CHAPTER 8

SOCIAL FACTORS IN THE AGE OF SOCIAL MEDIA:
TRANSDISCIPLINARY CO-DESIGN WITH THE PINOLEVILLE POMO NATION

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Introduction

In the last five decades, scholarship in environmental psychology has highlighted the centrality of users to the design process. Moreover, sustainable building measures, such as those created by the American Institute of Architects, include criteria for social and cultural factors. These measures, however, did not significantly change the design tools and methods used in practice. Co-design—a methodology that is predicated on the recognition that local people and users are key participants, with significant contributions to offer to and throughout the design process—is still not commonly deployed in architectural enterprises. With the goal to identify tools and technologies to facilitate co-design, this study investigates the design-methods and social-factors literature to extract recommendations regarding the role of local people in the design process from its very early stages. The recommendations for face-to-face and mediated methods for co-design in the literature are tested through a case-study in which a group of UC Berkeley faculty and students design sustainable homes with the Pinoleville Pomo Nation (PPN), a Native American Nation located two hours' drive north of Berkeley We conclude with a suggested framework for leveraging existing digital social media into a platform for co-design.

The architectural design process starts by studying the place where the building will be situated. Kalay (2004) refers to this early stage of design as an "exploration of the problem to be solved." This process includes, according to him, understanding the context of the project which contains physical, social, economic, political, and cultural aspects. All of these are

man-made or people-related aspects, except the physical context which may also include natural elements that are not a social product.

Though social factors have become increasingly important with the growing awareness that social and cultural aspects are part of sustainable design,[i] the methods for understanding the social context are unsettled. Liane Lefaivre and Alexander Tzonis use the term "critical regionalism" to describe a bottom-up approach to design "that recognizes the value of the identity of a physical, social and cultural situation" (Lefaivre and Tzonis 2003, 11). On a more metaphoric level, Burns and Khan claim that "Design does not simply impose on a place. Site and designer engage in a dialogic interaction." (Burns and Khan 2005, XV)Hence, this chapter focuses on bottom-up methods that facilitate the site-designer dialog by incorporating the local community, with their expertise on the local site, culture, and needs, as part of the design team and identifying technologies to support this co-design process as part of a sustainable design approach.

Approaches to learning about the people in the place

While there is general agreement about the importance of understanding social and cultural attributes of place, there are different recommendations for best achieving this understanding as part of the design process. Canter recommends three methods—sketching, accounts, and recordings—to comprehend the place through the three essential elements of place, which are physical attributes, activities and conceptions (Fig. 8-1). In Canter's own words: "Sketches mirror the physical attributes, accounts the conceptual, and behavior recordings the activity components" (Canter 1977:161). Rapoport advocates a similar focus on the social in his recommendations for architects, by encouraging them to look at people's lifestyle. According to him, lifestyle should "be seen as the outcome of choices about how to allocate resources, not only economically but also time, effort, involvement, etc." (Rapoport 2005:96). To learn about people's lifestyle, Rapoport suggests using customers' information gathered to aid product marketing.
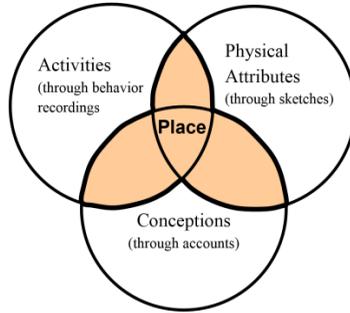
Fig. 8-1. Mirroring the elements of place (Canter, 1977).

Lynch and Hack (1984), supporting a similar perspective of the subjective nature of place, give an extensive list of the elements that planners should consider before designing, including soil, plants, water, animal behavior, human behavior, and more. They then detail the tools that can be used in this foundational evaluation, from maps and wind-tunnels to demographic analysis and observations.

While the 1980's literature focused primarily on on-site data collection methods, current debates center more on the analytical process. Site analysis, according to Ellis, is a method that helps designers to express the local character in the design (Ellis 2005). O'Donnell (2006) argues, conversely, that methodological site analysis creates generic buildings. She suggests using abstract diagrams rather than descriptive analysis for understanding the particular environment, arguing that the resulting "decontextualization" will yield an integrated, sustainable architectural solution.

Alexander, in his early search for rational methods to produce the optimal building, claimed that representations and diagrams are key to the architectural solution (Alexander 1964). A decade later he developed the Pattern Language (Alexander et al. 1977) in which architecture is decomposed to generative grammar components that can be tailored together to fit each project and should be implemented through a participatory process with users (Alexander et al. 1975). However, even as "the medium of representation" becomes increasingly more sophisticated, representation, for example representation of people, always unavoidably selects and transforms the information, including some aspects and leaving others out (Kalay 2004). It is therefore important to examine which medium of representation fits the co-design needs. Since participatory design or citizen participation, as Arnestein (1969) suggests, encompasses eight different levels from citizen control to (citizen) manipulation we choose the

term co-design as a partnership between professional designers and local users that focuses on empowering the users, as experts on their locality and needs. Choosing the term co-design aims to distinguish the design process from participatory processes that abuse the term "participation," an abuse which Arnstein labels as "tokenism" and "non-participation," but is often associated unrightfully with terms such as 'participatory design' and 'citizen participation.'

People, users and co-design in practice

Despite the variety of scholars emphasizing the need for local, emic understanding of place for design purposes, direct interaction that goes beyond the clients into groups of users and local communities is mostly uncommon architectural practice. As Cuff puts it "The connections between places and individual behavior and perception are well established, both in the academy and in the minds of designers. The weaker link is between places and groups, societies, or culture" (Cuff 1989, 101). A political change that empowers local groups through budget allocation, design restrictions or design controls, together with appropriate tools and methods to support a non-hierarchical design process, would offer ways for design to reinforce the link between place and local groups.

Alexander, working on the design of the school of music building at the University of Oregon, supported collaboration with users and recommends a process of reaching consensus in the co-design team (Alexander et al. 1975). Nevertheless, due to the nature of the project he worked on, a university campus building, set in a hierarchal environment, the design team he managed was ingrained with top-down approaches and his representative user-group was a relatively homogeneous group of only academics though at different levels: the dean, two faculty members, and a student, working together with two designers from Alexander's crew (Alexander et al. 1975). Therefore, in his experiment it was probably easier to reach decisions with a consensus process, as he recommends, than it would be with users of different cultures, disciplines, and socio-economic backgrounds. This chapter expands the thinking of co-design by presenting a project in which the design team, consisting of Native American clients and UC Berkeley faculty and students, designed together culturally-sensitive housing while transcending cultural, social, and professional differences. These differences offered an opportunity to identify and evaluate design methods and tools that support the co-design process, with the assumption that those effective in these extreme conditions could be useful to a broad variety of other case-study.

Research problem:
Supporting top-down approach with bottom-up solutions in U.S. Native American country

Hindering the implementation of socially sensitive design recommendations are a range of factors including time, costs, and unquantifiable benefits. In his book "Social Design", Sommer suggests that "time will tell whether professional education and research without politics (social design) or politics and legislation without research (consumer movement) is the more successful strategy for improving product quality and increasing accountability within industry and the professions" (1983, 167). We contend that increasing professional accountability and incorporating social factors in practice necessitates both the political top-down approach through regulations and laws as well as the academic grounding through research and professional education.

In our case-study, the political is a top-down approach, which includes changes in building policies to empower local communities and to provide them with freedom to make their own design decisions at the local scale. In 1996, the U.S. department of Housing and Urban Development (HUD) passed the Native American Housing Assistance and Self-Determination Act (NAHASDA), which allows Native American nations to use federal funds to self-compose their housing solutions as opposed to imposing on them pre-designed HUD houses[ii]. Particularly for small tribes in Northern California, this change in top-down paradigm is empowering tribal citizen to directly influence their own housing solutions. It provides them with an opportunity to identify bottom-up methods, which can facilitate community driven design, supported by professional designers. This change was the starting point of our co-design project with the PPN.

The PPN's search for a way to use the federal funds to create housing that will support their needs for self-sustainability and unique cultural needs, led them to CARES (Community Assessment for Renewable Energy and Sustainability), a group of UC Berkeley professors and students engaged in developing methods to help communities choose among the variety of sustainable solutions appropriate for them and make more informed decision in the path for a culturally-sensitive, sustainable future[iii].

The PPN brought to CARES its current design needs for developing a variety of sustainable, culturally sensitive housing projects. These projects were developed over several semesters using different co-design methods drawn from product design and architecture. The goal of the projects reflects both a bottom-up and the top-down approach: the direct goal was

to build better tribal housing for the PPN while defining the PPN's prototype house to represent the tribes' design needs at different levels. To support that top-down change, another political goal was to advocate tribal needs for culturally-appropriate and sustainable housing in-front of federal agencies (Edmunds et al. 2013). At the same time, the academic goal of the project, which is the focus of this chapter, was to identify and experiment with co-design methodologies and supporting technologies that could conciliate the top-down and bottom-up approaches.

Research method

In this community-based, case-study research project we gather knowledge from interactions between professional designers (architects and engineers) and PPN citizens that spanned over three years. During that time, the designers and citizens worked on three projects:

- The co-design of a concept house and supporting engineering systems,
- The co-design of a low income clustered-housing neighborhood for PPN tribal members, and
- The co-design of two prototype houses on the PPN reservation and supporting engineering systems.

All the design projects were focused on sustainable housing and the required supporting systems. On the designers' side were members of the CARES leadership team, as well as students from the College of Engineering and the College of Environmental Design. The PPN community was composed of the PPN Chair, Vice Chair, other elected council members, and other citizens. The co-design process aimed at understanding the unique needs of the PPN and developing, with tribal members, the appropriate housing solutions. While doing so, we explored appropriate design and communication methods, including discussions, workshops, meetings, and design-charrettes, and experimented with in-person and mediated tools such as phone, email, content management systems to support these methods.

The process started by discussing broad concepts such as sustainability and technology, including understanding their unique meaning for the PPN. It then became more project-specific: visiting current PPN citizens' houses, discussing current problems of the existing homes as they emerged during walk-through of the current housing, and establishing priorities for the tribal housing and sustainable living practices as part of collaborative

workshops. Eventually, the process included a design charrette in which tribal citizens envisioned their housing solution guided by CARES members. As all authors of this paper, the CARES members and PPN representatives, are active participants in the design method we analyse, we situate this research between Participant Observation (DeWalt and DeWalt 2002), in which the researchers participated in the design activities while observing the process, and Participatory Action Research (Whyte, Greenwood, Lazes 1989) as PPN participants were active researchers by taking decision regarding the project and the methods used, rather than being blind participants.

Co-design through unmediated and mediated interactions: Findings

The design process of the prototype houses developed was in response to needs and restrictions coming both from the tribal leadership and from the academic counterpart; the project was part of design education of the UC Berkeley engineering students and architecture students. The workshop, organized as part of the co-design, aimed to familiarize the students with Native American culture and lifestyle as well as to attract native community members to actively participate in the process through discussions, sharing of experiences, and developing alternatives and solutions. We divide the in-person process into three parts before presenting the technologically-mediated interactions, which happened in between these different stages: (1) producing knowledge from cultural understanding of broad concepts; (2) producing knowledge from current tribal housing experience; (3) producing knowledge through design charrette.

Producing social knowledge from cultural understanding of broad concepts

The first workshop with the PPN included a session in which we gathered subjective responses to the meanings of broad concepts such as 'technology' and 'sustainability' with PPN citizens. In the interaction between CARES members and PPN citizens, different terms were used interchangeably to describe the tribe's housing needs such as ecological, environmentally sensitive, sustainable, etc. During the workshop, four major aspects that frame sustainability for the tribe were identified: Cultural

Sovereignty, Tribal Sovereignty, Economic Self-Sufficiency and Environmental Harmony (Shelby, Perez and Agogino 2012).

An important element of this stage of the process was the "situating" (Haraway 1988) of all participants, including engineers and architects. All participants expressed their own histories related to the project and their own aspirations for the work. This allowed for points of shared experience as well as points of difference to be identified. Doing so improved social relations across race, class, and educational barriers and possibly expanded the range of ideas put forward within the group. Moreover, the situating of all participants allowed the process to be transdisciplinary, setting the foundations for interaction and cross-fertilisation among different professions and the non-professionals. The expression of different subjectivities and epistemologies holds significance beyond the strictly interpersonal and allows each worldview to be situated in a socio-cultural matrix that constitutes the design team yielding a deeply rooted co-design process.

Producing social knowledge from current tribal housing experiences

To better translate the broad concepts of housing needs into design guidelines, PPN members participating in the workshop were divided according to age groups (elders, adults, and youth) to describe or illustrate their needs based on their experience from their current housing. Then, in the mixed group of elders, adults and youth **the community identified five top priorities: (1) traditional building** techniques, (2) energy generation and conservation, (3) exercise and recreation, (4) privacy, and (5) heating, cooling, and lighting. The CARES member acted as interpreters, helping to extract and organize the needs that were voiced. The full process of extracting the subjective sustainable priorities with the PPN is described in Shelby, Perez and Agogino (2012). This knowledge production was combined with meetings between CARES and PPN citizen on campus, often as part of the student's class. The switch of roles that happens when PPN citizens are coming as guests to campus and offer the students feedback on their work, allowed the PPN citizen to experience being the local experts between professional and non-professional, the host and the guests expose, allowed the PPN to come and offer feedback for the students' work as the experts, and allow them to experience being guests.

In addition CARES members visited current tribal HUD houses, talked to their users while touring the house, and identified and discussed characteristics in the current housing that the users appreciated and those

the user felt were inappropriate to their lifestyle. HUD-designed houses provided to the PPN are designed for the stereotypical American, nuclear family of four. When CARES members visited the houses on the Indian reservation the Native residents mentioned the kitchen to be too small to serve the richer social activity involved in food preparation in Native American culture. According to some residents, the living rooms were not open enough to allow visual and oral communication between family members or to have social life in the main living space and in the kitchen. Rooms were too small and too few to fit the cultural need of having, often extended family members residing together for long periods of time.

Producing social knowledge from current housing also included defining characteristics of the ideal house of PPN citizens. Thinking about the ideal house helped the community to bracket off, albeit momentarily, the constraints anticipated in imagining new housing solutions for them. In this part of the workshop, we focused on conceptualizing problems rather than looking for solutions that are set into a form. For example, some of the needs identified for a dream house included "fence," "block wall," and "bulletproof," when we discussed these needs further we found we could categorize them under "privacy and security." This opened up a greater variety of solutions and forms to be considered for achieving privacy (see Fig. 8-2). The CARES members mobilized higher order concepts as prosthetic devices (Bruner 1991) to enable the problem solving and planning to go beyond the concrete token level towards the more abstract, encompassing and open ended realm of possibilities (and solutions).

Fig. 8-2. PPN citizen presenting solutions for privacy. Source: Authors.

Once solutions were suggested or chosen we discussed and developed them through quick sketches during the workshop. For more complex issues we set additional workshops, created printed posters presenting existing examples of specific solutions and got some feedback through post-it notes and open discussions. These allowed us to get the tribe's reaction to different forms of each solution. For example, in the discussion around community housing we brought a variety of images of co-housing projects and asked members to use post-it notes to share their thoughts about each alternative. We then learned that many members of the community reject solutions that include a shared wall.

Producing social knowledge through design charrettes

As we moved forward into conceptual designs, social knowledge was produced through a design charrette. For the prototype house we prepared "cardboard plan pieces" and community members used them to produce their own design and formulate their own solutions, using placement of the form to prioritize needs and alternatives.

During the design process each of the participating members, which included architects, engineers and the local community, had to go through a process of detachment. It is often accepted that architects are strongly

attached to their designs; their attachment is based on feelings of ownership towards their artistic creation and some level of detachment is needed to adjust to. But engineers also get attached to the optimized shape they produced and are reluctant to move from what they perceive as the optimum, called "design fixation" (Linsey et al. 2010). Moreover, users may also be attached to some specific forms often to things they are familiar with. (This attachment could be positive, as in they keep using the forms they are familiar with, or negative, as with avoiding forms). The discussions we had through words and visuals, and the process of attachment and detachment from suggested solutions are the premise of what the co-design in transdisciplinary teams is all about – a team with multi-disciplinary skills transcending their specific disciplines and fixations through discussions, leading to mutual understanding, and resulting in an agreed solution. The following example, of incorporating round shapes in the design of the homes, provides insight into the detachment process.

Round shapes

According to tribal belief, bad spirits live in corners, and thus straight corners should be avoided in PPN housing. This guideline created debates among the different disciplines. Architects explained the difficulty of building and living in round spaces, due to inefficiency of wall materials, complexity in creating openings, inefficiency in insulation quality, as well as the difficulty of organizing the interior space and furniture. Following some discussions with PPN members the CARES and tribal leadership organized a collaborative charrette.

Fig. 8-3. PPN citizen Debra Smith discusses design ideas with Leona Williams, PPN's chair. Source: Authors.

In this charrette, PPN members were provided different cardboard shapes cut to scale, varying in size and shape to represent the house footprint (squares, rectangles, circles and partial circles, each marked with the square footage it represented) and paper-cut furniture to scale, from which they produced a floor plan of a prototype house. During the activity, one member mentioned that while their culture supports rounded corners, it was hard for her to leave the "known space" of square corners and experiment with rounded shapes. While the architects assumed that direct interaction of tribal members with rounded shapes would convince them that curves are too difficult to handle, the PPN members developed a house plan that included two round corners: one that created the house's entry and another directly across, to create the kitchen. In addition, the design included a round space in the center of the house for socializing. In plan, the house was shaped like an eye, and the design resolved the desire for round spaces without complicating the insulation or furnishing (Figures 8-3 and 8-4).
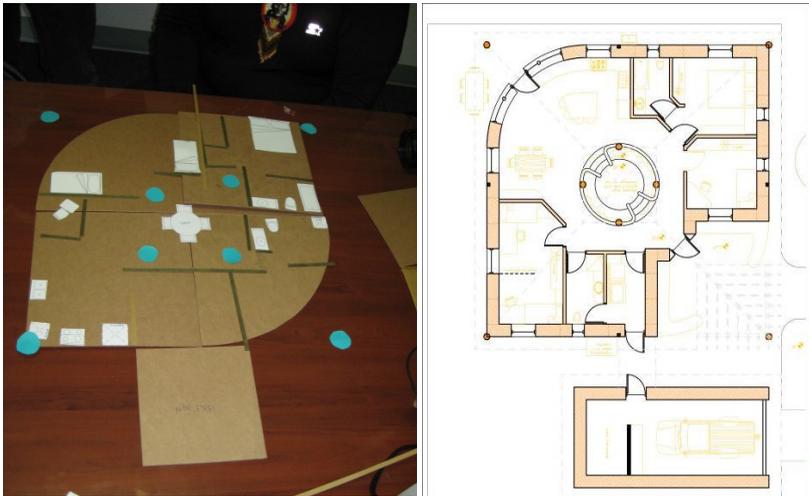

Fig. 8-4. The final design produced by PPN citizens during the design charrette (left) and the refined design as developed over several weeks afterwards (right). Source: Authors.

Producing social knowledge through mediated interaction

In our collaboration with the PPN we aimed to sustain direct, face-to-face interaction as much as possible. This interaction was spread between locations at UC Berkeley and the PPN's reservation. Nevertheless, the 120 miles between the designers' location and the PPN's reservation made each of the visits challenging. Due to the four hours' drive required for each in-person interaction, we combined different activities into each visit, which was demanding, both for the community and for the designers.

To compensate for the physical distance and increase interaction we tried different types of mediated interaction (Table 1). These included conference calls (phone calls using speakerphones with a few participants on both sides), emails with questions and answers, emails with attachments of case-studies or design alternatives, and later a dedicated website with a content management system (CMS) that allowed uploads, blogging, commenting and discussions. We used Drupal as our CMS. As the professional interaction between CARES team and PPN citizens increased, we found ourselves adding each-other to our Facebook pages, and while we did not use Facebook for direct professional interaction, we realized that it provided insight into Native American culture, both traditional and contemporary and indirectly contributed to a shared understanding of culture and place.

We used conference calls when the CARES team needed timely information or feedback from community members. Through this interaction we were able to discuss alternatives and get opinions from community representative that allowed the CARES team to direct the design towards the community's chosen alternative. We participated in conversations in which we learned about energy use in houses and benefitted from feedback on designs previously sent. Conference calls were not public events open to all PPN citizens, but rather limited to PPN representatives. Usually, these were representatives of the tribal governance and those holding official relevant positions within the tribes' administration. Some representatives within this group were more active and influential than others.

Interaction Type	Goals	Characteristics
Conference call	Getting answers to specific questions. Discussion of design alternatives.	No anonymity; No diversity of media; High technological accessibility to those invites and attended.

Email	Getting answers and feedback from specific community representatives. Sharing drawings and photos.	No anonymity; High diversity of media; Good accessibility of emails in this community.
Drupal (CMS)	Keeping the community informed on design progress of the Berkeley team. Getting some feedbacks on design alternatives.	Good anonymity options; High diversity of media; Low accessibility to unfamiliar technology.
Facebook (to be friends only, not a dedicated project page)	Creating a mutual, personal "getting to know" process between designer and community members. Some understanding of contemporary culture and lifestyle.	No anonymity, high diversity of media, high accessibility to Facebook within the community

Table 8-1. Types of mediated interactions used in the co-design process

Email was used to share drawings or to send out list of questions to individuals or a group. It was our main form of communication with the PPN's Environmental Director and was very often used to send drawings produced by CARES to different members of the community whose email address we had. It was rarely used to get direct feedback from members of the community we sent it to, but the environmental director often collected responses in meetings with different members and shared these responses with us.

Similar to email, Drupal was used for spreading out information that could potentially allow a wider variety of members to have access to the information we posted. Rarely, however, did we receive comments on alternative designs via email. Most discussions started online then moved to and developed through targeted phone calls.

Project goals vs. people's goals.

Beyond the different perspectives about design, our co-design team members differed in their goals. Architects and engineers are often evaluated by their design results–the building as the product–but the design process has great importance too, and is too often ignored. Peter Hall (1982), in his book 'Great Planning Disasters,' chooses the disasters (e.g. the BART- Bay Area Rapid Transit system and Sydney's opera house) based on failures in the design *process*, such as poor financial plan or inadequate population studies, rather than on the architectural or engineered qualities or performance of the final product. In his analysis Hall identifies, among other important factors, the importance of the community's role in the design. He suggests either finding a way to get "more reliable, less biased information directly from the real public" or improving the "amount and quality of participation" (Hall 1982, 207).We found that identifying broader community goals, which lay beyond the building results, is key to improving the amount and quality of participation.

In bringing community participation to design projects, there is often imbalance in the motivations of the varied participants. While the designers are getting paid for their time, it is often assumed that the influence on the building is enough of a motivation for community partners. But community members have other commitments, which often make it hard for them to invest the time needed for design, even in projects which have great importance and influence on their lives. Motivating the community to spend their weekend on workshops, going over design ideas and sharing experiences, was one of CARES' main tasks. In this task we were depending on an "ambassador," a community representative devoted to the project and the community, who was being compensated for some of the time he invested in enabling this interaction. Our ambassador was the PPN's Environmental Director, a co-author of this article, who was not a tribal member but had worked for the PPN for five years. The ambassador answered most of our questions and referred us to others for more information when necessary. Moreover, through his understanding of both the community's and the designers' worlds he was able to shape our interaction in ways valuable not only to the design project but also for other goals the tribe would have, such as familiarizing youth with academic institutions to increase the number of them continuing to higher education, or expanding the collaboration to include grant writing to fund this and other projects to benefit both sides. Therefore, the strategy of combining a variety of goals and purposes into the design of the prototype homes made the homes a multi-purposes collaborative project--this paper, for example, is one of its fruits. These mutually beneficial-benefiting interactions motivated participants and increased the amount and quality of collaboration with the community.

Conclusions

Each type of communication, whether direct or mediated, has different affordances which make it better suited for certain goals. Through this case-study we learned that community participation thrives through the use of a range of communication methods and cannot be achieved through one existing communication technology. Based on this understanding, the technology chosen to mediate should enhance direct interaction with community members and should be diversified to provide different characteristics that suit the diversity of people. We identify three characteristics that are important for technologies to support co-design: (1) it should provide different communicative modalities (e.g. verbal–written and oral, visual–photos and drawings) to convey ideas and exchange information; (2) it should offer the choice of anonymity or different levels of exposed identity; and (3), it should be readily available and easy to use. Technologies that have these characteristics broaden the spectrum of people participating in the design process and offer a mediated alternative to support transdisciplinary co-design.

Co-design includes both interaction with form (design) and continuous interaction with the community (social interaction) in multiple platforms. We organize our interactions as a three steps process (Table 8-2. Defining co-design tools for community and design interactions).

Community interaction	Design interaction	Main face-to-face tools used	Main required characteristics identified for each stage
		Supplemental technology used	
Creating a mutual getting to know process Discussion of broad concepts (such as culture, technology, sustainability).	Avoiding form	Round robin sessions	Reciprocal information change Racial/cultural diversity
		Facebook	

Discussion of current experiences and other case-studies	Reacting to form	Posters and post-it notes. Building visits with the community.	Getting examples from the community Anonymity
		email blog posts video blogs	
Producing design ideas	Interacting with form	Flip chart drawings in small groups Design charrette	Simple design tools that do not require professional or technical knowledge. Producing unique pattern blocks, appropriate for the project that can easily be put together into a draft design.
		Missing appropriate technology	

Table 8-2. Defining co-design tools for community and design interactions.

   To eschew biased co-design process and to allow all members of the design team, whether design professionals or not, to engage in the process with their expertise and exigencies, it is important to avoid interaction with form at the early stages of the process. A variety of activities could be useful for early exploration of the design problem. **Error! Reference source not found.** lists the face-to-face and virtual tools we used as an example. In the first step of the process we found it helpful to use tools that facilitate reciprocal relationships between professional and non-professional designers and that situate all worldviews with the team in a socio-cultural matrix. This feature allows community members to learn about the designers as well as the designers learn about the community in the meeting. Since our work with the PPN community included racial differences, having designers from a variety of races, even if none were Native American, also contributed to achieving trust among participants in the co-design enterprise (Shelby and James 2009).

Step two includes discussions of current existing HUD housing and other case-studies. These may be the current built environment and conditions (whether housing or other buildings) or could be other built examples. This step allows members to quickly react to form and direct the design ideas produced in the next step towards their preferred form and solutions. In step three, when the co-design aims at interacting with form and coming up with a scheme, simple tools are needed. By this time some understanding of preferred form exists and professional designers can produce a simple mock-up toolkit with the appropriate shapes, which allow non-professionals to play with the patterns and give shape to design ideas. Using Christopher Alexander's pattern language system (Alexander et al. 1977), the designer should produce the appropriate "pattern blocks" based on the interaction and the knowledge accumulated in the co-design team, which will allow the community to produce solutions with their own project's language. Existing design tools, even simple ones, are not equally conducive to such process. In our interaction with the PPN we used existing technology to complement our face-to-face interactions. Each tool we used, whether email, conference phones calls, or Content Management Systems, was selected only when the face-to-face was limited by geographical constraints or by the capabilities of the unmediated interaction.

Co-design, as a process that comprises both professional and non-professional players, is summarized in Figure 8-5. While designers use online technology such as Google Maps to learn about the physical attributes of a place, by harnessing other existing technologies, such as blogs, video blogs, and social-networks, into design projects they may better learn about the people. **Error! Reference source not found.** shows how different existing online technologies can fit into Canter's definition of place. We identified three main characteristics for the mediated digital technologies to support co-design process: Anonymity options, diversity of media, and accessibility to the technology. Any one available technology still does not offer solutions encompassing all characteristics identified hence the ability of one digital, mediated technology to support co-design is still limited.
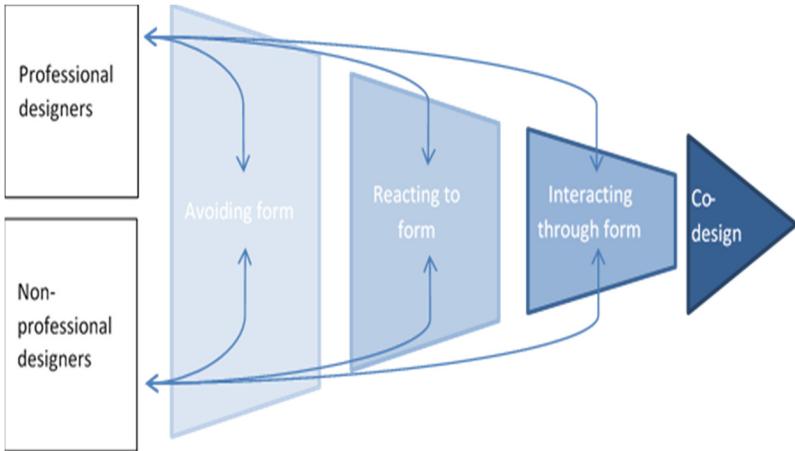
Fig. 8-5. Interaction with form in the process of co-design. Source: Authors.
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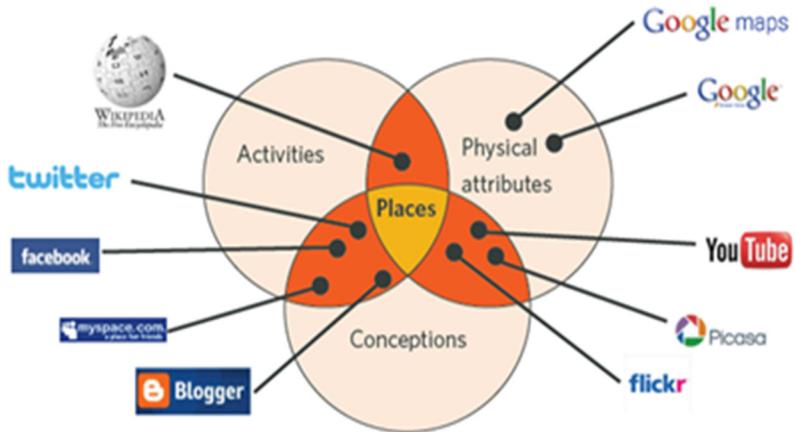
Fig. 8-6. Existing technologies that could teach designers about place based on Canter's definition. Source: Authors.

ⁱ Examples for emphasizing social and cultural factors as part of a sustainable design definition:
The American Institute of Architects (2014): Top Ten Green Projects:
"Sustainable design recognizes the unique cultural and natural character of a

given region."
BioRegional: One Planet Living Programme 10 Principles: principle number eight urges, "Valuable aspects of local culture and heritage must be maintained, enhanced or revived." (One Planet Living 2014).

[ii] The Native American Housing Assistance and Self Determination Act of 1996 (NAHASDA) reorganized the system of housing assistance provided to Native Americans through the Department of Housing and Urban Development by eliminating several separate programs of assistance and replacing them with a block grant program. The two programs authorized for Indian tribes under NAHASDA are the Indian Housing Block Grant (IHBG) which is a formula based grant program and Title VI Loan Guarantee which provides financing guarantees to Indian tribes for private market loans to develop affordable housing. Regulations are published at 24 CFR Part 1000 (US Department of Housing and Urban Development 2014).

[iii] For more details about CARES please visit: http://ppn.airjaldi.org/drupal/node/71

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