Cover Page

Professor Tanda: Greener Gaming & Pervasive Play

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Abstract

This study examines the development of a mobile phone-based pervasive game that related its user's environmental footprint. It discusses the design challenges, development and evaluation of the prototype game in order to identify the key strategies and mechanisms that relate to the production of pervasive systems for mass participation. Designing the user experience for such systems is particularly difficult, as the game had to educate and entertain without patronizing or preaching to the user. A prototype system was developed and trialed in order to identify and understand how users related to the experience and how the game may be further developed. We found that character-led tailored physical activities were generally found to be the most enjoyable, while players wanted more interaction with each other and more score-based content. Creating interdependent question sets and orchestrating the game arduous process. In the future a fully automated system will be key to its use.

Project/problem statement

Prof. Tanda's Guess A Ware is a pervasive computing-based mobile phone game that forms part of the Participate project [1]. The Participate project explores convergence in pervasive, online and broadcast media to create new kinds of mass-participatory events in which a broad cross-section of the public contributes to, as well as accesses, contextual content - on the move, in public places, at school and at home. The project is split into three main areas, with a different consortia working on each area. The areas are; games and the community to appeal to the public and a schools-based project. The purpose of Participate is to examine and investigate the tools, applications, services and business models required to facilitate each of the 4 core activities.

- Motivation (Managed Campaigns and Events)
- Publicly Authored Content (Capture and Contribute)
- Managed 'Professional' Editing (Collate and Re-purpose)
- Broadcast and Interaction (Publish and Share)

Fundamentally Participate will enable the development and understanding of what technologies need to be created or enhanced to facilitate mass participatory events. This investigation primarily focuses upon the 'games' component of the project and its design and development.

'Prof. Tanda's Guess A Ware' [2] invites players reflect on their environment and the impact they have on it. Through a series of quizzes and activities players can learn about their environmental footprint and find ways to reduce it. The game takes 2 weeks to complete, though potentially users can continue to play for longer. Prof. Tanda is a character who lives on your mobile phone and interacts with you, currently twice a day to play with him. Play sessions last between 2 and 10 minutes and involve activities such as answering questions in a quiz, performing a task for Prof. or doing some activity with the people that you're with at the time. He appears as a small graphical character on your mobile phone. He speaks through speech bubbles; inviting players to respond to instructions, select answers from multiple choice questions or enter text into forms to interact. He combines serious questions with playful ones; showing interest in your opinions about film stars, facial hair and all kinds of quirky topics, as well as environmental issues. Over the course of the game, Prof. Tanda aims to provide both an amusing diversion and give context/user sensitive information to the player; in particular, environmental information and advice relating to the player's location and environmental impact.

GOALS
The main goal of the project was to develop an interactive mobile phone-based game that collected environmental and location-based (contextual) data on the users, in order to provide relative information on their environmental footprint and persuade them to alter their habits to more environmentally friendly ones. The market that the game was aimed at was adults that regularly update their phone to the latest model and use it for a variety of applications.

- Investigate how to develop and deploy large-scale, mass-participatory pervasive systems.

- Evaluate where, when, and why people play.

- Examine user behaviour and attitudes towards persuasive systems.

- Collect data relating to the users' understanding of place, activity, and time.

The technological goals were; to develop a platform that can be used by any mobile phone handset, have the ability to collect rich data in order to build a profile of the user and provide user-based context and to automate the content. So the game could ask appropriate questions, based on the user's profile and context.

Background

Previous projects in the MRL (Mixed Reality Lab, University of Nottingham) have used Cell IDs (these are specific to the telephone transmitter in the location that your phone connects to) and transitions between cells as a technique for locating players, viewing their context and examining their behavioral patterns. A pervasive game called "Day of the Figurines" [3] [4] captured Cell IDs from players for a study of where and when players liked to play the game. Hitchers [5] used this Cell ID data to build up a map of players movements and used the label given for location by users to search and filter graphs of cells to understand how players related to their environment.

The research gathered from these pervasive games provided an insight into the type of visualizations that would be ideal for building a set of prototype visualization tools for Professor Tanda game. This would then enable the orchestrating of the game, allowing its users to view the history of player's movements over time and to view popular or frequently visited cells. We used a character in the game as previous research [6]

had shown that the use of a character had encouraged/persuaded people playing a gamed called "Fish 'n' Steps" to take more exercise, thereby altering their daily habits.

Project dates and duration

The project is a 2 phase 4 year project. The first phase is concerned with the development, trialing and evaluation of the application, while the second phase will see the application used as part of a larger television led campaign with the general public taking part. Here we report on the first phase of the project. The trial took place in February 2007.

Project Participants

The 'games' consortia consisted of the University of Nottingham (MRL), Blast Theory and BT Research. Nottingham's role in the project was to develop the software, lead and evaluate the application, Blast Theory were developing the content and designing the game, while BT produced the look and feel that 'pulled' the content and the software together. Every partner had input in the design process. This was ensured by holding a series of workshops relating to the game design, content and most appropriate technical methods to develop the application. The application was also demonstrated at the plenaries for the whole project. Feedback from these was fed back into the game.

Challenge

The main challenge of the project was to develop a mobile phone based agent that aims to give advice to raise the players' awareness about their carbon emissions and suggest activities and games which will actually reduce them.

The initial aim was to design a number of small activities and reminders in your daily life can have a pervasive and significant impact on the players' behavior. The difficulty would be to educate and entertain and not appear to preach and patronize

Using a mobile phone as the channel for directing these activities would provide unique access to the user as it's generally something that is always on and always close at hand. The challenge was to find a way to identify actions that are appropriate to the user and to their context at any given time. This design work was focused in 2 areas: content and platform development.

In content development, a number of broad areas needed to be identified in the field of carbon emissions: home energy use, travel and commuting, work, waste/recycling and green awareness. Specific activities in each area and married these to appropriate users and contexts. For example, car drivers would be asked to measure their mileage and spending on petrol when they were about to fill up at a garage.

In terms of platform development, we would need to design and develop an interface embodying a dialogue with the fictional character of Prof. Tanda. The dialogue needed to establish a sequence for the game:
- establishing the user's context
- playing a suggested activity or answering questions
- feedback about the activity

Clearly one of the main issues is the cost to the individual in playing this game. A possibility might be to consider cheaper methods for offloading phone data. As an example, Bluetooth connections could be exploited to offload data to PCs or laptops to subsequently be uploaded to the game server.

Other issues that that would need to be addressed are: how do we encourage mass participation? What are the most appropriate mechanisms for inducing fundamental behavioral change? How can a game be created that becomes part of everyday life that relates to the user's behavior and where would the game fit into the larger project if a campaign was to be run?

Solution
Through a series of workshops and group discussions the 'games' consortia defined a design strategy and planned 3 simultaneous strands of development, relating to each partner's role. Each partner had a series of milestones and deliverables to meet. These also had to be applicable to the project as a whole and regular top level management/steering group meetings were held in order to plan how the wider project (games, schools and community) may come together for a combined campaign that may engage the public. Nottingham would finally combine the content graphics and software to produce the prototype game application. The following section discusses the development of each of the 3 strands in terms of the procedures, methods and influencing factors.

DESIGNING THE LOOK AND FEEL
Pen illustrations of the game sessions and story boarding, were the starting point for the look and feel of Prof. Tanda, each gives a feeling of Prof. Tanda's personality, describes the scene and Prof's interaction within.

A decision was made early on to develop the initial sketches in the style of a comic book with multiple panels, as it was felt this would allow the imagery to be used on both small screen devices as well as potentially on bigger screens. This also allowed the images of images to act in a frame by frame filmic style to create a narrative. [7]

The early illustrations of Prof. Tanda were produced based on the pen pictures, and depicted a cartoon Prof. Tanda as a 'mad scientist' in a number of scenes, seen in Figure 1. The illustrations were predominantly black and white, with strongly colored areas to draw the user's attention. Subsequent designs continued the theme of a black and white cartoon but with a strong brightly colored background. These images were strongly influenced by Japanese comics, animations and computer games that often use simple repeating backgrounds to indicate motion while leaving the main visual focus static.
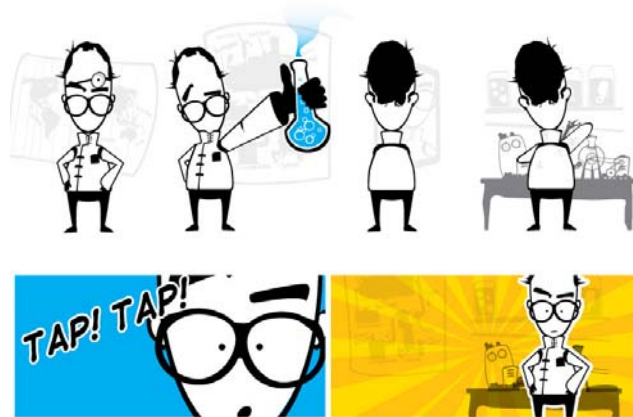
Figure 1. Early cartoon visualizations of Prof. Tanda

The discussion of the initial imagery focused on the idea that Prof. Tanda should look potentially more like a series of stop frame animations rather than a quirky cartoon, and that we should move away from the 'mad scientist' stereotype… *"He's a weird guy experimenting in his basement rather than a full time chemist so his jacket is cool but something a distinctive as the forehead mirror would be out based on this"*. It was felt that a style more akin to Terry Gilliam's [8] famous surreal animations in Monty Python's Flying Circus would be more appropriate, and that the use of 'muddier' muted colors would help visually tie it all together, as shown in Figure 2.

As the style moved away from illustrated cartoon to designs largely based on photos, a number of test photos were taken in a variety of unusual poses, and with a number of props.

Figure 2. The sequence of images above illustrates a few of the developmental stages. From Initial test photograph on the left through to a cropped image of Prof. Tanda used in the trail as one of the welcoming screens.

These images were then altered digitally, often with the background being totally replaced with other imagery. A dark and murky virtual residence for Prof. Tanda was created with bare brick and plaster walls, old electronics and often irrelevant posters, plans or warning signs. Even when viewed on a small screen device, these little details help give the user more

visual cues into Prof. Tanda's world and help in creating a level of engagement with the character. See Figure 3.

Figure 3. These photos show some of the details created for Prof. Tanda's world. The image on the right has included the early cartoon designs as a program on the TV.

The final images were deliberately produced at a much higher resolution and size than a small screen device could display, so that multiple crops of the images could be produced easily and quickly to fit in with each scene or set of questions (content) produced for Prof. Tanda to ask the users. PNG files were used on the phones. These were used as they rendered well on the phone and also have a small file size. The final designs can be seen in Figure 5.

CONTENT
Prof. Tanda is a person who is obviously well informed about energy use and the environment, however, he's not infallible and is shown to have somewhat suspect tastes. He's portrayed as being entertainingly egocentric, this was done to aim it at the youth market and it allowed the Prof to interact with his users in an effective non-patronizing way. A play session with Prof. Tanda might be along the lines of:

OK homebird. Now I'd like to work out your electricity usage for the year.

When was the last time you read your electricity meter?
- Today
- In the last week
- The last month
- Soon after the birth of Jesus
- What's an electricity meter?
- What is electricity?
- Where the hell am I, and who are you?

How do you get to your electricity meter?
- It's in a cupboard
- By standing on a chair
- I don't know where it is
- Talk to my mother, she has big eyes

Can you read your meter now?
- Yes
- No
- I need a torch
- I like you, what are you doing tonight?

Shut up, and get on with it

Each play session shows Prof. Tanda in one of a number of situations as he chats with you. These are like mini comic strips that may have some relationship to the questions that Prof asks you. For example, he could be in the lab, at home, in the countryside and or getting lunch.

We've talked about the game having a sense of humor. This could be easily conveyed in how Prof. Tanda introduces himself and asks questions. Again this might also mean compiling comparative material but possibly tangential to the topic of the environment to give the game an element of surprise and therefore imbue the experience with a degree of 'off-beat' humor.

In relation to environmentally driven goals it was decided that the game should always offer actions that would allowed players to act intelligently and positively based on what they had been informed about.

TECHNICAL DEVELOPMENT
Prof. Tanda is a mixture of a game and survey and is intended to engage players during their daily routines, providing them with amusement and information in return for data about their lifestyle, environmental actions and attitudes. This information is then sifted and fed back to the public by broadcasters and campaign organizations.

The game is embodied through a quirky character called Professor Tanda who contacts the player, tries to guess where they are and what they might be doing, asks them questions and even gets them to undertake simple activities and experiments such as measuring the amount of water that they use when taking a shower by leaving the plug in the bath (see figure *).

A distinctive feature of Prof. Tanda is the way in which he tries to guess a player's current context whenever he contacts them. This draws on the time of day and also on handset location (cell ID). For example, if a player tells the game that they are at home in one session, then the game will associate "home" with the

time and logged cell ID of that session and use this information to tailor subsequent sessions.

Prof. Tanda is currently realized as a "trigger" application (Figure 5.) mplemented in Python (*a high level programming language)* and running in the background on the phone and XHTML (*Extensible HyperText Markup Language)* pages generated by the server. Each night the trigger application downloads details of when it should next trigger a session from the server. It then monitors the time and current cell ID, and when the condition is met (or when the player explicitly "calls" the Professor from the trigger application) it directs the phone's web browser to a session-specific URL *(Uniform Resource Locator)* on the server, which generates the XHTML pages for the player's interaction with the Professor during that session.

This initial implementation of Prof. Tanda has recently been trialed by 30 players for two weeks. In general, they reported enjoying their interactions with the central character in the game, especially the way in which it engaged them in local activities, an aspect of the game that they would like to see extended in future versions. This shall be further expanded upon in the concluding section. We also may consider using additional context information being logged and used in triggering (e.g. the phone profile = people called/texted, calendar entries, other phones connected to through Bluetooth and photos).
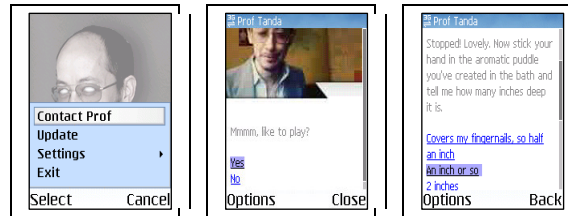

Figure 4a. The phone rings using a tone that telles the user its Prof. Tanda time!

Figure 4b. The interface opens and the dialogue between the user and Prof. Tanda begins.

Figure 4c. Prof. Tanda asks a series of questions and the user responds. The user wonders how did he know where I was?

Figure 4d. The information is then sent through to Prof. Tanda

Figure 5. Images from Prof Tanda trigger app. (left) and XHTML pages (middle & right)

ARCHITECHTURE OVERVIEW

The overall Prof. Tanda system architecture is shown Appendix 1. Underlying the whole system is a persisted Equip2 [9] data-space that stores questions, answers and facts about players. The session engine is a core game component responsible for direct a conversation between the player and Prof Tanda. Players interact with the session engine (SE) through a WAP (Wireless Application Protocol) or HTML browser, typically (although not essentially) running on a mobile phone. The game engine is the second major component of the Prof. Tanda system; this component is responsible for the (currently only semi-automated) allocation of new sessions to players based on their previous game experience.

The TriggerApp is an application, currently written in Python (a *high-level programming language*), that runs on the mobile phone. Python was chosen as it is allowed rapid prototyping. Although Python allowed for rapid development it also restricted the amount of phones that could run the application, because Python applications can only run on mobile phones running the Symbian (*an operating system for mobile devices)* operating system. This application is the player's entry point into the game. The TriggerApp is configured to silently call the game server at startup and 8am every morning to download the latest trigger information. An authoring/ orchestration web interface provides the author with a set of custom forms which provide useful views on the data in the data-space. Finally, a third party visualization application exist that can be used for authoring and analysis purposes; the visualization shows a players game data (sessions played, facts established, cell IDs visited) in a timeline view.

Session Engine
The Session Engine (SE) is a core game component responsible for directing a player's conversation with Prof. Tanda. The SE decides what questions to ask a player and what responses to give.
The SE is invoked once for every step in a conversation between the player and Prof. Tanda.

Phases of Play
There are 3 phases of play:
• Establishing Context

In this phase of play, the SE attempts to establish the player's current context, i.e. where they are and what they are doing.
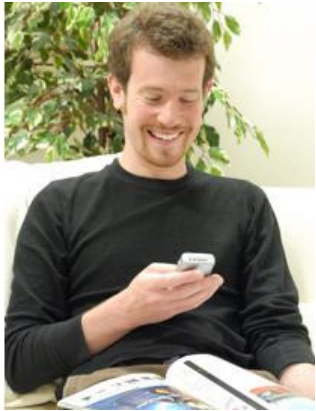• Asking Questions

In this phase of play, the SE will ask the player a set of questions that are tailored to their current context.
• Giving Feedback

In this phase, the SE will provide the player with feedback related to information given in this and previous sessions.

Facts and fact types
There are 3 types of facts:

Figure 4e. Information is then passed back to the user who gets an eco fact. This is presented in a humorous way. The player can then act on the information they were given.Bye!

Context Facts
A context fact is a fact that is specific to a particular player which remains true for the duration of the given session. A typical context fact would be 'context:player:home=true' which states that a given player was established as being at home during a given session.

Profile Facts
A profile fact is a fact that is specific to a particular player which remains true for the duration of a game. A typical profile fact would be 'profile:player:haschildren=true' which states that a specified player has children.

General Facts
A general fact is fact not specific to any particular player for example the average MPG of all participants who drive a car.
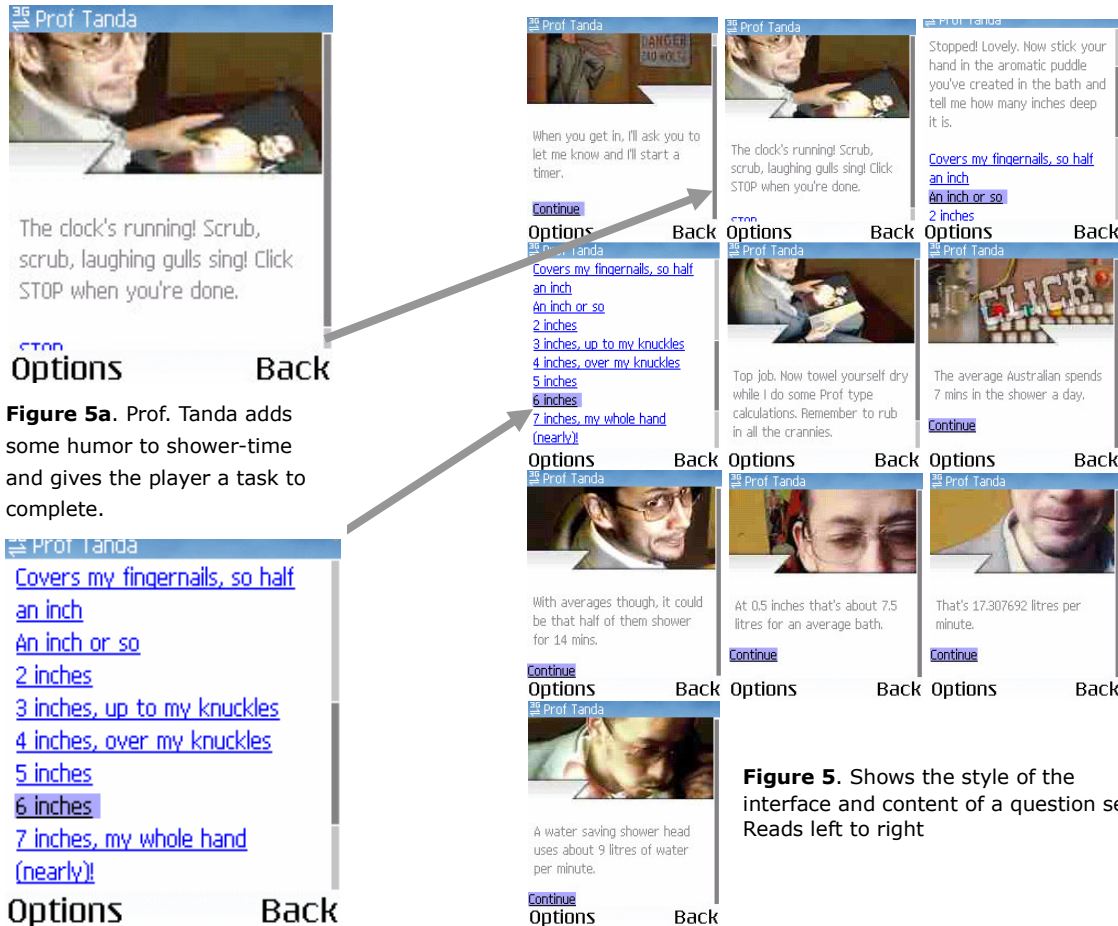Fact values can be of several types:

- Boolean: the fact is a simple yes/ no or true/ false answer.
- Enumeration: the fact is one of a given list of possible values.
- Int: the fact is a numerical integer value.
- Float: the fact is a numerical float point number value.
- String: the fact has an unrestricted string value.
- Enumeration or String: the fact is either one of a set of answers or an unrestricted string value.
- Tally: the fact holds a number or tally for each of several values

SOLUTION DETAILS
The game was run over two working weeks, as this was seen as an appropriate length of time in which the user could have a valid experience with the system and that the technology and content could be tested. 30 Nokia 60 series mobile phones had the software loaded onto them and they were then handed out to 30 participants. All network time was pre-paid by the project. The cost of this worked out at 4KB per page and with a maximum of 10 pages per session, 40KB equated to 4p (at Orange PAYG (*Pay As You Go*) data rates). The game was run in a variety of different locations throughout the country. Instructions were mailed out and there was a set-up session for anyone who wanted help with starting the game held at Nottingham University.

Participants were sent 1 session per day and were able to trigger 1 session per day. This was done so that in the future we could establish how many sessions the participants would accept. Below (Figure 5.) is an example of a played session. The figure also shows how the graphics and content were integrated.

Figure 5a. Prof. Tanda adds some humor to shower-time and gives the player a task to complete.

Figure 5b. This shows one of the screens that allowed players to select an option that related to them. It was done in order to gather information from the player.

Figure 5. Shows the style of the interface and content of a question set. Reads left to right

After completing the game each player could access a web based evaluation of their game and find out facts about the way they played relating to their environmental footprint. Each player was asked to complete a questionnaire. 22 of the 30 players answered the questionnaire.

ORCHESTRATING THE EXPERIENCE

In developing the system an initial technical trial was run lasting a week in order to test the piece of software that could provide the user's location. This trial involved 10 participants being given a mobile phone (Nokia series 60) and keeping a diary of locations and activities. The location was provided by matching up cell mast IDs (collected by the software) to the participants' diary. So if a participant said that they were eating at home at 6pm and the cell ID was 203, we could then say that home was cell 203. With a week's worth of data we could then find out what locations and activities the other cell IDs collected by the software related to. This was not automated in the 2 week trial with full content. It was decided that the trial would be orchestrated by an operator before the system was fully automated in order to raise any issues relating to the content provision. The questions and content sent to the participants were based on their answers, location and questions that they had answered, in order to provide the appropriate content.

Running Prof. Tanda required a game operator to review each player, every day the game was played and allocate new content for the next day's game. Players are allocated 2 game sessions per day:

- 1 triggered by the Prof. Tanda application/operator
- 1 that can be triggered by the player choosing to contact Prof. Tanda themselves.
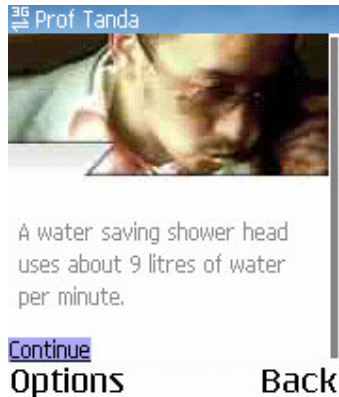
Figure 5c. Prof. Tanda gives the user advice on how much water they could save by using a water-saving shower head.

Each session comprises of an initial question set to establish the player's context, followed by a number of potential activity question sets suitable for the contexts which could be established.

One of the constraints was that the process of generating sessions for 30 players takes from 1 to 3 hours per day depending on how many sessions from the preceding day have been left un-played and can be rolled over to the coming day. This gave the designers an insight into the way that the game could be automated and the amount of sessions needed for an extended playing session.

Generating sessions requires:
- Reviewing which question sets have been played and checking for consequences from these
- Choosing a trigger and context establishing question set
- Choosing and prioritizing appropriate activity question sets

This process is largely done using a web-based interface, supported by a spreadsheet which defines the dependencies and consequences of each question set and an operator log of the players which is updated each day.

RESULTS
After the end of the trial a post-trial questionnaire was sent out to all of the users involved. This was filled in by 22 of the participants. This was designed to find out how users had found the experience, what parts of the experience were liked and disliked, and what players thought could have added to the experience. The

design of the application also meant that we were able to see how many times people answered the Prof., when they answered and when they called the Prof.

We found that a majority of players really enjoyed the experience, but felt that it didn't last long enough. People mainly played at work or at home, preferred to play twice a day and would have liked to have been contacted randomly or based on their location. Interestingly, nearly every participant thought that the use of the Prof. Tanda character encouraged play.

Overall the results from the questionnaire showed that most people thought that Prof. Tanda was an 'interesting' character. Other key words included fun, friendly, quirky, perverse and non-patronizing. One player said, "I felt like I learnt something but did not feel 'taught'". In this respect it felt like we had successfully achieved our objective, both in terms of characterization and content creation.

Some issues that cropped up were the length of interaction for each session: "I didn't warm to him (Prof. Tanda), because of the constraints of the technology his answers and the length of interaction was very short." 2 people were unsure if he was serious or not. This may again relate to the length of time the game was played for.

We asked the question: What would have made you engage with Prof. Tanda more? Participants were able to make multiple choice selections. We found that participants wanted the following (*numbers relate to the amount of responses*):

19 Activities that felt more tailored to you

Figure 7a. BT's Widgets appear on your desktop and can act as a survey/game. It may be possible to integrate Prof. Tanda and the Widget system in the next stage of development, as many users liked the idea of Prof. Tanda appearing on the desktop of their computer.
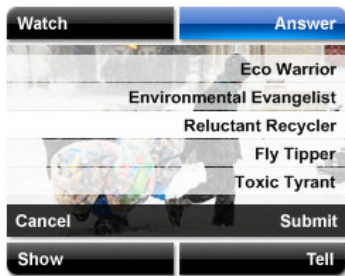
Figure 7b. The Widget asking, "how would you identify yourself?". From this we can see that question sets may be taken from Prof. Tanda and used with the widget.

16 Content tailored for particular places= e.g. things to do on the bus
9 More jokes/absurdity
5 Less jokes/absurdity
9 Better jokes
10 A clearer goal as a player
13 More feedback in relation to the goal
9 More physical activities
17 More practical experiments
2 More information/statistics about C02 emissions
9 Clearer actions to take as a player
16 Being able to review my game or my score
12 Being able to monitor environmental levels e.g. carbon monoxide noise light in your environment

Other replies suggested that the players would have changed their behavior and have been persuaded more if the information and tasks had been tailored to themselves. More contact/playing more was an issue, players wanted to build a stronger relationship with Prof. Tanda. One good suggestion related to the smaller things that people could do, for example, installing low energy light bulbs. This may also tie in with an emphasis of economic savings as well as the feel good factor and relate to the fact that users that wanted more practical tasks.

When examining future development of the game we found that a majority of players would have liked to interact/play against each other and have the ability to pass the game onto other people

We asked: Are there any other ways Prof. Tanda could be played, or places that you'd like to see him? And found the participants chose:

14 As a character on your desktop (see figures 7a & 7b)
5 As a pop up on a TV show
4 As a Voice call/leave a spoken message on your phone
9 Via email - Receiving links to further information
10 Save to your phone for later
7 Send Prof facts to friends
This will feed into the next level of our design.

Future Design
The results from the questionnaire suggested that players would have liked the experience to last longer and would have like to have played between 1 to 6 months. The promise of this extra time being much more in-depth content and comparisons from week to week to measure how changes of behavior change your energy consumption.

This raises the issue of how much content would need to be authored, how it could be tested, visualized and intelligently tweaked once it's in the system.

12 days required 36 question sets at only 1 triggered set per day – in 2 cases people who only played at work ran out of content. Over a longer game, more distinctions between player profiles would occur and hence many more exceptions, customization and strands of content would be needed for each player to play over this time.

Feedback showed that sessions that did not account for someone's circumstances annoyed players, e.g. advice about shopping for seasonal vegetables when they get it locally delivered. The more detailed our knowledge

and questions are, the more likely it seems they'll be unaccounted for circumstances.

Potentially, a generic 'does not apply to me' option in could avoid frustration with a field to enter descriptions about the issue. These could be periodically reviewed and the system updated.

It feels clear that practical activities were popular, however, these were the most time consuming to construct. Experiments were physically walked through several times to check for potential problems. Researching, writing and trying out an experiment based session takes a minimum of a day with additional testing by someone other than the author to identify potential problems or exceptions in the logic. Over a longer period, some kinds of larger structure would be useful to help build a sense of progress through the game.

ORCHESTRATION

As the amount of content increases the interfaces become harder to navigate. For example, choosing a question to add to a question set requires selecting the question from a pop-up menu with about 300 entries in an unknown order. For a longer game these menus will easily run into 1000's of entries.

Sorting pop-up menus based on relevant properties, eg. PossibleFact for questions would be helpful though in the long term they may need to be replaced with a tool for quickly searching and filtering list views.

TECHNICAL ISSUES

The model of allocating content in a session, i.e. a trigger, context establishing question set and potential activity questions set in advance, suits a model of manually allocated game content, however, a fully automated system can potentially make these decisions 'on the fly'. This has the advantage that all information available at the time of triggering can be accounted for to assign content. This would be a critical development for the game as it would allow the game to be run without an operator having o orchestrate it. Potential key developments are:

- Switching from a phone based Python trigger application to server triggered MMS/SMS alerts
- Switching to WML for the Prof's dialogue

Potential options may be:

- Offering browser sensitive WML or XHTML pages for the Prof's dialogue
- Operator cell ID lookups at trigger times

The next stages of website development for a Prof. Tanda end of game website would be:

- Reviewing your profile
- Reviewing any scores or measures of energy use
- Reviewing game wide statistics
- Comparing your score/measures with that of other players
- Comparing your score/measures with similar players
- Including material/links/calls to action based on recent activity

Some suggested areas of added functionality were:

- Sending Prof. Tanda facts to friends
- Sending Prof. Tanda game to friends
- Having Prof. Tanda widgets on our desktop
- Receiving email links as calls to action
- Being able to review your score

CONCLUSION

We have given a detailed account of the development of the initial Prof. Tanda system and have examined some aspects of the user experience. In the next phase of development it is envisaged that the game will be fully automated and that the content will designed to give the user a longer, more tailored, task/mission-based experience. The game may also be developed as a text-based only mobile game and may even become web-based in order to get a larger audience. There are also plans to use this system as part of a nationwide television-based environmental campaign.
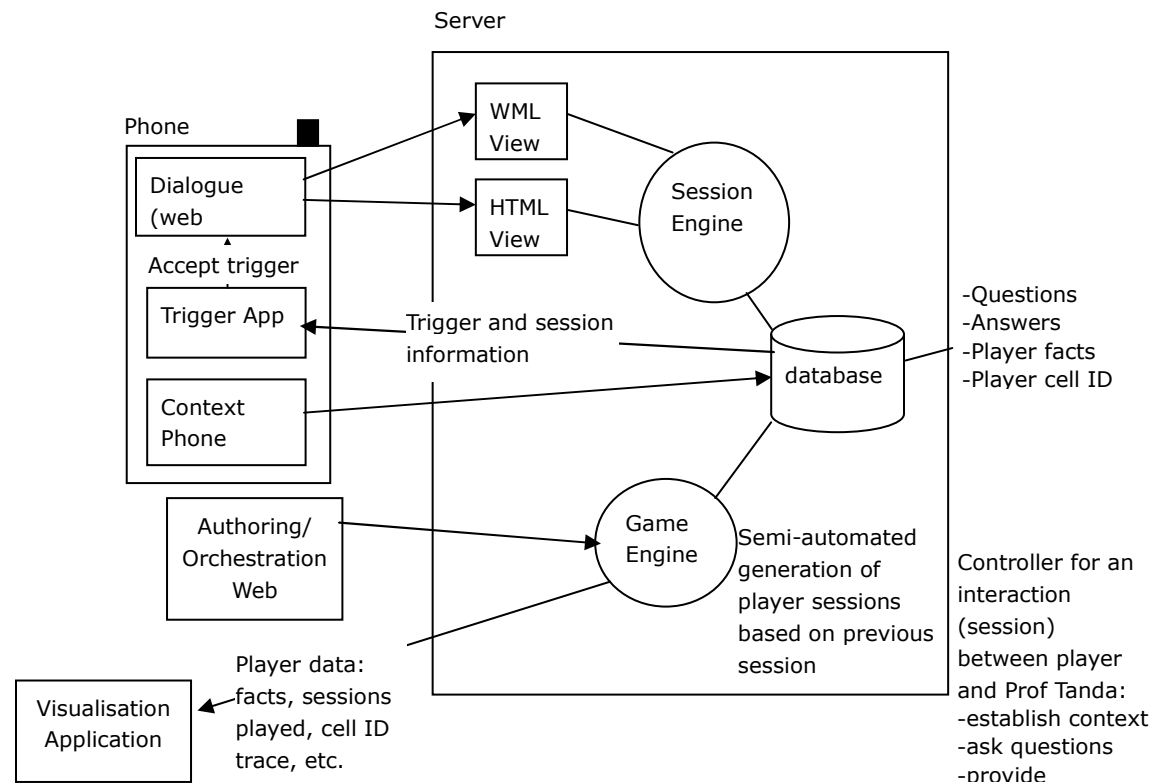
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Acknowledgements

Appendix 1   **The Session Engine**

Server

Phone

WML
View

Dialogue
(web

HTML
View

Session
Engine

Accept trigger

Trigger App

Trigger and session
information

-Questions
-Answers
-Player facts
-Player cell ID

database

Context
Phone

Authoring/
Orchestration
Web

Game
Engine

Semi-automated
generation of
player sessions
based on previous
session

Controller for an
interaction
(session)
between player
and Prof Tanda:
-establish context
-ask questions
-provide

Player data:
facts, sessions
played, cell ID
trace, etc.

Visualisation
Application

Prof Tanda System Architecture. This shows a diagrammatical view of the Professor Tanda sytem.