part in one approximately 1 hour long semi-structured interview with myself, either in-person at the University of Toronto, over the phone, or at a location of your choosing.

To qualify, you must have some experience designing or developing Web sites and/or “Web 2.0” applications (e.g., have been involved in at least one project of this nature). Over the course of the interview, you will be asked to share your views on how and when (if at all) you incorporate accessibility guidelines, standards, and policies in your design and development work. You may also be asked to share accessibility documentation you use in your work, such as WAI Webpages, best practice or accessibility statement documents, or personal protocols you follow.

Approximately 10-15 participants will be interviewed in total. The results of my study will provide perspectives on how guidelines and standards are used in a variety of approaches to Web accessibility. Interviews are currently scheduled to take place between the months of November 2009 and February 2010 and will be scheduled at a time and location of your convenience.

All information gathered in this study will remain completely confidential. Any confidential or identifying information about participants will be anonymized and only myself and my supervisor will have access to the original data collected. This study has been reviewed and received ethics clearance from the Office of Research Ethics at the University of Toronto.

If you are interested in participating in this study, or would like to discuss my study or this letter, please contact me at: alison.benjamin@utoronto.ca. Alternatively, you may contact my supervisor for this study, Dr. Stephen Hockema, Assistant Professor in the Faculty of Information: steve.hockema@utoronto.ca; phone: 416-978-7110.

Thank you!
Alison Benjamin
Masters of Information candidate
Faculty of Information, University of Toronto