

1 **AN INTEGRATED WEB 2.0 APPROACH FOR IMPROVING PUBLIC TRANSPORT**

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14
15 July 14, 2010
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17 **ABSTRACT**

18 This paper describes how computer games and Web 2.0 applications could be used to help
19 improve public transport service. The paper presents several examples of how Web 2.0
20 applications are currently being applied in public transport, outlines the potential motivation for
21 players to help public transport operators, reviews the main types of computer games that might
22 be applied to public transport situations and finally describes three potential applications that
23 demonstrate how the ideas would work in practice. A key theme of the paper is that public
24 transport funding is being cut while the demand for service is increasing. Therefore, the
25 potential applications described in this paper are oriented towards helping improve the efficiency
26 of public transport operations, planning and maintenance.

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3 1. INTRODUCTION

4 The public transport industry is facing serious problems. Government funding is being reduced
5 while service demands are increasing. Furthermore, according to organizations such as the
6 American Society of Civil Engineers, public transport infrastructure has not been adequately
7 maintained, further increasing the need for funding. [1]

8 Unfortunately the government's ability to raise funds for maintaining and expanding
9 infrastructure has been hampered by anti-tax sentiment and fears about national budget deficits.
10 Compounding the problem are financial commitments for government programs such as social
11 security and health care for the retiring baby boom generation.

12 In short, it is hard to feel optimistic that sufficient funding will be available for public transport
13 in the future (if it ever was). But, public transport needs increased government support whether
14 to reduce greenhouse gas emissions, increase transport options for disadvantaged populations,
15 support economic development and provide transportation for an aging society – the question is
16 where will the money come from?

17 This paper steps back from the money question and re-frames the discussion to ask: where
18 will the resources needed to operate and improve public transport systems come from? The
19 paper's answer is that these resources could be provided by the public and could include ideas,
20 political support and volunteer activities in addition to the traditional financial resources.
21 Unlocking these resources will be a challenge but organizations will need to do this to be
22 successful in the future.

23 Perhaps not surprisingly, the tools used to unlock these resources will be based on the
24 Internet. The Internet has revolutionized every business sector where it has been applied and
25 the next target sector is government. Indeed there is a very active community working on how to
26 integrate new internet technologies into government operations today. [2]

27 Section 2 of this paper describes internet techniques that can be used to unlock these new
28 resources. Section 3 describes the evolution of these applications in the area of public
29 transportation and three potential applications based on these ideas. Section 4 presents
30 conclusions and recommendations.

31 2. USING THE INTERNET TO UNLOCK HIDDEN RESOURCES

32 The Internet is so pervasive today that sometimes it's hard to understand the big picture: Chris
33 Anderson, writing in WIRED, puts it this way:

34 *If the past 10 years have been about discovering post-institutional social models on the*
35 *Web, then the next 10 years will be about applying them in the real world. [3]*

36 In essence, applying these post industrial social models in the real world means unlocking
37 resources that we have been unable or unwilling to use in the past. Anderson refers to this
38 process as "democratizing" and continues, "The Internet democratized publishing, broadcasting,
39 and communications, and the consequence was a massive increase in the range of both
40 participation and participants in everything digital – the long tail of bits. Now the same is
41 happening to manufacturing – the long tail of things." [3] His article describes the process
42 whereby people are using Internet-based applications to manufacture products from customized
43 automobiles to tee shirts.

44 If information could be democratized, and now manufacturing is being democratized, why
45 couldn't public transport be democratized? A truly democratized public transport system would
46 bring new resources to the table and would create the opportunity for rethinking how the
47 industry is organized and how services are provided. In short it could bring about a revolution in
48 public transport service – a revolution public transport needs if it is to meet society's future
49 transport demands. This paper presents ideas for extending the Internet-based democratization

1 model to public transport, recognizing that similar approaches could be applied to other services
2 (e.g. water supply, garbage collection, etc.).

3 **2.1 Internet Applications**

4 As a starting point it is useful to consider the structure of internet applications. There are two
5 main considerations: function and interactivity. In terms of function, there are six basic types of
6 Internet applications:

- 7 • **Information Provision** – applications designed to provide information, for example
8 public transport schedule information.
- 9 • **Sales** – applications designed to sell products and services, for example Amazon.com.
- 10 • **Administrative Process** – applications designed to help users complete an
11 administrative task, for example completing and submitting government agency forms.
- 12 • **Social Networking** – applications allowing users to create interest groups, share
13 information and ‘meet’ like-minded people; for example Facebook and LinkedIn.
- 14 • **Games** – applications meant to be played, they serve a wide variety of purposes (e.g.
15 fun, education).
- 16 • **Analysis and Evaluation** – applications providing tools for so users can create and
17 evaluate data; for example ‘cloud-based’ applications like Google Documents.

18 An important feature of internet applications is that they include elements from several of these
19 six categories. For example, Amazon’s primarily sales oriented website also provides
20 information (e.g. by publishing book reviews and enabling users to read book pages), and social
21 networking (by enabling users to contribute product reviews and comment/rate other reviews).

22 In addition to function, Internet applications can be categorized in terms of interactivity (i.e.
23 how much user input they support). The first internet applications had little interactivity, they
24 provided one-way information, however, as computers and networks have become more
25 powerful, applications have significantly increased the amount of user-based information that
26 they collect and use. In fact, several of the application types listed above (e.g. social
27 networking) only became possible when users could interact more fully with the Internet.

28 The term Web 2.0 was developed to distinguish between the original one-way sites and
29 today’s much more democratic and active Internet. Today, all applications fall on a spectrum of
30 how much user-developed content they accept and use.

31 It is this interactivity that provides the opportunity for government to unlock resources that
32 could help improve public services. The following section outlines how this process is evolving.

33 **2.2 Public Involvement**

34 The project goal is to unlock new resources to improve public transport. In general terms this
35 would transform the public involvement process from one where people simply comment on
36 plans and programs to one where people actually help develop the plans and programs, and
37 ultimately help provide the services. In other words it would turn the public from interested
38 spectators into active participants.

39 The traditional approach is to simply replace older paper- and meeting-based public
40 participation techniques with internet applications. For example, allowing comments to be sent
41 via e-mail or creating websites with multi-media channels (e.g. YouTube videos). The author
42 summarized Web 2.0 transport planning applications in a previous paper. [4]

43 This traditional approach has been gradually extended by many government agencies to
44 enable users to add content and comments directly to the project websites (or associated
45 websites). For example, the city of San Jose used a system called wikiplanning in their Envision
46 San Jose 2040 project. [4]

47 Unfortunately, there are several problems slowing the process of extending Internet
48 applications for government – especially for government activities that require following a formal

1 process. For example, how would an interactive discussion forum on a project website be
 2 treated in terms of comments in an environmental impact assessment? These problems can be
 3 solved, but must be considered carefully before developing the new applications. Novek
 4 presents an excellent analysis of these types of issues in her book Wiki Government. [5]

5 A good approach would be to redesign formal processes to make use of the new tools
 6 available. In other words to move from replicating the paper- and meeting-based techniques to
 7 creating whole new processes for accomplishing the ultimate goals (e.g. in environmental
 8 planning: selecting the best possible solution).

9 Redesigning existing processes to take advantage of these new tools is complex and
 10 involved. It is work that should be done, but another approach is to begin using new Internet
 11 applications to do things that were previously not possible (and then taking the results through
 12 the formal process, if necessary). If the new processes work well, they will reduce the time
 13 needed for the formal process, maybe even reducing the total time needed for controversial
 14 projects. The next four sections describe examples of internet applications being used to involve
 15 users in the process of transportation planning in a new way.

16 *Next Stop Design Project*

17 The US Federal Transit Administration funded Next Stop Design project in Salt Lake City was
 18 completed in late 2009. [6] The project asked users (i.e. anyone with access to the internet) to
 19 help create a new bus stop design. The process of asking everyone to help accomplish a
 20 project is called “crowdsourcing”; the paper provides an excellent description of this process.
 21 Figure 1 presents a screenshot from the project website.
 22



1 **Figure 1: Screenshot: Next Stop Design; Source: [7].**

2

3 In the Next Stop Design project users were given basic information on bus stop design and
4 asked to create their own ideas of how a bus stop should look and what services it should
5 include. The website (<http://www.nextstopdesign.com/welcome>) included links to publications
6 about bus stop design as well as photographic examples from around the world. The website
7 received a wide variety of designs, many of which were done by professionals, from around the
8 world. In addition to asking site visitors to create designs, the website also invited users to rate
9 the designs that were submitted and to comment on the designs.

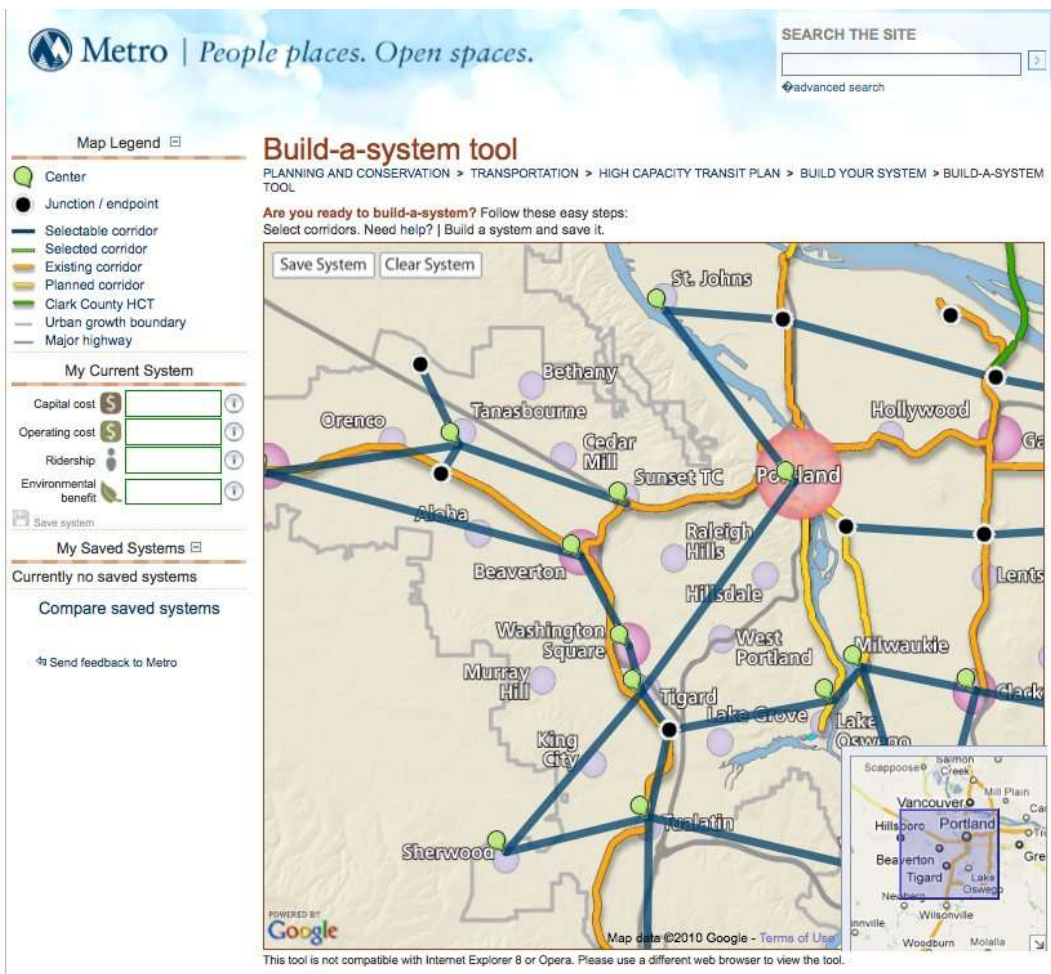
10 The process appears to have been very successful. It was followed by another project in
11 spring 2010, where users were asked to design a bus stop for a specific location in Salt Lake
12 City. The winning design took into account the actual physical dimensions available for the
13 shelter and referred to the area’s historic furniture making industry in its design.

14 The next stop design project combined user education with many standard Web 2.0
15 networking applications (rating, commenting, submitting design ideas). In order to help non
16 professional users participate, the sponsors created a page that pointed users to Google
17 Sketch-up, suggesting that it could be used to easily create professional looking graphics. A
18 similar crowdsourcing approach could be taken for many different planning projects.

19 *Portland METRO’s Build-a-system-tool*

20 A path-breaking approach to using Internet applications to educate users was the Portland
21 Oregon METRO, “Build-a-system-tool” shown in Figure 2. [8] [4]

22



23

1 **Figure 2: Metro: Build a system tool; Source: [9].**

2

3 The tool was designed to help citizens understand the trade-offs involved in planning high
4 capacity public transport systems (e.g. budget constraints). The application replicated on-line a
5 relatively simple public involvement activity of giving citizens lengths of colored tape to
6 represent different public transport modes and then asking them to place the tape on a map; the
7 activity demonstrates that you can't afford to build rail transport everywhere.

8 The METRO application provides more information (i.e. estimated ridership) than is possible
9 with physical systems, included links to other useful internet tools (e.g. www.walkscore.com)
10 and provided an easy way to comment on the region's High Capacity Transit System Plan (for
11 which the site was developed). The application was considered successful as over 4,200 visited
12 the website (and over 600 answered a survey associated with the page).

13 *SeeClickFix*

14 A third public involvement application is seeclickfix (<http://www.seeclickfix.com/citizens>). [10]
15 SeeClickFix enables residents to identify "non emergency" problems (e.g. potholes) and allows
16 others to comment on the problem's importance or suggest solutions. This is another example
17 of crowdsourcing, in this case the crowd is helping identify problems government needs to
18 address. A seeclickfix screenshot for a typical problem is shown in Figure 3.

19



20

21 **Figure 3: seeclickfix screenshot for a problem in San Francisco; Source: [11].**

1
2 The important point about seeclickfix type applications is that they enable users to do
3 something that government “should” be doing (i.e. identifying problems). Some might argue that
4 seeclickfix simply replaces systems where citizens called city hall to report problems (which
5 replaced systems where people mailed letters to city hall, etc.) – but at the end of the chain, it is
6 government that it responsible for finding and solving these problems. What’s interesting about
7 placing this process on the internet is that the internet both vastly increases the amount of data
8 that can be provided (e.g. exact geographic locations for problems rather than “somewhere on
9 Main Street”) and facilitates the development of tools for organizing and dealing with the
10 problems.

11 *Applications Created with Open Government Data*

12 Another example of citizens doing something that government “should” do is in the area of
13 information provision. As government agencies make data available on line, independent
14 programmers are developing internet applications that provide this data to users in traditional
15 and new ways. For example many cities have independently developed applications providing
16 real time public transport schedule information. Other cities, notably Washington DC, have
17 encouraged developers to be innovative by combining different data sets to provide new types
18 of information. [12] (<http://www.appsfordemocracy.org/>)

19 *Summary of Public Participation Applications*

20 The next step in this process would be to use the internet to organize citizens to perform
21 activities traditionally the responsibility of government beyond the area of information provision.
22 A simple example would be using social networking websites to organize local clean up days or
23 special civic events. This type of activity is taking place, but could be improved both in terms of
24 organization (i.e. better integrated into overall goals) and scope (i.e. more activities could be
25 included).

26 Ganapati has carefully considered how one type of information technology, geographic
27 information systems (GIS), could be better used to increase citizen involvement in government
28 decision-making. [13] He identifies the “Build your high capacity system” tool as one of very few
29 examples of government effectively using Geospatial Web 2.0 systems in the participatory
30 decision-making process. Many findings in Ganapati’s research can also be applied to Internet-
31 based applications generally. Particularly interesting are three trends he identifies supporting
32 increased citizen participation:

- 33 • Increased data transparency – public agencies are placing more data on-line and
34 encouraging independent developers to create new applications.
- 35 • Taping citizen-volunteered geographic information – many websites have been created
36 that ask people to help by adding information (e.g. seeclickfix).
- 37 • Using “information technology” to enhance citizen participation in decision making –
38 creating new applications to increase citizen participation and integrating them into
39 government processes.

40 Finally, Ganapati recognizes that increasing the use of internet applications in public
41 participation is not only a technological issue, but also an organizational and institutional issue.
42 Public agencies must value public participation, address organizational impediments (e.g. lack
43 of financial resources), and develop appropriate guidelines for providing public data.

44 In summary, while progress is being made in creating and applying Internet applications to
45 help involve the public in decision making and helping to provide public services, it is not
46 proceeding as quickly as possible.

47

1 **2.3 Motivation for Public Support**

2 While it is fine to suggest that new internet applications could be developed to improve the
3 public's ability to influence government decision making and assist in the provision of public
4 services, it's important to ask, if these tools were available would anyone use them?

5 Several researchers are now exploring the importance of intrinsic motivation and especially
6 the ability of new technologies and ways of organizing work to harness this motivation. Clay
7 Shirky believes that humans have a cognitive surplus (loosely defined as free time available to
8 devote to shared projects, which he estimates to be over a trillion hours per year and growing),
9 and an innate desire to create and share.

10 According to Shirky's research, this cognitive surplus and creative energy can be channeled
11 into communal projects or civic projects. Communal projects are projects done for the group, for
12 example funny YouTube videos. Civic projects are done to improve society as a whole, for
13 example wikipedia or Ushahidi (a website that aggregates information collected in the field and
14 places it on a map, used, e.g. to help coordinate relief efforts following the Haiti earthquake).
15 The goal is to design and support organizations that are developing approaches for channeling
16 the cognitive surplus towards accomplishing civic goals. [14]

17 Another author who believes that more focus needs to be placed on intrinsic motivation is
18 Daniel Pink. He believes that the typical carrot and stick motivational techniques (extrinsic) may
19 have been fine for many 20th Century tasks, but that they don't work very well for 21st Century
20 problems. He describes Microsoft's traditional approach to developing its Encarta encyclopedia,
21 10-years ago no one would have believed an essentially volunteer effort could have created a
22 better product than one created by one of the world's most powerful companies, but wikipedia
23 did it.

24 According to Pink, the key motivators today are autonomy (the urge to direct our own lives),
25 mastery (the desire to get better and better at something that matters), and purpose (the
26 yearning to do what we do in the service of something bigger than ourselves). He believes that
27 these are the building blocks for an entirely new operating system for our businesses. [15]

28 However, intrinsic motivation only becomes important after basic needs (financial
29 compensation, praise, promotion, being treated fairly, etc.) have been met through extrinsic
30 reward systems. Furthermore the importance of intrinsic rewards differs based on the type of
31 work, those developing software probably are more motivated by intrinsic rewards than from
32 those driving buses. But the main point is that there is a great deal of human energy that could
33 be made available to accomplish civic projects, the key is restructuring organizations to attract
34 and channel this energy.

35 In summary, new internet technologies have made a new resource available: people who
36 want to do something creative and would like to contribute to a civic purpose. The people were
37 always there, it's the internet technologies that have provided organizations with efficient access
38 to these people. Innovative organizations will create internet applications that encourage these
39 people to contribute to projects that both help the organization accomplish its goals and
40 contribute to a communal or civic purpose.

41 For example, Amazon's book reviews help the company sell books and create a community
42 of independent reviewers (a communal project). SeeClickfix is a good example of a civic project.
43 The next section describes where this civic interest could potentially be applied in the public
44 transport industry.

45 **2.4 User-based Improvements to Public Transport**

46 Providing public transport can be divided into two broad categories:

- 47 • Planning
- 48 • Operations

49 This research focuses on how the public can be involved in planning public transport, but
50 considering ideas that rely on the public actually operating public transport service (for example,
51 where should the border lie between carpooling and public transport? Or, what is the proper role

1 of users in providing public transport schedule information?) would be an excellent area for
2 further research.

3 Given that public transport is being asked to do more with less funding, a good problem
4 statement might be to improve the efficiency of public transport. In this case the goal would be
5 to develop applications that help citizens identify and support physical and operational changes
6 that increase public transport efficiency. There are three possible areas for improving efficiency
7 that can be affected in the planning process:

- 8 • **Public transport operations** – this consists of making public transport operate more
9 effectively on the route level. There has been significant research in the area of public
10 transport priority and bus rapid transit (BRT) systems that can be applied to improve
11 efficiency. [16]
- 12 • **New infrastructure planning** – this consists of deciding what new infrastructure
13 projects should be built. While there have been many studies that attempt to evaluate
14 the effectiveness of new infrastructure projects, these studies are often controversial and
15 there are many arguments about externalities and true costs.
- 16 • **Infrastructure maintenance planning** – this consists of deciding what maintenance
17 projects should be completed. Many studies have shown the importance of good
18 preventive maintenance programs for public transport, however maintenance is often the
19 first area cut when budgets are tightened.

20 In summary, the goal in all three areas is to make optimal use of funding by providing more
21 efficient public transport operations and investment decisions. The following sections will outline
22 some specific strategies for achieving these goals.

23 3. INTERNET APPLICATIONS TO OPTIMIZE PUBLIC TRANSPORT

24 Transportation and urban planning are interesting subjects to consider in terms of Shirky's
25 dichotomy between communal and civic projects because they are areas where a huge amount
26 of resources are being directed towards communal projects but very little is being directed
27 towards civic projects.

28 Quite simply there are many very sophisticated computer games that enable players to
29 design and simulate imaginary cities and transport systems. Huge communities of players have
30 developed around these games. These communities use the latest in Web 2.0 social networking
31 and information sharing techniques to communicate with their peers and learn how to improve
32 the performance of their imaginary cities and transport systems. For example
33 www.simtropolis.com for city building games. [17] In short, this represents a huge cognitive
34 surplus that could be tapped to solve real problems.

35 The next section outlines internet game research and three types of games that could be
36 applied to improve public transport systems. In this discussion it should be emphasized that
37 these games include associated Web 2.0 applications (e.g. social networking, best practices
38 wiki libraries, etc.) and that these integrated applications should be integrated into a larger
39 website to create additional synergies. Following the general description, Section 3.2 presents
40 ideas for how these concepts would be applied in public transportation.

41 3.1 This Is A Game

42 Computer games are a controversial subject: are they destroying society or helping it? Answers
43 range across the board, but evidence is growing that well-designed and oriented games can
44 help identify good ideas, solve problems, educate players and motivate them to act in the real
45 world. Our goal is to design games that unlock these resources to improve public transport
46 efficiency.

47 McGonigal has investigated computer games to identify why people play and how these
48 qualities could be used to create games that could help solve real problems. She finds that
49 games provide a sense of urgent optimism (players need to do something and, while

1 challenging, it's possible to be successful), provide a social fabric (people tend to like people
2 better after playing games with them), they require users to work at challenging tasks
3 (happiness research shows that people are happier when working hard than when just relaxing
4 or hanging out), and that games provide epic meaning (akin to purpose in the real world). [18]

5 One of the most important of these findings is the fact that computer game players are
6 attracted to games with epic meaning. This is good because it is consistent with the idea of
7 people's search for purpose (one of Pink's intrinsic motivators) and because it points in the
8 direction of civic projects.

9 It is possible to identify three main types of games that could be used to help citizens
10 improve public transport: simulation games, planning games and scenario games. These game
11 types are outlined below.

12 *Simulation Games*

13 Simulation games are games where players control the vehicles. There are simulator games for
14 many different types of vehicles one of the first and most famous is Flight Simulator by
15 Microsoft. There are many bus and train simulators; for example, Bus Simulator 2010 shown in
16 in Figure 4 allows players to drive a bus in New York City.

17 (<http://www.citybussimulator.com/index.php?id=265&L=1>) [19]

18



19
20 **Figure 4: screenshot from City Bus Simulator 2010; Source [20].**

21

22 While computer game simulators have improved significantly over the years, many still are a
23 bit slow and limited (in contrast to simulators used for professionals, e.g. for the airline industry).
24 This seems especially true for applications with limited popularity (i.e. more people would like to
25 simulate flying an airplane than driving a bus).

1 In any case, the question is how could a bus simulation game be used to help improve real
 2 public transport service. The most obvious application would be to educate players on the
 3 difficulty of operating a bus on congested streets. Unfortunately, the buses in Bus Simulator
 4 travel through mostly empty streets and processes (e.g. boarding) don't seem to be under the
 5 player's control (it would be interesting to be able to test different boarding strategies). Videos
 6 from Bus Simulator 2010 (a screenshot is shown in Figure 4) help illustrate these criticisms.
 7 (<http://www.youtube.com/watch?v=FP1yddiEzpQ>) [20] Just to be clear, these criticisms are not
 8 of the game, but of its ability to be used by public transport agencies to help increase the
 9 involvement of citizens in planning and operating public transport – at least for now.

10 *Planning Games*

11 Planning games are games where players can lay out public transport systems. Games can be
 12 distinguished based on the level of detail. For example, the basic version of Sim City 4 allows
 13 players to “build” various types of public transport (buses, railways and subways). [21] The
 14 game developers have also created an add-on module, Rush Hour, that gives players more
 15 options for building public transport and more accurate graphics including the ability to see what
 16 it's like to ride on the vehicle (similar to a simulation). [22]

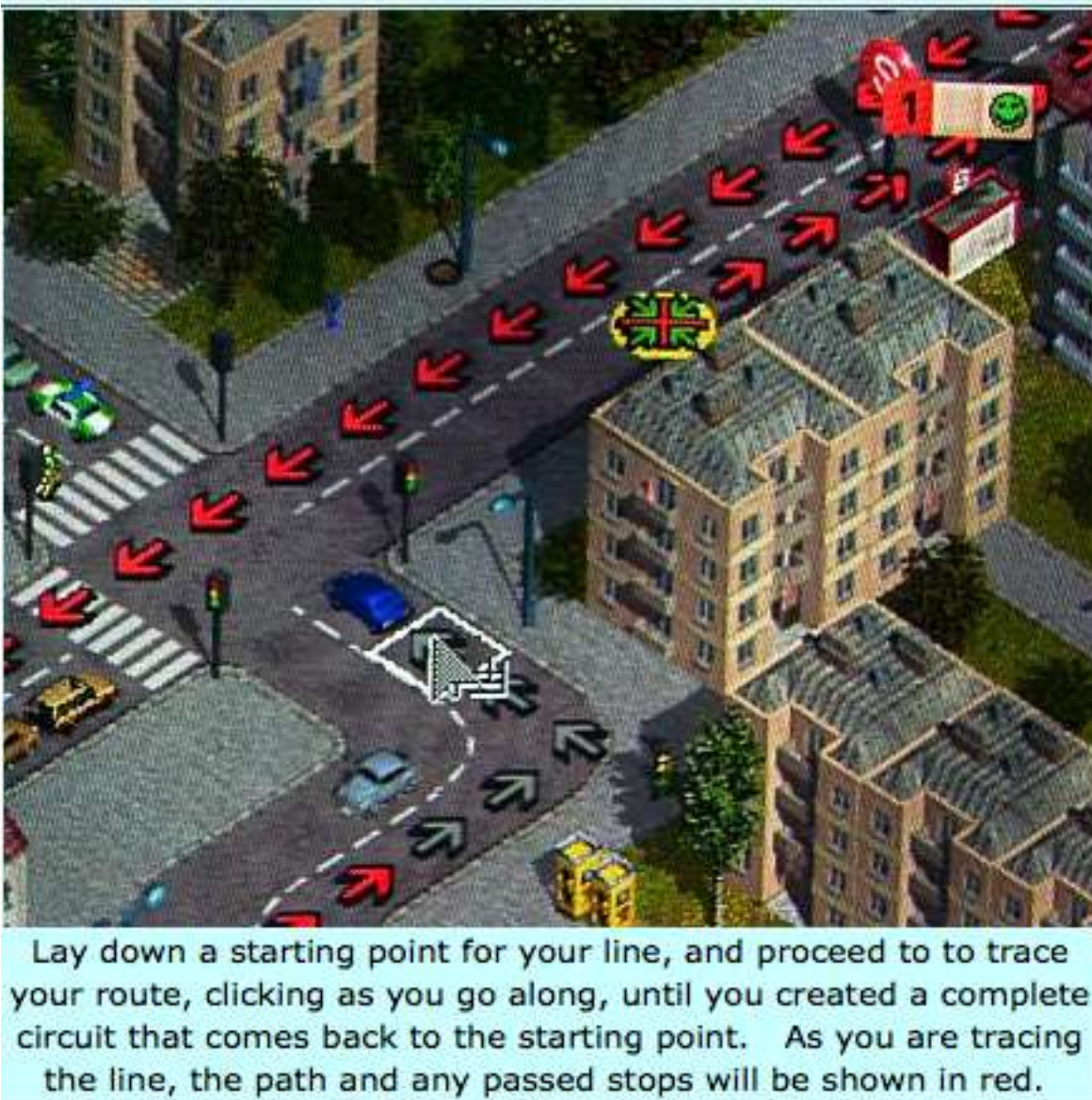
17 An interesting note on Sim City 4 Rush Hour is that the application's internet pages shown in
 18 Figure 5, include an interview (http://simcity.ea.com/about/inside_scoop/gridlocksam.php [23]
 19 with Sam Schwartz, former New York transportation official, and also Schwartz's history of
 20 transportation (http://simcity.ea.com/about/inside_scoop/gridlocksam02.php). [24]
 21



22
 23 **Figure 5: Screenshot from Simcity 4 showing Gridlock Sam Interview; Source [25].**
 24

1 In his interview Schwartz suggests that the game developers add features like adjustable
2 traffic signal timing and special roadway types (e.g. truck routes) – things that would make the
3 game more of a standard traffic engineering model. What's interesting is the blurring of reality
4 and gaming (and, what influence will this have on the next generation of transportation
5 planners?).

6 Another interesting game for planning public transport is Traffic Giant. [26] This game is
7 about ten years old and is no longer supported by the developer, but an active community
8 remains using social networking to help each other solve problems and improve their results.
9 Figure 6 is an illustration from a tutorial created by a user designed to help others learn to play
10 the game (<http://www.btko.net/tg/trafficgiant.html>). [27]
11



12
13 **Figure 6: Directions for creating a bus route in Traffic Giant; Source: [27].**
14
15
16
17
18

1 Similar to SIm City, Traffic Giant has a very interesting internet page providing advice on
2 how to plan bus lines – interesting because the advice makes sense in the real world. Here’s an
3 example of some instructions given under the topic of line building:

- 4 • Avoid building too complicated lines (build along main-roads). You should
5 always have a good overview in order to be able to connect effectively later on.
- 6 • If possible, do not let your vehicles turn at much-frequented crossings (traffic-
7 jam area!). Otherwise you would block your own line.
- 8 • Preferably you should set down the turning-point after the next crossing (if a
9 little less-frequented), after the next block of flats or in a cul-de-sac. However,
10 do not forget to build a further, well-positioned stop right after the turning-point.
11 This stop should be within easy walking distance! [28]

12 This blurring of real world and game world makes sense; the game developers want their
13 games to reflect reality therefore they need to program them with reality in mind. However, the
14 actual programming remains a black box so it is unclear exactly how the systems work.

15 *Scenario Games*

16 Scenario games are games where alternative worlds are created and players interact as if these
17 worlds were real. These games are often played during a fixed time period. The best way to
18 understand them is to describe an example.

19 World without oil is a game that calls itself “a massively collaborative imagining of the first 32
20 weeks of a global oil crisis”. (<http://www.worldwithoutoil.org/>). [29]

21 The idea was to help players understand what would happen during an oil crisis. The game
22 provided information (a story) consisting of various internet media (e.g. news reports, blogs,
23 data, etc. on the lack of oil and what was happening in various places because of the shortage)
24 over the 32 week period. The players described what they “would” do under these conditions via
25 a wide variety of communications channels (blogs, videos, etc.). Players also formed social
26 networks to exchange information, ideas and thoughts.

27 The interesting aspect of these types of games is that players get extremely into their roles,
28 they really feel what’s happening and make changes to their real world behaviour. For example,
29 world without oil players reduced oil consumption both while the game was being played and
30 afterwards. [18]

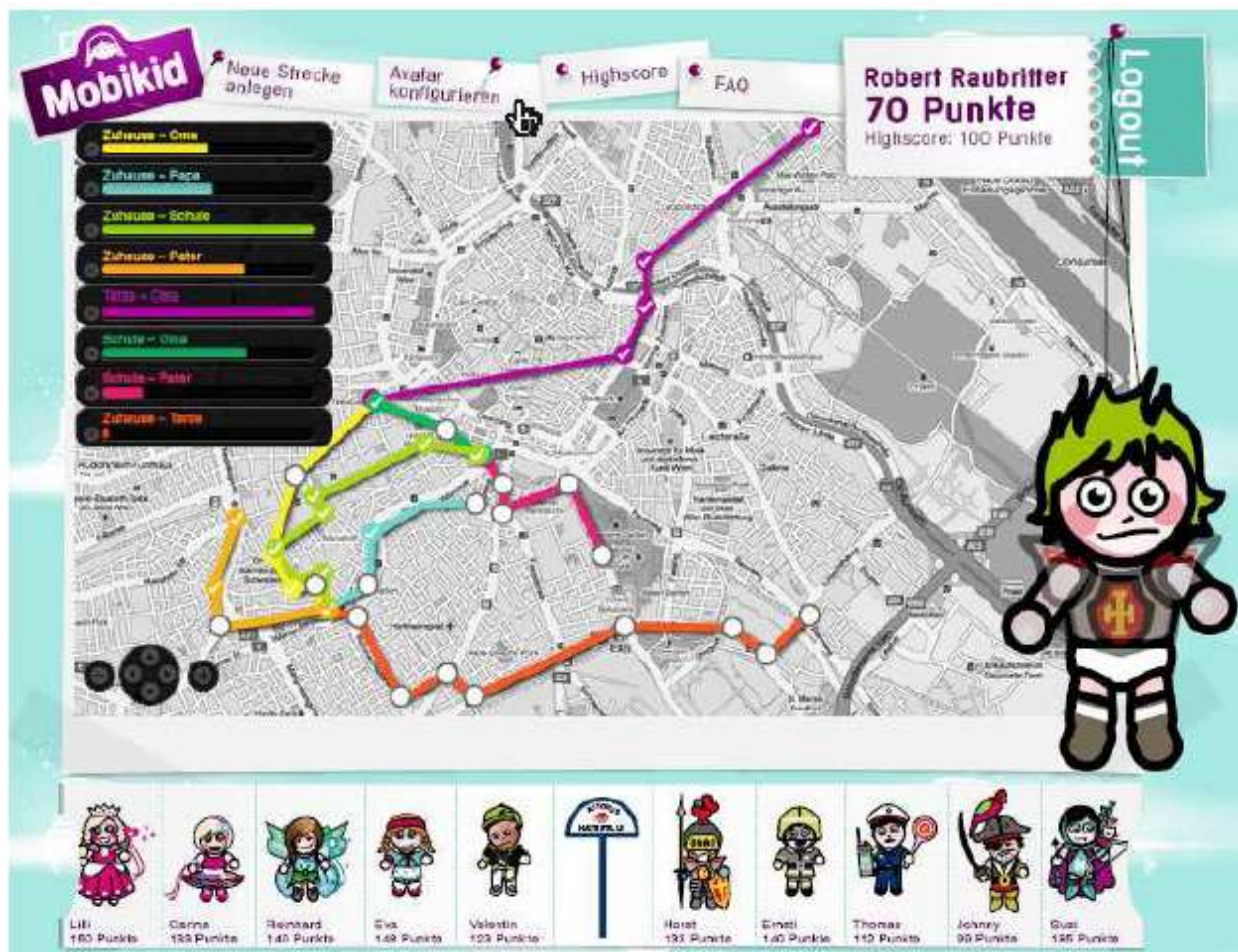
31 **3.2 This Is Not A Game**

32 The interesting question is whether computer games could be used to improve reality. There are
33 currently few examples of using computer games to improve public transport in the literature
34 (Portland’s Build your high capacity system “game” is an exception). Therefore this section
35 describes several games now being developed to help illustrate the potential for using games to
36 improve public transport.

37 *MobiKids Vienna*

38 The MobiKids project was designed to help children use public transport. The research team
39 believes that if children learn to use public transport at an early age they will be more likely to
40 use it as they get older. The project included walking through complex underground stations and
41 asking the children to explain the signs (to better understand direction-finding) and developing a
42 board game to help children learn their local public transport network. The project also included
43 development of a computer game called Mobikid illustrated in Figure 7. [30]

44



1
2 **Figure 7: Screen shot from Mobikid computer game; Source 30.**

3
4 The Mobikid computer game is designed to help young teenagers learn about Vienna's
5 public transport system. It covers the entire city network (the board game is designed for
6 younger children and covers single neighborhoods). Players register on the website and are
7 asked to enter various trips that they make regularly (or would like to make). They enter a
8 starting address and ending address, then give the trip a name, e.g. "home to grandmother's
9 house".

10 Next, the game displays several public transport routes, just like a regular public transport
11 information site, and asks the player to select one of the routes. The player does this for several
12 typical journeys and the selected routes then become the player's objective. The idea is that the
13 player needs to go to every stop/station on the route where she will find a unique identification
14 number. Then she sends this identification number via SMS to the game site and this is
15 indicated on the player's scorecard. The goal is to visit all the stops on all your routes.

16 The Mobikids computer game is in its final stages of development and should be deployed
17 in autumn 2010.

18 The Mobikids computer game is not designed to help improve operation of public transport,
19 per se, but rather to educate young people and to help them develop a relationship with public
20 transport, and Vienna's public transport system in particular. These are not trivial activities, but
21 rather represent the first step in the process of involving people with the public transport system
22 and potentially engendering them with an interest to improve the system. Especially critical in
23 this effort is that the game be integrated with the overall public transport system's marketing
24 strategy and internet activities.

1 *Bus Meister*

2 Bus Meister is an integrated package of internet-based applications designed to enable citizens
3 to help plan and improve the operation of their city's public transport system. It has two main
4 functions: education and empowerment. Bus Meister will educate citizens on measures
5 designed to improve public transport efficiency and attractiveness (using a game and best
6 practices library), and empower them to lobby effectively for measure implementation (using
7 social networking features).

8 Education is important because most citizens do not understand how efficiency
9 improvements can improve service (for example: an improvement measure may seem too small
10 to make a difference, but, if it reduces the number of buses needed, it can save significant
11 money).

12 Empowerment is important because many citizens are disenfranchised by the current
13 system; when public transport companies try to implement public transport priority measures,
14 they are often blocked by automobile supporters (who, as often more wealthy people, are much
15 better integrated into the city power structure than bus riders).

16 The initial system would include a generic game designed to teach players about public
17 transport priority. Working with public transport operators and cities, later versions of the game
18 would be developed for specific routes; these games could be especially helpful in detailed
19 route planning studies and neighborhood planning studies.

20 The Bus Meister applications would be integrated into the public transport operator's internet
21 site; it would help drive traffic to the site and help the operator develop a better relationship with
22 their passengers. The Bus Meister application is currently being developed and an optimistic roll
23 out date is early 2011. [31]

24 *Working on the Railroad*

25 Working on the Railroad is a scenario-based computer game designed to help players better
26 understand the problems of urban rail transport infrastructure maintenance. The application
27 would also include Web 2.0 based information sharing and social networking.

28 The game would be similar to urban planning games (e.g. Sim City) but would focus on
29 track maintenance. The player would have a certain budget and would be receive points based
30 on how efficiently they maintained the rail network; these points would be given for both
31 economic efficiency and resident satisfaction. The scenario type of game will be particularly
32 effective for urban track maintenance because it will enable players to experience 30 years of
33 time in an hour or two.

34 The game would be designed to teach players ideas such as the importance of early
35 maintenance. It would consider the main drivers of maintenance including: service quality,
36 environmental impacts, vehicle maintenance costs (poorly maintained track increases vehicle
37 maintenance costs), and disruptions (due to accidents caused by poorly maintained track and
38 construction shut-downs).

39 The initial game would consider a simple network in an imaginary city. The goal would be to
40 educate the players on the importance and impacts of track maintenance. Later versions of the
41 game would be developed to help push the user to identify ideas for improving the track
42 maintenance process. For example, a rail transport operator could use the game to place a real
43 section of track scheduled for maintenance in the next five years on-line; users could be asked
44 to suggest detours or scheduling ideas.

45 Working on the Railroad is currently a design idea under review and is likely to change
46 significantly during the review process, but the goal is clear: making the urban track
47 maintenance process more understandable by the public in the hope of increasing public
48 support and stimulating good ideas. Again, creating a forum that enables people to become
49 engaged with their public transport operator will help unlock new resources.

4. CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

This paper's main conclusion is that innovative internet applications can be used to provide new resources to support improved public transport. Computer games, social networking applications, Web 2.0-based information sharing and ubiquitous mobile access are just four of the currently available technologies that can be applied to accomplish this ambitious goal.

The goal is to create applications that transform players from bystanders to participants; to convert people complaining about bus service to citizens suggesting improvements, supporting difficult public policy decisions, volunteering in some way to make service better (clean-up days at stations), and, hopefully, seeing the benefits of paying higher taxes or fares.

A key question is whether people have the time and inclination to get involved in this way. Currently people are spending hundreds of billions of hours on internet-based communal projects and games, so it's clear that people have time. Furthermore, research on professional motivation and computer game playing supports the idea that humans have a strong desire to help make the world better.

The technology needed to create these applications is mostly in place. Recent improvements in game technology like better 3-D and easier ability to incorporate real places into games (e.g. augmented reality) will further increase the ability to create these types of integrated applications.

The main problem is institutional reluctance. Government, and public transport in particular, is not usually considered an early adapter. But progress is being made as shown by Portland's Build your high capacity system game, and many government agencies are recognizing the importance of new technologies.

A related concern is the reaction of public transport workers who could see some of these ideas as ways to force them to work harder or replace workers. These are real concerns and must be taken into consideration, but it's also important to recognize the potential benefit that will come if citizens become more invested in their public transport service.

For example, it's hard to drive a bus, if users develop a better understanding of the difficulties (e.g. traffic congestion) and lobby their city councils to extend public transport lanes, it will make driving easier – improving conditions for drivers. More importantly, the applications may make users feel more connected to drivers, making the job more pleasant and passengers more satisfied.

The main ingredients for success are: combining multiple elements (game, social networking, information) into integrated applications; making certain that this application is well integrated into the public transport operator's overall strategy and marketing concept; making key stakeholders part of the development process; and, taking a chance on new innovation.

The main need for further research is to try and develop these types of computer games and Web 2.0 elements to improve the operation of public transport systems, and then to evaluate how they work. This could be done with simple applications as is being pursued by Mobikids and Bus Meister. Another recommendation is to consider how games and Web 2.0 elements are being used in other disciplines to see if there are lessons to be learned that could be applied to public transport.

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