



*Integrated Project on Pervasive Gaming*  
**FP6 - 004457**

Work package WP12: *Showcase – City as Theatre*

**Deliverable D12.3:**

First Phase Game Prototype for the first City as Theatre Public Performance

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Version: 1.0

Release date: 28<sup>th</sup> August 2005

Status: *public*





## Executive Summary

The City as Theatre (CAT) showcase within iPerG is exploring artist-led pervasive games, drawing on the talents of artists to create novel and compelling experiences that offer visions of how more mainstream games might be in the future. This deliverable presents the first prototype of the software used to deliver out first experience, called Day of the Figurines.

Day of the Figurines is a public performance, which can perhaps best be envisaged as being a massively multiplayer board game that is played by sending and receiving SMS using standard mobile phones. Its aim is to provide players with a rich narrative experience through SMS messaging that combines interactivity and improvisation, but in a scalable way. Specific targets underlying its design are to: support one hundred simultaneous players; run for four weeks; and be playable by members of the public using their own phones.

Details of game play in Day of the Figurines, and the artistic inspiration behind the game design and a thorough explanation of operating and playing the game have been described in a previous deliverable, D12.2.

This deliverable presents the software that was developed for the first public prototype of the game, that was played for four weeks in July, 2005, presented at the Laban Centre. Similarly, evaluation of the game play and analysis of the lessons that can be learnt from it will follow in a future deliverable.



**Deliverable Identification Sheet**

<b>IST Project No.</b>	<i>FP6 – 004457</i>
<b>Acronym</b>	<b>IPerG</b>
<b>Full title</b>	Integrated Project on Pervasive Gaming
<b>Project URL</b>	<a href="http://IPerG.sics.se/">http://IPerG.sics.se/</a>
<b>EU Project Officer</b>	Albert GAUTHIER

<b>Deliverable</b>	<b>D12.3 First Phase Game Prototype</b>
<b>Work package</b>	<b>WP12 City as Theatre</b>

<b>Date of delivery</b>	<b>Contractual</b>	Month 12	<b>Actual</b>	Month 12
<b>Status</b>	version. 0.2		final <input type="checkbox"/>	
<b>Nature</b>	Prototype <input checked="" type="checkbox"/> Report <input type="checkbox"/> Dissemination <input type="checkbox"/>			
<b>Dissemination Level</b>	Public <input type="checkbox"/> Consortium <input checked="" type="checkbox"/>			

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<b>Abstract (for dissemination)</b>	<p>The City as Theatre (CAT) showcase within IPerG is exploring artist-led pervasive games, drawing on the talents of artists to create novel and compelling experiences that offer visions of how more mainstream games might be in the future. This deliverable presents the first alpha prototype of the software developed to support our first experience, called Day of the Figurines.</p> <p>Day of the Figurines takes the form of a massively multiplayer board game that is accessed by mobile players using text messaging. Its aim is to provide a rich interactive and improvised narrative to up to a hundred players over a month.</p> <p>The software is presented as a set of scripts to be installed on a web server. They provide interfaces for authoring and operating the game. We also provide the content that makes up the first prototype, with log data from the first prototype.</p>
<b>Keywords</b>	City as Theatre, Day of the Figurines, SMS, Test Messaging, Orchestration, Improvisation

<b>Version Log</b>			
<b>Issue Date</b>	<b>Rev No.</b>	<b>Author</b>	<b>Change</b>
05.10.2005	0.9	Flintham	Responses to reviewer comments
26.8.2005	0.1	Flintham	1 <sup>st</sup> draft of deliverable



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## 1 INTRODUCTION

The City as Theatre (CAT) showcase within IPerG is exploring artist-led pervasive games, drawing on the talents of artists to create novel and compelling experiences that offer visions of how more mainstream games might be in the future. This deliverable presents the first alpha prototype of the software developed to support our first experience, called Day of the Figurines.

Day of the Figurines takes the form of a massively multiplayer board game that is accessed by mobile players using text messaging. Its aim is to provide a rich interactive and improvised narrative to up to a hundred players over a month.

The software is presented as a set of scripts to be installed on a web server. They provide interfaces for authoring and operating the game. We also provide the content that makes up the first prototype, with log data from the first prototype.

## 2 GAME DESIGN OVERVIEW

Features	Day of the Figurines Game Design
<b>Research Goals</b>	<p>The software prototype provides an implementation of the game described in section 2. It is implemented as a set of PHP scripts that are hosted on a web server, and provides three main functions to implement the game:</p> <ul style="list-style-type: none"> <li>• The <b>authoring</b> web interface allows the creation of events within the game, which are defined to be active for a period of turns, and in a certain location on the game board.</li> <li>• The <b>operator</b> web interface is used to run the game. It is used to step through each turn, and generates movements for players, meetings between players, and events that affect players, which in turn result in the movement of figurines and the sending of SMS messages.</li> <li>• The <b>public</b> website allows players to login and view the status, location and history of their figurine.</li> </ul> <p>Figure 1 shows how these functions relate to game players, authors and operators, and also the web server used to run the game.</p>

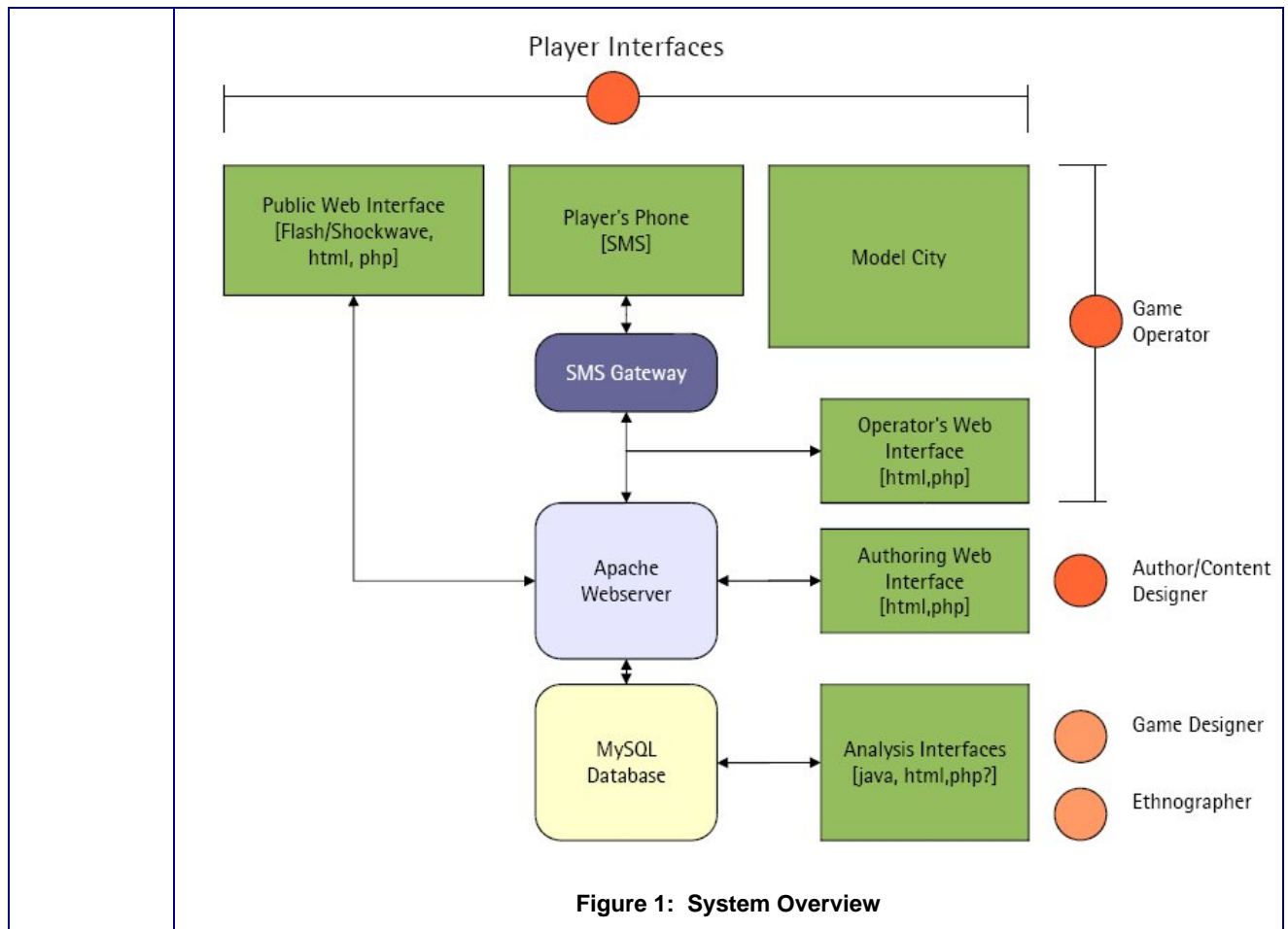


Figure 1: System Overview

<p><b>Game Setting</b></p>	<p>The work is sited in two places: a public space, such as a gallery, and the entirety of a mobile phone billing area, for example a country. Each game lasts between one week and one month.</p> <p>Visitors enter the public space where the work is housed to find a large scale model of an imaginary city at table height. The model is 1:100 in scale and extends for several metres in either direction. The model is constructed of card. A single sheet of card is used for the entire city. Printed onto the card are roads, street lights, traffic lights and the facades of buildings. Each flat feature is carefully sliced with a scalpel and bent to the vertical to create the landscape. The image is a mix of computer graphics and photographic collage.</p>
<p><b>Story Line and Game Play</b></p>	<p>Day of the Figurines is based on SMS message where players interact with the game through their mobile phones. The goal of the game is to help other players. The city has identifiable buildings such as the YMCA, the Big Chef, Video Zone, the XXX Cinema and the Battle of Trafalgar Square. There are other features such as a Cemetery, a Gasometer, a canal, a Railway Crossing and an Underpass.</p> <p>To play the game the visitor goes to a second table where they select a 2cm high painted figurine. They then give the figurine a name and answer a series of questions that define its initial characteristics – how does it walk? What does it like and dislike about other people? What is a notable feature of its appearance? And is it a lover or a fighter? These answers are written down on a postcard and handed to the game operators. After inspecting the game board, they then chose an initial destination in the city for their figurine. The player also gives the operators some other personal details including their mobile phone number.</p> <p>The game starts for that player when the computer selects a random location and puts the figure into the city. Each hour a turn is executed and the operator moves each figure in the game 2cm towards its current destination.</p> <p>Having set their figurine in motion and left the public space, the player receives text messages to alert them to the progress of their figurine. Texts will announce their figurine's arrival at a destination. Each</p>

	<p>destination has a short description. For example, if you arrive at the 'The One Club' you receive the SMS: "Home of the 2 Fs. The lock-ins are legendary, the fire escape stairs have seen it all." Having arrived at their destination players can choose to stay there or to select another destination.</p> <p>Texts will also announce when one figurine meets another. Each player will be texted the other's description and the players can then communicate by an exchange of text messages. These messages are anonymised so that the players only see each others figurine names, not real names or phone numbers.</p>
<b>Game Time</b>	<p>The game time takes place over the course of a fictional day (game time) with each turn representing six minutes. Pubs open, shops close, the car park gets deserted and a series of special events unfold – a fete, a gig that goes disastrously wrong, a fire and the arrival of a platoon of Arabic soldiers. During the course of these special events players are given dilemmas, either in the form of multiple choices or free form responses. Each choice leads to a different outcome. Very often it also leads to a degeneration of their character, reflected through its description (perhaps they bump their head, shake, or move in a peculiar way).</p>
<b>Web Interface</b>	<p>A web interface, at <a href="http://www.dayofthefigurines.co.uk">http://www.dayofthefigurines.co.uk</a> has information about the game and each player will have their own page for their figurine. Initially players see a limited view of a map of the city and have no sense of other players' locations but as they progress they will reveal more. They also learn information about each figurine that they meet.</p> <p>While not essential for playing the game, they provide an out-of-game point of contact for players, and historical information about the players' figurine. The web page allows the player to access a localized map showing where their figurine is, their current appearance, and gives them information about the in-game time and weather.</p> <p>Players log on with their email address and secret word. The PHP scripts that generate the interface draw data from the live game database to show the player the state, location and history of their figurines.</p>

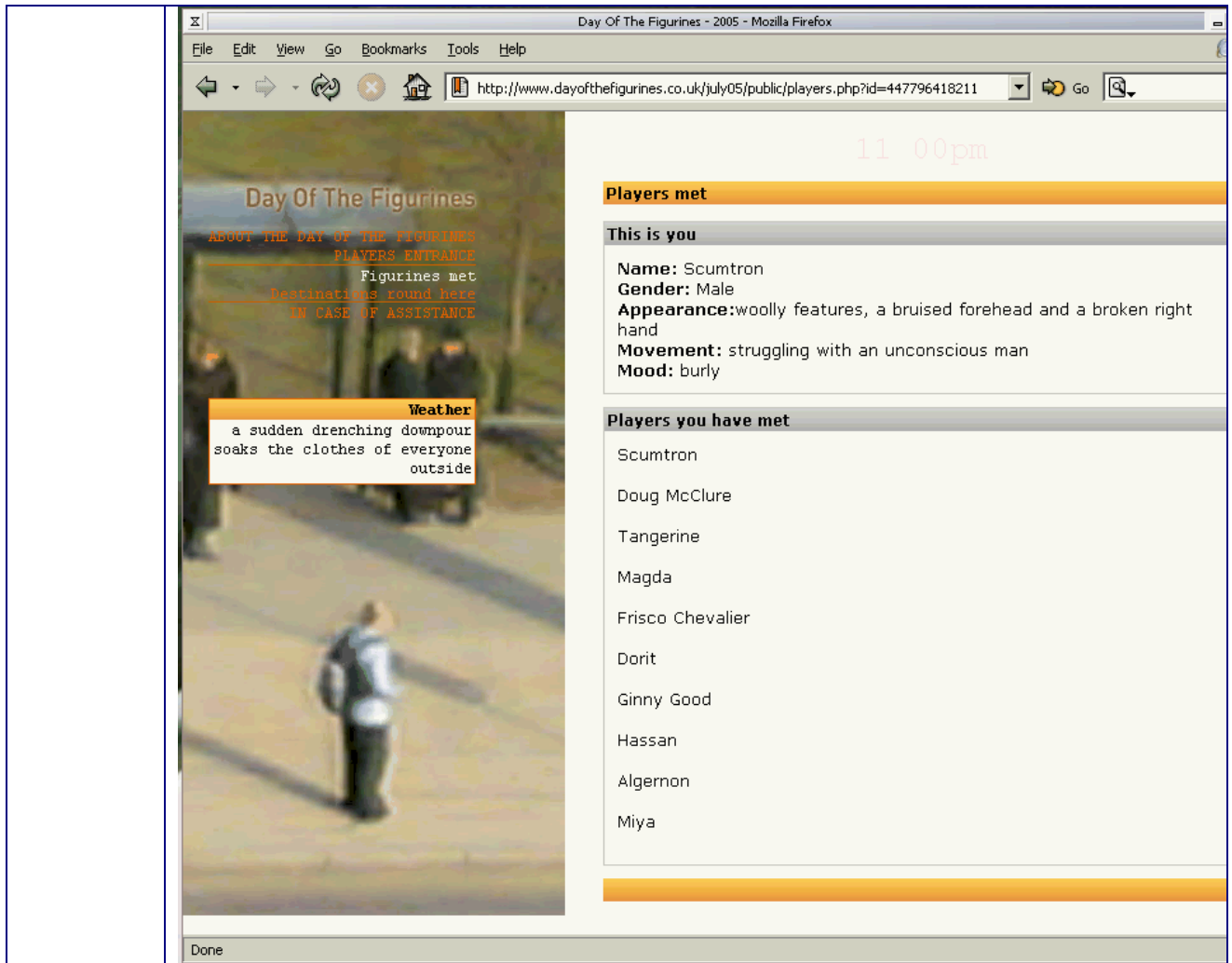


Figure 2: Public Interface

**Automation: Destination Routing**

The other system of notable interest is the route finding and movement system. As mentioned previously, a figurine moves along the shortest path to their current destination. It was discovered that PHP was not a suitable language for such processor intensive algorithms such as route finding. This was largely due to the fact that the commercially hosted web server used to develop and run the game limited PHP scripts for running for longer than 30 seconds, and the time taken to develop a complex system using PHP 4, a language not specifically designed with object oriented programming in mind, was high compared to other languages. This led to the implementation of a pre-processing and caching system.

The colourmap that defines the spatial layout of the destinations was populated with waypoints, in the form of blue pixels. Offline, routes were between these waypoints in the form of pixel by pixel steps, and then calculated the shortest routes between all combinations of the waypoints, using the A\* algorithm. The resulting routes were then stored in the online database. This was possible because the map is static throughout the entire game.

Offline route calculation is facilitated by **route.exe** provided in the **Utils** directory. It is a C++ application that searches colourmap data for blue waypoint pixels, then brute-forces all possible routes between these waypoints. The program outputs SQL queries that can be used to directly insert the routing data into the database.

When a figurine updates its destination, A\* is again used to find a route to the nearest waypoint on the colourmap to its current location. Secondly, a route is found to the nearest waypoint to the point

	<p>representing the destination. As the distance from any point on the colourmap to a waypoint is relatively small, this calculation can be done quickly, and does not risk the PHP script timing out.</p> <p>Finally, these two routes are combined with the shortest route between the two waypoints, extracted from the database. This route is then stored as part of the figurines profile. When the figurine moves, their next step is extracted from this route entry, which is very fast in comparison to calculating the entire route.</p>
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### 3 GAME REALISATION

Features	Day of the Figurines Game Design
<b>Requirements</b>	<p>1. A web server running PHP (<a href="http://www.php.net">http://www.php.net</a>) version 4 or above, with a compatible MySQL (<a href="http://www.mysql.org">http://www.mysql.org</a>) installation. The game software is not operating system specific. For the prototype the game was hosted by a commercial shared hosting service, giving 600MB disk space and 10GB data transfer per month, which proved sufficient.</p> <p>2. An SMS gateway service with a web interface to allow the sending and receiving of messages via PHP.</p> <p>In the prototype installation described in D12.2, the SMS gateway service used was purchased from <a href="http://www.hslsms.com/">http://www.hslsms.com/</a>. This service charged a monthly fee of £30 with each message sent costing £0.045. There was no charge for receiving an SMS.</p> <p>Text messages were sent to the service via an HTTP request, with the text to be sent included in the request URL, combined with an MD5 hash of the recipients phone number, the account name and password.</p> <p>Text messages were received from the service by it making an HTTP request to the web server using a pre-defined address. The sender's number and message can then be extracted from the URL. This mechanism is also used by the service to deliver message receipts indicating when an SMS has been successfully delivered to the recipient.</p> <p>Full details of the API used can be found at the address below: <a href="http://www.hslsms.com/documents/HSL.HTTP.SMS.Interface.pdf">http://www.hslsms.com/documents/HSL.HTTP.SMS.Interface.pdf</a></p>
<b>Installation</b>	<p>The directory named <b>website</b> contains scripts and html content to be uploaded to the web server. Within this directory are several subdirectories, the contents of which are explained in full later in this document:</p> <p><b>Authoring</b> – contains scripts used to author and edit game content</p> <p><b>External</b> – log viewing and status scripts that are made available for external viewing</p> <p><b>Maps</b> – images and colourmaps used by the system</p> <p><b>Operator</b> – contains scripts used to operate the game</p> <p><b>Public</b> – the publicly accessible web interface for players</p> <p><b>Utils</b> – miscellaneous utilities for installing and debugging the game</p> <p>The <b>website</b> directory also contains scripts and functions that are shared by all of the specific directories, such as database connection configuration and colourmap functionality.</p>

	<p>The <b>mysql_content</b> directory contains files that may be imported into the MySQL database to construct the correct database structure, and to populate it with the content defined for the first prototype.</p>
<b>Messaging</b>	<p>In this prototype, SMS messaging is provided by an external, commercial SMS gateway service. Messages are delivered by this external host making an HTTP request to the script located at <b>website/receivesms.php</b>. Similarly, the script <b>website/operator/event.php</b> sends messages by making an HTTP request to the external host. These files would need to be customised on a per-host basis, and as such the software in its current state will not send or receive messages.</p>
<b>Authoring</b>	<p>When the software and database are installed, the authoring interfaces will be available at the following address:</p> <p><b>http://&lt;host&gt;/&lt;installdir&gt;/authoring/</b></p> <p>This allows existing content to be browsed and edited. It is expected that this directory is password protected using htaccess, to prevent unauthorised modification of the game.</p>
<b>Operating</b>	<p>Similarly, the operator interfaces described in the previous deliverable are available at the following address:</p> <p><b>http://&lt;host&gt;/&lt;installdir&gt;/operator/</b></p> <p>Again, this directory should be password protected, so that only a designated operator may run the game.</p>
<b>Testing</b>	<p>The setup can be tested by stepping through a turn, using the operator interface. This is described in detail in the previous deliverable.</p> <p>The current version can also be found at the following addresses:</p> <p><a href="http://amutualfriend.co.uk/dof/july05/operator/">http://amutualfriend.co.uk/dof/july05/operator/</a></p> <p><a href="http://amutualfriend.co.uk/dof/july05/authoring/">http://amutualfriend.co.uk/dof/july05/authoring/</a></p> <p><a href="http://www.dayofthefigurines.co.uk">http://www.dayofthefigurines.co.uk</a></p> <p>A history of messages queued and sent for each player can also be found in the operator interface.</p>

#### 4 GAME CONTENT

Features		Day of the Figurines Game Design
<b>Messages</b>	<p>The system has an internal message structure which is used for all messages. This message type contains a variable that defines whether a message is:</p> <ul style="list-style-type: none"> <li>• incoming and is unread</li> <li>• has been read and flagged</li> <li>• has been queued for previewing</li> <li>• has been sent</li> <li>• has been discarded (i.e., deliberately not sent)</li> <li>• has been sent and received</li> </ul> <p>Each message is stored as a line in the “gamelog” table of the database, allowing a message to be updated at any point; with associated timestamps being recorded when each of these actions occurred.</p> <p>When a message is generated by the system, the message is flagged as being of a certain type. This type is used to generate appropriate message content from a template. Similarly, incoming messages are manually flagged as being of a certain type by the operator.</p> <p>In order not to overload players with too many received text messages, an important feature of the system is that messages are not automatically sent without first being approved by the game operators. An operator may view all messages that are queued to be sent at any time. They may choose to send the messages or discard them. If a message is discarded, it remains in the database but is flagged as such. If the message is sent, then the message is transformed appropriately and sent to the external SMS gateway, this responds with a unique SMS id, which is stored in the message structure.</p> <p>The message has now been sent, and is flagged. When the message is received by the player’s phone, the SMS gateway will deliver a receipt using the unique SMS id, allowing the message status to be updated in the database.</p> <p>One message is a special case in the database, it has a specific unique identifier, and is used to store the current game turn, the only piece of data that is not content, nor is it specifically related to one player.</p>	

#### 5 USER INTERFACES

Name	Purpose
<b>Operator interface</b>	<p>The operator interface is used for running the game. The operator is responsible for classifying incoming messages, which appear on the inbox page, reviewing and customizing outgoing messages generated by the system, and physically moving figurines to the locations generated by the system. All events within the game are described using a message, including text messages sent and received, and messages for operator use, such as location updates.</p> <p>The game rules that the system implements are described in detail in section 3.3.2 of D12.2.</p>
<b>Author interface</b>	<p>The authoring interface web pages allow an author to enter content into the system. As described in section 3.3.6 of D12.2, content may be spatially or temporally triggered by the position of a figurine on the game board or by the current turn respectively.</p> <p>Spatial content is generated and authored using a ColourMap. The ColourMap is presently authored offline to create spatial regions, and then uploaded to the web server. ColourMap functionality is provided by <b>colourmap.php</b> which retrieves the colour of a specific pixel,</p>

which is then used to look up a particular content string in the database.

Temporal content is defined using the Timeline Event editing interface within the authoring section, which provides a table showing all turns for a game. Content can be added and viewed using this table.

Content may be added, edited or removed at any time during the game.

A detailed description of authoring and adding content and of the creation of the ColourMap can again be found in section 3.3.6 of D12.2. Screenshots of the interfaces are shown in the figures below (Figure 3 to 7).

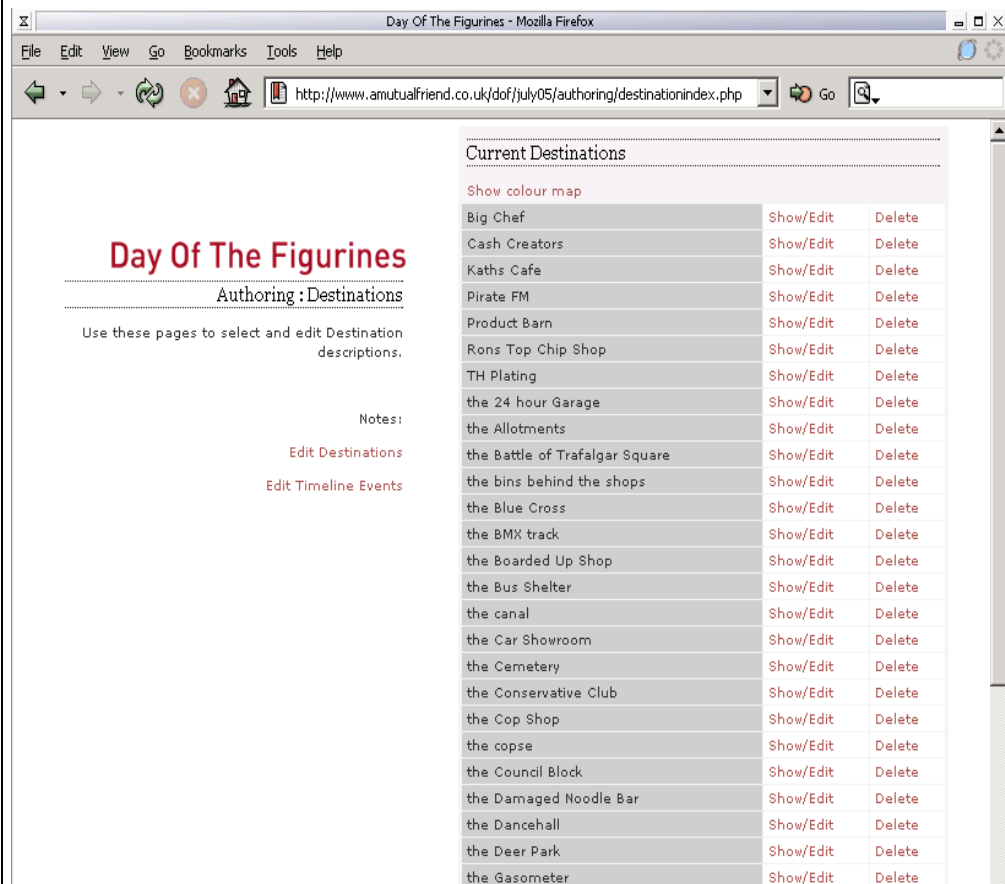


Figure 3: Destination Overview



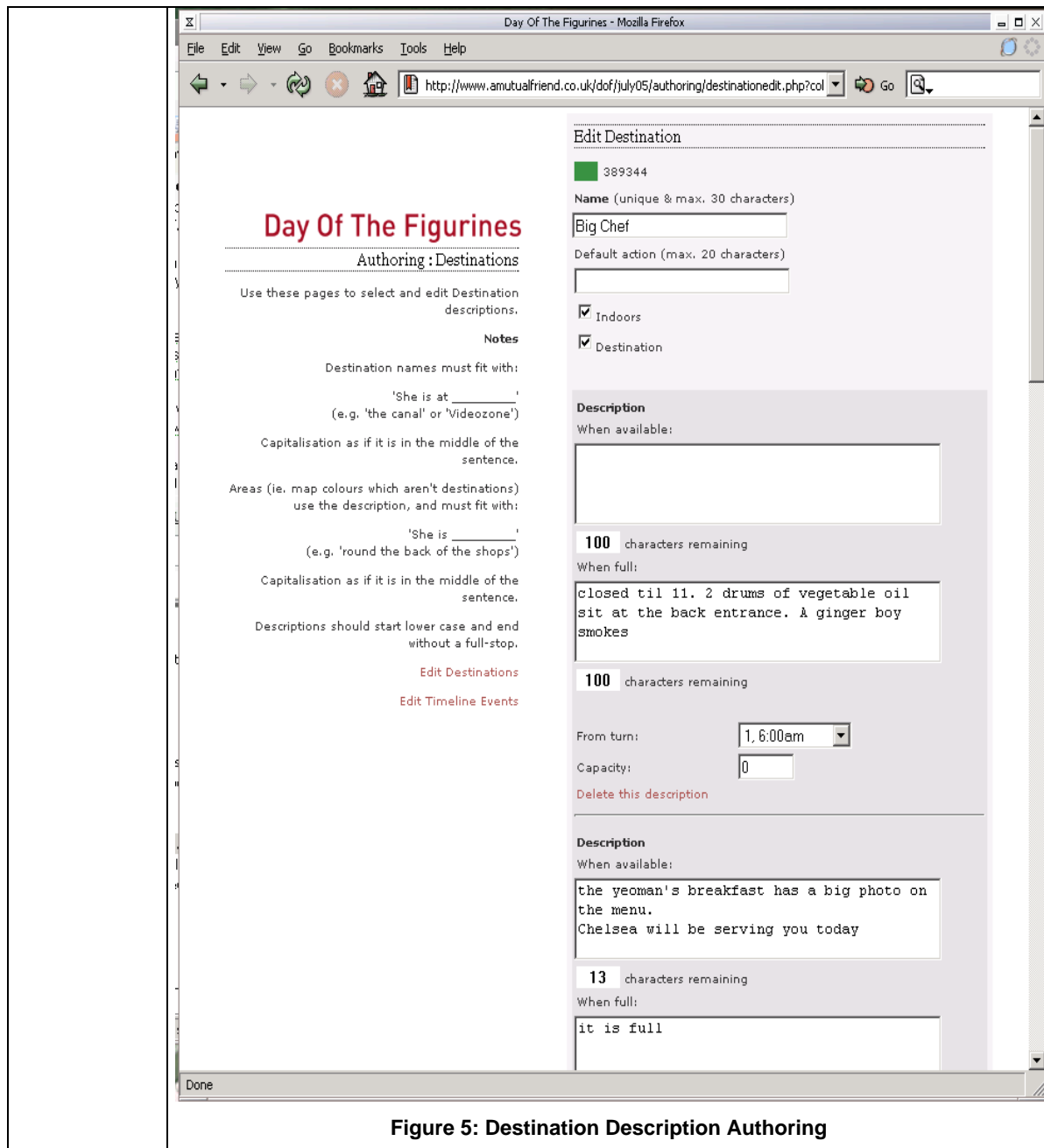


Figure 5: Destination Description Authoring

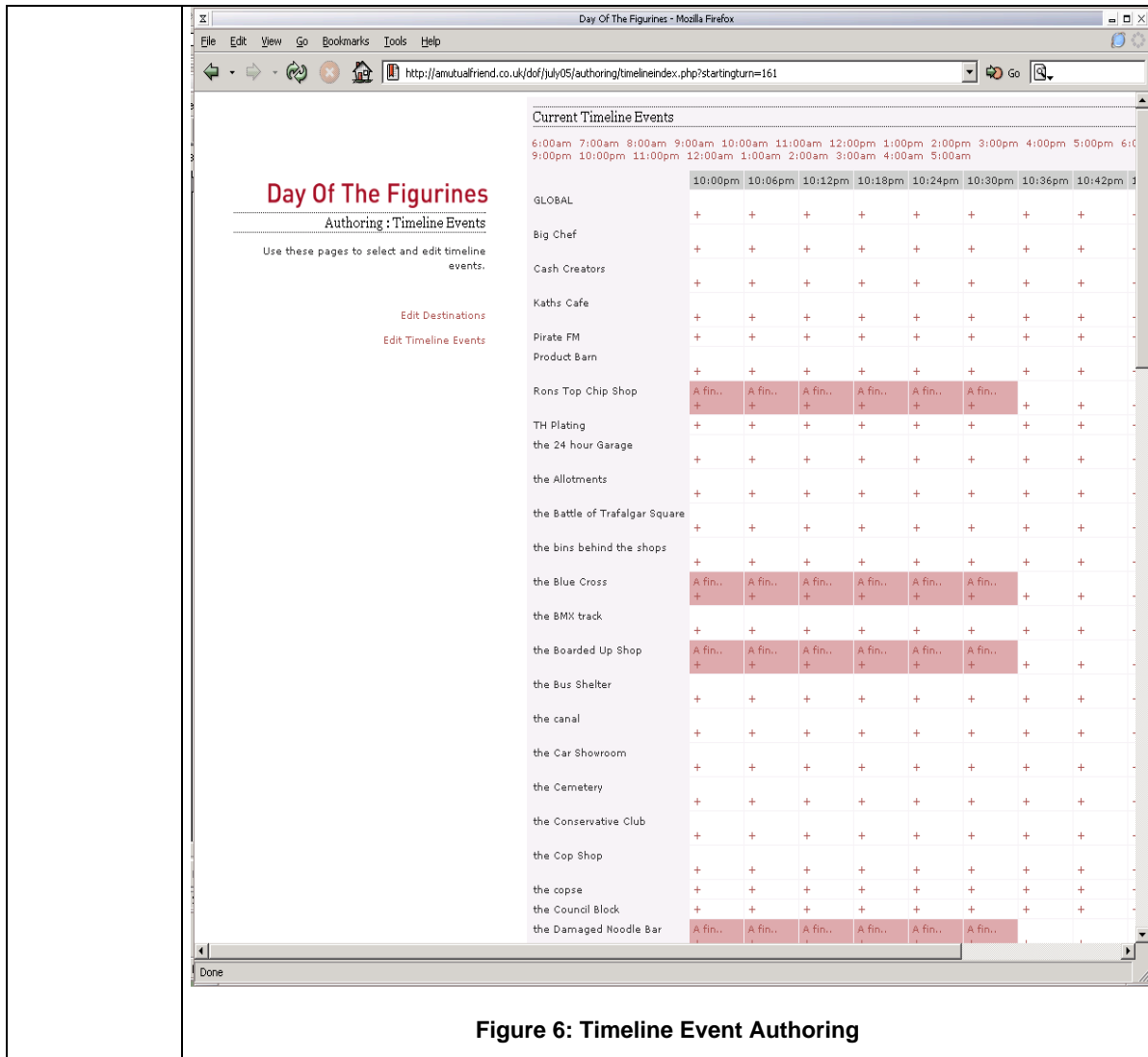


Figure 6: Timeline Event Authoring

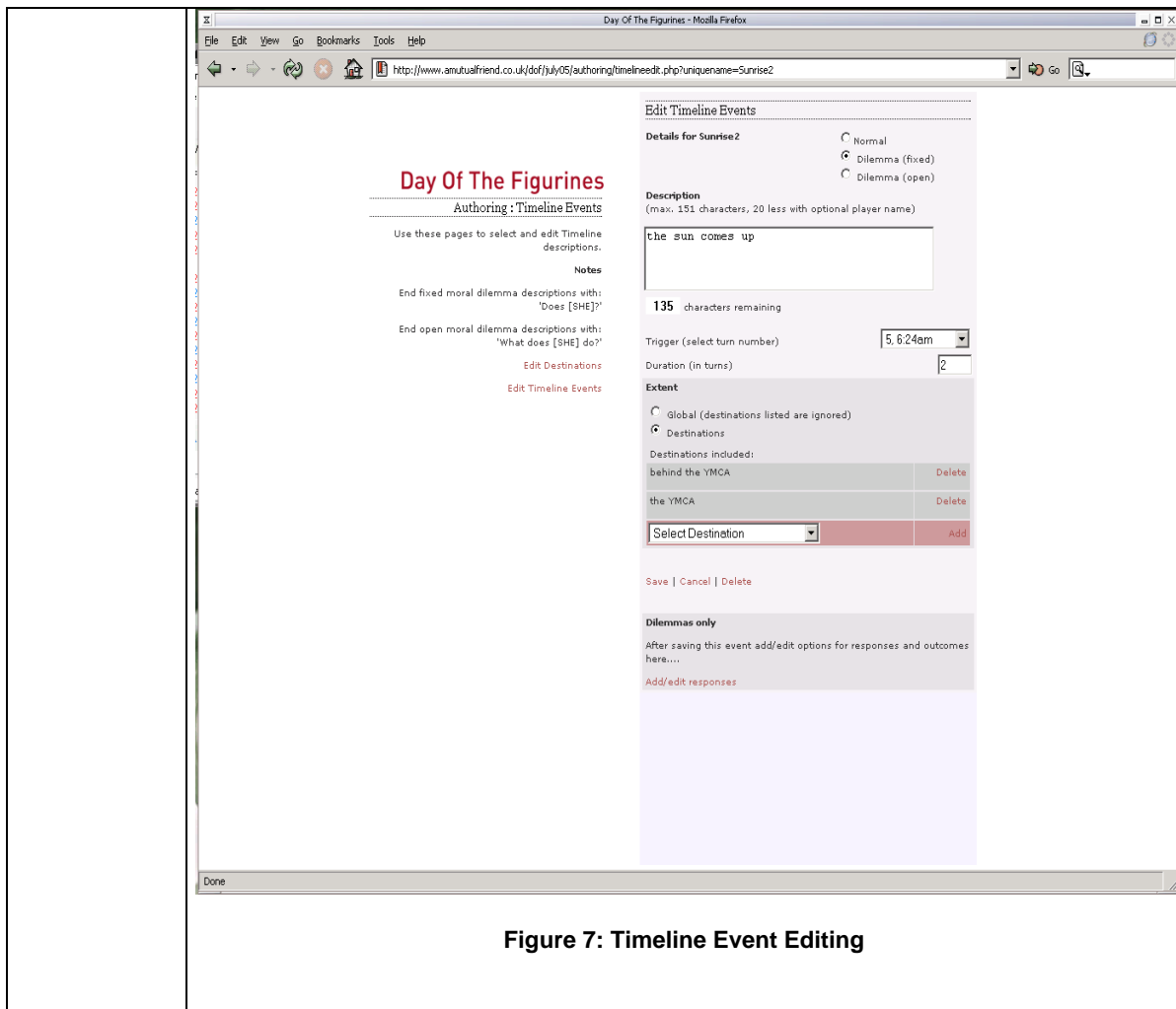


Figure 7: Timeline Event Editing