1 Introduction

The use of Internet-based participation tools has grown dramatically over the past five years. Online chat rooms, bulletin boards, list serves, community weblogs (BLOGs) and text-based survey forms are now commonplace and provide a means for “written” participation. However, while these text-based survey tools are easy to produce, they are typically not adequate for assessing the public’s opinion regarding visual or spatial design issues. While there are several spatial-oriented off-the-shelf software products that allow planners, landscape architects and decision makers to assess a community’s concern and design preferences, these applications have limited Internet adaptability, are often not very customizable, are over-laden with features, and more importantly are priced out of the reach of the budget for a small community project. This paper presents the functionality and technology behind the development of the Internet application, Visual and Spatial Survey Builder (VaSS Builder) as it addresses several of these issues.

1.1 Tenets of Public Participation

As the Internet provides a new medium for encouraging and enhancing public participation, it is important to recognize several of the tenets of public participation when developing new participation technologies.

- In *Community Participation Methods in Design and Planning* Henry Sanoff (2000) states that there are three primary purposes for participation:
  1) Involve people in the decision making process.
  2) Provide people with a voice in design and decision making.
  3) Promote a sense of community.

- Recognizing that no design project is the same, there are five questions that should be asked when planning a project that utilizes public participation (WULZ 1986).
  1) Who is to be involved in participation?
  2) What are the tasks to be performed?
  3) Where should the participation lead? What are the goals?
  4) How should people be involved?
  5) When in the planning and design process is participation needed?

The tasks to be performed may include generating ideas, identifying need, information dissemination, information gathering, conflict identification and resolution, opinion poll, design proposal review or simply as an outlet to vent emotions towards a project.
• The participation process should arise from grass root efforts and be community driven. The participation process should not wait until a design professional has been hired and is presenting design options, but rather should begin at the onset of the project through citizen promotion and awareness. Once hired, it is the design professional’s responsibility to ensure that public involvement exists throughout the entire design process, including the post-occupancy evaluation.

• The tasks and the goals of public participation can be grouped into four distinct categories: Awareness, Perception, Decision Making, and Implementation (BURNS 1979).

• In Arnstein’s 1969 classic Ladder of Citizen Participation, she identifies on the ‘rungs of a ladder’ eight levels of participation that increase until you reach the top rung where the public has complete control of the outcome of the project. The first two rungs, manipulation and therapy are considered non-participatory where the aim is to educate the participants. The middle three rungs of the ladder consist of informing, consulting and placating. Informing is the first step to participation; however, it generally involves information flow in only one direction. Consultation provides an opportunity for public meetings, surveys and public inquiries. Placation allows participants to serve in an advising role; however, the final decision resides with those in charge of the project. The last three rungs of the ladder represent increasing degrees of ‘citizen power’ through partnership, delegation and citizen control. Through a partnership, planning and decision making responsibilities are shared through joint committees. On the delegation rung, the public holds the majority of seats on committees. Citizen control exists when the public has the entire job of planning, policy making and financial control.

• A new pragmatic approach to participation that simplifies Arnstein’s ‘citizen participation ladder’ includes three elements: information exchange, resolving conflicts and supplementing design and planning (SANOFF 2000).

Collectively these items define the framework of public participation that VaSS Builder has been designed to accommodate.

1.2 Online Public Participation

In recent years, Internet-based technologies have provided new methods to solicit participation in consumer surveys, funding for political campaigns and online games. This technology is now being transferred for use in the planning and design profession. In Digital Town Halls: Public Participation in Cyberspace, James Sipes writes, “that there is a new generation of ‘digital’ town halls that use web-based communication technologies to encourage public participation” (Sipes 2002). While ‘Digital Town Halls’ is a good metaphor for describing online design participation that includes information dissemination and public feedback, online participation tools can be used in several other design and planning situations, including digital design charrettes, community mapping (site information gathering), project visualization, land use planning and visual preference analysis.
2 Online Participation Tools

There are several online tool options that offer a variety of functions and can be used to facilitate varying degrees of online participation (Figure 1).

![Online Tool Characteristic Matrix](attachment:characteristic_matrix.png)

**Fig. 1:** Online Tool Characteristic Matrix.
While many of the online tools offer basic text and graphic capabilities for public participation, there is a limited usefulness of these products in the realm of design and planning where much of the information to be presented has visual and spatial qualities. Geo-based Web tools such as ESRI’s ArcIMS provide “out-of-the-box” access to spatial data. Products such as GeoTools, the University of Minnesota’s MapServer, and the Web Mapping Server (WMS) and Web Mapping Testbed (WMT) protocols all provide an open source (OpenGIS) development environment for building spatially enabled Internet applications using JAVA or scripting languages such as Perl and PHP. Although these geo-based web tools are rich in spatial interactivity, they lack some of the video, interactivity and multi-path communication features that are desirable for online participation.

2.1 Rich Internet Applications

Rich Internet Applications (RIA) are the latest generation of online tools that can be used to create enhanced online public participation products. “Rich Internet Applications combine the functionality of desktop software applications with the broad reach and low-cost deployment of web applications—resulting in significantly more intuitive, responsive, and effective user experiences” (MACROMEDIA 2004). Combining a RIA with a LAMP (Linux/Unix system, Apache web server, MySQL database and Perl/Python/PHP scripting language) open source platform allows for dynamic, data-driven, visual and even geo-spatial public participation solutions to be created.

3 Project Background

VaSS Builder’s beginnings go back to the summer of 2000 when the first set of public participation modules were designed to assess a theoretical approach to building spatial and visual surveys for the Internet. With the assistance of Chris Wall, a landscape architecture graduate student at Iowa State University, two products were created; “River Notes” and “Digital Charrette” (Figures 2 and 3). Both products used a database back-end to control the content of the survey. Functionality was provided using a Macromedia Flash 5 SWF file connected to a FileMaker Pro database through a Lasso CGI script that resided on a WebStar web server.

![Fig. 2: Community inventory mapping using USGS maps vs. the online River Notes.](image-url)
3.1 River Notes

River Notes was designed for use in situations where the designer needed to collect geographic inventory information for a large site. The typical traditional method used to collect this information would involve laying out several maps on a large table or pinning them to the wall and having the public write notes or place pins on the maps marking areas of significance to the project. The result of this method was that the public could contribute a large amount of inventory information that would be useful to the design team. One drawback of the paper map method was that the collected data had to be manually digitized before it could be used with a Geographic Information System.

The web-based River Notes module utilized static aerial photography and allowed participants to drag and place a point on the photo marking the location of an inventory item. In addition to placing the point, the participant could type in a label and provide a comment or feature description. This information was then stored on the project server and combined with other information in the database. The client/project administrator (community leader, planner or architect) could access the information and display the data in a variety of modes. One mode allowed the data to be viewed in a step-by-step process showing one feature point on the screen at a time. Another mode allowed for all points to be displayed at the same time.

A search interface allowed the database to be queried for any keyword. The result of the search was that only the point features containing the keyword in the label or description were displayed. In all view modes, clicking the point displayed the label and description attributes as submitted by the participant. At the completion of the project, the location of the features and their descriptive information could be exported to a data file and later imported into ArcView GIS.

The online River Notes participatory application allowed for the automation of digitizing data and did not depend on citizens attending the project meeting to contribute valuable site information.
3.2 Digital Charrette

Digital Charrette used a "Concept Design Game" approach also known as a "Chip Game," to allow the participant to locate design program elements such as parking, playgrounds, boating and other features by dragging "chips" onto the site map. Comments regarding the location of these elements were then submitted to the web server. The project leader could review the submitted data in a fashion similar to the River Notes module, except that the chips could be displayed by individual participant or by program element, the latter of which resulted in a map that would show all locations for one particular program element as submitted by the participants. This participatory tool allowed the designer to review where the public thought features should be located and to reflect in the final design why features were or were not located in the areas submitted by the public. Digital Charrette was a prime example of Arnstein’s fifth rung, placation, by providing the public an opportunity to significantly affect the final design of the site.

3.3 Viewshed Delineator

Developed as a prototype in the spring of 2000, Viewshed Delineator was designed to collect information regarding the public’s opinion of where the best views were located along a highway corridor (Figure 4). Participants could pan and zoom to a location along the corridor and place icons delineating a viewshed and then comment on the quality of the view. This online application utilized statewide aerial photography that could be dynamically combined and scaled with spatial data sets that were exported from ArcView and converted into EPS format (SEEGER 2000).

![Fig. 4: Viewshed Delineator provides dynamic aerial maps, GIS data layers, and zooming/panning functionality to a highway corridor inventory project.](image)

3.4 Customization

River Notes, Digital Charrette and the Viewshed Delineator demonstrate how Rich Internet Applications can expand upon the typical email, survey, chat, video and geo-spatial participation tools. However, these examples were not designed to be easily customized and thus require a great deal of time to redesign for use with new participation projects.
Realizing that to be useful to grass root community driven projects, a new application called Visual and Spatial Survey Builder (VaSS Builder) was created.

4 Visual and Spatial Survey Builder (VaSS Builder)

VaSS Builder is a Rich Internet Application (RIA) that utilizes Macromedia® Flash MX 2004, MySQL databases and PHP to create customized participatory web applications (Figure 5). VaSS Builder allows the project administrator, be it a landscape architect or community leader, to create an online visual and spatial survey and customize it to fit their specific needs without having to write code or redesign the graphic interface. VaSS Builder uses dynamic building techniques similar to those used by websites such as www.flashbuilder.net and www.flashbannernow.com by allowing anyone to build a website quickly and easily by filling out simple forms and uploading graphic content.

VaSS Builder can be used to create applications that supplement traditional face-to-face meetings through kiosk or Internet browsers. To control Internet access and the “stuffing of virtual ballot boxes,” the administrator can enable a security code feature that limits access to only those given the code, allowing for online focus group participation.

Fig. 5: VaSS Builder introduction and project selection pages.

4.1 Modules

VaSS Builder includes several modules that provide participation in the areas of awareness, information gathering, perception, decision making, and implementation. Modules are available on a per project basis for a small setup fee of $30 - $100. Each module is designed as a “Thin Client” requiring that only 50 to 250 kilobytes of information be downloaded into the clients Web browser window.

VaSS modules do not require the client to keep any files on their hard drive other then cookies used to identify returning clients in some of the modules. Several of the modules make use of short feedback loops and can provide participants with access to survey results
or analysis summaries. Some of these modules even allow the client to integrate the survey results into a Geographic Information System (GIS) for further analysis.

Modules currently included in VaSS Builder include: photo and resource inventory mapper, game board designer, viewshed delineator, and visual preference surveyor.

### 4.2 Customization Process

Using the example of a basic Photo Inventory module for collecting visitor-employed photography, the process to create a customized survey is as follows:

1. Enter administrator contact information, project title, and project description.
2. Select the desired Photo Inventory module from the list of available modules.
3. Customize the module by selecting a graphic theme (Figure 6).
4. Upload a background map or select an aerial photo base map by zooming to the desired location (Aerial photos provided by the Ortho Photo Server at Iowa State University).
5. Preview the survey map (Figure 7).
6. Agree to the licensing terms and submit payment.

While the survey administrator is filling out the form and selecting content, a project directory and file structure is created on the server (Figure 8). Two web pages for the project are also created. The first of these contains the client survey module. The second page consists of tools that allow the survey administrator to export the data stored in the MySQL database into a format that can be imported into a GIS.

![Fig. 6: Photo Inventory module setup.](image-url)
Fig. 7: Photo Inventory preview and example of completed survey.

Fig. 8: General server process flowchart for VaSS module execution.
5 The Future

VaSS Builder is currently in development and is scheduled to be available in July of 2004. In the future, additional modules and features will be added as requested. One of these features will allow ArcView Shapefiles to be uploaded and geo-referenced with existing ortho-photography.

Whenever the public has an opportunity to participate in the design process, there is an increased trust and confidence in the designer and the sponsoring organization. This results in a higher probability that the design will be implemented with less controversy and that the community will take “ownership” in the project after it is completed.

As applications such as VaSS Builder are developed over the next several years, planners and designers will have a new set of tools to choose from when working on public projects. Small communities and citizens will also be able to use these tools to initiate new community projects and express their voice in the design process.

6 Printed References


8 Online References

ESRI ArcIMS - http://support.esri.com
University of Minnesota Web Map Server - http://mapserver.gis.umn.edu/