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Standards, in particular Web standards, have become critical and complex information technologies as they influence our everyday activities. Standards making is a social practice where in experts engage in discussions to develop standards by weighing various alternative design solutions. Processes followed to develop these standards and how decisions for core features are made are not well understood. In this paper, we have drawn on concepts of rational discourse described by Habermas to examine whether processes followed at W3C meets requirements of rational discourse. Our investigation shows that processes followed at W3C do exhibit an approximation of rational discourse, while some concerns exist.

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AN INVESTIGATION OF W3C STANDARDIZATION PROCESSES USING RATIONAL DISCOURSE

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Abstract

Standards, in particular Web standards, have become critical and complex information technologies as they influence our everyday activities. Standards making is a social practice where in experts engage in discussions to develop standards by weighing various alternative design solutions. Processes followed to develop these standards and how decisions for core features are made are not well understood. In this paper, we have drawn on concepts of rational discourse described by Habermas to examine whether processes followed at W3C meets requirements of rational discourse. Our investigation shows that processes followed at W3C do exhibit an approximation of rational discourse, while some concerns exist.

Keywords: Standardization Processes, W3C, Habermas, Rational Discourse, Standards

Introduction

Many diverse domain/subject experts and various interested individuals have engaged in making standards which are key ingredient of this modern industrial and information society. For instance, in the information technology domain, standard interfaces allow disparate devices and applications to communicate with each other over different networks. Standards are known for benefits of increasing efficiency over entire product lifecycle, increasing quality of the product, facilitating mass production, and providing best practice guidance. Thus, most standards development is not stimulated by any particular theoretical reasoning rather by pragmatic commercial and social necessities (Schoechle, 1999).

Over the past decade, the growing number of Information and Communication Technology (ICT) standards continues to shape our everyday activities. These ICT standards are anticipatory standards, or in other words, those containing substantial design components. Anticipatory standards define capabilities that must be inherited by the future ICTs, as opposed to selecting one among many existing capabilities or practices as a standard (Lyytinen, Keil, & Fomin, 2008). Anticipatory standards, therefore, are developed before widespread acceptance of the technology (Cargill, 1989). Standards Development Organizations (SDOs) are required to address the needs of a variety of industries, governments, and common people. Given the exponential rate at which technology is advancing, developing ICT standards following traditional SDO methods, such as those of the American National Standards Institute (ANSI), are becoming more expensive, time-consuming, and complex to craft (Hill, 2003). Traditional SDOs are giving way to new consortium-based SDOs, such as the World Wide Web Consortium (W3C).

Consortium-based SDOs typically contain both technical and administrative components. The technical components include various committees, where each committee develops a specific standard based on contributions from volunteers representing organizations, users, governments, academia, and individuals. The administrative components coordinate activities within and among committees to ensure that standardization processes are inclusive and at the same time create timely solutions.

The standardization processes followed by consortium-based SDOs depend upon the voluntary participation and contributions of their consortium members who provide significant design components. Participating members meet to discuss and select mutually acceptable standards from various alternative design solutions. Participating members actively engaged in designing standards find themselves cooperating through the standardization process, even though they compete in the marketplace (Kretschmer & Muehlfeld, 2004). In contrast, traditional SDOs develop standards as products of legislative and regulative processes (Weiss & Cargill, 1992). Thus, standardization processes followed by consortium-based SDOs to develop anticipatory standards are different from traditional standardization processes (Cargill, 1997) and they continue to be severely under-researched (Lyytinen et al., 2008).

Success of standardization processes followed by consortium-based SDOs depends upon its ability to resolve impasse and support reaching consensus among participants. We argue that standardization processes are similar to Habermasian view of rational discourse, i.e., open-ended discussion geared towards reaching consensus. Many have criticized that Habermas's view of ideal rational discourse as impossible to achieve in our constrained lives due to its demanding procedural conditions. We join other researchers (Froomkin, 2003; Lyytinen & Hirschheim, 1988; Schoechle, 1999), who argue that principles of rational discourse can be used for analyzing contexts that are oriented towards reaching consensus. In theory of communicative action, Habermas, explains how to design and recognize discourses that are legitimately consensus oriented towards achieving common goal (Froomkin, 2003). Habermas's view of rational discourse, therefore, serves as ideal reference point to critique processes followed at consortium-based SDOs as their core value is to develop quality standard based on consensus among participants.

In this paper, we focus on standardization processes followed at W3C. W3C has produced many widely adopted standards such as Hypertext Markup Language (HTML) and Extensible Markup Language (XML). However, W3C has also seen its share of failed attempts, for example, Web service architecture (a specification intended to provide common model for understanding Web Services) development was abandoned because participants were not able to reach consensus. Also, not all standards developed by W3C are considered to be effective, for example, Web Services Choreography Description Language (WS-CDL) is considered to lack necessity components to satisfy its intended purpose (Umapathy, 2006). In this paper, we investigate whether W3C has appropriate policies to ensure that standardization processes has higher probability to produce effective standard. For that purpose, we examine W3C policy document that provides guidelines to regulate processes against to conditions for rational discourse. Our objective is to determine how well standardization processes followed at W3C actualize Habermas's rational discourse and identify inconsistencies with W3C policies. In the following sections, first, we introduce W3C standards consortium. Second, we present key concepts of Habermas's rational discourse. Third, we analyze W3C

policies and processes to assess how well rational discourse is instantiated. Finally, we provide discussion on the analysis.

World Wide Web Consortium (W3C)

Tim Berners-Lee, the inventor of the World Wide Web, along with others created W3C as an international consortium with aim to achieve Web interoperability, i.e., Web technologies that are compatible with one another and allow any hardware and software to access the Web. The mission of the W3C is to ensure the long-term growth of the Web and achieve its full potential through the creation of Web standards (W3C-About, 2008). Since, its birth as standards consortium, W3C has published more than 110 standards. W3C provides a vendor-neutral forum in which more than 400 member organizations, about 60 W3C staffs, and other invited experts and individuals can participate and work together to design Web standards.

In order for W3C to consider developing standard for a particular topic, first, there must be considerable signs of interest or proposal submitted by W3C members expressing interest and support (W3C-Process, 2005). When there is enough interest, a new standard activity proposal is created and appropriate Working Group is made responsible for development of that standard. Interested participants can take part with development of the standard under the assigned Working Group. Standard specifications are created through a process which involves cycles of significant reviews and revisions of the specification by the participants (W3C-Process, 2005). When the specification reaches expected maturity set by the Working Group charter, then it is published as a W3C recommended standard. We are interested in the processes followed by the Working Groups to develop standard specifications, but not necessarily on pre-stage activities that lead to initiation of the process.

In order to promote fairness with discussions held during cycles of reviews and revisions, and to develop high quality standards, W3C has set forth policies on achieving consensus among participants. W3C requires Working Groups make the processes open for participation from W3C members and public. W3C requires Working Group to consider all legitimate views and objections, and endeavor to resolve them regardless of who expressed it (W3C-Process, 2005). Decisions can be made either through face-to-face meetings, virtual meetings, or email. Consensus on an issue is achieved when there is substantial number of participants express their support on a decision and no individual registers a 'Formal Objection' (W3C-Process, 2005). Any individual (including public) can register an objection to decisions made within the process to the W3C Director along with technical arguments and propose changes that would remove the objection. The Director reviews such objections to decide on next course of actions. W3C policies do not set minimal number of participants required to achieve consensus, however, Working Groups are expected to include such threshold requirements in their charter. In the next section, we present key concepts of theory of communicative action.

Theory of Communicative Action and Rational Discourse

Habermas, in the theory of communicative action (Habermas, 1984), suggests that actors with conflicting interests working towards a common goal can achieve it by reaching consensus through an argumentative process where the statements of each actor are verified and validated (p. 86). Habermas provides a theoretical basis that can be used for planning processes that involves public participation, sharing information, and reaching consensus through dialogue rather than exercise of power (Bolton, 2005). Assumptions, conditions, and principles provided in the theory of communication, then can be used for analyzing consensus oriented processes in order to determine whether its outcomes can be considered legitimate. In this section, we provide, first, Habermas's classification of social actions and second, overview of principles of rational discourse.

Types of actions

Habermas categorizes social actions based on two human tendencies: first, striving for success based on available resources and power; and second, striving for mutual understanding through coordination of actions with partners (Klein & Huynh, 2004). He distinguishes three kinds of actions: instrumental, strategic, and communicative. Instrumental and strategic actions are directed towards achieving individual success or a goal, while communicative action is focused on achieving mutual understanding (Hansen, Berente, & Lyytinen, 2007).

Instrumental action

The success-oriented instrumental action involves application of technical rules derived from empirical knowledge about natural laws and are directed towards manipulating physical objects in ways to serve the actor's needs (Klein & Huynh, 2004; Lyytinen & Hirschheim, 1988). The central concept with instrumental action is selecting best course of action to achieve the goal in the given situation (Habermas, 1984). The success of instrumental actions can

be measured by effectiveness in achieving the desired objective or the truth of causal assumptions (Hansen et al., 2007; Klein & Huynh, 2004).

Strategic action
The strategic action involves contexts where actor follows certain set of decision rules to maximize his/her interests or goals. The key difference between strategic action and instrumental action is the need to predict likely reaction of (rational) opponents based on empirical knowledge about human behavior (Klein & Huynh, 2004). In strategic action, actor recognizes the social context and depending upon whether goals of their counterparts coincide or oppose, chooses actions from standpoint of maximizing utility or expectation of utility (Habermas, 1984).

Communicative action
Communicative actions are oriented towards reaching an understanding and maintaining it by coordinating planned actions (Habermas, 1984). Therefore, actors engaged in communicative action inform each other about norms, common values, assumptions and states of affairs, events, decisions taken and so forth (Klein & Huynh, 2004). The basic condition to achieve communication action is for actors to achieve intersubjectively-determined understanding of the situation at hand (Hansen et al., 2007).

When there is misunderstanding, differing opinions, differing viewpoints of the goals, or differing best means to achieve a goal, then communication action breaks down (Klein & Huynh, 2004). In those situations, actors would aim to reach consensus by convincing each other or by finding a common ground through a civilized argumentation process, known as rational discourse (Hansen et al., 2007; Klein & Huynh, 2004).

Rational discourse
Rational discourse (also known as discursive action) is an open-ended discussion aimed at resolving differences and conflicts to mutual satisfaction (Schoechle, 1999). Members involve in such discussion would expect others to comply with a norm (agreed upon common values in a social group) by behaving in a particular way in certain situations (this is known as normatively regulated action) (Klein & Huynh, 2004). During discussions held in public forum, a member may purposively reveal their subjective feelings (this is known as dramaturgical action), which can enable interaction among members to gain legitimacy in various situations (Manninen, 2003).

Conditions for rational discourse
In situations, where there is no willingness to compromise or find new common ground or distorted and misleading communication takes place, then what may appear as communicative action would actually is strategic action (Klein & Huynh, 2004). In order to achieve consensus through rational discourse, Habermas provides following conditions:

1. Members engage in discussion to reach mutual understanding rather than to win the argument (Habermas, 1984).
2. Any member should be permitted to take part in the discussion (Habermas, 1992; Hansen et al., 2007).
   a. Any member should have the ability to participate and express themselves.
   b. Any member should be able to question any proposal.
   c. Any member should be able to introduce a proposal.
   d. No member should be forced to perform specific activities.
3. Statements of all members are open to questions of validity, which can be accepted or contested (Habermas, 1984).
4. Arguments among members should be conducted in open forums and allowed to continue long enough to reach mutual understandings (Habermas, 1984).

During the argumentation process, members can challenge validity claims of other member statements. Members would evaluate other member statements on the basis of four validity claims (Habermas, 1984):

- *Truthfulness*—statements of a member can be objectively evaluated.
- *Appropriateness*—statements of a member must be appropriate to the context of discussion.
- *Sincerity*—statements of a member must be sincere and honest.
- *Comprehensibility*—statements of a member must be well-formed and comprehensible to other members.

According to Habermas (Habermas, 1984), consensus can be reached through rational discourse when members do not violate any of the validity claims described above. If validity claims are not violated, then it will lead to undistorted communication building trust, clarity, knowledge, and agreement among members, thus enabling the member's ability to reach consensus. In contrast, if validity claims are violated this results in distorted

communication, which then leads to misrepresentation, confusion, false assurances, and illegitimacy, and thus hinders the member's ability to reach consensus. If validity claims are violated then members engage in argumentative discourse to reach mutual understanding. Based on validity claim challenges, an argumentation process could lead to the following types of discourses:

- *Theoretical discourse*—a form of argumentation in which claims to truth are discussed on the virtue of evidence and logic.
- *Practical discourse*—a form of argumentation in which claims to social norms, appropriateness, and acceptability of solutions are discussed.
- *Aesthetic criticism*—a form of argumentation in which criticisms are based on good taste and adequacy of value.
- *Therapeutic critique*—a form of argumentation in which claims to sincerity are questioned.
- *Explicative discourse*—a form of argumentation in which claims to well-formedness, rules of correctness, or comprehensibility are expressed and questioned.

A discourse that is consistent with above described conditions and properties can be considered to be approximately a rational discourse (Hansen et al., 2007). Table 1 provides summary of above described properties of rational discourse along with assessment scheme that can be used for examining standardization processes to assess whether they facilitate rational discourse.

Table 1. Assessment scheme using properties of rational discourse			
Discourse Type	**Validity Claims**	**Distortion**	**Assessment**
Theoretical discourse	Truthfulness	Misrepresentation	Examine whether there is evidence of argumentation on facts and solutions provided.
Practical discourse	Appropriateness	Illegitimacy	Examine whether statements and terminologies used are relevant to the issue under consideration.
Aesthetic criticism			Examine whether there are discussions on the adequacy of value standards.
Therapeutic critique	Sincerity	False Assurance	Examine whether a member is promoting or suppressing a specific solution by using metaphors and connotative words.
Explicative discourse	Comprehensibility	Confusion	Examine whether facts intended by members are perceived or understood by other members.

In the next section, we will apply the conditions provided by Habermas for rational discourse on the W3C standardization processes and provide argument to demonstrate how well W3C processes satisfies those conditions. Later, we investigate actual processes followed for a specific W3C standard to examine whether rational discourse is facilitated.

W3C Standardization Process as Rational Discourse

We argue that, prima facie, standardization processes followed at W3C are good example candidate for rational discourse. First, processes are highly open and transparent. Second, processes are not merely technical discussion, while it may be a substantial part, also involves considerable amount of non-technical discussion. Third, participants are drawn from around the world and likely sharing a professional socialization. Fourth, most participants have mutual interest and tend to gain from the existence of the standard under discussion.

We further investigate to determine whether standardization processes followed at W3C meets the conditions of rational discourse set forth by Habermas, by examining the W3C Process Document. The Process Document provides account of policies that govern processes followed in quest of developing quality standards (W3C-Process, 2005). We analyze these policies to determine how well W3C processes satisfy conditions for facilitating rational discourse.

Condition 1: Sincerely seeking mutual understanding

Participants interested in taking part with W3C standardization processes must exhibit following qualities (i) relevant technical competence, (ii) ability to act fairly, and (iii) social competence. First criteria is established by Working Groups that are responsible for standards development. Working Groups has to include in their charter required expertise and expected documentation to demonstrate the expertise. In regards to second criteria, members are expected to follow the spirit of the policies described in the W3C Process Document. In case of serious violations, friendly negotiations would be held between involved parties. However, if repeated attempts to resolve violations failed, then appropriate disciplinary action would be taken by the W3C Director. If disagreement further exists, then legal action would be taken. In regards to third criteria, members are expected to disclose their affiliations and relationships with organizations. These disclosures are used for identifying conflict of interest, such as participants being paid consultant, has decision making responsibility or board member of organizations whose activities is relevant to the standard. Thus, these policies on participant criterions seems to ensure that participants would attempt to reach mutual understanding with quality of the standard as their goal rather than engaging in discussion to maximize their individual goals.

Condition 2: Facilitate ideal speech situation

Participants of the Working Group perform the most important actions towards standards development such as debating and selecting best alternatives, proposing alternatives, and developing technical reports. Eligibility for interested persons to participate with a particular standard development is clearly described in the Working Group charter and in the call for participation. Charter is prepared by the Chair of the Working Group, who is appointed by the W3C Director. Participation with the development of the standard is open for those who meet the set forth criterions. Generally, participants are expert representatives of W3C Member organizations. Chair of the Working Group, can invite other experts who meet the criteria and willing to agree with the W3C policies described in the W3C Process Document. These policies seem to ensure that interested person who has potential eligibility to contribute towards development of the standard. However, these policies allows only few exclusive individuals to participate, therefore, it seem to violate condition of allowing anyone to participate. We will address this issue in condition 3.

Participants conduct their discussions through two types of meetings: face-to-face and distributed meetings (telephone, video, or internet relay chat conferencing) as well as through emails. The Chair of the Working Group is responsible for announcing the date, time and location of the meetings. In regards to face-to-face meetings such announcement should be made 8 weeks prior and 1 week prior for distributed meetings, giving ample time for participants to plan and be prepared for the meeting. If some objections are raised in regards to schedule date or agenda, then the Chair needs to make required adjustments which should be accepted by all. Each Working Group would also utilize email mailing list for conducting offline discussions. Decisions in regards to the standard are made through these meetings and email discussions. These avenues provide opportunities for participants to propose their viewpoints and similarly to oppose other viewpoints. The Chair is responsible to document these proposals, objections, and other relevant issues. The Chair has to ensure that the group addresses legitimate proposals and objections, and make an effort to resolve them. These policies seem to ensure that participants would have enough time to plan and prepare to participate and express themselves. Also these policies ensure that participant's proposals and objections are heard and attempt is made to address them.

Participants of the Working Group are expected to volunteer to perform action items such as reviewing proposal, following public comments, developing test cases, and taking meeting minutes. If no one volunteers for an action item, then the Chair can request or assign a particular participant to perform it. Even though it may be understood that the Chair may not force an individual to perform activities against his/her will, the W3C Process Document does not have policies to ensure that participants are not compelled to perform an activity against their will.

Condition 3: Open to questions of validity

The Chair is responsible to ensure that discussions held in meetings are recorded and minutes of meetings are made available to public within 2 weeks after the meeting. Meeting minutes are scribed by one of the participants and this responsibility is assumed on rolling basis. Most offline discussions are held in mailing list which is open for public to either subscribe or read archive messages from W3C mailing archive website (W3C-MailingLists, 2002). Technical reports developed by the Working Group are also made available to the public.

While the participants of the Working Group does most part of the standards development, such as taking part in meetings and preparing technical reports. The final standards specification is developed through cycles of review and revisions based on feedback from participants and public. Interested individuals can follow meeting minutes,

mailing list, and frequently updated technical reports, which are publically accessible. Individuals are open to make comments or raise questions on any subject that is relevant to the standard through the mailing lists. Individuals are also allowed to submit recommended solutions or changes to the technical report to overcome the issues. Comments, issues, and questions raised are addressed by the Working Group and subsequent changes made into technical reports.

In the situations, when an individual has objections even after careful consideration from all points of view by the Working Group, then individual can register a formal objection requesting the W3C Director to evaluate the relevant decisions made. In order to register formal objection, individuals must also provide technical arguments on how the decision affects the standards and provide proposal to resolve the objection. These policies ensure that anyone can take part and raise questions which are duly addressed.

W3C maintains technical merit of the standard by controlling participation for core development to exclusive set of experts, while circumventing problem of violating condition of allowing anyone to participate by making participation through mailing list open to any interested persons.

Condition 4: Open forum with enough time to reach mutual understanding
As indicated in the previous section, Working Groups are expected to document all aspects of the standard development and make it publically accessible. Such documentation provides basis for participants and individuals to accurately formulate their arguments and counter-arguments. Such arguments are facilitated through open forum such as publically accessible mailing lists.

Working Groups are expected to address issues raised within appropriate timeframe. Working Group should hold discussions on the issue and develop substantive response with rationale for their decisions. Individual who raised the issue is provided more than a week or so to respond. After repeated request, if individual does not respond then Working Group has to take appropriate decision to ensure issue is properly addressed.

While individuals from public can participate, contribute, review, and raise issues and objections; relevant decisions are made by the participants of the Working Group. In order to reach consensus, participants are expected to engage in discussions considering all legitimate viewpoints posted by both public and other members. Consensus is considered to be reached when there is unanimous support for a particular alternative. In case of lack unanimous support, the Chair has to allow the discussion to continue until there is significant support towards particular alternative. After several discussions and considering all available alternatives, if there is deadlock or no comprise is reached, then Chair can conduct a vote to resolve the issue. Working Groups are expected to set quorum requirements for reaching consensus. These policies ensure that discussions in regards to standards development are conducted in transparent and open manner. These policies also ensure that all potential alternative solutions are duly considered and enough time is provided to reach consensus around the best alternative.

Examining instantiation of W3C Standardization Process
In this section, we examine a specific instantiation of W3C processes followed to develop a standard. For that purpose, we choose processes followed for development of Simple Object Access Protocol (SOAP) 1.2 standard (SOAP, 2003). SOAP is a part of core Web Service standards and was developed under XML Protocol Working Group. SOAP standard defines XML technology based messaging protocol for exchanging structured information in a decentralized and distributed environments. Development of SOAP standard started on October 2000 and became a W3C recommended standard on June 2003. There are about 120 meeting records that are available under XML Protocol Working Group for the above timeframe which are related to development of SOAP standard. These meeting records are the transcripts of face to face and distributed meetings held for development of SOAP standard. We use these documents to support our investigation on actualization of rational discourse within W3C standardization processes. We examined these documents using assessment scheme described in table 1.

Theoretical discourse
Theoretical discourse involves discussion around controversial claims which are supported by evidence and logical arguments. Habermas suggests that theoretical discourse is a medium in where "negative experiences can be productively assimilated" (pp. 19), i.e., members can learn from their mistakes when other members provide more credible and convincing evidence for their opinions (Habermas, 1984). Theoretical discourse, thus, tend to be commonly around discussions on technical issues. The following exchange on a technical issue offers an illustration of theoretical discourse:

A: *No notion of XP that talks about link relationships and the like*

B: *If there is data that has to be within the boundary of the XP message and if base64 is not acceptable, then is there room outside the boundary of the envelope or is this something that we have to figure out how the XP envelope can encapsulate it.*

A: *XP message is the outer construct, which is XML. Cannot stick binary stuff in it.*

C: *In certain bindings will not be XML, e.g. HTTP. There is nothing that you can find that is in the envelope that is not in the message*

D: *Procedural suggestion - collect them all and decide how to handle them. Observation is that the diagram and the terminology where the optional data precedes the body*

E: *This was to deal with intermediaries where they can read the optional stuff without reading the entire message.*

A: *Agrees*

In the above exchange, members B, C, and D preconceived notion of the issue is misconstrued and members A and E are providing their opinions with sufficient evidence to help them overcome their misunderstandings on the issue under discussion.

Practical discourse
Habermas (Habermas, 1984) suggests that practical discourse is characterized by "an internal relation to the interpreted needs and wants of those affected in a given instance" (pp. 19). Practical discourse involves discussion in relation to value and norms of rightness for governing and serving the common interest. Practical discourse, thus, tend to be commonly around discussions in relation to regulating the processes followed to develop standards. The following exchange on scope of the group offers an illustration of practical discourse:

A: *The charter says that we will not handle binary data, but we can consider other solutions*

B: *Is there sufficient interest to discuss binary data? Is this a charter loophole*

A: *... the assumption that there is sufficient interest in binary data. What the charter talks about is how to find an implementation of binary data.*

In the above exchange member A points to the charter (which can be considered as agreed upon norm) to guide the discussion to be within realm of the group.

Aesthetic criticism
Aesthetic criticism involves discussion judging value of an artistic work (e.g., art, music, and literature). In regards to aesthetic criticism, Habermas (Habermas, 1984) states that it "grounds or serve to guide perception and to make the authenticity of work so evident that this aesthetic experience can itself become a rational motive for accepting the corresponding standards of value" (pp. 20). Aesthetic criticism, thus, tend to be commonly around discussions that judge effectiveness of term to describe a concept. The following exchange on terming a box in a diagram offers an illustration of aesthetic criticism:

A: *stick with one of them and use the text to define the box*

B: *prefers to have both transport and transfer*

C: *why stick with both? Why not use something neutral like "substrate"*

D: *doesn't like overloading the terms but application is clearly not the right term*

B: *concern with coming up with an unrelated term is that this is our hook into the outside world*

E: *displaying something neutral is generally a problem*

In the above exchange, members are discussing and criticizing potential terms to be used to label a particular feature which is represented as a box in the diagram under discussion.

Therapeutic critique
Therapeutic critique involves discussions that seek to clarify or question sincerity of other members. Habermas (Habermas, 1984) in regards to therapeutic critique, states that "expressive manifestations can be appraised on the basis of their sincerity only in the context of communication aimed at reaching understanding" (pp. 21). Therapeutic critique, thus, tend to be commonly around discussions that questions sincerity of other members. The following exchange on where a member questions intentions of another member offers an illustration of therapeutic critique:

A: *It is not so much a question where the doc ends. It is more that the work is already going on in the X. Agrees with Y on overlap, mutual understanding. Feels not a good idea to go off and do something on our own. We should take advantage of X-W3C co-ordination*

B: *Confused. I don't understand the deal with X.*

A: *There is an existing....X draft and it is being discussed. Instead of going in a different direction of our own, we should work with X to continue the work.*

B: *I understand the work in X and the author is on the call. No problems with co-ordination. But why we need to complicate the organization? We have the expertise to do it. Who is participating from the X aside from A?*

A: *It is a working crowd of people. Not clear the relationship with that work and the note we would produce. What is the easiest way to start work on that?*

B: *Clarified but confused.*

In the above discussion, member A is representative of organization X, wants to hold off discussion on an issue related to X, however member B believes that discussion should continue regardless of ongoing work at X, hence questions intentions of member of A.

Explicative discourse
Explicative discourse involves discussions that questions comprehensibility, structure, or conformance to rules of (relevant) construct. Habermas (Habermas, 1984), suggests that explicative discourse is about "asking whether symbolic expressions are produced according to rule, in conformity with the corresponding system generative rules; linguistic inquiry may serve as a model here" (pp. 22). Explicative discourse, thus, tend to be commonly around discussions in regards to editing technical report. The following exchange on editing a section of the report offers an illustration of explicative discourse:

A: *the 2nd bullet in Section 6.3.3 is problematic. All conform or not conform to this HTTP binding - context of this binding 405...*

B: *How about if we change "A 405 'Method Not Allowed Status' SHALL be returned" is changed to "A 405 'Method Not Allowed Status' MAY be returned"?*

A: *Agreed*

In the above discussion, member A indicates potential problem with existing description in the report and member B provides alternative description to overcome the problem.

Discussion
Analysis presented in this paper indicates that there is significant similarity between the policies and procedures followed to develop W3C standards and Habermasian view of rational discourse. First, we assessed whether policies set forth by W3C for developing standards meet conditions of rational discourse. In regards to the condition 1, W3C policies satisfies the condition by setting explicit participant criterion to ensure that participants aim to achieve consensus on developing quality standard rather than pursuing goals that benefits them most. In regards to condition 2, policies ensure that any participant can contribute and anyone can question other's proposal. However, there are some inconsistencies in relevance to allowing anyone to participate with the process. While general public is allowed to participate with standards development via mailing list discussions, the core development that occurs within Working Group meetings is restricted. There are also inconsistencies with use of force; there is lack of clearly specified policies to ensure that participants are not forced to perform an activity. In regards to condition 3, policies satisfy the condition by enforcing documentation of the process and making it publically accessible for anyone. Policies provide provisions for interested persons to review, raise questions, raise issues, and suggest best solutions. In regards to condition 4, policies satisfy the condition by ensuring participants consider all alternative solutions and reach consensus around what they consider is the best alternative. Our analysis indicates that W3C policies meet most of conditions to facilitate rational discourse in their standardization processes required to legitimate the standard it produces. However, as observed in our analysis there are few inconsistencies with policies. In regards to that, we point out that, many researchers consider achieving true rational discourse is counterfactual supposition given our human condition and constraints provided by our social environment (Froomkin, 2003; Hansen et al., 2007; Klein & Huynh, 2004).

We also provide an illustration on potential facilitation of rational discourse in processes followed to develop W3C standard – SOAP. Habermas suggests that during rational discourse, in order to reach consensus, participants would engage in different types of argumentative discourses depending upon validity claims. We examined meeting of

minutes documents, to identify contexts in which different types of argumentative discourses takes place within W3C standardization processes. Our analysis indicates that theoretical discourse commonly takes place around discussions on technical issues; practical discourse takes place around discussions to regulate the process itself; aesthetic criticism takes place around discussions on terming features of the standard; therapeutic critique takes place around discussions that questions sincerity and intentions of other participants; and explicative discourse takes place around discussions to edit technical reports.

Other concerns
While our analysis reported in this paper suggests that processes followed to develop W3C standards approximates conditions and properties of rational discourse formulated by Habermas. However, our observation of W3C policies and processes indicates other concerns.

W3C claims to have worldwide participation, our observation from development of SOAP standard indicate that larger portion of participants are from United States. W3C indicates that there are more than 400 organizations are their members who appoint representatives to participate in various standards development. Data from W3C indicates that organizations from United States are the largest portion with 37% and organizations from United Kingdom are next with 8.6% (W3C-Members, 2008). Fast growing and developing countries such as India (3.4%), Ireland (2%), and China (1.6%) has substantially lower participation (W3C-Members, 2008). Considering that W3C develops Web standards for worldwide audience, larger portion of participation are concentrated to smaller set of countries would be inconsistent with Habermasian view of participation for rational discourse. W3C is actively engaged in exploring options of opening new offices in regions of Africa, south Asia, and Latin America. If these effects lead to increased participation from these regional members, it would help W3C to overcome this concern.

There are some concerns of power associated in particularly with the W3C Director and Chairs of Working Groups. W3C Director has responsibility for assessing consensus, approving standard recommendations, approving proposals to develop new standards, determining what constitutes good standing participant within a Working Group, appointing Chair for a Working Group, reviewing and resolving formal objections on Working Group decisions, and lead technical architect for W3C (W3C-Process, 2005). Chair of the Working Group is responsible for managing and regulating processes followed by the group, ensure consensus has been reached for issues under consideration, ensure all legitimate views are considered, and decide on eligibility criteria to participate. Autonomy associated with the Director and Chairs, can allow others to question legitimacy as critical decisions made by them would not be a collective decision. However, W3C is a standards development organization and working in a finite timeframe to develop standards, therefore, it does need administrative components and leadership to function effectively.

Standards, in W3C, are developed based on contributions from the participants of the Working Group, such an approach is known as 'Design by Committee'. Some have questioned Design by Committee approach for software engineering and systems development (Purao, Bagby, & Umapathy, 2008). Participants of the Working Group, even though are competitors in the marketplace, cooperate with each other to develop mutually acceptable standards. Due to different goals and interests of the participants, standardization processes could involve socio-political issues. While W3C has policies for reaching broad consensus, the precise definitions and processes for reaching consensuses are left to the Working Group. Thus, participants with conflicting viewpoints, debate on available alternative choices they might result in designing a comprised standard rather than an effective standard.

Limitations of this study
This study is by no means complete; we provide only preliminary analysis of standardization processes followed at W3C. Analysis performed and findings reported are based on documents made available by W3C. These documents are made accessible after W3C reviews and removes confidential details. These documents, thus, may not necessarily represent complete actuality of the processes followed.

Contributions
The main contribution of this paper is that it demonstrates W3C policies governing standardization processes satisfies conditions of rational discourse with some limitations and evidence of rational discourse properties exhibited by W3C processes. It is widely believed that most formal standardization processes mirror to some extend Habermas's concept of ideal speech and communication norms (Schoechle, 1999). However, such a belief has not been validated in the context of consortium-based SDOs. Findings of this paper validate long held belief in the context of W3C standardization processes. Given our lack of understanding of standardization processes followed by consortium-based SDOs such as W3C, we argue our findings indicate that Habermas's Theory of

Communicative Action is an appropriate theoretical framework to conduct further analysis to gain deeper understanding.

In regards to practical contribution, our findings indicate that W3C policies have some restrictions on who can participate within a working group. Such restrictions may be necessity to ensure quality of the standard; however, W3C should pursue to ensure that Working Group participants do have worldwide representation. W3C should also consider including appropriate clauses in the policies to ensure that participants are not forced to perform activities against their will.

Conclusion

The participants in the development of W3C standards engage in high level discussions to reach consensus among them on variety of issues. We investigated standardization processes followed at W3C using prerequisite conditions provided by Habermas for conducting a rational discourse that is legitimately consensus oriented towards the common goal. We examined W3C policies to determine how well it meets conditions of rational discourse and examined processes followed at W3C to assess how well argumentative discourse types that are critical to facilitate rational discourse are evident. It appears that standardization processes followed at W3C do harbor an environment for conducting rational discourse, while we argue that there are some inconsistencies with rational discourse requirements.

Our understandings of standardization processes on how it produces design components and our ability to explain why these processes succeed in producing a standard or sometimes fail in producing a standard are highly inadequate. Future research will focus on performing detailed analysis on these processes to gain deeper understandings on how concepts of rational discourse is actualized, in particular different action types and argumentative discourse types. Such analysis would provide us knowledge on factors that enable and hinder reaching consensus. These factors would provide us insights to develop artifacts that can aid standards makers to design effective standards.

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