

# Analytic and Deictic Approaches to the Design of Sustainability Decision-Support Tools

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## ABSTRACT

This paper identifies two approaches to designing user experience in decision-support tools, each drawing from a particular model of political culture and operationalizing a different set of assumptions about typical users and potential use effects. While the *analytic* approach emphasizes the benefits of involving competent citizens in a ‘rational’ process of consensual decision making, the *deictic* approach highlights the benefits of finding resonance between everyday, lived experience and the premise and principles of policymaking. The paper demonstrates the two approaches by analyzing the visualization strategy chosen by the designers of MetroQuest, a Canadian sustainability decision-support tool commissioned by the City of Vancouver. The paper concludes by suggesting that the normative questions associated with the design of sustainability decision-support tools should be reconsidered in light of the relations between user experience and political culture.

## Categories and Subject Descriptors

D.2.2 [Software Engineering]: Design Tools and Techniques – *user interfaces*; H.5.2 [Information Interfaces and Presentation]: User Interfaces – *theory and methods*; I.3.6 [Computer Graphics]: Methodology and Techniques – *interaction techniques*.

## General Terms

Design, Human Factors, Theory.

## Keywords

New media, digital rhetoric, sustainability politics, democratic participation, Habermas, Bakhtin, user experience, Vancouver.

## 1. INTRODUCTION

Social theories of technology argue that technology is neither a force outside history nor a mere assortment of functions. Rather, technology is social through and through, reflecting its designers’ understanding of the set of real world problems the technology addresses, the social and material relations it mediates, and the effects it may produce. As first argued by Marx in the context of early industrial capitalism, and then by members of the Frankfurt School (especially Herbert Marcuse) in the context of advanced capitalism, technology relates to the ideological matrix as both a

product and a producer of ideological dispositions [see 43, 44, 45]. More recently, Winner [70] and Feenberg [16, 17] show that technical artifacts have politics in the sense that they promote particular worldviews and agendas. Feenberg [16] uses the term “technical code” to point to the way technologies feature the intermeshing of political interests and technical affordances, emphasizing the underdetermination of technological design by ‘pure’ technical considerations. The technical code is social discourse materialized; it is the often invisible, self-evident way in which social meanings are inscribed in the very form of the technical object and the technical practices it anchors – the way “ideological visions” are delegated to technical design [19; see also 3]. Technology folds into it the social and material contexts of its design and use which are, effectively, “virtual ‘lifeworlds’, frameworks of meaning within which affordances emerge” [18], or, to put it in a slightly different way, what a technology does emerges within a dynamic network that consists of the social and material relations, practices and significances it is involved in. It is in this sense that technological artifacts have meaning, and technical interactions mediate political culture.

Political culture references the framework within which citizens negotiate political participation and the values and attitudes that orient it.<sup>1</sup> Following Howard [33] we can say that it is “a set of cognitive and material schemata for organizing the movement of socially significant objects through scripted political process in political events and for organizing the way we remember those objects, events, and processes”. Every competing political culture includes both a set of values, attitudes, knowledges and skills that orient political behaviour, and the structural allowances that regulate political activities. Political culture, therefore, includes the various interrelations, interstices and interfaces between the (objective) political structures that constitute the political field and the (subjective) individual experience of that field – between political *procedures* and political *consciousness* [29].

The interrelations between political procedures and political consciousness are increasingly mediated by technical interactions. This is quite pronounced in sustainability politics where new media technologies are increasingly relied upon to facilitate public access to relevant information and to engage and mobilize citizens on the goals and policies of sustainability. Guided by instrumental, substantive and normative rationales for public participation in policymaking [63], the design and deployment of sustainability decision-support tools aims to improve and legitimize policymaking and promote the values of democratic

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<sup>1</sup> On the lineage and application of ‘political culture’ see [69].

participation. However, the technological mediation of public participation in sustainability decision making can take more than one form, reflecting competing technical codes (to return to Feenberg's terms). These translate into different affordances that result in significantly different user experiences. By relating user experience to the tool's technical code this paper aims to shed light on the way technical interactions mediate political culture, or, to paraphrase Latour, make visible the way technology makes certain social formations durable.

In what follows I suggest two different approaches to the design of sustainability decision-support tools. While both approaches share the view that public participation is essential for sustainability policymaking, they draw from different characterizations of the public, feature different reasoning and methods for engaging it, and reflect different expectations from participatory processes as a whole. In short, they project different visions of political culture. After briefly outlining the two approaches I will demonstrate how they shaped and, in turn, were expressed in the design of the visual components of a sustainability decision-support tool. My goal is to offer a framework for rethinking the design and impact of sustainability decision-support tools.

## 2. TWO APPROACHES TO DESIGN

### 2.1 The Analytic Approach

The first approach to designing decision-support tools I call *analytic*. It emphasizes the benefits of involving informed citizens in a 'rational' process of consensual decision making, reflecting a *purposive-instrumental* view of public participation according to which the latter is valued for the way it builds citizen competence and contributes to more effective, inclusive and legitimate decisions.

The analytic approach can be associated with the work of Jürgen Habermas on communicative rationality and the public sphere, especially with the way Habermas projects from a particular view of linguistic interaction – a communicative act – a desirable image of public participation as a whole. For Habermas, discourse is characterized by its movement towards mutual understanding as "reaching understanding is the inherent telos of human speech" [25]. In this formulation, "the roots of cooperation", Weblar [68] notes, "are found in the very structure of language", insofar as there is "an implicit commitment between any two persons talking with each other to cooperate". Truth emerges as socially achievable consensus brought about by ethical procedures.

The relation between rational consensus and political participation animates Habermas's well known account of the public sphere.<sup>2</sup> Here, Habermas identifies in 18<sup>th</sup> century English coffee houses, French salons and German 'table societies' the discursive orientation towards rational consensus that catalyzed a new form of publicity based on the "critical reasoning of private persons on political issues" [26]. The new public sphere injected public scrutiny into political discourse and created new forms of political

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<sup>2</sup> Hirschkop [30] notes that Habermas's investment of language *qua* language with emancipatory potentials is retroactive, that is, he first came up with his theory of democratic discourse and only then, following his "linguistic turn", he sought to validate it universally in language. In this sense, Habermas's oeuvre can be seen as an attempt to "dissolve the rational-critical force of the bourgeois public sphere into language as such".

subjectivity and democratic legitimation whose influence can still be felt in contemporary liberal democracies.

Achieving rational consensus involves translating particular (subjective) experiences into debatable statements, which Habermas calls "communicatives", that can then be validated discursively. In their purest form such communicatives constitute "ideal speech acts":

we call a speech act ideal if communication is impeded neither by external contingent forces nor, more importantly, by constraints arising from the structure of communication itself. The ideal speech situation excludes systematic distortion of communication. Only then is the sole prevailing force the characteristic *unforced force of the better argument*, which allows assertions to be methodically verified in an expert manner and decisions about practical issues to be rationally motivated. [27; emphasis added]

Enabling the "unforced force of the better argument" to shine requires discourse ethics that safeguard equality, open access, rational argument, mutual understanding and consensus (see also [28]). Without them truth remains subjugated by power, merely a reflection of the interests of the powerful, and deliberation looks more like an exercise in the manufacture of consent than an emergent process of arriving at shared opinions.

Rational consensus also requires competent participants, which is why the analytic approach aims to improve the public's access to relevant, accurate and comprehensive information. This is largely consistent with what some have called the "diffusionist" or "information deficit" model [7, 9, 53], whereby the main objective is to simply "fill the gap of knowledge" that hinders meaningful popular participation in politics. The analytic approach, we can conclude, aims to *inform the public* and engage them in an equitable *deliberative* process in order to solicit quality *input* on how to deal with particular problems.

### 2.2 The Deictic Approach

The second approach, which I call *deictic*, highlights the benefits of finding correlations between everyday, lived experience and the premise and principles of policymaking. Its thrust is *dialogic* and *open-ended*, seeking to provoke self-reflection over the values and motivations that animate citizens' political positions, to bring differences in identities and predispositions to the surface, and create an environment where disagreement and dissensus become as instructive and valuable as rational consensus.

The deictic approach resonates with Mikhail Bakhtin's dialogism, most importantly, with the way he identifies the tendency of texts to include a plurality of languages and voices that lend themselves to alternative, competing interpretations (what he calls heteroglossia). Similar to Habermas, Bakhtin's account of heteroglossia is premised in a phenomenological insight on linguistic interaction, only in this case it focuses on the way every linguistic utterance anticipates a response without which it remains unconsummated or incomplete.<sup>3</sup> Speech, Bakhtin [1] writes, "provokes an answer, anticipates it and structures itself in the answer's direction" and is therefore "determined by that which has not yet been said but which is needed". Linguistic expression

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<sup>3</sup> For a reading of Bakhtin's influence by phenomenology see [4]. For a series of particularly insightful comparisons between Habermas and Bakhtin see [29, 30, 31].

is never self-sufficient, always situated, relational and partial. Meaning is disclosed by the encounter of content and context, denotative and connotative dimensions, continuously remade as result of one's encounter with difference:

A meaning only reveals its depths once it has encountered and come into contact with another, foreign meaning: they engage in a kind of dialogue, which surmounts the closedness and one-sidedness of these particular meanings, these cultures. [2]

The image of subjectivity offered by Bakhtin's dialogism is accordingly fluid and contingent, continuously refracting as result of the subject's encounter with otherness. It is never self-sufficient or self-same, reflecting Bakhtin's affirmation "that nothing is anything in itself" [32].

The deictic approach is also emblematic of what Albert Borgmann [6] calls "deictic discourse", an explanatory, illuminating and highly personal mode of communicating assertions. Deictic discourse is disclosive but in a non-persuasive, non-didactic way; it puts forth a softer combination of self-evident testimony and sympathy-garnering appeal, replacing persuasion with demonstration:

Speakers of deictic discourse never finally warrant the validity of what they tell but point away from themselves to what finally matters; they speak essentially as witnesses. Enthusiasm gives deictic discourse the force of testimony. Sympathy requires that one testify not simply by setting out in some way what matters but by reaching out to the peculiar condition in which one finds the listener, by inviting the listener to search his or her experiences and aspirations; and so one ensures that the listener is as fully engaged as possible by the concern to be conveyed. Sympathy gives deictic discourse the force of appeal. [6]

Since enthusiasm and sympathy are the central rhetoric devices of deictic discourse, the latter seems highly suitable to engaging what the *Common Cause Report* [12] calls "bigger-than-self problems" such as climate change or, in this case, sustainable urban policymaking. This is because such issues retrieve the cognitive entanglement of emotions, values and identity – the same elements the analytic approach seeks to keep in check in order to allow rational consensus to materialize.

Further, the deictic approach emphasizes the relevance of the form and content of communication – the mode of delivery or platform, the language, imagery, narrative, etc. – to the lived experience of the users. Its goal is not so much to inform the public but to create the experiential resonance that would help them engage the problem meaningfully. In the context of sustainability policymaking, it can make evident in a non-didactic manner the ways in which the complex set of interrelated environmental, social and economic problems that comprise sustainability politics [55] are made meaningful in everyday experience. This is done by creating immersive user experiences that reproduce the sensation of 'being there', using narrative and storytelling, tapping into personal and collective memories, and triggering emotional responses by using evocative examples, resonant metaphors and compelling imagery – in sum, by linking the public's personal experience of the issues with the ways the issues can be addressed in policymaking. The deictic approach, it follows, is very much about *meeting the public where they are* and allowing certain

aspects of reality to come forth, instead of providing the public with persuasive 'scientific' information and expecting them to come to rational conclusions.

### 3. THE TWO APPROACHES IN PRACTICE

#### 3.1 MetroQuest

In the next section, based on my involvement in the design process and on a close reading of the technology itself,<sup>4</sup> I trace the presence of the two approaches in the visual rhetoric of MetroQuest, a planning decision-support tool that uses backcasting<sup>5</sup> simulation and visualization techniques to allow users to generate and compare future urban design scenarios.<sup>6</sup> The version discussed here (MetroQuest-Vancouver, or MQ-V) was designed as part of the City of Vancouver's public engagement on its incipient transportation plan, and in relation to the City's goal to become 'the world's greenest city' by 2020 [65]. It includes design elements pertaining to land use (location and density of buildings and amenities), energy (the kind of energy produced and the location of energy facilities), and transportation (road allocation and designation of certain roads as high-capacity arteries), and was to be used on the Web, on mobile kiosks and in facilitated workshops. As it stands, despite the completion of its design in May 2011, the City decided to postpone MQ-V's deployment because of changing public engagement needs and timeline.

MQ-V features a challenge-based interactive flow [15]. It begins with a set of screens explaining the rationale behind the transportation plan, linking the issues with the greater goal of making Vancouver green, and asking users to help the City decide on the degree to which it should pursue density, green transportation, and different energy production strategies. Introduction slides are followed by a set of 12 priorities that the user is asked to hierarchize, and which are later used to indicate the effects of user choices (a green arrow indicates the priority is served well by the user's choice, while a red arrow in the opposite direction means the inverse (see the bottom left-hand side of images 1-3)). Once the list of priorities is put in order, the user can select one of three options for each of the three design elements, resulting in a scenario space of 27 options. For each combination of selected elements (one of 27 possible scenarios) MQ-V generates a set of three corresponding visualizations: a wide scope view of the transportation hub taken from a relatively high vantage point and which includes the adjacent neighbourhoods and a detached and a smaller scale profile view of downtown (see image 1); a street view of a high volume transportation corridor that includes a transportation hub (see image 2); and a street view of a single-family, detached home neighbourhood (see image 3). Working within a particular scenario, users can switch between views, focus on a limited set

<sup>4</sup> The account presented here is based on my participation in a series of design workshops that took place between Sept. 2010 and May 2011, and which included members of the City of Vancouver's transportation and community services departments, the sustainability office, and researchers from the University of British Columbia and Simon Fraser University. It also reflects numerous private conversations with the different design stakeholders.

<sup>5</sup> Backcasting is the process of "envisioning desirable futures ... in order to stimulate discussions on how to get there" [64].

<sup>6</sup> For more on MetroQuest (or Quest as it was previously known) see [55, 56, 59, 66].

of features ('highlights'), or get more information about different urban design elements. After users complete their iterative select-and-compare process they are invited to rank scenarios on a 1-to-5 star scale and see how their choices compare to others.

Aside from the model that formalizes a set of interrelated variables (some of which are present to users as priorities and indicators), MQ-V's representation of reality – the way it links virtual space with real space – relies on three modes of rhetoric: linguistic (terms used), procedural (interactive flows) [5], and visual (images used). While all three are integral components of the tool's digital rhetoric,<sup>7</sup> in what follows I will focus only on visual rhetoric, tracing the way it was shaped and, as result, expresses the two approaches discussed above – the *analytic approach* that seeks to engage, inform and then poll participants as competent rational agents, and the *deictic approach* that seeks to offer participants meaningful experiences that make explicit the entanglement of values, identities and knowledges that animate political dispositions. This will allow us to relate particular design choices over visual representation to competing images of political culture and identify the kind of effects they may provoke.

### 3.1.1 Perspective and Subjectivity

Several visual elements disclose the presence of the two approaches. Perspective, positionality, realism and detail are all part of the manner by which images relate “psychophysiological” (visual, tactile, directly experienced, aggregate) space into “mathematical” (infinite, unchanging, homogenous, systematic) space [52]. While perspective establishes the rules for depicting the visualized environment – objects and their relations – it also has significant implications to the spectator's self-perception. This is because perspective is tied to the spectator's point of view. On the one hand, the spectator's point of view anchors perspective (perspective is always perspective *for someone*), and on the other, the spectator's point of view is derived from the visualized field: the viewer's position is determined by the image's perspective. As Manovich [42] puts it, perspective effectively “imprisons” the viewer, fixing their position in a visual field that extends all the way to the image's vanishing horizon. In this sense, perspective binds the material objects of vision and the social-symbolic forms that give vision meaning: the ‘objective’ represented world and our ‘subjective’ perception of it. Since, as Crary [11] observes, vision, or more accurately, the embodied spectator “is both the historical product and the site of certain practices, techniques, institutions, and procedures of subjectification”, perspective, as the nexus of vision and world, is a dynamic symbolic form (see also [34, 52]). The choice of perspective, it follows, represents an epistemological and ideological position on a field that stretches from visual “truth” to visual “experience” [11]. So not only does perspective order the represented world, it does so while reflecting back on the viewer and interpolating them into the depicted world, with considerable effects on the viewer's experience and subjectivity.

### 3.1.2 Positioning the Viewer: Location and Scale

Throughout the process of MQ-V's design, stakeholders discussed the interrelated questions of perspective, positionality and scale, weighing the benefits of two potential viewing positions: a bird's eye view that is higher in altitude and farther from the image's centre (see image 1); and a street level view which locates the user within the visualized field at more or less normal height (see images 2 and 3). A bird's eye perspective gives users a more

comprehensive view of the transportation corridor, situating the transportation hub in a wider context that includes adjacent neighbourhoods and green spaces. It therefore may communicate high-level tradeoffs more effectively (especially the relations between land use density and the designation of particular roads as fast transit corridors). It also implies an external viewer position, that is, the user is located outside the visualized space, divinely floating in high altitude. As such, a bird's-eye perspective seems like a more useful way to effectively detach users from the everyday settings and circumstances that may hamper their ability to be impartial participants, preparing users to make decisions in a more ‘clinical’ manner. On the other hand, a street level view where the viewer's location is more congruent with their everyday experiences of urban space is much more immersive, inviting and relatable, for after all, most city dwellers don't fly over their city but walk its streets.<sup>8</sup> So while from the analytic approach a bird's-eye view seems preferable, it runs the risk of leaving users without a meaningful mechanism to translate their everyday experiences of urban space, which, to a large degree, shape their opinions on urban policies, into debatable propositions (or discursively redeemable communicatives in Habermas's terms). The difference in scale may simply be unbridgeable. Instead, a more “interiorized” point of view (to borrow from Crary) may furnish participants with a set of relatable images and narratives around which to evaluate and reconstruct their understanding of the situation. It may not only resonate more closely with users' everyday experiences but also help disclose the socio-cultural tropes that make these experiences meaningful: the movement between familiar and unfamiliar experiences may trigger moments of reflexivity. In any case, the fact that both approaches were equally valuable was reflected in the decision to use both positions and scales. This did, however, significantly increase the amount of visuals from 27 (one per each scenario) to 81 (three per each scenario).



Image 1. Bird's-eye view of transportation corridor and hub

Positionality is inseparable from location (or locale), that is, the question where to locate the user geographically. On the one hand, “The ability to localize and ground the information by detailed depiction of recognisable and well-known sites as they would be seen by local residents or users” [60] is considered a key element in the process of linking perception with action [23, 38, 39, 51].

<sup>7</sup> On digital rhetoric see [40, 72].

<sup>8</sup> Interestingly, some designers were concerned about the height of the street level view in image 2 for fear that triggering the sensation of someone “sitting in traffic” may bias user perceptions and opinions. As result the view is slightly elevated.

Simply stated, we are much more inclined to move into action when we detect the effects of the issue on a recognizable and not abstract environment, allowing us to fit what is otherwise abstract information into existing frames of reference [8]. On the other hand, designers were concerned that making the locale recognizable will not only bias user responses (a form of NIMBYism), but may give the impression that the City is already committed to developing particular sites and thus may provoke citizen pushback. This was especially the case when it came to visualizing downtown Vancouver, where designers argued that providing only a small, abstract and mountain-less view of the downtown core was the best way to keep its recognizability in check and thus help avoid questions about particular development sites. So while a recognizable locale may have been preferable for providing users with the most accurate and relevant information, thus allowing them to make more informed and competent decisions, a more abstract locale may reduce political fallout – as long as the visualized environment maintains familiar landmarks. At the end, designers chose to base all three views on an existing location, but some of the location’s features were intentionally altered to reduce recognizability. It was familiar but not identifiable, realistic but not real.

### 3.1.3 Realism

As a stylistic marker, realism clearly affects the visual experience, however, it does not necessarily determine it. McMahan [47], for instance, notes that “Most scholars and scientists seem to agree that total photo- and audio-realism is not necessary for a virtual reality environment to produce in the viewer a sense of immersion”.<sup>9</sup> So while realism may contribute to stronger immersive experiences it depends on the way it interacts with other elements such as the consistency and extent of the interactive responsiveness afforded by the visual/virtual environment, and the social dimensions of immersion (on the latter see [22]). Lange [37], using flight simulators as an example, argues similarly that, “even simulations with a lower degree of realism can still contain the most important information needed for a specific purpose”. The question is, what is “the most important information” to the user: is it the information that grounds their thought processes in the actual, concrete environment, or is it the information that may trigger strong experiential resonances and therefore may compel users to re-evaluate their positions? In the terms used above, is it information that designers deem necessary for making rational, analytical decisions, or is it information that complies with the deictic imperative – conveying experiential narratives, images and metaphors? Since “realistic representation will lead to more direct and more robust knowledge construction” (Furness et al., cited in [60]), from an analytic approach a highly realistic environment that simulates as accurately as possible the relevant site is preferable. To a certain extent, more realism would also comply with the deictic approach as it may strengthen the experiential quality of the engagement, creating emotional resonances that may contribute to a stronger sense of identification and urgency [20, 23, 38, 39, 67]. The question, then, is *how* realistic should the visuals be: should visualizations derive exclusively from a set of ‘scientifically valid’ representations (bolstering its credibility and “defensibility” in Sheppard’s terms), or would a measure of plausibility suffice? Can users perceive the relations between land use, energy and transportation even in a visual setting that severs those relations from their real world objects? MQ-V’s designers

<sup>9</sup> I discuss this issue in more detail in [36].

were unanimous that a certain degree of realism was required to tie MQ-V with its real world site, so while the option to use a more cartoonish visual style was tabled, the overwhelming majority view was that since visual realism can be perceived as indicator of the scientific validity of the scenarios, more realism is preferable. This was further expressed in discussions on two related concerns, namely, keeping the visualized building topology to already existing standards (focusing on low-mid rise development up to 12 stories high), and avoiding visualizations of non-realistic policy options (such as reallocating road-space away from cars altogether).

There was, however, one area in which realism was not a significant concern. When it came to indicating graphically some of the important changes caused by particular scenario choices, designers felt comfortable using non-realistic colours to draw users’ attention to some of the most pertinent transformations. For instance, bike lanes were coloured bright blue and “green” (LEED certified) buildings were coloured bright green. A less realistic visual depiction, as this case shows, may actually increase analytical clarity by focusing cognitive efforts on what designers perceive as the primary implications of user choices.

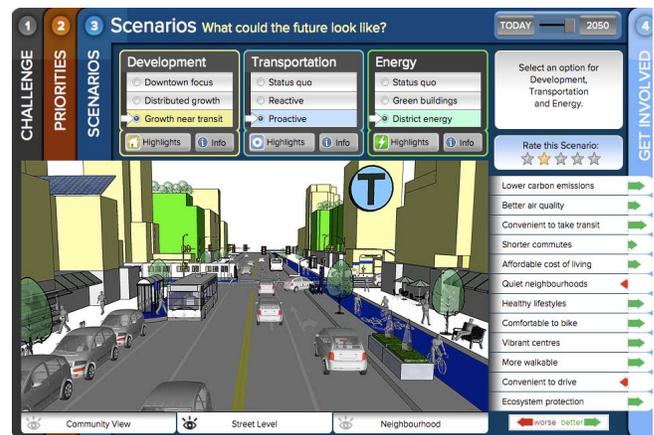


Image 2. Street-level view of transportation corridor and hub

### 3.1.4 Detail

Detail, as mentioned above, is instrumental to the construction of realistic representations, but it is also derived from the scope and extent of the model that anchors the visuals. Since urban design is a highly complex practice, every decision involves a sizeable set of variables and includes a large degree of contingency and uncertainty. Nonetheless, from the analytic approach, providing the user with all the information they need to make a reasonable choice is imperative. The variables, tradeoffs, indicators and implications are all important for understanding the full extent of urban planning and thus for being able to rationally weigh options and action paths. Paradoxically, this amount of detail and complexity may also undermine the user’s capacity to abstract from the complex model the most important lessons (the basic rules of urban design) in an instance of “cognitive friction” [10]. The question is, then, how much detail does one require in order to possess the capacity to make an informed decision? What degree of visual detail is required to make the images look and feel real? It seems there are no straightforward answers. UBC’s Stephen Sheppard [60], for instance, warns that increasing the intensity of visual stimulus by providing more dynamic detail may result in information “overkill” and confusion. Like MacFarlane et al. [41] he argues that the degree of visual detail needs to be

weighed against the intended effects of the visualization.<sup>10</sup> This is especially the case when designing visual interfaces for tools that are used in relatively short time intervals, where impressionistic learning is often more common than a generative learning process.<sup>11</sup> MQ-V designers, aware of common use patterns, were adamant about limiting the amount of priorities that the user ranks (and that then serve as indicators for the different scenarios) to twelve, and chose not to inundate users with gratuitous visual detail that although it may enhance the interactive experience may also detract from the cognitive tasks of identifying change in context.<sup>12</sup>



**Image 3. Street-level view of neighbourhood adjacent to transportation corridor and hub**

#### 4. CONCLUSION

This paper argued that the manner by which sustainability decision-support tools such as MQ-V mediate political culture is disclosed by the presence and admixture of analytic and deictic design elements. In the example given above, visuals produced from an *analytic* perspective aim to produce a distancing effect that is believed to help users transcend their individual predispositions and biases, hence the emphasis on ‘external’ or detached, comprehensive viewpoints and accurate, defensible, realistic and detailed visual representations. In this sense, MQ-V brings a citywide perspective to bear on what is increasingly practiced as a neighborhood-centred participatory planning process, allowing users to step outside their everyday experiences and ‘think like a city’. Analytically designed visualizations, it follows, promote the achievement of rational consensus by helping to build citizen competence, understood as a set of

desirable skills and knowledges. They promote the shaping of ‘rational’ subjects as means to support disambiguated and frictionless communication and ultimately promote a political culture modeled after Habermas’s public sphere [26].

Visuals produced from the *deictic* perspective, on the other hand, aim to provide users with opportunities to revisit their positions and reflect on the narratives and images that make certain politically relevant decisions viable and desirable. MQ-V’s deictic strengths are its capacity to communicate complex information with compelling, immersive imagery, and the way it affords its users with multiple scenarios and viewing perspectives, balancing static and dynamic visual details, and unfolding a plurality of futures. The use of an ‘internalist’ view point, immersive images, an amount of detail that avoids cognitive friction and just enough realism to make the visualized world familiar, make MQ-V’s user experience compelling and meaningful. The correlative subjectivity this style of visualization promotes foregrounds the importance of difference and otherness as means to unpack the entanglement of emotion and reason in every act of decision making. In this sense, a deictic political culture may help restore to lived experience its political value *institutionally*, and thus resist the discriminatory normalization of a very particular form of (rational) discourse with its correlative roles and rules.<sup>13</sup> In other words, the re-socialization of experience away from a consensus-driven public sphere can potentiate the emergence of new counter-publics [50].

There are clearly important differences between the analytic and deictic approaches to design. At times, they may even seem like theoretical or ideological antinomies. Yet, as the discussion of MQ-V’s visual rhetoric makes evident, there are also ways in which the two approaches may combine, either as ‘moments’ within the larger interactive flow (as exemplified in the capacity to switch between views), or as coinciding, convergent imperatives (as with the choice of a realistic but not real locale as geographical premise for the visuals). In the latter mode, MQ-V’s design demonstrates what French philosopher Gilbert Simondon [62] calls “concretization”: the way the process of technological evolution – the selective materialization of *abstract* potentialities into a particular, *concrete* object – features the structural integration of disparate, sometimes contrasting functionalities into a singular technical framework. In light of Simondon’s account, the dynamic, ‘concretized’ relations between analytic and deictic design imperatives can be seen in their fluid and contingent form. Technical design, as it matures, embodies a fuller range of technical codes, contrasting and compatible political agendas.

Since they are designed to facilitate public engagement with policymaking, sustainability decision-support tools are explicitly political. But if some of their effects are registered as changes in political consciousness, their normative dimensions should be reconsidered accordingly. So while questions of inclusion (who gets to design and use the tool) and defensibility (how scientifically sound is the model’s representations of reality) remain important indicators of the democratic value of decision-support tools, we need to consider more carefully the way

<sup>10</sup> A related technical issue is that the more detailed the visualizations the heavier their computation toll. If not addressed, the need for more intensive graphic rendering may contribute to extended loading times and less than optimal responsiveness (which is a crucial component of interactive environments and a major factor in immersion. See for instance [47, 49, 61]).

<sup>11</sup> The working assumption held by MQ-V designers was that the average user in kiosks will interact with MQ-V for about 5 minutes, while the average online user will interact with MQ-V for about 10-15 minutes (based on previous experience in Chicago [24]).

<sup>12</sup> For a discussion on the importance of the ratio between static and dynamic elements see [21].

<sup>13</sup> For a critique of the consensual thrust of deliberative politics see [48, 54]. From a more practical perspective, Ryfe [58] argues that ideal, rational deliberation is not only rare but in fact, “Each moment of a deliberative encounter raises significant obstacles in the path to stimulating greater intentional reflection on public issues”.

decision-support tools reproduce “the sensual, emotional, volitional, and dialogically imaginative aspects of felt experience” [46] and then relate those experiences to political concerns, procedures and outcomes – moving from aesthetics to politics and vice versa.<sup>14</sup> This, I believe, calls for research that seeks to clarify and flesh out empirically not only the normative contexts and implications of the product of decision-support tools, i.e., particular policy recommendations or rates of inclusion, but also the ways by which the continuous negotiation of technical codes re-articulates political culture in the modalities of user experience, resulting in significantly different types of democratic legitimation.

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<sup>14</sup> In this sense, the present essay joins others who see Human Computer Interaction (HCI) as a site of affective engagement and meaning-making (see in particular [5, 13, 14, 35, 46, 71]).

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