Bus Meister
Using information technology and social networking to reduce traffic congestion by improving public transport efficiency and attractiveness

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Introduction

Reducing congestion means identifying and implementing good ideas for building and operating transport systems. Bus Meister uses IT and social networking to involve users and stakeholders in that process – thus generating creative new ideas and helping develop the political support to implement these ideas.

Start with identifying good solutions. Bus Meister includes a game enabling users to test and understand how operating changes can improve service on their public transport routes. The game's foundation is a "crowd" sourced research database documenting best practices in public transport operations.

But good ideas aren't enough. Bus Meister will also help get good ideas implemented by increasing understanding of what works and what doesn't work (understanding gained both by playing the game and from the best practices database) as well as by providing social networking tools to help users obtain political support for improvement implementation.

In a nutshell, Bus Meister empowers public transport passengers to identify and evaluate creative solutions to transport problems, speak authoritatively about their ideas with decision-makers and, perhaps most importantly, share information about the benefits of their ideas widely using social networking tools such as SeeClickFix thereby helping generate political support for implementing innovative transport solutions.

In its generic form, the approach consists of linking transport research and ideas developed by professionals and academic researchers with a game that enables real people to test the impacts of their own ideas and a dissemination platform that enables them to share information about these ideas with others. Bus Meister would be a prototype application focusing on public transport; if the prototype is successful it could be expanded for other modes of transport.

Public transport was chosen as the prototype application for two main reasons. First, the key congestion problem is that there are no practical alternatives to driving for many trips; thus, the first step in reducing congestion is to improve alternatives such as public transport. Second, there are many simple ideas for significantly improving public transport that are not being implemented because they are not widely known and they lack sufficient political support. Bus Meister addresses both these problems.

The following sections describe Bus Meister in more detail.

Research Database

Bus Meister's foundation is a crowd sourced research database presenting information on best practice public transport solutions. Information is presented on three levels: detailed (research results), technical overview WIKI pages (reviewing

latest research results for a particular aspect of operations), and public summary WIKI pages (summarizing research results in a particular aspect for non-professional audiences).

Researchers and public transport professionals (the “crowd”) would enter a small amount of information about their projects (abstract, contact information, link to download paper, etc.) into the research database and edit the technical overview WIKI page(s) to reflect results of their project.

The technical overview WIKI pages would focus on a single subject area (e.g. door opening and closing), researchers and professionals would be encouraged to edit these pages since they will provide good exposure for their work. (Eventually these WIKI technical summary pages could replace the “literature reviews” found at the beginning of most research papers – further encouraging participation.)

The public summary WIKI pages would be created and maintained by a group of editors. These editors would be experts in the particular subject area and would serve a function similar to editors of technical journals. They would develop both higher-level technical overview pages for broader topics (e.g. operations at a bus stop, which would include door opening and closing), and the public summary pages that would explain the technical summaries in language accessible to the public.

The research database would serve three main purposes. First, it would provide the foundation for the Bus Meister public transport operations game. Second, it would provide a solid source of well-organized information on public transport operations for citizens and community leaders. This will help improve public discourse and understanding of public transportation issues. Third, it will provide a source of technical information for transport managers and planners to use in improving their transport systems. Thus Bus Meister will also help encourage research and effective dissemination of research results.

The research database would operate similar to a technical journal. Researchers and professionals would be approved to enter data into the system. Recognized experts would serve as editors/organizers of the technical and public summary WIKI pages. Since the goal for the research database is to provide technically sound information, it would not be a totally free access WIKI. However, as outlined below, the public will have the ability to participate in the user forums and community organized around the Bus Meister game.

Bus Meister Game

The Bus Meister game allows users to examine the impacts of public transport improvements on their own public transport routes. The game will both teach users about public transport operations and help them assess the value of their ideas.

The best way to understand how the game would work is to follow the activities of a typical player. Then, the following section will describe how Bus Meister’s social networking element will help improve public transport operations in the real world.

First the player enters geographic information about their public transport route using an interface to an open source mapping software (e.g. Google Maps). Next the player would enter some easily available route information using standard web-based forms (e.g. travel time, location of bus lanes, etc.). Special applications would be developed for smart phones to facilitate this process.

Bus Meister will allow players to collaborate in creating the route maps. Over time, as more information is added, the route maps will become quite accurate. (Public transport operators would be welcome to assist in this process.) Once the basic

geographic and route information was available, the game would create a schematic route map that players could use to test their improvement ideas.

Players would test their ideas by dragging improvement widgets on to the route map and the game would estimate the improvement's benefit. For example, the player could add public transport priority to a traffic signal by dragging the "public transport priority signalization widget" (PTPS widget) onto the route map at the specific intersection and see how that would improve route performance.

The improvement widgets would be based on the research in the database (e.g. traffic signal priority reduces time spent at traffic signals by 20%). The game would apply data from the widget to the specific route (buses spend an average of 60 seconds waiting for the traffic signal at this intersection) to estimate the benefit. The widget would also estimate the impact on other intersection users (e.g. cross traffic) to better understand the tradeoffs.

The game developers would create the improvement widgets using a standard format and the latest research data. Game managers would update widget data as more detailed research became available although developers would need to create new widgets for new ideas.

The game would enable players to create solution scenarios on separate layers that could then be combined and shared. For example, several users might choose to work on ideas for the same route.

Bus Meister Focus: Public Transport Priority

Bus Meister will initially focus on encouraging the implementation of what is collectively known as public transport priority measures. Public transport priority measures are cost effective measures designed to increase public transport attractiveness by speeding-up buses, streetcars and trains. Public transport priority measures are excellent ways to reduce congestion because they are generally inexpensive and can be implemented quickly.

Speeding-up public transport both reduces operating costs (since more service can be provided with the same number of vehicles) and makes public transport more attractive to customers (since trips are faster). This makes public transport a more viable alternative to driving and therefore helps reduce traffic congestion.

There are many different public transport priority measures; furthermore, they can be implemented independently or as part of a comprehensive upgrade project (e.g. as part of a Bus Rapid Transit – BRT – project). BRT is very successful in cities like Curtiba Brazil and Bogotá Columbia, where it provides very attractive and cost effective service.

One characteristic of public transport priority measures is that individually they can be too small to make a big performance difference, but collectively they can make a substantial improvement. This creates two problems: a lack of public support and insufficient technical information. Public support is low because the measures are decidedly not sexy and because some perceive them as 'zero-sum' games.

A good example is reducing time buses spend waiting at traffic signals by giving them priority. While traffic signal priority provides better transport for the majority of users, automobile drivers often complain since they (often incorrectly) perceive longer wait times while public transport passengers are silent. Bus Meister will provide information to help public transport riders and decision-makers effectively address the complaints of those who argue against implementing measures like traffic signal priority.

Bus Meister will provide two main types of information. First, the Bus Meister game will enable proponents to show the benefit of specific improvements implemented on specific public transport routes. Importantly a few seconds of travel time savings multiplied by many trips per day over the course of a year can add-up to a significant amount of cost savings for a public transport operator.

Second, Bus Meister's research database will provide a multi-level clearinghouse for information and data on best practices in public transport priority. This information can be used by citizens, public transport professionals and decision-makers to better understand public transport priority measures and their benefits/costs.

The Bus Meister game and database will be important tools for increasing implementation of public transport priority measures, but, as outlined below, Bus Meister's social networking component will be even more critical to this effort.

Bus Meister's Social Networking Component

Bus Meister's basic premise is linking people who want to improve their own public transport routes with best practices for improving public transport operations. Therefore, Bus Meister will create a platform and tools for local and theme-based user groups to help encourage formation of, and activity in, these social networks.

Local users will consist of game players and public transport advocates in specific cities and regions. Members of this social network would collaborate on identifying improvements for public transport routes in their city or region. These user groups would serve three major functions: encourage participation, provide feedback and generate political support for improvements.

Local user groups would help encourage users to participate and remain active by providing forums for information sharing and ideas. They could sponsor 'tournaments' where group members compete with each other to develop the most cost effective and attractive sets of measures for a given line. The game could supply users with a given budget for implementing measures and then compare how much travel time savings each solution would generate. It's also possible to see how, as the community grows, there could be a 'problem of the week' where users from all over the world compete to see who can develop the best solution. The ability to generate and test many different solutions will likely generate many excellent ideas.

Local groups will also serve a second important function: providing feedback to other users on their improvement ideas. According to the book Groundswell, one of the key problems with many internet-related applications is that people send a suggestion or comment and never hear any response. In the case of Bus Meister, it would be impossible for public transport operators to respond to all the ideas generated by users. Therefore, local groups would have the responsibility for evaluating each other's ideas and then recommending only the best ideas to local decision-makers for implementation. This evaluation process could be based on a ranking system similar to that used by websites like YouTube and could include additional evaluation by independent professionals or researchers.

The third major function of local user groups would be to generate political support for implementing the 'recommended' public transport improvements. Generating public support for public transport operations improvements (e.g. public transport priority) is the most important goal of Bus Meister therefore this role for user groups will be taken very seriously as Bus Meister is developed.

Bus Meister will help generate effective political support for public transport improvements by providing model political involvement tools for user groups. These tools include information on lobbying elected officials, writing "letters to the editor"

and using information technology to create policy change. Bus Meister would create these tools by customizing currently available “how to guides” (e.g. for political change and public involvement campaigns) to address implementing public transport improvements. Local user groups would further customize these tools by adding local information and contacts. Local user groups would also have electronic forums for providing information to members on attending important public meetings and creative ways to publicize the need for public transport improvements.

Bus Meister’s support for political action would also extend to independent public transport activist groups. Members of these groups might not be interested in playing the game, but they could participate in the forums and help develop policy-oriented summaries of public transport priority issues adding local examples, photos and ideas from the Bus Meister game. These groups would provide an important connection to local political activists that will be needed to generate support for controversial public transport measures.

Before leaving the subject of political support, it is also important to emphasize that a major benefit of Bus Meister is its two-pronged approach to helping non professionals understand the benefits of public transport priority: through the research database, but more interestingly though the game. These tools will help citizens argue effectively for implementation of public transport improvements. It will be hard for automobile drivers to argue against changing traffic signal timing if public transport passengers can show that the change will benefit the majority of transport system users.

In addition to local user groups, Bus Meister will also sponsor a forum for people interested in assisting with the further development of Bus Meister game and networking technology. The goal is to build Bus Meister as an open source application and therefore contributions and improvements will be welcome. (Standard open source software development practices would be used.)

Finally, Bus Meister would provide users with integrated interfaces to a variety of social networking applications (e.g. FaceBook, SeeClickFix, etc.). It is easy to see users starting a Facebook group dedicated to improving a particular transit route with information and results of the latest Bus Meister game evaluations. These integrated social community systems will significantly increase the ability to generate political support for implementing public transport improvements.

Bus Meister’s Professional Networking Component

Bus Meister’s professional networking element will be designed to improve the understanding of public transport best practices by using the database-WIKI to make this information available on several different levels, but Bus Meister does more than simply disseminate dry technical information.

Bus Meister will improve research quality by providing a single location for information; this will provide researchers with a real-time state-of-the-art summary enabling them to identify fruitful areas for research and providing them with an effective dissemination platform. Research quality will also be improved through the creation of a professional social networking community; public transport managers could use Bus Meister’s professional network to contact researchers with specific questions about their research, and, in turn, researchers could ask professionals to evaluate the practicality of research ideas and/or to field test ideas on their public transport systems.

Finally, we expect Bus Meister users (i.e. public transport customers) will generate some totally new ideas for improving public transport operations. These ideas will be

fed into the professional forum discussions for evaluation. Promising ideas could then be taken-up by researchers and/or professional planners for more detailed study. This type of customer-driven innovation is likely to develop ideas that professionals don't see because they are too close to the subject.

In summary, Bus Meister will use a variety of social networking applications to make information on best practices in public transport widely accessible, to improve the quality of public transport research, to significantly increase the creativity of public transport improvements and to help generate political support for implementing public transport improvements and thereby reducing congestion.

Developing and Implementing Bus Meister

This proposal for Bus Meister has been developed as a project idea suitable for funding under a national or international research program such as the US National Science Foundation or the European Union's 7th Framework Program. We envision a 3-4 year grant on the order of EUR 3-4 million will be necessary to develop Bus Meister. This grant would cover the initial software development, populating the database, publicity and management.

Once Bus Meister is on-line we expect that maintenance (i.e. software refinement, game improvements, technical editing and oversight) will cost on the order of EUR 500,000 per year. We believe that Bus Meister could raise some of these maintenance funds through sponsorship and professional events.

As described below, bringing Bus Meister to reality will require four work tasks: developing the research database-WIKI, developing the Bus Meister game, dissemination and publicity, and finally project management.

Research Database–WIKI – The research database–WIKI would be developed using an open source application. The research database and WIKI will not be complicated to develop, although it will take time to populate the database and to create the initial summary pages and organization. Once these tasks have been completed the WIKI will require maintenance and editing/control.

The approach for populating the technical database is to hire university or professional institutes as WIKI technical page editors and to create the initial database in their area of expertise. This consists of completing a state-of-the-art survey, summarizing research results at the technical and general levels, entering data into the WIKI pages, and serving as editors of their specific WIKI pages during the grant period. An information technology expert would develop the database, WIKI and associated web pages (including the local user forum models and tools).

Bus Meister Game – The Bus Meister game will be the most complex part of the project. The game itself will be a mini public transport operations analysis model, thus transport analysts will need to work closely with computer game developers to create a useful and usable game.

The game's complexity will be increased by three important elements. First, the game must be able to be played with varying amounts of data. In other words it must be possible to get 'general' results with only a limited amount of data and more detailed results with more detailed data. This means setting some minimum data requirements and creating algorithms that generate data at the level which the game needs from less detailed data, and that present game results at the appropriate level (general results with general data).

Second, a variety of data input applications need to be developed to increase the quality and ease of collecting and entering public transport route data into the game.

(Note that these data collection and input systems will also be extremely useful for transport planners and companies as they evaluate their networks.)

Finally, the public transport priority improvement widgets will need to be fine-tuned by game managers as new research becomes available. These widgets must be carefully designed to ensure that they are flexible and easy to use.

It is unlikely that developing widget applications for Bus Meister will generate the same interest as for the iPhone, but it is likely that there will be some people interested in this effort. Therefore, the game will be designed to enable users to develop their own widgets and submit them to the developers for approval. Information on developing widgets will be made available on the website.

A team of transport operations planners, transport modellers and game developers will develop the game. The process is expected to take approximately 18-months to develop a 'Beta' version of the game. During this time several test versions will be developed and revised. The 'Beta' version will be tested for six-to-twelve months before making adjustments and releasing Version 1.0. After about six-to-twelve months of operation, Version 1.5 would be released.

Publicity and Dissemination – Publicity and dissemination will be needed for at least three target audiences. The first will be public transport researchers; the goal being to encourage them to add their research into the research database. This will be done through technical publications, conference presentations and academic networking.

The second target audience will be public transport planners and managers. To be honest, this audience may not be entirely receptive. They could view Bus Meister as an idea that makes their work more complicated since it will empower the public to question established operating practices. However, similar to many other social networking and information technology applications, enlightened public transport managers will appreciate public input and learn to use it effectively. Eventually, professionals will recognize that Bus Meister is a powerful tool for improving public transport.

Publicity for public transport professionals will focus first, on showing how they can use Bus Meister to help improve their systems; and, second, on encouraging them to provide feedback on what would make Bus Meister more helpful to their work. Our goal with this audience is to bring them on-board; Bus Meister will be much more effective if it is embraced by public transport companies since, for example, these companies could then provide the detailed input data needed for the game. One specific technique used in reaching this audience will be to create a public transport company advisory group to help advise the project team.

The third target audience is the public. Our goals for this audience are to encourage them to use the WIKI information to better understand public transportation and to play the game with their public transport routes. The main publicity for this group will begin shortly before the Beta version game is released. It will consist of announcements and information submitted to public transport "activist" networks. During the project's initial stages (pre-Beta release) a database of these networks will be collected and an exciting virtual event for the Beta launch will be developed. Once the Beta version is released, usage will be monitored and additional networking will be done to the on-line public transport activist communities.

Finally, in addition to the main target audiences, the project will disseminate results of a project assessment completed at the end of the project. This assessment will describe the project activities, lessons learned and include recommendations for extending the Bus Meister approach to additional forms of transportation.

Project Management – The Bus Meister project will be completed by a consortium of transport planners, software developers and academic researchers. The consortium will be formed with the objective of combining the best available technical understanding and creativity with solid project management techniques.

The project will have a project manager responsible for ensuring that the tasks are well coordinated, that the schedule and budget is maintained and that the products are of the highest possible quality. The project manager will form a management team that includes team leaders from all the tasks as well as key sub-tasks. This management team will meet regularly to ensure coordination, early recognition of problems, and effective decision-making to bring work packages on track. A detailed work description and management plan would be developed for the funding proposal.

Conclusions

Bus Meister creates a social networking application for improving public transport quality and efficiency. The project tackles two of the main problems preventing implementation of public transport priority measures: the lack of accessible information and the lack of political support. By creating a game to evaluate the benefits of improvement measures it makes everyone a public transport planner and encourages the development of new and innovative ideas.

Bus Meister supplements this fun way of involving non-professionals in the transportation planning process with a solid foundation of best practices information and a two-way communications process designed to generate creative new ideas and to increase general understanding of how the transport system works.

Finally, by developing new ideas, increasing public understanding of transport improvement measures and providing local users with tools that help them provide effective political support for controversial improvement measures, Bus Meister will help increase the implementation of public transport improvements designed to reduce traffic congestion.

Bus Meister focuses on improving public transport systems, but other alternative modes of transport also face similar problems in understanding and evaluating improvement measures. If Bus Meister is successful than the model can be used to develop ideas for other modes of transport such as bikes, pedestrians and roadways.

Traffic congestion is a difficult problem, but one thing is clear: no single mode of transport will ever be sufficient. The answer lies in providing alternatives tailored to meet specific transport needs. Today many regions have over-invested in automobile transport and there is a critical need for alternative transport modes such as public transport. There are many inexpensive and effective public transport improvements that can make a difference, but information and support is lacking, Bus Meister's goal is to provide the needed information and generate the needed support.

So, who ya gonna call?