

Collaborating with the Crowd:
Online Participation for Architecture

University of Cambridge
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2013

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Submitted to the University of Cambridge in partial fulfillment of the requirements for the Degree of Master of Studies in Interdisciplinary Design for the Built Environment

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2013

Summary

The architectural profession has a mixed history of public participation. While there are many examples of successful civic engagement during projects, there are just as many cases where architects developed detailed, independent plans without consulting the community that the building would affect. The aim of the thesis was to introduce a new element to the architectural design process that could enhance engagement in the industry. Today, online social and professional networks make it easier than ever to connect with people and gather ideas. Online participation is changing the way industries operate including the design professions. Crowdsourcing is built around the idea that the knowledge and diversity of the ‘crowd’ can develop better solutions than a small group of experts. Most applications of crowdsourcing in the past decade have been in the digital world (software, photography, web design, etc.) or product design industry. Could it also be useful for something as local and permanent as a building design? This study examines how consulting with the *crowd* might affect the design process for architecture.

The literature reviewed on collective intelligence identified the characteristics of the crowd, how it can be engaged, and the products that result from that engagement. This thesis evaluated the literature through the lens of an architect and used that knowledge to develop a three-month project test case. The focus of the test case was the critique process that many architecture offices use during the design phase. A project was taken from the programming phase through concept development using offline and online critiques for design input. A design log was kept during the process, which allowed for comparison and analysis of the input from both critique groups. Additionally, two surveys were used to gauge the demographics, motivations, and opinions of the online test case audience.

Based on the test case design logs, the crowd critique provided more in-depth and creative ideas while the offline comments were more technical in nature. Furthermore, the online participation provided balanced input across the three-month period whereas the offline critique generated most of its input towards the beginning of the project. Both critiques broadened the designer’s perspective and strengthened his confidence during the process but the online critique increased the pressure that he felt to deliver a quality concept. Based on the surveys, the online critique gathered a diverse group of voices in the areas of technical background, geography, age, and gender. Also, the majority of design professionals who were exposed to the online site were open to the idea of online participation depending on the project type and client. However, the test case emphasized the difficulty of building a loyal online community and revealed that a designer must be strategic about the issues that he or she presents online in order to maximize the crowd’s potential. Overall, the thesis provides a guide for any professional who wants to use online participation during the architectural design process.

Declarations and Statements

This thesis has not previously been accepted for any degree and is not being concurrently submitted in candidature for any degree.

This thesis is an original piece of work and all other sources are cited and acknowledged in the appended bibliography.

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Word Count: 12,401

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Acknowledgements

The overall theme of this thesis is rooted in collaboration and, similar to many research endeavors, this thesis was a team effort. I must first thank Sebastian Macmillan, Alice Moncaster, and Becky Stanley, the staff of the Interdisciplinary Design for the Built Environment (IDBE) course, for an enriching two-year experience that has refreshed my passion for design and research. Thank you to all my IDBE peers for many enlightening conversations, eye-opening presentations, and vivid memories. The network we have created will continue to grow and impact our industry in ways we cannot measure.

Thank you to my Director of Studies, Kayla Friedman, for many inspiring words and acting as a personal therapist, friend, and research specialist during my time in the UK. Also thanks to Stephen Platt and Lorna McNeur, both excellent research supervisors, who helped broaden my perspectives when I needed it most.

My time working on this research has spanned two design firms, A2SO4 and URS Corporation. Both companies graciously supported me with encouragement and tolerance. I must give particular appreciation to Mark Darrall for a five minute conversation that started a year long journey. Also thanks to all my colleagues at URS Indianapolis for participating in the project test case.

The Stratford High School Spartans in Nashville, Tennessee and their coach Jason Barrett played an important role in this research. Their baseball field project provided me with a great test case project and I wish them the best in realizing their vision.

To the *Crowd*, thank you for the unconditional, anonymous collaboration.

To my family and friends, thank you for the confidence and encouragement that motivated me to achieve a lifetime goal.

Liz and Henry, thank you for the inspiration, patience, and love that move me every day.

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1 Introduction

In the architectural profession, every project warrants a different approach depending on variables such as client type, budget, and schedule. Designers often cannot control those variables. However, every designer and design team can influence the project's process. Essentially, the process is what separates one design firm from another. The architectural design process has evolved over many centuries as architects have continually adapted to new building types, materials, and technologies. Over the past couple of decades, the introduction of the computer into the architectural realm has continued the evolution. During design, the computer has allowed architects to build virtual models, study multiple schemes efficiently, and collaborate with team members remotely. So what is the next step in this evolution? The primary aim of this thesis is to introduce a new element to the architectural design process that could continue its evolution by enhancing collaboration.

The first objective to accomplish this is to refine the way people are engaged during built environment projects. Throughout any project, a design team needs to include many voices from other design professionals to politicians to local citizens. In general, it is up to the design team and owner to decide the true level of participation from other groups during the design process. Encouraging meaningful participation is important for the built environment because as Sherry Arnstein states, "There is a critical difference between going through the empty ritual of participation and having the real power needed to affect the outcome of the process (1969, p. 1)." Many design teams go through this *empty ritual of participation* to satisfy a corporate or governmental requirement but this thesis examines some of the benefits of public input.

The second objective of this research is to examine how the phenomenon of *crowd wisdom* can be applied to the architecture profession. Computers and the Internet have allowed the world to be networked like never before and many industries are using these networks to develop innovative solutions to their problems. The concept of *crowd wisdom* is based on the idea that, "under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them (Surowiecki 2005, p. 11)." Architects already collaborate with many other disciplines but perhaps with a large, online network, designers can find ways to collaborate with an even broader audience.

Overall, there are three main contributions of this research to the built environment industry. First, it acts as a guide for any designer who wants to use online participation during the architectural design process. Secondly, the research presents a way for the architecture profession, particularly in the United States, to increase the diversity of voices involved in building design. Finally, the research underlines the untapped potential of the *crowd* to broaden a designer's perspective and strengthen their confidence during the design process.

The body of the thesis is organized into three major sections. The **Literature Review** outlines who makes up the crowd, how they can be engaged, and the products that result from that engagement. The knowledge gleaned from the literature sets up the basic parameters from which the thesis experiment is designed. The **Approach** section outlines the overall research methodology and experiment design. This includes a design project test case as well as two surveys. The **Experiment Results** section underlines the critical data and trends that the test case and surveys revealed.

2 Literature Review

2.1 Literature Approach

This research journey began with a goal of enhancing the architectural design process by refining the way citizens are engaged during projects. Planners and architects regularly engage the public in early design phases for city, campus, or neighborhood master plans. However, public involvement at the building scale often only occurs after a design has been developed and the project team is looking for community ‘approval.’ This led to a study of the *Co-design* movement that began in the 1960’s. *Co-design* sessions are public brainstorming meetings or *charettes* that occur at the beginning of the design process and use artists to help citizens illustrate their visions for the community. Co-design supporters claim this gives citizens more power to influence their built environment and helps reduce alienation in a community (King et al. 1989, p. 06).

Still, these sessions are restricted by a set time and date, which reduces the number of people that can be involved in the process. This is in addition to other challenges with public participation such as face-to-face personality issues or a domineering facilitator [see Table A]. Could an online version of a design workshop loosen some of those restrictions? This prompted a study of how the software and product design industries are utilizing the Internet for participatory design. Over the past decade, these industries have increasingly been turning to the *crowd* for design input.

1. One way communication flow with no feedback or deliberation.
2. Citizens’ lack of power to have real influence on planning or policy.
3. Face-to-face politics of difference and unequal power relations are flawed.
4. Involving individuals who typically do not participate in the planning process.
5. Planners’ outreach and coordination of participatory activities.
6. Generating creative solutions.
7. Administrative structure for participation too stringent or professional.
8. Face-to-face interactions favor extroverted personalities.
9. Measurement of the effectiveness of public participation.
10. Planners’ facilitation style of participatory activities.

Table A: Top Ten Challenges of Public Participation (Messina 2012, p. 11)

Jeff Howe coined the term *crowdsourcing* in a WIRED magazine article in 2006. His simple definition for the term is, “the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call (Howe 2006, p. 1).” Since that time, the term has been used in a variety of ways to describe methods of capitalizing on the wisdom of the crowd. While Howe’s definition is concise and effective, it is important to identify a more detailed definition of crowdsourcing that encompasses the many sectors of crowdsourcing that have developed since 2006. Enrique Estelles-Arolas and Fernando Gonzalez-Ladron-de-Guevara propose the following integrated definition, developed from 40 other definitions of crowdsourcing:

Crowdsourcing is a type of participative online activity in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task. The undertaking of the task, of variable complexity and modularity, and in which the crowd should participate bringing their work, money, knowledge and/or experience, always entails mutual benefit. The user will receive the satisfaction of a given type of need, be it economic, social recognition, self-esteem, or the development of individual skills, while the crowdsourcer will obtain and utilize to their advantage what the user has brought the venture, whose form will depend on the type of activity undertaken (2012, pp. 9-10).

As mentioned above, there have been many other types of crowdsourcing, such as *crowdfunding*, *crowdventuring*, and *crowdvoting*, that have recently emerged and the field still seems to be finding its overall role in many industries [see Table B]. However, it is important to clarify that this thesis reviews the literature regarding crowd wisdom through the lens of an architect and it does not analyze any one particular sector of the overall *crowdsourcing* landscape.

Types of Crowdsourcing	
Crowdsourcing Category	Description
Service marketplaces	Matching buyers and sellers of services.
Competition markets	Competitions awarding prizes to selected entries.
Crowdfunding	Donating to creative ventures, sometimes as a pre-sale.
Equity crowdfunding	Equity funding from many small investors.
Microtasks	Markets for very small well-defined tasks.
Innovation prizes	Prizes for single, defined innovation outcomes.
Innovation markets	Matching clients and researchers for innovation.
Crowd platforms	Software used to support crowdsourcing processes.
Idea Management	Processes to propose, rank, and improve on ideas.
Prediction markets	Coalescing diverse views into collective forecasts.
Knowledge sharing	Sharing knowledge, experience, and insights.
Data	Gathering or refining data in specific domains.
Content	Creating media content.
Content markets	Enabling creators to sell their content
Crowd design	Product design, selection, development, and marketing.
Crowd process	Aggregation and added value to marketplaces.
Labor pools	Access to groups of specialists.
Managed crowds	Aggregated services provided by selected specialists.
Crowd ventures	Businesses conceived and managed by crowds.
Citizen engagement	Contribution to civic or government initiatives.
Contribution	Philanthropic fundraising and ventures.
Science	Contribution to scientific endeavors.

Table B: Crowdsourcing Types (Dawson and Bynghall 2012, p. 7)

2.2 Conversations on the Crowd

Similar to a physical crowd of people protesting in a public square or civic building, an online crowd can have monumental influence on an organization's strategy or decision-making. However, beyond sheer quantity of people, the similarities end there. The physical crowd that is acting in unison towards one goal can be classified as a mob whereas an online crowd can think independently to take advantage of its anonymous, diverse opinions (Surowiecki 2005, p. 409). The literature on crowdsourcing outlines who makes up the crowd, how they can be engaged, and the products that can result from that engagement.

2.2.1 Crowd Characteristics

Although every crowdsourcing effort taps into a different group of people, four assets of an online network were identified through the literature review: quantity, diversity, anonymity, and independence. This is not to say that every project using this methodology needs to or will have these characteristics but the evidence suggests that these are key components to the harnessing the crowd's wisdom.

Quantity

As of 2012, roughly two thirds of the World is using the Internet in some manner (McQueeney 2012, p. 1). That fact combined with the simplicity of social and professional networking, results in the conclusion that online participation can produce a higher *quantity* of ideas compared to an offline group of people. However, the interesting trend in the literature is the emphasis on soliciting *quantity* over *quality*. The supporters of crowdsourcing argue that quantity is more important than quality because Sturgeon's Law states that only 10% of ideas are useful and an even smaller percentage are actually valuable [see Figure 1]. Therefore, when consulting the crowd, as the overall number of ideas increases, so does the proportion of valuable ones (Howe 2008, pp. 226-227). Regarding design endeavors, it is not clear that the same rule applies because even if an idea is not a perfect solution, it could add something relevant to another idea. This concept of iteration in design will be discussed further in Section 2.2.3. Nevertheless, if a crowdsourcing project focuses on the *quality* of ideas first, it might discourage more contributions (Simoes-Brown & Harwood 2011, p. 48). Finally, large numbers of participation is critical to crowdsourcing because one of the key products of a large quantity of ideas is that it comes with built-in diversity.

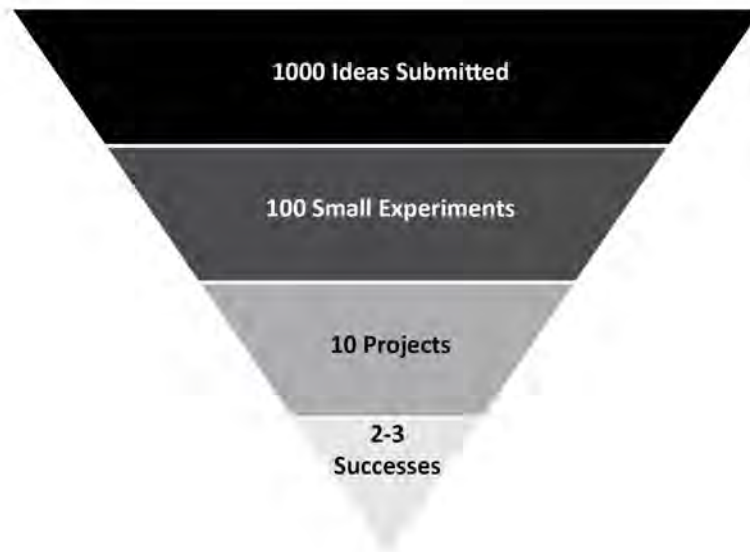


Figure 1: Innovation is a Numbers Game (Kelley 2010, p. 60)

Diversity

The accessibility and broad scope of the Internet allows the crowd to be diverse in age, gender, race, education, experience, and more. In America, the architecture industry is becoming more diverse from a gender and ethnicity standpoint with 16% of the AIA membership being female and 10% being ethnic minorities (The American Institute of Architects 2012). However, this is still starkly homogeneous compared to the overall workforce, which is composed of 46% females and 18.7% minorities (U.S. Census Bureau 2012). It is beyond the scope of this study to examine why the profession lacks diversity but considering that architecture affects all those within a community, this relatively homogeneous group of experts might benefit from a diverse voice. Diversity within a group allows for overlapping information, differences of opinion, and local knowledge. It could be argued that consulting with the crowd could infuse a broader voice into the architectural design process.

Howe (2008, p. 141) suggests that if a crowd is to maintain its edge on a small group of experts, diversity should be sustained so that consensus is avoided. In the realm of crowdsourcing, diversity can be described in three overall categories: identity, skills, and investment (Brabham 2008, p. 86). Identity, in this case, refers to statistics such as age, nationality, gender, religion, and so on. Beyond those general demographics, which are often associated with the term 'diversity', striving for a variety of technical skills is

important for the creative process. Renee Hopkins (2011, p. 19) explains, "Some research into the psychology of creativity also holds that group creativity works best in a group whose members comprise people who have high domain knowledge as well as people with less domain knowledge but high creative skills." Although Hopkins's description could pertain to many interdisciplinary design teams, the potential creativity of an interdisciplinary *crowd* providing ideas during the process could be exponential. Most design teams are composed of a handful of different professions whereas an online network has boundless possibilities.

In terms of personal investment, everyone who participates in a project does so with a different inspiration and therefore, a different perspective. Accordingly, when a design team conducts a public workshop regarding an upcoming project, members of the community get involved for different reasons. For example, business owners might want to know how their customer base will be affected and residents might want to know if it will increase traffic or noise. Local feedback has always been one of the major strengths of face-to-face public workshops. However, because the sessions are limited by the elements of time and location, online participation can help gather additional diverse inspirations of those invested, which could give the community more power to influence design decisions. Striving for a diverse range of identities, skills, and investment perspectives from the crowd is important because the anonymity of the Internet allows all of those perspectives equal opportunity for input.

Anonymity

One thing a public face-to-face workshop does not provide is anonymity. Online networks remove industry barriers for any creative process because of their flat structures. Darren Brabham describes how this structure aids participation:

Traditional public participation methods should not be devalued, for these methods have generally served us well in the past, and no method is perfect. But when we consider the medium of the Internet, for instance, where anonymity for users is available and where body language, identity politics, and interpersonal power dynamics are absent or changed, we can begin to ameliorate some of the common pitfalls of public participation that this body of counter literature on public involvement identifies (2010, p. 20).

The counter literature referenced by Brabham concludes that public participation can be counter-productive because of increased conflict due to personality issues, workshops being too scripted, and presenters intimidating local stakeholders with technical jargon and extravagant imagery (2010, pp. 18-20). This thesis sides with Brabham and takes the position that most public participation is valuable and online participation can help neutralize personality issues.

Another product of anonymity is the employment of the passionate amateur. Many crowdsourcing initiatives have given people an outlet for talents that they're not currently using in their everyday jobs. Crowdsourcing does not distinguish between professionals and amateurs so the only thing that matters is the final product. With the increasing convenience of creative tools such as free web-based 3-D modeling programs, amateurs have the ability to design in a swift and detailed manner. In other words, crowdsourcing can attract "people with lots of enthusiasm but little time (Howe 2008, p. 219)." Because the anonymity of the network eliminates the credentials of participants, it's hard to tell to the true scope of amateur involvement in certain projects. However, at a minimum, amateurs will increase the quantity and diversity of the endeavor.

Independent Thinking

As mentioned above, one characteristic that separates an online crowd from a mob is independent thought. Autonomous thinking helps maintain the diversity that is valuable to the process (Howe 2008, p. 175). First, the de-centralized nature of the network makes a virtual crowd inherently independent from the beginning. However, according to the literature, the challenge is to reduce deliberation and consensus among the crowd once it begins collaborating. Though it sounds contradictory, measures must be implemented to limit *herd mentality*. Surowiecki describes the consequences of this, "The more influence we exert on each other, the more likely it is that we will believe the same things and make the same mistakes. That means it's possible that we could become individually smarter but collectively dumber (Surowiecki 2005, p. 87)." This suggests that there is an inherent challenge for small design teams. Maintaining anonymity of contributors and making sure the problem presented is not too politically polarizing are ways of encouraging independent thought. Surowiecki goes on to argue that too much dependency on others for decisions can lead to an information cascade. This is what can create things like market bubbles when too many people react to events around them (Surowiecki 2005, p.

109)." Market bubbles might not be applicable to how design teams work but this does highlight the importance of independent, fresh ideas within a group of people.

2.2.2 Crowd Engagement

After examining the basic characteristics of an online crowd, it is important to identify the key criteria that a collective intelligence project needs in order to take advantage of those characteristics. The literature continually references the importance of maintaining a transparent process and adequately motivating the participants for crowdsourcing to be useful.

Transparency

Engaging the crowd requires a new level of openness and trust that might be foreign to the majority design firms. Many architects have a fear that too many voices will muddle the vision of the client or design team (King et al. 1989, p. 163). The past two decades of open sourcing in the software and product design industries provides evidence that a transparent architectural process could deliver high quality, successful projects under certain conditions. *Transparent* does not mean giving up all control of a project's process. It means sharing the design process with the public in exchange for fresh input. This requires a company to have a proper balance of a tight intellectual core and a porous boundary (Walzer and Hamm 2012, p. 166). Tapscott and Williams (2006, p. 21) agree with that concept, "Today companies that make their boundaries porous to external ideas and human capital outperform companies that rely solely on their internal resources and capabilities." In regards to a design team, honest communication with external players could have the potential to provide more knowledge of the physical, cultural, or economic context of a project. It could be argued that this might lead to a higher level of trust and acceptance by the community that will be affected by the project.

A major challenge to opening up the design process to the public is the issue of Intellectual Property. One of the key products of the open source movement is the ability for people to build upon the ideas and solutions of other contributors [see Section 2.2c – Iteration]. When the sponsoring entity of a crowdsourcing project becomes too protective of the ideas generated, this can create a barrier to collaboration (Resnick 2011, p. 149). Architects and engineers must protect their construction documents because they contain details for which they can be held liable. However, most overall building concepts are

unique to the context of the project and unlikely to be duplicated multiple times. Therefore, it could be argued that building professionals should be less protective than other design industries. “The more a piece of knowledge becomes available, the more valuable it potentially becomes, because of the wider array of possible uses for it (Surowiecki 2005, p. 274).” For this reason, firms should protect their valuable trade secrets but any ideas or products of a crowd engagement process should belong to the crowd, not just the solicitor.

Motivations

So if a company decides to open up their design process, why would the crowd be motivated to participate? There are many reasons that people participate in crowdsourcing activities but most are motivated by either financial gain or intrinsic needs like creative achievement (Howe 2008, p. 114). Both motivations speak to the competitive and collaborative spirit that is created by the crowd. Financial incentives will entice people to contribute but tapping into causes that people find important is what really ignites a crowd (Carpenter 2011, p. 78). There are many online design competitions that allow people to provide final concepts in exchange for financial reward so a design team that is looking for fresh ideas and feedback needs to find a way to appeal to the intrinsic side of people. It could be argued that architecture has an advantage with this because as Stanley King (1989, p. 06) observes, “Everyone may claim an interest in the design of public architecture because it affects the life of the entire community.”

In a summary of the basic motivations for online participation, several can apply [highlighted in Table C] directly to the architecture process. Besides helping their local community, participant goals can be condensed into two key areas: enhancing their reputation by sharing knowledge or connecting with others to gain knowledge. One’s professional reputation, particularly online, continues to increase as a precious asset. In fact, recent evidence suggests, “Our brains neurologically compute personal reputation to be as valuable as money (Botsman 2012, p. 102).” Therefore, when collaborating with the crowd, it is important to give participants recognition for their contributions and continue to engage them throughout the process. Despite the importance of independent thought regarding decision-making, the crowdsourcing platform should allow dialogue between participants so they can make knowledge connections. This will help satisfy the desire for a collaborative environment and allow people to gain new skills and

information. According to the literature, an impassioned crowd with a collaborative environment will deliver the best products.

Crowdsourcing Motivations
Make money
Advance one's career
Recognized by peers
To meet new people and socialize
Contribute to a collaborative effort
Have fun
Pass the time when bored
Learn new skills and knowledge
Express oneself

Table C: Crowdsourcing Motivations (Brabham 2010, pp. 52-53)

2.2.3 Crowd Products

Crowdsourcing in the creative realm has many potential products. Key outcomes that could be useful for design teams would be more iteration, cost efficiency, and a loyal online community.

Iteration

An open design process that allows people to access previous concepts can create numerous iterations for the design team to consider as well as a platform for the team to test a series of their ideas. The concept of crowdsourcing is not to solicit countless average ideas but to allow the crowd to aggregate the different ideas in order to refine the design (Bonner 2011, p. 201). Tapscott and Williams describe this concept in a more elegant manner, "Think of a shared canvas where every splash of paint contributed by one user provides a richer tapestry for the next user to modify or build on (2006, p. 37)." That is a statement that could also describe the architectural design process or the built environment itself. Additionally, by allowing those that are engaged to build upon the ideas of others, it simplifies the online experience by reducing redundant efforts. With the

endless amount of content available on the Internet, the experience must be simple to attract and retain a larger quantity of participants. This potential for increased design iteration due to online participation could help a design team push their services to the next level.

Cost Efficiency

Anyone engaging with the crowd must be mindful of the costs of such efforts. The beauty of challenging the crowd is that the failures are not expensive. If a monetary reward is involved, the firm only pays for the solutions that work and the failures only cost them the time and/or money it takes to set up and manage the infrastructure. With a similar internal process, the firm pays for the successes and the failures (Shapiro 2011, p. 207). Besides the infrastructure costs and possible financial rewards for the best ideas, the cost of collaborating with the crowd is minimal and the hours it takes to manage the crowd collaboration could be built into a design firm's fee since the client is theoretically receiving an additional service. If the crowd is large enough, allowing it to participate in the design process could be considered a type of built-in market research benefitting the project and the client.

However, this cost efficiency also has its share of critics. For instance, Bill Gates is concerned that the "creative commons" movement threatens the ability to make profits in knowledge-based industries and other executives compare the movement to a creative communism (Tapscott and Williams 2006, p. 16). There is also a fear that crowdsourcing can lead to exploitation of the participants because their labor is worth much more than the amount they're awarded and this trend resembles a slave economy (Brabham 2008, p. 83). The global implications of crowdsourcing is beyond the scope of this study but a design team engaging the crowd should understand these criticisms and respect the intellectual value of participants when considering the overall cost of the process.

Community

There is a social aspect to crowdsourcing. Many examples in the literature reviewed highlighted the online creative community that can be formed during a project. When this happens, people can then become motivated by their online reputation and their commitment to others in the community (Howe 2008, p. 180). From an architectural perspective, this community could have many scales. It could be as small as the physical

context of the project or a large network of design enthusiasts. Regardless of the scale, a design team could benefit from a loyal external community that believes in the firm's open process. Because the Internet allows for real time reactions, the designers then become the facilitators of the community conversation instead of just broadcasting their own ideas periodically. Taking this a step further, the design team can delegate power to the community to make decisions or prioritize project goals. The role of the online community may vary but, according to the literature, the social atmosphere created is an asset (Brabham 2010, p. 46; Kelley 2010, p. 60).

2.3 Research Questions

The literature regarding virtual crowd participation provides a broad framework for studying how the architecture profession can take advantage of this movement. A useful crowd can be described as large, diverse, independent, and with no regard for individual backgrounds. When engaging this crowd, the process must be as transparent as possible and the project should adequately motivate the participants to continue to contribute. There are some fine lines to consider such as maintaining independent thought while encouraging knowledge sharing and collaboration. However, the literature suggests this type of engagement can lead to increased iteration, cost efficiency, and a loyal online community. These conclusions lead to the following research questions regarding the architecture profession:

How can consulting with the *crowd* affect the design process for the built environment?

How does input from the crowd compare to input from a small group of designers?

Can online participation increase the diversity of voices involved in the design process?

Are designers open to using online participation during the design process?

3 Approach

3.1 Methodology

The literature on crowd wisdom provides a theoretical foundation for further investigation into the potential of online design participation. As highlighted in the research questions above, the approach for this study is to develop an initial understanding of how crowd input can influence the design process for buildings. Because the built environment is rooted in the context of the people who create and interact with it, the ontological and epistemological perspectives of this research are of a constructivist nature. In other words, the design professionals and owners of a project provide the knowledge and meaning for the design process. This means every project's process is different depending on the parties involved and their individual experiences. To undertake this constructivist-based research, the approach is inductive following a mixed methods methodology in order to address the research questions. This consists of a qualitative assessment with a few quantitative variables to help structure the analysis. The research medium is a project test case with surveys, both during and after concept design, regarding the demographics and opinions of the participants. The overall framework for the assessment is displayed in *Figure 2* and the methods are detailed in the Experiment Design section below.

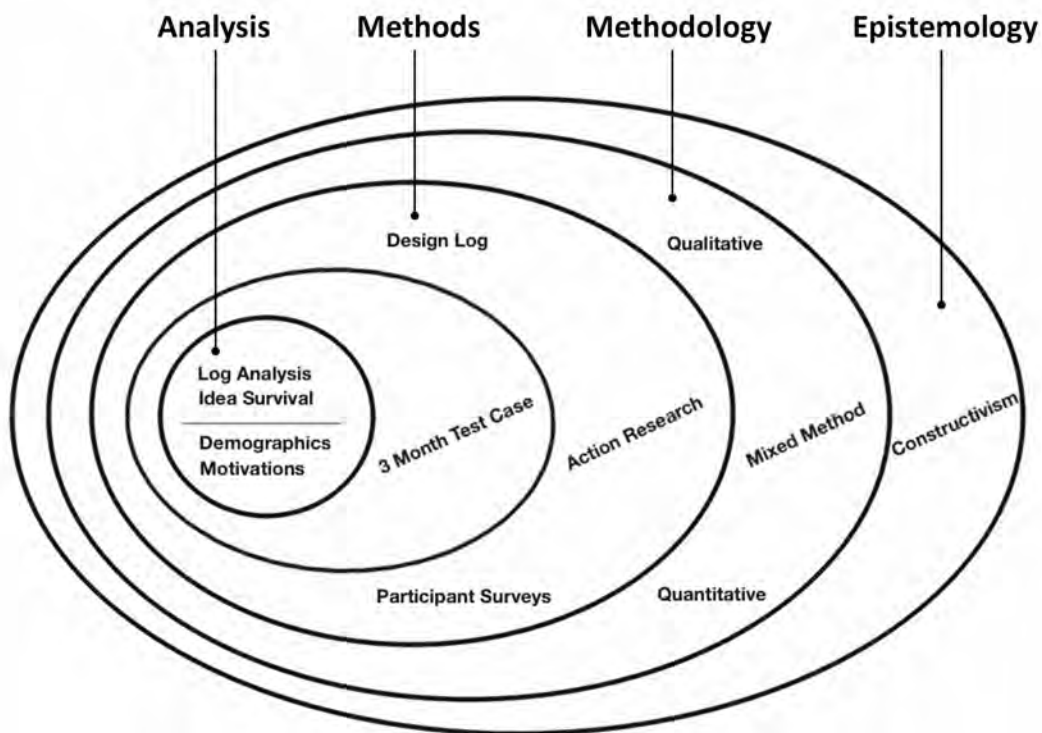


Figure 2: Research Approach Onion (adapted from Saunders et al. 2009).

3.2 Experiment Design

The concept of crowdsourcing has previously been used for architectural projects but there are not many examples of its use throughout a design process. Two recent theses, both referenced in the literature review above, used crowdsourcing in the manner of a design competition. One for a transit oriented development called the Green Line Challenge (Messina 2012) and the other for a bus stop called Next Stop Design (Brabham 2010). All the concepts presented for those projects were more polished design ideas and did not necessarily take full advantage of the iterative potential of the crowd. That method seems ideal for owners who are looking for the best ideas for the smallest investment necessary. However, this research is geared towards discovering how designers can consult with the crowd throughout the design process.

One of the most productive exercises within any design practice is an internal project critique. Once a team develops some initial project concepts, they hang them up in a public space within the office and ask the rest of the staff for ideas about improving them [see Figure 3]. The other design professionals make notes and sketch on top of the concept drawings and then this process is repeated again during the next phase of the project. The experiment design for this thesis is based on the notion that the internal project critique could benefit from *crowd* participation.



Figure 3: Office Critique Example

Because crowdsourcing is a relatively new concept and every design process is different, it makes sense that a live test case be used for the study. Furthermore, as an architect working for a company with over 50,000 employees (URS Corporation), the author was the subject in this experiment as the sole designer.

The test case was to take one project and run simultaneous critique opportunities both offline (within an office) and online. As a scheme was developed, it was posted in the URS Indianapolis office break room and to a web platform created specifically for the test case. Part of the qualitative analysis of the test case took place during the design process. As comments were posted in the break room or online, a design log was kept to track how each idea was affecting the process. This thesis takes the stance that architecture is not a purely democratic endeavor. Someone is always the filter and decision maker for the design team's ideas. In this test case, the author was the filter. As a type of action research¹, the author logged his initial reaction to the idea during the process and how it ultimately affected the design process once the test case was complete.

The project chosen for the test case was a master plan for the Stratford High School baseball field in Nashville, Tennessee. Stratford is an inner city school with a very limited budget. The team's new coach is determined to help the school provide an environment that matches the team's passion for the game. The images developed will help plan for the program's future and raise funds for the field's improvements. The project was a good fit for the study for several reasons. It is moderately sized and simple in scope. Also, being associated with a school, it will have an impact on the surrounding community. The test case ran for a period of 3 months, which is a reasonable length for conceptual design on a project of this scale.

Since this experiment had many players involved, it was important to identify specific goals for the structure of the test case. The four overall goals of the experiment design were as follows:

1. Develop an environment where the crowd's effect on the design process can be studied.

¹ "Action research is simply a form of self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own practices, their understanding of these practices, and the situations in which the practices are carried out (Carr and Kemmis 1986, p. 162)."

2. Foster an online community that can become a resource for designers.
3. Allow for a fair comparison between offline and online process.
4. Gather enough information on the participants to study their diversity and motivations.

The first two goals were important to the design of the online critique platform and, of course, the medium for this test case is a website where the project brainstorming took place. The literature on crowd wisdom set up some clear environmental parameters for any entity that intends to engage people online. It recommends that a site allow for anonymity, attract as many people as possible, be easy to use, keep people motivated, and keep the process transparent. The platform that was created for the study was called *Crowd Critique* (<http://crowdcrit.weebly.com/>). The website was in a blog format with a basic layout of text and photos. It allowed anyone to post images and surveys could be hosted on the site to gather information. Once arriving on the project page, a visitor could review the project's background information including existing images and the client's goals. This then led to the brainstorming section where the critique of concepts took place [see Figure 4]. There was no registration required to provide ideas on the site but a commenter could provide a name if they desired. Therefore, people were able to remain as anonymous as they wanted to.



Figure 4: Crowd Critique Brainstorming Page

In order to attract visitors to the site once the three-month test case began, a link to the site and brief description of the project was posted on a variety of social and professional networking websites including Facebook™ (the author’s personal page and the Stratford Baseball page), LinkedIn™, Twitter™, and Yammer™ (URS Corporation’s professional network). The author’s personal connections on those sites totaled more than 700 people but that doesn’t account for any overlapping contacts. Nevertheless, it is a large group of people that could serve as a useful ‘crowd’ for the test case. The link was posted

whenever new content was added to the site. A promotional piece regarding the website was also included on the Indianapolis American Institute of Architects newsletter. A financial reward system was considered but not incorporated because this test case had the opportunity to study other types of motivation identified in the literature such as the desire to be a part of a collaborative effort or to learn new knowledge. New content was posted as often as possible in order to keep people engaged and participating regularly.

The third goal for the test case was to provide a fair method of comparison between the offline and online processes. The Indianapolis office of URS Corporation is composed of about 40 engineers and 7 architects as well as support staff. A public critique of a project is a normal part of the architecture department's process but not in the engineering departments. Therefore, even the offline study in this test case is opening up the design process to a wider group of participants. The designated offline critique space is the office break room [see Figure 5]. This was chosen because the entire office uses the space and people are always waiting around while preparing food and beverages. Similar to the online critique, a notification will be sent via email to the entire office once new content has been posted.



Figure 5: Break Room Critique Space

As previously outlined, part of the qualitative analysis for the study was performed during the three-month test case by using a spreadsheet log to track all of the contributions to both the offline and online critiques. See *Figure 6* for an example of the spreadsheet that was used. The author’s initial reaction to an idea was recorded within minutes of reading the comment. This is an important feature of the experiment design because it provided a link back to the moment where an idea might have affected the process. More importantly, it kept an accurate record to allow for critical analysis and reflection once the test case was complete.

Crowd Critique Log - Crowd					
Phase	Idea Code	Idea / Comment	Date	Initial Reaction	Affect on Design Development
1					
2					
3					
4					

Figure 6: Critique Log Template

For the Green Line Challenge, Messina (2012) tracked the number of *distinct* ideas for both an offline workshop and a crowd-sourced competition. Surprisingly, the public workshop provided more *distinct* ideas than the online competition. However, Messina concluded that the online ideas were much more detailed and layered (2012, p. 95). Due to the evidence in the literature, quantity was also important to this study and was tracked. However, since iteration throughout the process was a major goal, this thesis was also interested in the survival of each idea. In a recent study regarding interdisciplinary design teams, Jennifer Barrett (2010) used a method of idea mapping that was analogous to evolutionary biology [See Figure 7]. In other words, she compared how ideas from balanced (multi-disciplinary) and unbalanced teams had adapted in order to survive into the final design submission. The research used a similar method of idea mapping by tracking the survival length of each idea. Each piece of feedback was marked with an idea

code and mapped from its conception to either its demise or the final scheme. This allowed for some comparison between the efficiencies of the offline and online critiques.

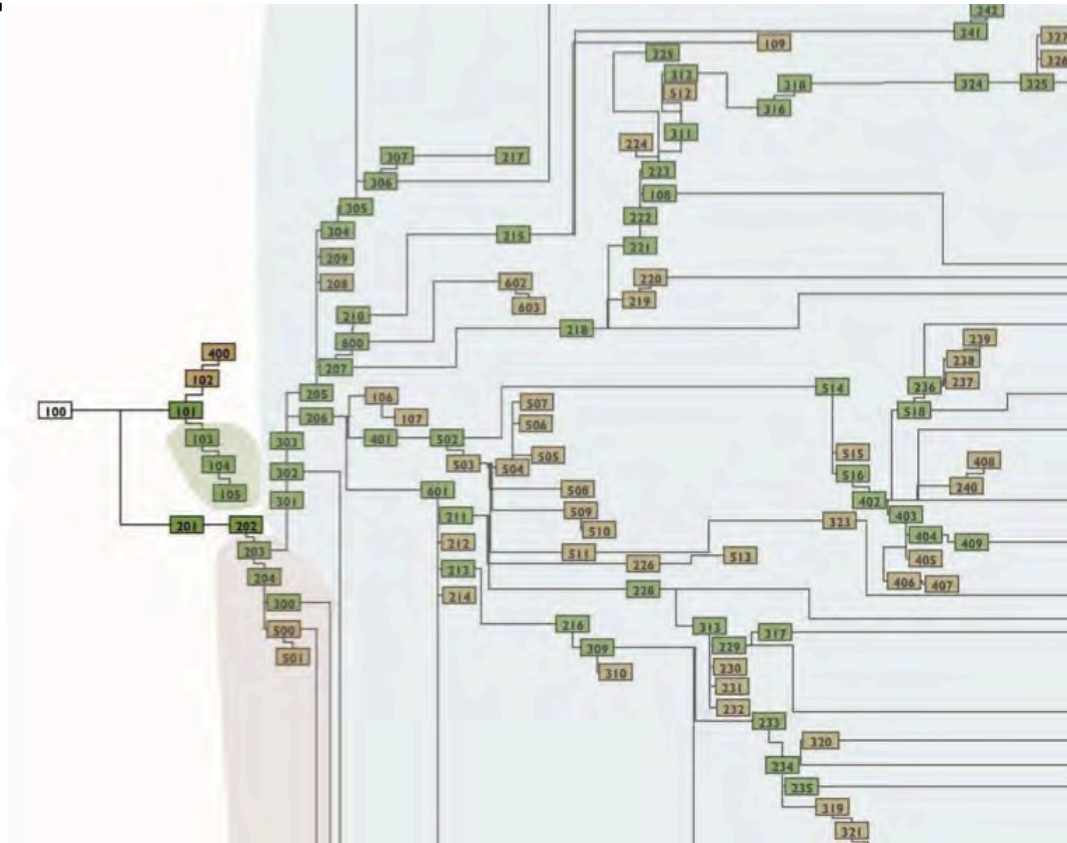


Figure 7: Phylogenetic Tree (Barrett 2010, p. 7)

The fourth goal of the experiment design was to gather enough information on the participants to study their diversity and motivations. Before a participant can peruse the *Crowd Critique* site, it asks them to complete a brief demographic survey that helped track the diversity of the site’s audience. Specifically, the survey identified a visitor’s location, age, sex, and ethnicity. It also classified whether they visited the site because of URS Corporation, a local interest, their general design interest, or another reason. After the three-month project was complete, another survey was conducted via *Crowd Critique* to gather the thoughts of participants and non-participants on their respective motivations and opinions regarding the use of an open, online platform during the design process. The specific questions of the Participation Survey were as follows:

1. Profession? *Fill in the Blank*

2. Have you provided feedback or ideas on the Crowd Critique website? *Yes/No*
 - If YES, what compelled you to do so? *Check all that apply*
 - Express my creativity or technical knowledge.
 - Help a good cause.
 - Contribute to a collaborative effort.
 - Be recognized by my peers.
 - To advance my career.
 - Personal connection to the project or website creator.
 - To have fun.

 - If NO, what were the barriers to your participation? *Check all that apply*
 - This is the first time I've heard of the site.
 - The site was not easy enough to use.
 - I have no interest in the project type posted.
 - I do not feel qualified to provide design input.
 - I'm nervous about sharing my thoughts on a public site.
 - I don't have time to provide input on other projects.
 - I don't provide my ideas without financial compensation.

3. If you are a design professional, are you interested in using an open, online participation site for projects? *Check all that apply*
 - I am not a design professional.
 - Yes. I'm always interested in more input on projects.
 - Yes, but it depends on the project type and client.
 - No, too many voices will muddle the vision.
 - No, there could be Intellectual Property and liability issues.
 - No, it will lengthen the design process.
 - Maybe, if the site users have to register.

There were other potential elements to the test case that were considered but not incorporated. The first was an offline workshop in Nashville to kick the project off and gain more local participation. This would have provided an interesting comparison with the online platform similar to Messina's study (2012) and probably increase the quantity of ideas provided. However, as stated before, it's the continuous input that this study was most interested in.

Another potential method was to develop multiple online projects to compare instead of an offline and online study. As a professional who was already managing multiple projects, the author chose to focus on one with the intent of developing a more detailed solution as well as prevent participation fatigue amongst the participants. Finally, as the online platform was being developed, there was an attempt to provide a tool that allowed people to markup drawings on the website in a similar manner to the offline critique

experience. A third party markup tool was incorporated into the site during a pilot test of *Crowd Critique* but it proved to be too confusing for people to use so it was removed before the launch of the three-month project.

3.3 Approach Summary

Overall, the experiment design provided a well-rounded, active approach to answering the research questions and exploring good techniques for online design engagement. A platform was created that can foster an online community and provide an environment to understand how crowd input can affect the design process for architecture. The design log and idea survival methods allow for fair comparisons between the offline and online critiques. Additionally, the demographic and participation surveys will help answer if online participation can increase the diversity of voices within architecture as well as if designers are open to using something like *Crowd Critique* during the design process.

4 Experiment Results

4.1 Project Development

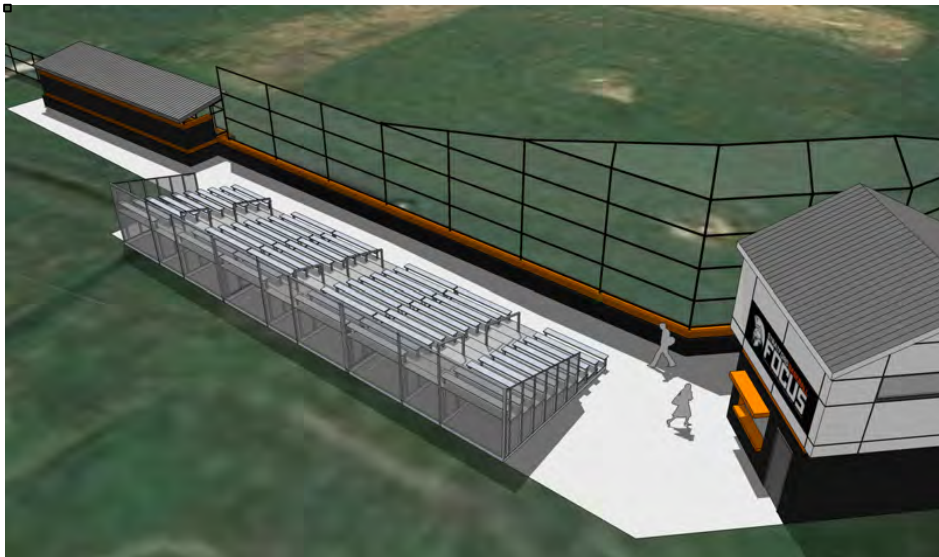
The master plan for the Stratford High School Baseball Field ran for three months and, in the end, the team had some refined images to help them raise the funds they will need for the improvements. New content was posted to *Crowd Critique* and the break room critique space about every two weeks [See Table D]. All posts asked for general comments on the current progress while some of the posts also prompted visitors for specific feedback such as the cladding material used on score box.

Project Timeline	
February	Platform build and testing
March 1	Programming
March 11	Backstop design
March 31	Coach's questions
April 14	Score box concept
May 12	Score box revised and dugout concept
June 1	Final concept

Table D: Test Case Project Timeline

Despite most of the content posts allowing for others to upload their own images, none were added to the site during the three-month period. Overall, most of the comments posted online came within 1-2 days of the content being uploaded. This corresponds with *Crowd Critique* web traffic analytics that consistently showed a higher volume within 24 hours of a posting. Predictably, this is in contrast to the offline critique in the break room. Ideas on that board would trickle in up to a week after the new content was posted. The final project concept included a new backstop, score box, seating area, and dugouts [See Figure 8]. A catalogue of all the content posted on the site can be found in Appendix A.

Figure 8: Final Concept Images



4.2 Surveys

Demographic Survey | See *Appendix B* for complete survey data |

The major goal of the Demographic Survey was to see if the *Crowd Critique* site was gathering an audience that was more diverse than a typical architectural firm. The term *audience* is important regarding this survey. Because the intent of the research was to allow contributors to have the ability to remain anonymous, the website asked a visitor to complete this survey on their first visit before they viewed the project posted. Consequently, there is no way to tell the specific demographics of each person who provided an idea and the data from this survey is merely the audience and *potential* diversity of contributors on *Crowd Critique*.

As mentioned above, only 16% of the AIA membership is female and only 10% are ethnic minorities (The American Institute of Architects 2012). Unfortunately, this test case did not gather a more diverse audience from an ethnicity perspective, as 89% of survey respondents were White. However, the gender diversity was greater than the AIA figure with 25% of respondents being female; but still nowhere close to the overall workforce statistic of 46% female. Over half (51%) of all visitors to the site are employed with URS Corporation in other offices besides Indianapolis. These employees were all exposed to the site via the company's internal professional network hosted by Yammer™. This is an interesting figure because it means the test case developed a 'crowd of experts' that visited the site during the three-month process. The most balanced category of the survey was the age ranges with the three age groups over 26 each composing of one quarter to one third of the overall respondent group [See Figure 9]. This is an encouraging figure because it means people at all stages in their life were exposed to the site.

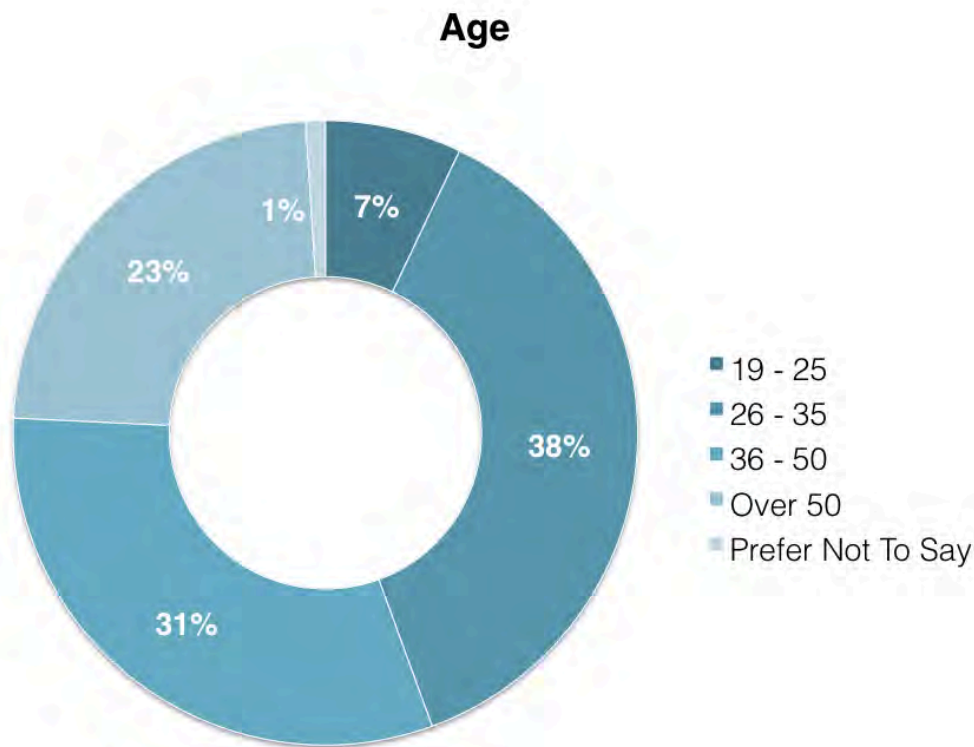


Figure 9: Age Ranges of *Crowd Critique* audience

However, the most interesting data from the demographic survey was how geographically diverse the *Crowd Critique* audience was with respondents representing at least 28 different American States or other countries [See Figure 10]. This is a type of diversity that is impossible for one design office to replicate. At the same time, there was very limited representation (4%) from the location of the project site, Nashville, Tennessee. This is a disappointing figure because of the community-based nature of the project but not surprising given the fact that there was not an offline public workshop held at any point during the three-month process. The insight this survey provides is that the crowd is only as diverse as the network it is built upon. The author was the only designer in this case. If a whole firm promoted and used a platform like *Crowd Critique*, perhaps the diversity of each of these categories would increase.

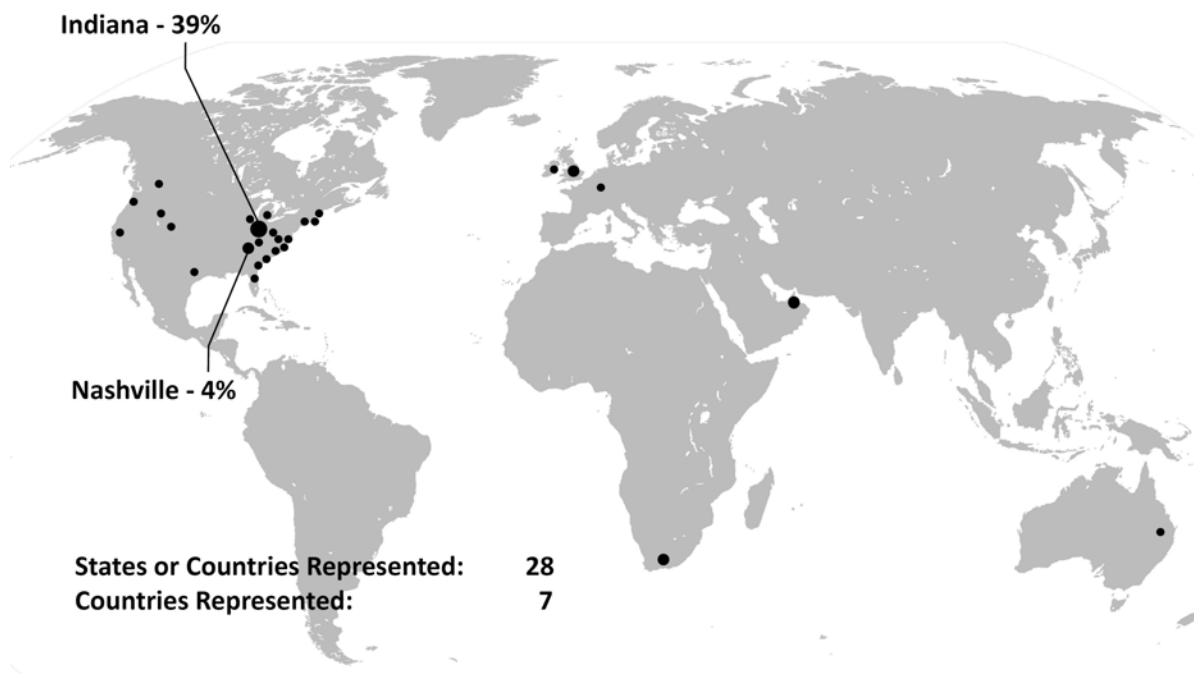


Figure 10: Crowd Critique Geography Diagram

Participation Survey | See *Appendix B* for complete survey data |

As described earlier, the survey at the conclusion of the three-month study was primarily to understand the reasons people did or did not participate on *Crowd Critique*. Secondly, it was to recognize if other design professionals would find an online critique platform useful as part of their process. In a one-week capture period, the survey yielded 76 responses. The first piece of the survey asked respondents to list their profession. Overall, there was a broad mix of professions with the majority (55%) being built environment specialists [See Figure 11]. This fact reveals that 45% of respondents were from outside the construction realm, which reinforces the potential technical diversity that this platform can engage.

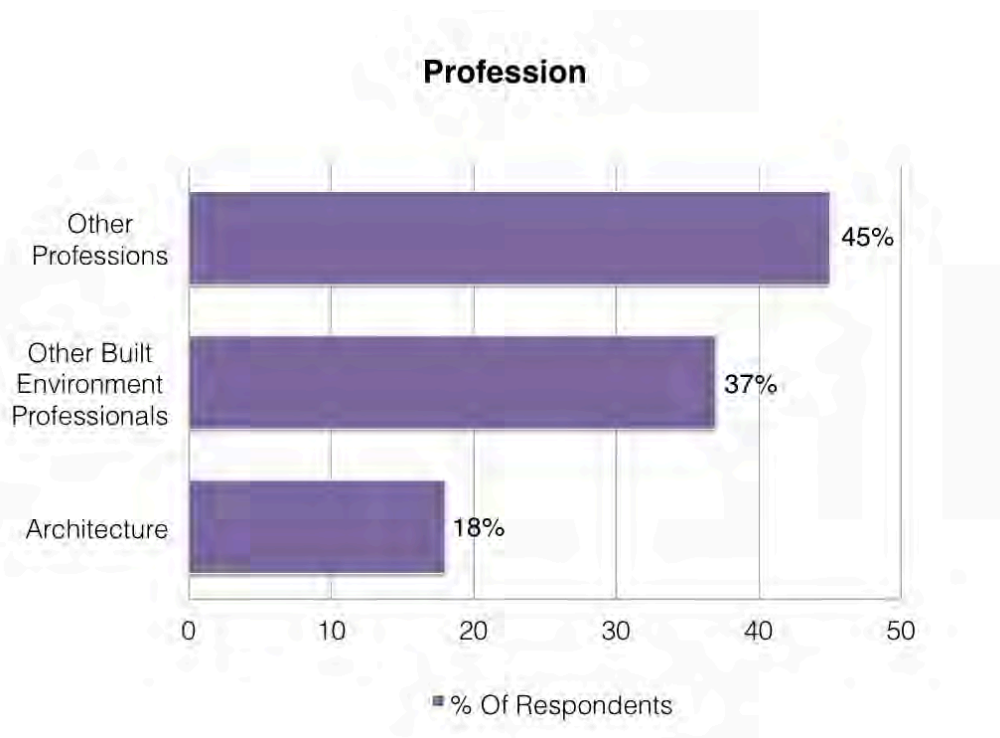


Figure 11: Respondent Professions

The response to the second prompt on the survey, which asked if the respondent provided feedback on the site, was not as encouraging for the platform. Of the 76 respondents, only 12% actually participated with comments or ideas. Based on the responses to the follow-up question regarding the barriers to participation, the low participation rate among respondents could be due a lack of awareness. The majority (77%) of nonparticipants said they had never heard of the site. The next highest reason given (6% of respondents) was

an anxiety about sharing thoughts on a public site. It could be argued that the lack of awareness is a consequence of the fast pace of social media and how competitive web space is regarding people's attention. The networks on which the site was advertised all filter the newest or most popular information to the top of the feed. So, as mentioned before, the *Crowd Critique* web traffic had high volume within 24 hours of a posting then a significant drop-off after that. This data emphasizes the increased publicity effort needed by a design team and/or a firm's marketing group in order to establish a reliable online community. Of the 9 survey respondents who did contribute to the project dialogue, the majority (66%) did so because they had a personal connection to the Stratford Baseball project or the author, while 4 of the 9 were compelled by the collaborative nature of the process [See Figure 12].

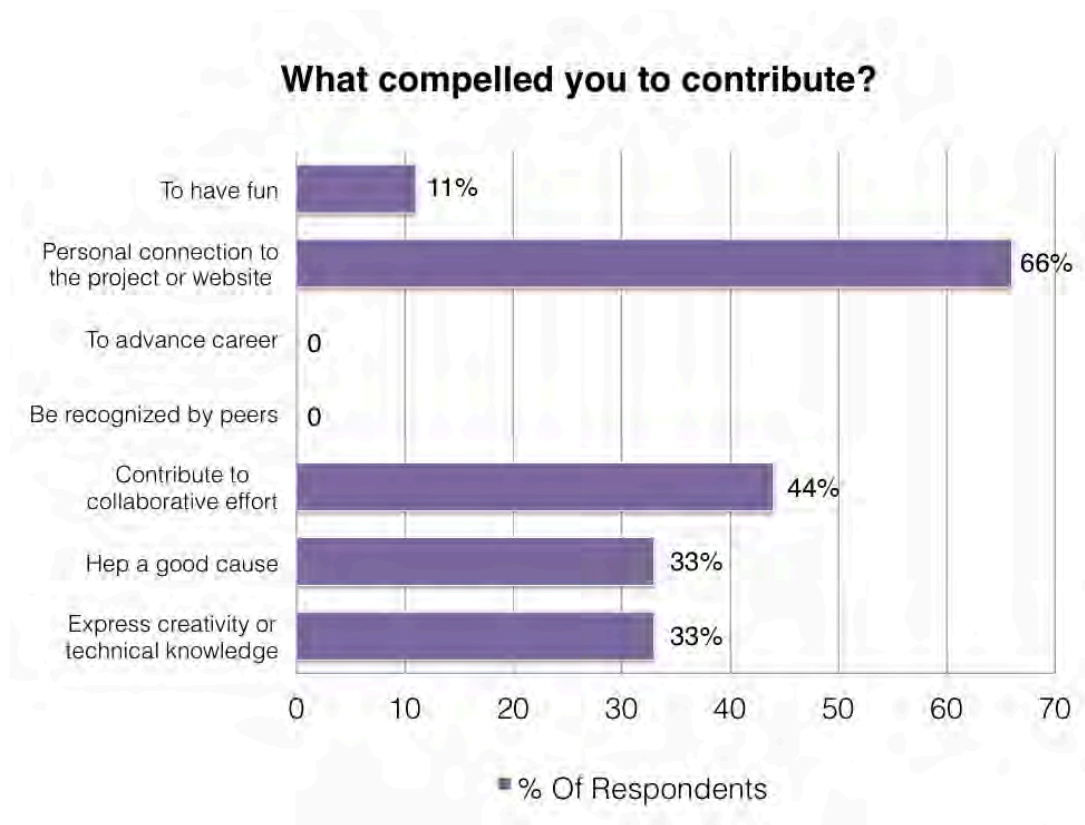


Figure 12: *Crowd Critique* Contribution Motivations

Finally, about half of the respondents (47%) said they were design professionals. When asked if they were interested in using an open, online participation site for projects, 72% of the designers marked, “Yes, but it depends on the project type and client.” Additionally, only 5.5% said that too many voices on a project would muddle the vision [See Figure 13]. Those two statistics suggest that many designers are interested in online collaboration but only under certain conditions. This outcome is particularly positive considering only 15 out of the 36 design professionals who responded had previously heard of *Crowd Critique*. In other words, the majority of designers who completed the survey had a positive view of online project feedback before experiencing the platform. Future research could include a detailed study of which types of clients and projects are good candidates for crowd participation.

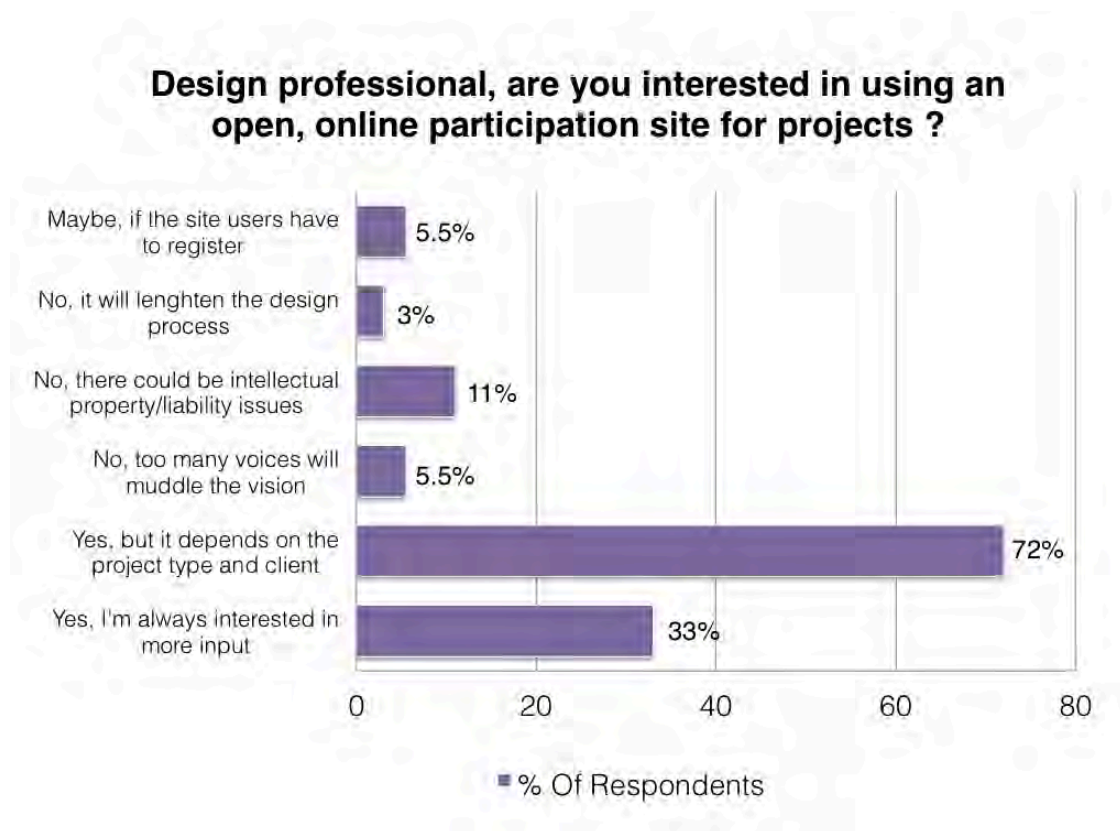


Figure 13: Designer Interest in Online Participation

4.3 Design Logs | See *Appendix C* for complete design logs |

Once the project commenced and the dialogue with the crowd began, I immediately started recording my initial reactions to the ideas.² My comments had a wide range of phrases from, “Very important, should be included in some manner” to “I’ve already thought of that and it’s been implemented.” They were mostly a sentence or two and very direct about my personal feelings. I also made an effort to respond promptly to any feedback, either to thank the contributor or continue the dialogue they started. This was done in order to, as the literature suggests, show appreciation and increase the social nature of the site.

Certainly, there were several comments from both the crowd and offline board that I disagreed with and a few debates arose around certain issues. For example, the concept of subterranean dugouts had people online and offline rallying around two distinct opinions. One group thought that it will improve the seating and sight lines around the field and the other thought it would not be worth the construction expense and long-term maintenance. Throughout the entire project, it was those situations that I found most useful. Even though the online and offline contributors did not provide a clear direction for me on that issue, they presented me with alternative views to consider. I felt it improved my confidence in the decisions I made.

Once the three-month concept design was complete, I reflected on all the comments and noted how each one ultimately affected my design process. In general, the comments were short responses such as, “No affect” or “Made me think” but over the sequence of 45 ideas, some trends were noticed. One way to compare the offline and crowd critiques is to look at the number of ‘productive ideas’ that each process yielded. A ‘productive idea’ could be defined as one that was incorporated into the final design, made me think of design alternatives, or solidified a position I was taking. Based on that definition, the crowd critique yielded 14 productive ideas versus the offline critique’s 11. So from that standpoint, the crowd input was slightly more productive but not enough to say the crowd wisdom had a profound effect on the overall process.

² The design log and conclusion portion of the research will be delivered in the first person for accuracy and to better explain the results since the author was an active subject in the test case.

However, when comparing the type of comments from the two critique processes, the crowd provided more in-depth and creative ideas while the offline comments were more of a technical nature. I believe the crowd comments were more in-depth because the digital medium makes it easier to provide as much detail as one desires. It is easy to understand that writing a full explanation or reasoning behind an idea on paper posted to a wall could be tedious. I believe that is why the offline comments were short phrases and sentences. As for the crowd comments being more creative and the offline ones being more technical, the survey results might shed some light on that issue but I believe it is a product of the difference in professional diversity between the two processes. For example, many of the offline comments were directed at site drainage and landscape issues while the crowd had input regarding aesthetic issues such as material colors and architectural context. I believe this is directly related to the fact that the Indianapolis office of URS Corporation consists of mostly civil engineers.

4.4 Idea Survival

The final piece of analysis regarding the design logs is the idea survival map. As mentioned above, each piece of feedback was marked with an idea code and its survival length was mapped from the phase it began to either the phase it was dismissed or incorporation into final scheme [See Figure 14]. When comparing the offline and crowd critiques, they both had the same number of ideas that survived to the final concept. However, the major difference that the map highlights is that the crowd input was more balanced across all phases of the design process. The offline critique yielded more ideas in the programming phase but very few were carried on or initiated in other phases of the design. Again, I believe this is a subtle manifestation of the difference in professional diversity between the two critiques. Both provided three ideas that survived to final scheme, but the office critique was more productive during the programming phase (regarding civil/site related issues) while the crowd provided comments on wide variety of issues from materials to signage to the score box layout.

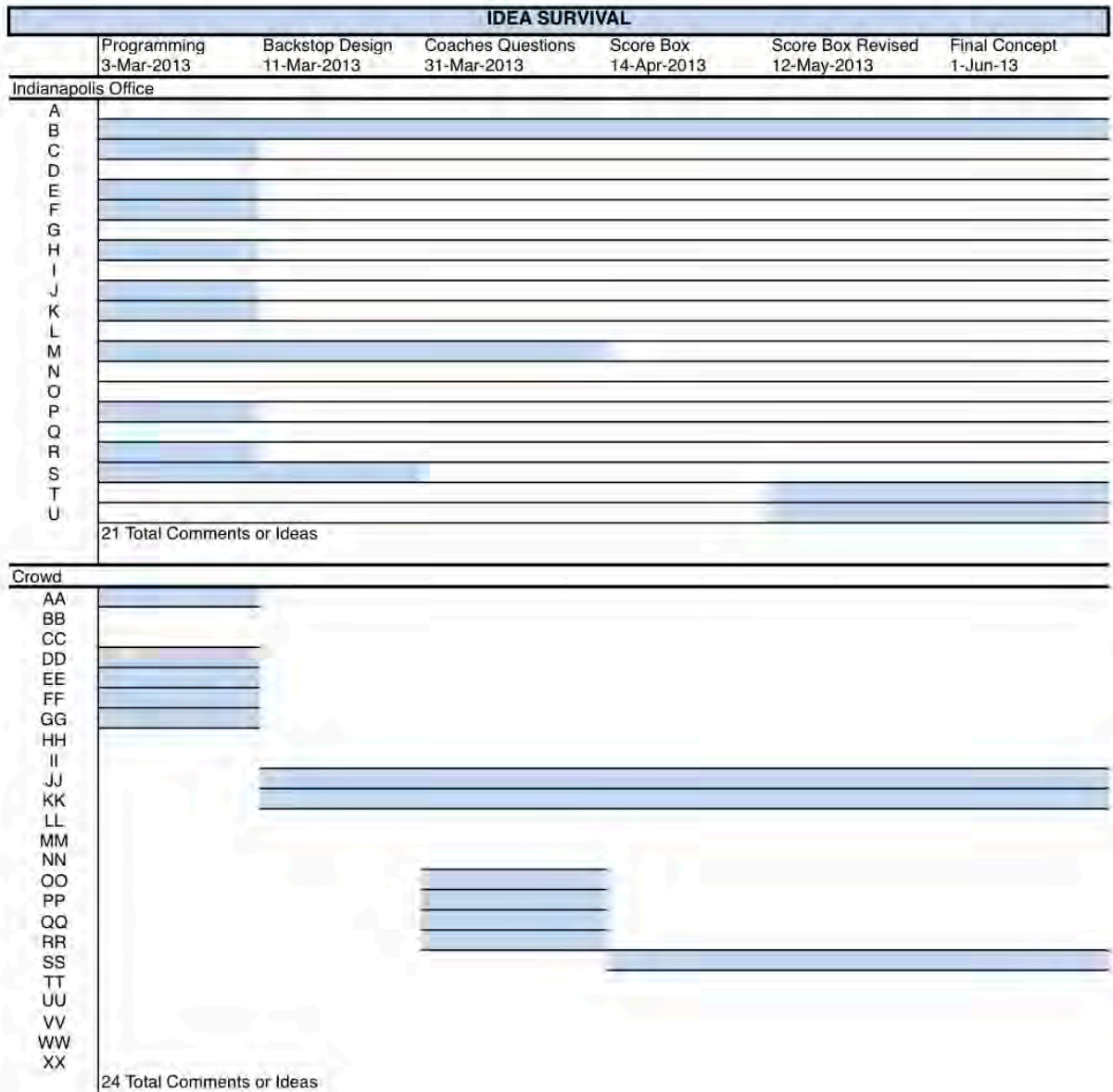


Figure 14: Idea Survival Map

5 Conclusion

Collaborating with the crowd is still an emerging concept and this thesis accentuates the potential it has to modernize and expand the way designers produce solutions with their clients. The literature on collective intelligence provides a compelling reason to explore the extent of its use. It consistently supports the argument that an open, online network can attract a large quantity of people who are diverse in many ways, can maintain their anonymity, and think independently. Furthermore, the literature continually emphasizes the importance of maintaining a transparent process and adequately motivating the participants in order for crowdsourcing to be useful. Finally, the literature suggests the potential products of a successful crowdsourcing effort could be more iteration, cost efficiency, and a loyal online community.

Taking those concepts into account, an experiment was developed to explore how a designer might collaborate with the crowd during the design process. The experiment consisted of a test case along with two surveys, one before and after the project. The test case was an architecture project that developed from the programming phase through concept design. During the process, periodic design critiques were conducted simultaneously online and offline. The online content was posted on a website called *Crowd Critique*, created solely for this research, and the offline content was posted in an office break room. As the project designer, I kept a spreadsheet log of all activity online and offline including my initial reaction to each idea or comment. In the end, the activity log was analyzed by tracking the survival of each idea as well as the overall influence it had on my decision-making. The survey conducted before the project was focused on the demographics of the visitors to the online critique. The survey after the design process was to learn more about the motivations and barriers of a platform like *Crowd Critique*. It also gauged other designers' willingness to use open, online participation during the process.

The arguments presented in the literature prompted several research questions that are reiterated below. The responses to those questions are based on the analysis conducted on the project test case and corresponding surveys.

How can consulting with the *crowd* affect the design process for the built environment?

Based on the test case project, the crowd collaboration helped to broaden my perspective on certain issues and give me more confidence in my decision-making. Many of the ideas proposed were things I had not yet considered for the project and when they were ideas that I had considered, it bolstered my confidence in the decision-making. However, these cannot be considered as major effects of the crowd's involvement because the offline critique had a similar effect.

Nevertheless, the crowd critique did have a unique influence on my confidence. Since I knew the concepts I would be posting would be seen by hundreds of my personal and professional connections around the globe, there was increased pressure that I felt to deliver a quality concept. It was a different pressure than when presenting to a client or my office colleagues. This reaction is not something I could track during the process but it definitely had a role in the content that was produced. This feeling reinforces Rachel Botsman's bold statement that, "By the end of the decade, a good online reputation could be the most valuable currency in your possession (2012, p. 103)." I believe this is an advantage and a disadvantage at the same time. While I felt I was feeding the crowd with nice concepts, I did not feel comfortable posting less polished images that I might normally post around the office for colleagues to review. With only text and imagery to explain a concept, I felt that the content posted needed to be more detailed than rough sketches in order to avoid confusion. From a broader perspective, this means it could prove difficult for designers to fully open up their work for input and share the daily iterations that are critical to developing a strong concept.

How does input from the crowd compare to input from a small group of designers?

The design logs that were kept during the project provided a way to compare the input from the groups. The major difference that was highlighted by the survival mapping exercise was that the crowd input was more balanced across all phases of the design process. The majority of the offline input was provided during the programming phase when major site issues were discussed. This could be attributed to the fact that the URS Indianapolis office consists of mostly civil engineers. Also, because of the nature of social networking, the online process was constantly being exposed to new people so the crowd might be less susceptible to participation fatigue than an office group.

Both the offline and online critiques yielded a similar number of ideas that were deemed to have influence on the outcome of the project. Therefore, the proposition that the crowd will always produce a much greater quantity of valuable ideas cannot be confirmed by this thesis. However, the crowd's input was more in depth and creative while the offline critique was more technical in nature. The wider lesson learned in this case was that when both the crowd and a small group of experts are engaged during a project, they can help balance the imaginative and practical feedback.

Can online participation increase the diversity of voices involved in the design process?

The results of two surveys provide an interesting picture of the demographic and technical diversities of the platform's visitors. Overall, the online crowd was a diverse group. It did not increase the ethnicity balance that was expected but the range of geographies and professions amongst the respondents was broad.

The statistics referenced earlier regarding gender and ethnicity in the architecture profession were that only 16% of the AIA membership is female and only 10% are ethnic minorities (The American Institute of Architects 2012). The Demographic Survey revealed that 89% of respondents were White so there was not much of an increase there with just a 1% difference. However, 25% of the

respondents were female. That is a slight increase in that area with a 9% difference.

Although the majority of respondents to the Participation Survey listed a profession related to the built environment, 45% of respondents were from outside the construction realm. I believe that statistic is the most encouraging of the survey data since project clients are usually the only group of people from other professions involved in the design process. In addition, respondents to the Demographic Survey represented 28 different American States or other countries.

Further study of my own networks would be necessary to prove this but I believe all these statistics might reflect the diversity of my personal and professional crowd since the test case was mostly broadcast to those groups. I'm confident if an entire design team began promoting the critique platform, the diversity of the site's visitors would continue to grow.

Are designers open to using online participation during the design process?

The Participation Survey was the sole research element regarding this question. Based on that survey, most designers who responded are open to a form of online participation but under the right circumstances. Out of the 36 designers who completed the survey, 26 marked, "Yes, but it depends on the project type and client." The response is an encouraging sign for crowd collaboration and a recommendation for further research would be to investigate what types of projects and clients would best suit this type of participation.

After engaging the crowd for the three-month project, I would advocate the use of online participation for any community-based project because of its potential to help gather the visions of people that the project might directly or indirectly affect. I would also promote online participation for private or corporate projects to help the design team and client think beyond the scope of their previous experiences.

In addition to the conclusions drawn in regards to the specific research questions, further learning can be had from the analysis of the work. The test case highlighted a couple of important considerations for any designer who wants to incorporate online participation into their process. First, giving the crowd more focused, specific questions was more useful in the test case. For example, the programming phase for the project began by asking contributors, “How would you improve this field?” Many responses to that question were useful but not particularly relevant to the current project scope. Conversely, when asking the crowd for ideas about the cladding material for the press box, more creative and specific answers were given. This is not to suggest that more open-ended questions won’t spark the crowd’s creativity but the designer should be strategic about the issues that he or she poses.

Secondly, this three-month test case revealed the difficulty that any company might face trying to build a *loyal online community*, as the literature suggests. Developing a crowdsourcing initiative should realistically involve marketing and public relation professionals as well to make the endeavor more efficient. Keeping the content in front of the audience without developing participation fatigue is a critical balancing act. In the end, the test case project was exposed to many more people than it would have been without using *Crowd Critique* but in order to reap the benefits that are outlined in the crowdsourcing literature, the online community must be larger.

Limitations and Recommendations

The test case project for this thesis was a part-time effort outside of my normal project workload as a Project Architect. I decided not to use one of my firm’s (URS Corporation) projects in order to limit the number of variables such as budget and schedule that might distract me from the overall goal. However, this decision did limit the number of designers on the project to one. If the test case project was full-time with a larger design team, the overall size of the potential crowd would have also been larger.

During the development of the *Crowd Critique* site, I wanted to incorporate a tool that allowed users to virtually draw over top of the imagery that is posted on the website. However, my web programming experience did not allow for that. I believe a virtual markup tool would have encouraged more dialogue on the site and better simulated the offline experience of a design critique.

The literature on crowdsourcing continually references the importance of rewarding the contributors with proper recognition for their ideas in order to keep the crowd motivated. This is especially important when no monetary reward is being offered. I believe the *Crowd Critique* site would have benefited from a strategic recognition scheme in order to add a competitive spirit to the site.


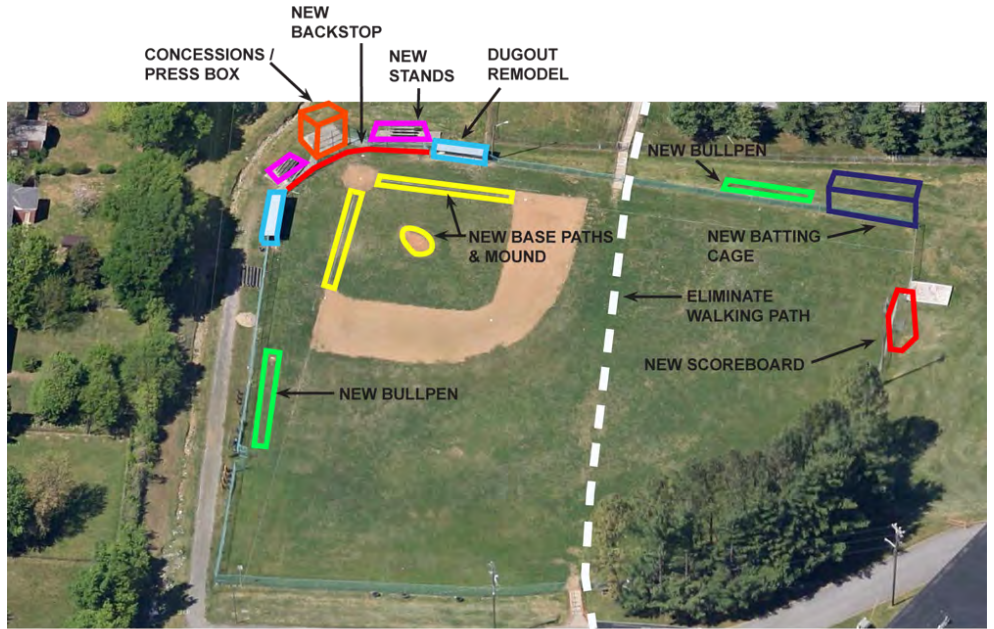
Contributions

This thesis was a subjective study that included a very personal experiment in order to learn more about the role of online participation in architecture. The study builds upon an emerging body of knowledge regarding collective intelligence while providing several contributions to the design industry. First, it provides some key recommendations for any designer who is interested in the value that online participation can bring to the architectural design process. Furthermore, the research provides evidence that crowd collaboration can increase the diversity of voices involved in building design. Finally, this thesis underlines the potential of the *crowd* to broaden a designer's perspective and strengthen their confidence during the design process.

The two main objectives of the study were to refine the way people are engaged during built environment projects and examine how the phenomenon of crowd wisdom can be applied to the architecture profession. As a result of this research journey, the two goals were achieved and I believe online participation and crowd collaboration have a role in the future of the architectural design process as a supplement to the traditional public engagement for projects.

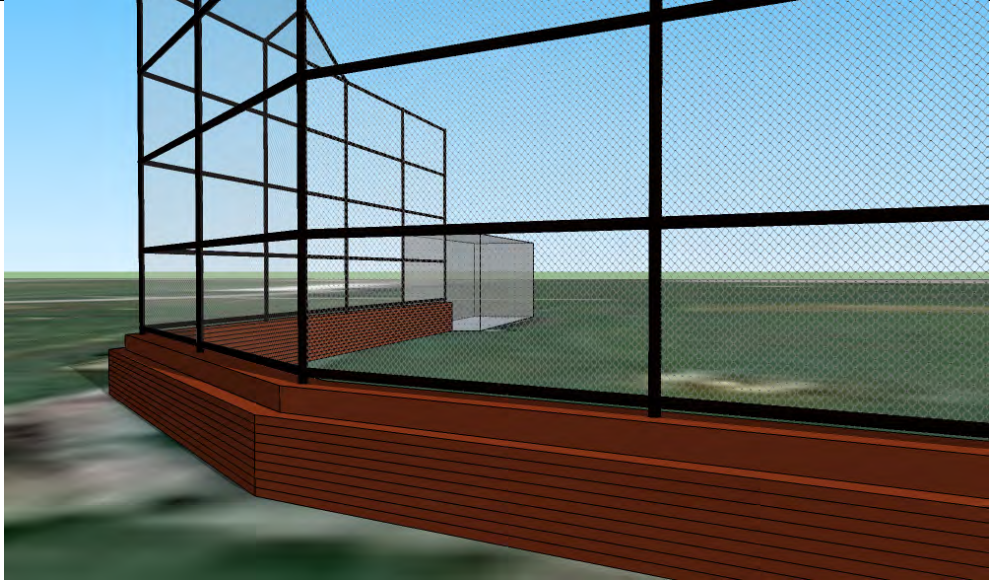
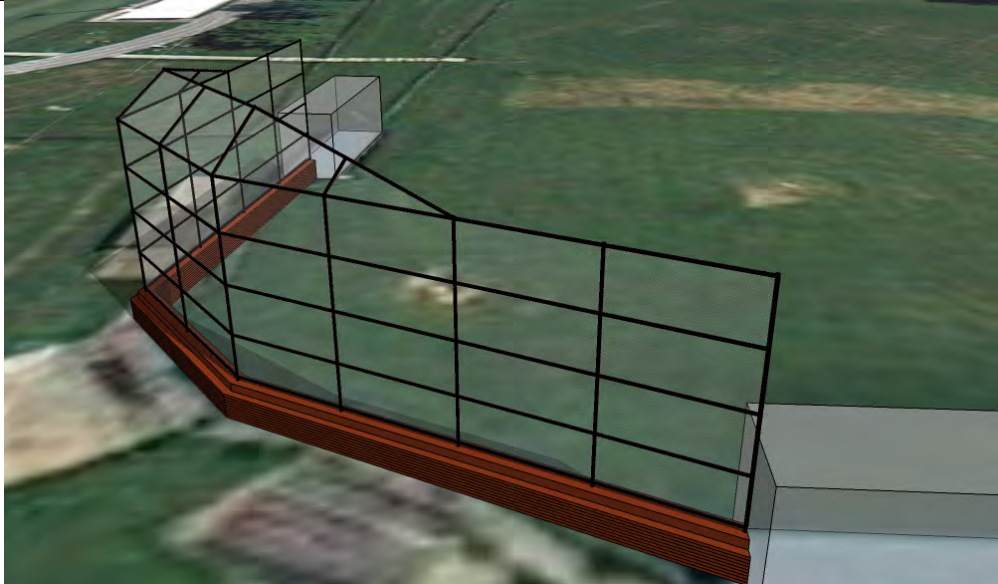
APPENDICES

Appendix A – Project Content

Project Posts	
February	Existing Field
	
March 1	Programming
	

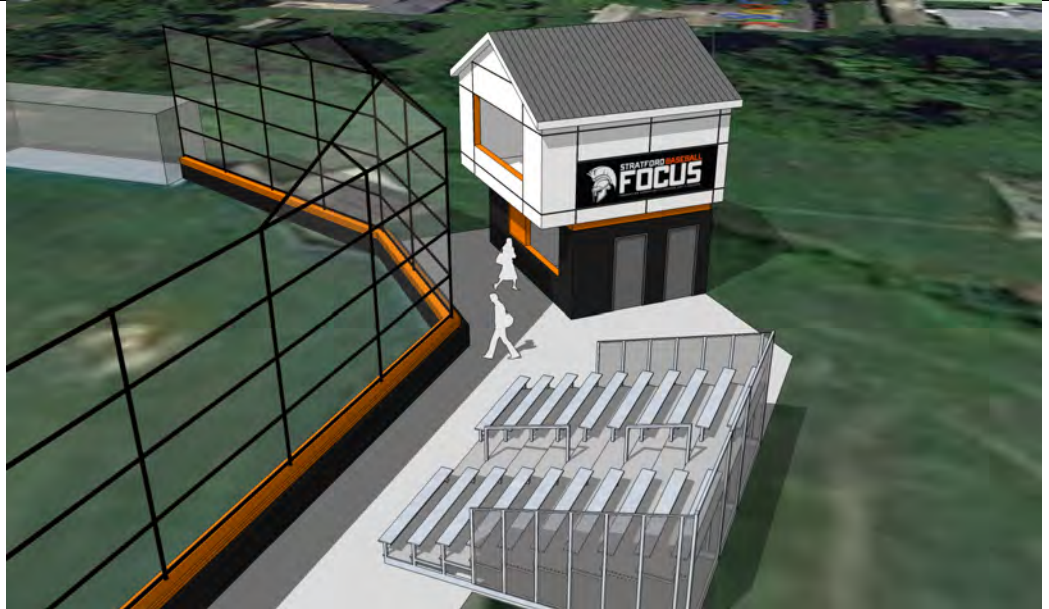
Project Posts

March 11 Backstop design



Project Posts

April 14 Score box concept



Project Posts

May 12 Score box revised and dugout concept



Project Posts

June 1

Final concept



Appendix B – Survey Data

Demographic Survey Summary

Total Respondents: 99

What brought you to this site?

URS Corporation: 51%

Local Interest: 9%

Design Junkie: 9%

Other: 31%

Gender

Male: 76%

Female: 24%

Age

Less than 18: 0

19-25: 7%

26-35: 37%

36-50: 31%

Over 50: 23%

Prefer not to say: 1%

Ethnic Background

American Indian or Alaska Native: 0

Asian: 2%

Black or African American: 3%

Hispanic or Latino: 1%

Multiracial: 0

Native Hawaiian or Pacific Islander: 1%

No Response: 4%

White: 89%

Geography

Indiana: 39%

Nashville (project site): 4%

of Different States or Countries: 28

of Different Countries: 7

Participation Survey Summary

Total Respondents: 76

Profession?

Architecture: 14 (18%)

Other Built Environment Professionals: 28 (37%)

Other Professions: 34 (45%)

Have you provided feedback or ideas on the Crowd Critique website?

Yes: 12% of Total Respondents

No: 88% of Total Respondents

If YES, what compelled you to do so? *Check all that apply*

Express my creativity or technical knowledge: 33%

Help a good cause: 33%

Contribute to a collaborative effort: 44%

Be recognized by my peers: 0%

To advance my career: 0%

Personal connection to the project or website creator: 66%

To have fun: 11%

If NO, what were the barriers to your participation? *Check all that apply*

This is the first time I've heard of the site: 77.61%

The site was not easy enough to use: 2.99%

I have no interest in the project type posted: 4.48%

I do not feel qualified to provide design input: 2.99%

I'm nervous about sharing my thoughts on a public site: 5.97%

I don't have time to provide input on other projects: 2.99%

I don't provide my ideas without financial compensation: 0%

If you are a design professional, are you interested in using an open, online participation site for projects? *Check all that apply*

I am not a design professional: 52.63%

% of design professionals

Yes. I'm always interested in more input on projects: 33.33%

Yes, but it depends on the project type and client: 72.22%

No, too many voices will muddle the vision: 5.56%

No, there could be Intellectual Property and liability issues: 11.11%

No, it will lengthen the design process: 2.78%

Maybe, if the site users have to register: 5.56%

Appendix C – Design Logs

Critique Log - Indianapolis

Phase	Idea Code	Idea / Comment	Date	Initial Reaction	Affect on Design Development
Programming	A	Check standard dimensions for college baseball	03.01.2013	I hadn't thought about dimensional issues.	No affect. School is not going to modify overall dimensions.
	B	Subterranean dugouts would be a significant expense and presents drainage challenges. Consider just remodelling existing.	03.01.2013	I agree and will express this thought to the client.	No subterra dugouts in the final design. The comment solidified my original thoughts.
	C	Scoring & Concession could be priority because it creates revenue.	03.01.2013	I had not thought about the business aspect.	Made me think.
	D	Restrooms need to be provided.	03.01.2013	I thought this would be included in the concession area.	Solidified my position.
	E	Advertising should be integrated into fencing.	03.01.2013	I had not thought about the business aspect.	Made me think but outside the scope of the project.
	F	New Grass, use mix of native species which will require less water	03.04.2013	Great point. Should be included in the long term plan.	Made me think but outside the scope of the project.
	G	Square up the infield	03.04.2013	Already thought of that and it's been implemented	Solidified my position.
	H	Create positive drainage, possibly install underground pipes	03.04.2013	Very important and should be included in some manner	Made me think but outside the scope of the project.
	I	Dirt baselines	03.04.2013	Already thought of that and it's been implemented	Solidified my position.
	J	Relocate walking path	03.04.2013	Already included in the program	Solidified my position.
	K	New dugout and bleachers	03.04.2013	Already included in the program	Solidified my position.
	L	More cow bell	03.07.2013	This appears to be a joke	No affect
	M	Depressed duguouts	03.07.2013	Mentioned above. Will be discussed.	Made me think.
	N	Astroturf could reduce maintenance	03.07.2013	This would be really expensive and usual detracts from the field character	No affect
	O	Upgrade the home team bleachers, provide folding chairs for visitors team	03.07.2013	Already included in the program to upgrade stands but I'm not sure I understand why you would provide folding chairs for visiting team	No affect
	P	Provide benches along relocated walking path for	03.07.2013	Great idea. Could promote use on off days	Incorporating into Master Plan
Q	Classify the drainage ditch on the west side. Is it an ephemeral stream and how does it impact construction.	03.07.2013	I will have to research this. Technical knowledge beyond my specialty	Made me think but outside the scope of the project.	
R	Fix flooding issues	03.07.2013	Mentioned above. Should be included in some manner	Made me think but outside the scope of the project.	
Backstop Design	S	Kids could climb on ledge. Maybe include hole in backstop for radar gun	04.01.2013	Kids could still climb on it without the ledge. The inset is to display important donors.	Made me think but left the ledge in.
Coach Questions (3)		No Comments	04.15.2013	~~~~~	~~~~~
Score Box Concept		No Comments	05.12.2013	~~~~~	~~~~~
Score Box Concept Revised	T	Having been in the dugout for 20+ years as a little league baseball/softball and travel softball coach, my personal opinion is that the only advantage for sunken dugouts is fan seating / sightlines, which can be an important factor. Obviously, drainage is an issue and you must make sure that the drains are sunflower seed proof. From a coaching perspective, I did not feel that sunken dugouts gave as good of a perspective of the whole field, particularly for positioning defenses. The sunken dugout may also hinder a coach's ability to visually communicate with the catcher for calling pitches. Just some personal observations and opinions.	05.13.2013	Another great perspective on this issue. Client now agrees to keep dugouts at grade.	No subterra dugouts in the final design. The comment solidified my original thoughts.
	U	The construction expense and continued maintenance of a true dugout in my opinion is not worth the advantages -- especially for a high school dugout -- I just saw the new IU baseball field a couple of weeks ago and they don't have sunken dugouts	05.13.2013	One more good argument to keep dugouts above grade.	No subterra dugouts in the final design. The comment solidified my original thoughts.

Crowd Critique Log - Crowd

Phase	Idea Code	Idea / Comment	Date	Initial Reaction	Affect on Design Development
Programming	AA	Think about adding landscaping outside the right field fence.	03.05.2013	Great idea. It should be included in the master plan.	Incorporated into Master Plan
	BB	Proposed scoreboard location is too far, consider relocating	03.05.2013	Most baseball scoreboards are beyond the outfield fence	No Affect.
	CC	In my opinion, the scoreboard belongs in left field. While it seems far away, this provides the best angle for the players and people in the stands to see it.	03.06.2013	I agree with this.	Reinforced concept but no affect.
	DD	I believe any renovations should start with the actual field. Playing on a nice field can really provide some confidence for the players, as stupid as that may sound. Once you get the field looking nice, other things will fall into place. I would suggest working to get the field as flat as possible and planting new grass. Also, providing a definitive outline of the infield, pitchers mound, and home plate area will really help bring the field to life. It appears they have already started on that and it looks great. A nice field will also help cut down on errors!	03.06.2013	I agree with this and some of it has already been completed. Good phasing ideas.	Incorporated into Master Plan
	EE	Once the field looks nice, I would just work my way out. If you put new benches in the dugout and put on some fresh paint, the dugouts will look good as new in no time. I would also suggest buying a tarp that covers the entire infield. While I know this can be really expensive, it will be money well spent if you are able to keep the field looking nice.	03.06.2013	I had not thought about the tarp. This should be included as well as a place to store it. Good phasing ideas.	Made me think but outside the scope of the project.
	FF	Once you are able to get the field squared away, you can start working on the bleachers, press box, and scoreboard. While it is nice to have an awesome press box, I think bleachers for fans to sit in and a nice scoreboard will make the surrounding areas look nice.	03.06.2013	Good phasing ideas.	No Affect.
	GG	Agree that the walk path should not go through the outfield, but can it be made an amenity by directing it to / through the stand of trees at center field, maybe even to a small seating or picnic area built there?	03.31.2013	Good idea. Could be a nice place for team gatherings.	Incorporated into Master Plan
	HH	Love the new designs. LOVE the fact your getting rid of the cut through path. I hated that when I played there.	04.01.2013	Validation of eliminating the cut through path.	Solidified my position but no affect.
Backstop Design	II	I like this design a lot. It's simple, clean and appears to be effective. The brick color and bond could match the local buildings (the school itself if it has brick?)	03.31.2013	I agree that the brick color should be thought through.	Made me think. A later thought about school spirit seemed more appropriate.
	JJ	Maybe there's a way to tie the backstop to the dugout construction - maybe the masonry base continues across the backs of the dugouts with the fence at the top few feet to allow ventilation?	03.31.2013	Nice idea. It will be considered in the dugout design.	This concept was incorporated into the dugout concept.
	KK	I would love to see the backstop have an orange bottom with black fencing. I mean, show them school colors, get that home field advantage.	04.01.2013	Maybe the entire masonry base is not orange but has an orange course within it.	Dark masonry with orange accents were incorporated.
	LL	I like the idea of recognizing donors but the commemorative bricks feel blasé.	04.16.2013	Fair point. It is a proven fundraiser though.	Made me think.
	MM	Consider dark gray or black bricks to reinforce the sleekness of the design.	04.16.2013	Yes, this was the plan.	Solidified my position.
Coaches Questions (3)	NN	Temporary concessions could be located between the parking area and entrance to the field.	03.31.2013	That's a practical place. I think it could be better if they pull down gravel drive on the first base line.	Made me think but outside the scope of the project.
	OO	Signs are often hung on the backstop fence but this would ruin the view through the backstop and also compete with the donor masonry if that were chosen. A better place might be the outfield fence or the backs of the dugouts.	03.31.2013	Yeah, I agree.	Useful to the baseball staff but outside the scope of the project.
	PP	Place food trucks in the south parking lot	04.16.2013	The second person to suggest that.	Useful to the baseball staff but outside the scope of the project.
	QQ	Temporary toilets should be close to the stands but upwind.	04.16.2013	Good point but upwind can vary.	Useful to the baseball staff but outside the scope of the project.
	RR	The 4x8 signs are about team pride so they should be in prominent locations. I would suggest somewhere along the walking path to the main stands.	04.16.2013	Something to consider.	Useful to the baseball staff but outside the scope of the project.
Score Box Concept	SS	Concession right behind home plate could distract the pitcher.	04.15.2013	Important point. This will be discussed with the coach.	Modified the score box design because of comments like this.
	TT	Dark masonry is difficult to maintain if it's not throughout the unit.	04.15.2013	Important to note but the intent was to use a dark clay masonry	Made me think.
	UU	The backstop seems a more conventional "client" and "architect" project. I wonder: what do the high schoolers "know" that might be of importance? How might their parents contribute? How are the baseball players involved?	04.16.2013	Good questions, I'll have to think about these.	Made me think.
	VV	I agree with a previous commenter about the concessions (window not behind the dugout)... We could however use that for field equipment and actually have a door that leads to the field from the storage room. I would like to see a drawing of a grandstand built above the dugouts and down the lines on both sides. We could possibly utilize that space for concessions and restrooms as well. To best utilize the space I think we need to think about building up and around. I think a cover over the top like a true grandstand would be ideal as well to keep the weather from deteriorating any upgrades... or at least slowing the deterioration down a bit.	04.17.2013	Building a platform to raise all seating areas above ground would be expensive and create accessibility issues.	No affect on this concept but the coach has developed an alternate concept using these thoughts.
Score Box Concept Revised	WW	Backstop; Board has decided we will be tearing down the current backstop and put in a brick backstop. We have the ability to move it back 5 feet I believe. I would love to see a mock up of the brick style backstop with an opening to press box/utility building directly behind the plate.	06.07.2013	Interesting concept but then there would have to be a large break in the masonry to accommodate the doors. Perhaps the storage area could be incorporated into the dugouts instead.	No affect on this concept but the coach has developed an alternate concept using these thoughts.
	XX	We also have plans to get estimates for building a deck eye level with the top of the dugouts from 1st base side to 3rd base side. This would enable us to have more seating and a better visual for fans. Concession area could eventually be build up on this in the back of the 1st base side seating. We also talked about putting a cover/roof of some sort to help with keeping the wood deck from weather. Also, at the top of the 1st base line entrance we plan to make a grand entrance into the baseball facility. This would be atop the hill in left field and face out between the school and field. There would be a brick walkway down to the opening of the deck on the left field line. Also would be a gated entrance.	06.07.2013	Again, building a platform to raise all seating areas above ground would be expensive and create accessibility issues. I like the concept of a gateway.	No affect on this concept but the coach has developed an alternate concept using these thoughts.

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