Virtual Reality Storyboard

The case of the Visual and Acoustic Tour of the Baptistery of Pisa

DHX IST-2001-33476
Deliverable D2e.4 - Storyboard for the research prototype scenario

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ABSTRACT

This report contains the detailed storyboard design of a non-linear story that describes a virtual visit of the Baptistery of Pisa, developed within the European project DHX - Digital Artistic and Ecological Heritage Exchange - IST-2001-33476, and described into the "Deliverable D2e.4 - Storyboard of the research prototype scenario" of the project. The scenario architecture makes use of digital storytelling and traditional dramaturgic concepts such as scenes layout, timing, emotional effects, proper use of sound and user interaction. The user can control and modify the narration development, access to historical artistic information and finally meet avatars of remote users and share the visit with them. The application is conceived to run either in a local virtual reality system in a museum or in a multi-site multi-user networked virtual environment of museums that want to share cultural contents.

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The design of a storyboard that must be realized as a virtual reality representation is a complex task that should adhere to well defined criteria in order to meet both the initial narrative and informative requirements and the technical constraints. The latter can impose severe restrictions on the possibilities of representing objects and situations and must be considered when tracing the preliminary design of the plot.

The theme of the story, its development over time and into different virtual scenes, is the starting points from which most of the subsequent choices depend.

Several questions require attention prior to tackling the details of the design. For this reason it is good practice to start with a preliminary storyboard definition with the aim of tracing an overview of the basic content and functionalities of the representation. In fact in this early stage the technical feasibility of the realization as well as the structure, the coherence and effectiveness of the story should be assessed.

The preliminary design of the storyboard creates the basic framework from which a detailed storyboard definition process can be safely started. Of course a feedback cycle of detail adjustments is normally required. At the end of this latter phase all the definitions and the structure of the storyboard will be available for the implementation, including the of the modeling of the objects and the actual scene graphs.

Preliminary storyboard definition

The preliminary storyboard definition is meant to give a basic overview of the content and functionality of the scenario. First of all the main concept around which the story is built should be made explicit. In this case the final goal is to create a virtual tour into the Pisa Baptistery, even allowing the close view of fine details, not normally accessible to the general visitor, to experiment special effects, such as light changes or audio effects, and to complement the information with audio/visual means.

The main objects of the story must be defined together with their level of detail and representation. The level of interaction with the objects and the environment is to be established. The major scenes and their relationships, with the proper text, light and audio effects, are now drawn to build up the plot of the storyboard.

The target environment and potential public should be well analyzed, in order to calibrate the tour information contents. This is a delicate task and very important for the final effectiveness of the representation. The size and type of the environment and the size of the representation system will deeply influence the choices of how to show scenes and organize the tour inside the virtual space. Important at this stage is a state-of-the-art survey on available VR technologies and authoring tools.

Detailed storyboard definition

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After having configured the basic structure of the story, the main
objects, the scenes and their relationships the definition process
proceeds with a detailed description of all the scenes with all
the objects involved and their characteristics, the needed text
and sound, the structure of the paths within the scenes, the
possible interactions, the audio and light effects, the use of
video, the presence and role of avatars.
The authoring tools for modeling and for realizing all the other
VR representation tasks must be selected in order to create a
coherent and efficient development environment. In fact these
decision bear a profound impact on the actual implementation of
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the storyboard and must be carefully weighted at this stage. The scene management software, the type and power of the computer system to be used, the available interaction devices, and so on will influence the final rendering of the storyboard during a virtual performance. In the following the details of the storyboard definition will be described.

Analytical definition of the storyboard research prototype scenario: visual and acoustic tour of the Baptistery of Pisa

THEME

The Baptistery of Pisa ("Battistero") is one of the four main ancient buildings that make the Piazza dei Miracoli one of the most famous places in the world. The Leaning Tower, the Cathedral, the Cemetery and the Baptistery stand actually as cultural heritage of the whole humanity: a source for artistic and historical searchers, tourists, schools.

Founded in 1152 by the architect Diotisalvi and completed two centuries after, the Baptistery is a masterpiece of structural and architectonical handicraft: its impressive inner space, determined by two orders of high columns disposed around the Christening Font and surmounted by a double-shaped dome, contains another masterpiece of sculpture: the Pulpit by Nicola Pisano.

A real visit in the Baptistery is therefore a unique experience, made of architecture, sculptures, shapes, colors, space, and sounds.

Keeping this in mind, we conceived a virtual visit to the Baptistery as a story that starts at the ground floor of the building. The user can explore it in its visual and acoustic aspects: in fact, the Baptistery has special acoustics determined by its architectonical structure. The story evolves in two possible ways that the user can choose: an automatically guided tour or free navigation. Never let alone, the user can obtain help and hints even in the free navigation mode by automatic guides that attend him discreetly.

The story develops from the ground floor tour, with several scenes focused on objects of interests - the Pulpit, the Presbytery, the Christening Font - up to the Women's Gallery, where the user can have a panoramic view of the whole Piazza looking thru the windows. All the information that the user can get in the scenes on specific themes is enriched with audio-video clips. The user can also experience the acoustics of the Baptistery, through the guide singing some notes or trying by himself.

But the user can also do things that are impossible in a real visit to the monument: he can "cut" the building making a real-time cross-section, or he can change the light accordingly to different hours of the day.

The user meets other remote-connected users in the Baptistery, shown as avatars, and he can actually speak with them. In special cases, such as for an historian or art specialist, a user can obtain special privileges to become a guide for other remote users: this means that he can show everybody his explanations and offer to the remote users the possibility to look thru his eyes in the meantime.

Setup

The main intention of the story is to offer to the visitor an immersive experience of the different aspects of the Baptistery of Pisa, on both sides: real and imaginary.

The real side is comparable with an actual visit to the building: to simulate a convincing replica of the Baptistery, with realistic visual and acoustic features (the simulation of the special acoustics of the building is one of the key features of the whole experience and of the research project as well).

The imaginary side is what a real visit to the Baptistery cannot offer and that cannot be experienced in the real world: to reveal the most hidden aspects of the building structure by creating a real-time cross-section of the building, to change lighting from dawn to sunset in a short while, or to provide valuable information such as comparing the monument with other external artistic objects. The informative and spectacular aspects are tied together in this kind of approach.

Another important issue is the possibility to access further information about the building and to discuss about them in real-time by meeting a remote connected user, shown as avatar. The avatar can have the role of a guide (that can indicate and explain special features and details of the building) or simply to be another visitor in the "virtual tour" of the Baptistery.

In this story the user has a high degree of freedom but, at the same time, he has always a clear vision of what he can do and where he is: the automatic guides serve as hints for the user.

Last, but not least, the project of the general plot for visiting the Baptistery can be enriched of new data points, without modifying the narrative structure. The basic story we have developed is quite simple and can be enriched in the future with new data and configured for different classes of users. By using pre-defined audio/video clips connected to objects/points of interest, the user can choose when, where, how much information to get.

Launch

The story starts from the exterior of the Baptistery: when a user activates the pointing device, the "screen saver" (a stylized 3D representation of the whole Piazza) flows smoothly into the first scene, welcoming the visitor.

Story

The story develops thru the inner space of the Baptistery. Once entered the building after a short welcoming scene, the user meets the first of the four automatic *guides* that populates the Baptistery, that helps and suggests him about what he can do and how.

This first *guide* gives the user the essential information about the navigation modes and the control buttons that are placed on the menu bar.

The user can choose two different navigation modes: the *guided tour* and the *free navigation*.

In the *guided tour* the user is led sequentially via a pre-computed path thru the various main objects and features of the Baptistery, from the start at the Ground Floor up to the Women's' Gallery external views. The path is articulated in various *narrative nodes* (for example: general introduction to architecture; the Christening Font; the Presbytery; the Pulpit and Nicola Pisano; the construction across the centuries; etc..), each one related to a specific location in the Baptistery. The user can stop, skip, forward and rewind the narration thru the nodes by the standard buttons placed in the *menu bar*, and can exit the

automatically guided mode in every moment. He can also re-access the *automatically guided* mode at any time, starting from the *nearest narrative node* (for example, if he is in proximity of the Pulpit, this will be the starting point) even if he can go back to the beginning using the controls on the *menu bar*. During this kind of tour, a voice-off narrates historical and artistic information.

In the free navigation mode the user is free to move into the space of the Baptistery exploring its features and main objects. The user walks, being linked to the ground (i.e. he cannot "fly"), hearing the sound of his own steps, and can approach the objects and architectural parts but cannot get closer than a predetermined distance (a proximity detection method assures that the user cannot go further the geometrical and texturing resolution of the objects).

The three automatic guides placed at the ground floor suggests the user to select the main interesting objects, such as the Pulpit, the Presbytery, the Christening Font, or the columns ring, to get audiovisual information about the history of the building and its details: in this way the user accesses several scenes in which audio-video clips are presented in a window placed over the 3D interface.

The user can also access special features and effects that are possible only in the virtual space and not in a real visit: the cross section of the building (activated by a button on the menu bar available once the user is in proximity of the columns ring of the ground floor) and the light change of the whole inner space (activated by a light dimming cursor on the menu bar available once the user is in proximity of the Christening Font).

The aforementioned guides also suggest the user to try and experiment echo effects determined by the very special acoustics of the Baptistery by selecting sounds or by singing notes.

When the user ends the tour of the ground floor, he climbs the stairs that lead to scenes in the Women's Gallery. Here the user meets the fourth automatic guide, he can walk through the balcony around the center of the Baptistery and look downward to see the Christening Font, the Pulpit or the mosaic floor from a higher point of view, he can get more audiovisual information about the history of the construction of the building by selecting the columns ring of the Women's Gallery. The user can also look thru the windows at the surroundings of the Baptistery (including the whole Piazza), and get further information about the history of the site.

The story ends once the user has completed the tour, and starts some sort of gentle "flight" from the Women's Gallery out of the main door from which he entered, via a pre-computed path - some kind of a reward for his visit.

A special case is given when there is a super-user. A super-user is a special user that has "expert" privileges (for example, a real expert in history of arts): the effects he starts, such as the cross section or the light effects are visible to all the other connected users. This expert, with the role of guide, can simply invite the other users to follow him, or can offer them the possibility to see thru his eyes. In this case, the subjective visualization of one user is changed in the expert's one, until the user chooses to leave this visualization and to switch back to the normal view.

Dramaturgy

The story has at least two main climaxes: the real-time cross-section of the building and the light changing, that are impossible to experience in the real world. Other climaxes are linked to the sound experiment the user can try with the echo and the acoustics of the building.

End

Even if there is the possibility to stop the navigation/narration in any moment, the story naturally ends in the Women's Gallery, once the user has made a complete tour of the building: after a farewell by a voice-off, some kind of "flight" begins from the Women's Gallery (following a pre-computed path) out of the entrance door, fading out.

AVATARS AND CHARACTERS

Role

There are two main types of synthetic characters: the autonomous characters and the avatars. The first ones are automated characters that move and attend the user according to pre-computed animations and recorded speech. The second ones are the virtual representation of remotely connected users.

Autonomous Character Role

This characters have the role of giving basic information to the user about what he can do and how. There are four autonomous characters in the application; three of them can also perform "note singing" to experiment the acoustics of the Baptistery for the user.

In a distributed representation each scene can show the proper autonomous character, according to actual situation represented.
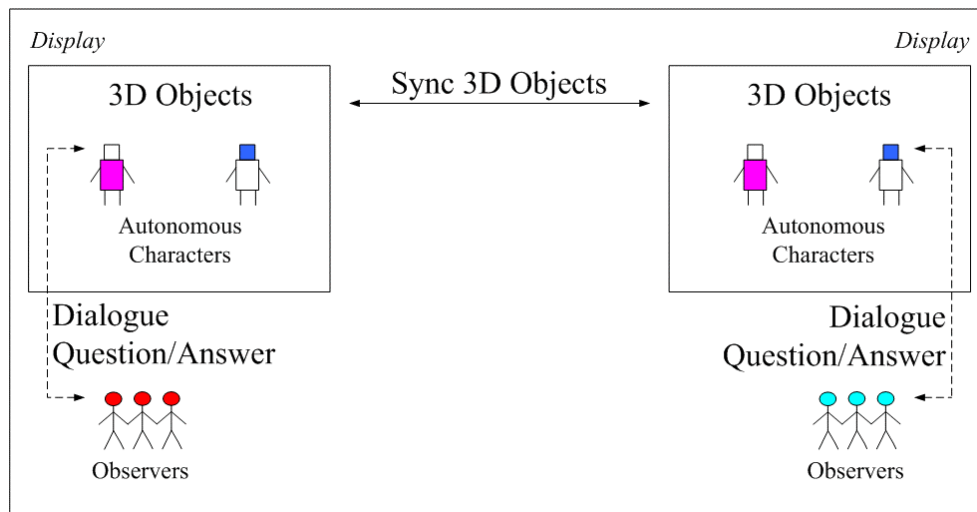
For instance the scenario above represents groups of persons at two locations that observe independent pre-computed tours. Two autonomous characters move in the scene and can be observed. If they meet in the same scenery, they will be seen at both sides. The movements and the speech of the autonomous character are program controlled and the observers can only watch the scene.

It is also possible that the observers at each side can ask questions to their autonomous character. The autonomous character replies program controlled. This dialogue is restricted to one side.

Avatar Role

The avatar has two main roles, depending on the kind of user they are linked to: normal user and super-user.

The normal user is a remote-connected user that is possible to interact with by real time speech (audio streaming).

The super user (with expert privileges) is an "higher level" user, that can supply information about the building as a guide or a teacher, and that can invite the other remote users to follow him or to place themselves in his point of view to look at the building features and details. There can be only one super-user per session.

In a distributed representation, for instance with two locations, on each side the avatar of the other site is displayed.
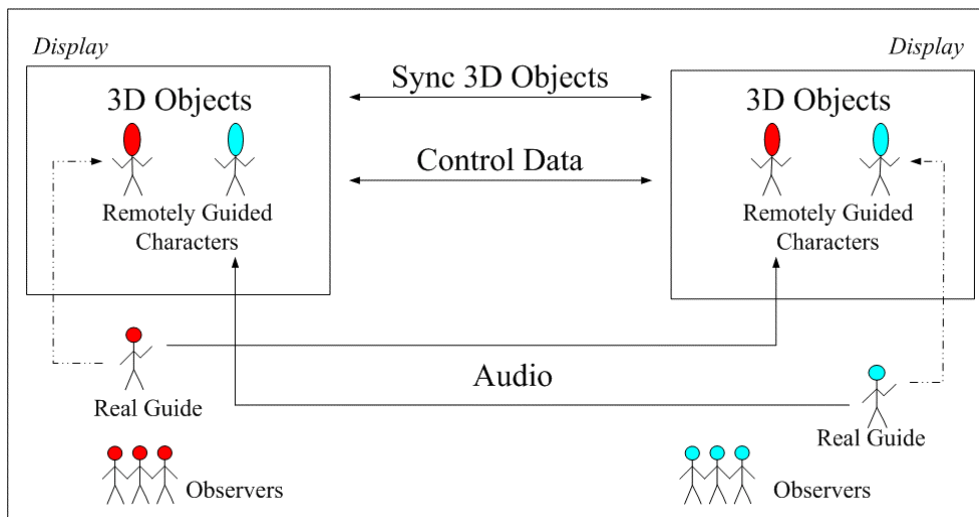
In the figure above two groups of persons observe the same scene at their displays. On each side a guide comments the scene. Both guides are integrated in the scene as remotely guided characters. Each guide controls the movements of his representation as remotely guided character. The remotely guided characters can interact within the scene and appear in the scene at both sides.

It is evident that in this scenario a visitor instead of the guide can be integrated by a remote user presentation.

The speech of each guide is transmitted to the remote side so that the guides can discuss a scene and comment it on the basis of their personal expert knowledge.

USER

Role

The general role of the user is the one of a typical visitor: it will depend on specific user interests and instruction to be either more interested in historical or artistic or simply "spectacular" effects and features of the Baptistery. The role of the higher-level user, the super-user, is the role of an expert, able to show and tell information or specific themes to other users.

SCENES OVERVIEW
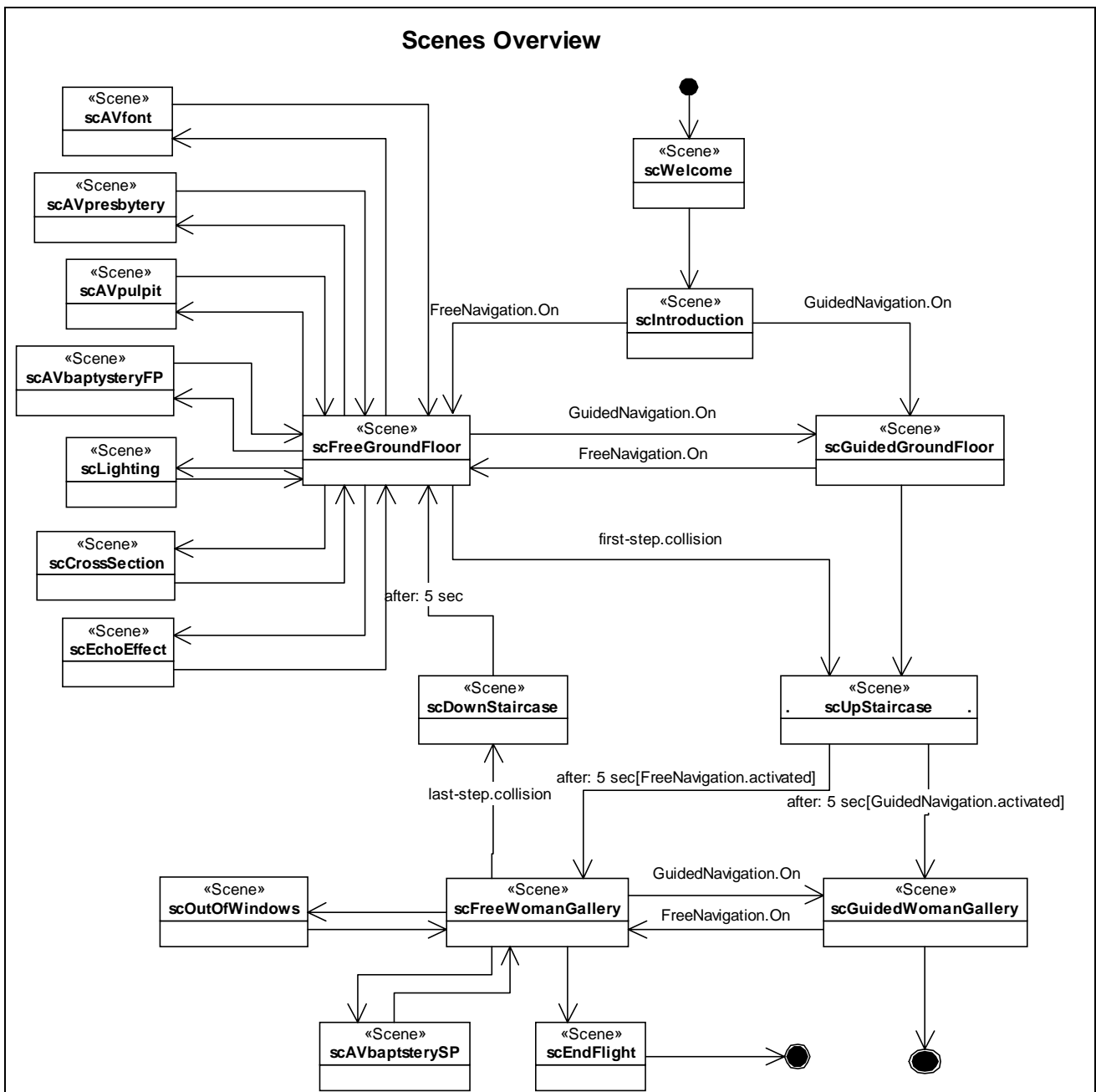
Figure 1. Scenes overview

CRITICAL FACTORS

Critical path

The user, in the *free navigation mode*, is free to navigate and explore the building. The user can move everywhere with the only constraint of objects collision.

In the *guided tour mode* the path is pre-computed, and flows smoothly from the beginning to the end, unless the user stops and exit from it.

Time management

The *automatically guided tour* mode has duration of about 10 minutes. The *free navigation* mode has a scene-based time management: each scene has got a maximum duration. When the time limit of a scene expires the user is invited by the voice-off to pass to another scene in a few moments (30 seconds, for example); if not, the story ends, fading out.

PRIMARY USER ACTIONS

System setup
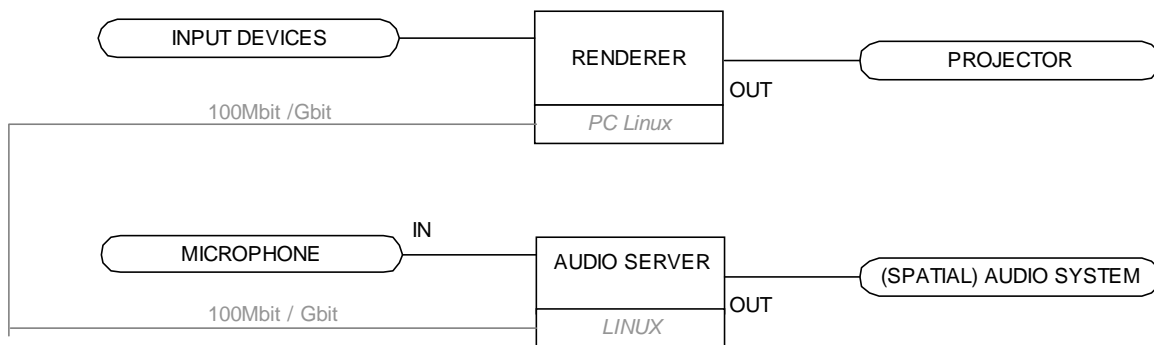
Figure 2: System setup.

Interaction

Selection /clicking:

> In selection mode the user moves the input device pointer over the desired object and pushes a button (to activate AV descriptions or to activate a guide voice).

Navigation:

> Free navigation mode: the user controls and moves his point of view in real time by means of a 3D input device such as a space mouse.
>
> Avatar navigation: the user controls and moves his remote avatar by means of the same 3D input device that he uses to control his local point of view.
>
> Staircase navigation: to go up-downstairs the camera motion is automatically run by the system, whether in free or guided mode.
>
> Guided tour: the camera motion is automatically run by the system as a pre-defined animation.

Special actions:

> The special actions *cross-section* and *light change* only affect the local environment even if a remote user is connected. They affect all the connected sites only when they are activated by the super user.

Avatar-actions:

> The avatar has a specific effect on the navigation through the scenes only when the super user guides it. Only in this case it controls the point of view of the remote user.

AV
Streaming:

> Only audio streaming is needed.

System controls
Menu interaction:

> A navigation bar appears in an appropriate position of the window when needed. It contains context sensitive buttons, i.e. the meaning of some buttons may change depending on the scene or the zone (Picture 20: Pulpit, AV Window and menu bar).

SCENES

SCENE [scWelcome]

Scene name
scWelcome

Scene description
The point of view smoothly approaches one of the doors of the Baptistery, while a short, soft background music introduces a warm voice welcoming the visitor and giving him a few preliminary information about the site, the building and what is going to happen. (example: "Welcome to the Baptistery of Pisa. You are entering this ancient and wonderful building which is part of the world-famous Piazza dei Miracoli."). The door gently opens and the visitor enters inside.

Scene time
Scene duration: 30 sec.

Scenery pictures
Picture 1: Baptistery exterior (photo).
Picture 2 The portal (photo).
Picture 3: The open portal (photo).

Scene requisite overview

Requisite name	Resources
myCamera	cameraAnimation_ID1

Scenery resources overview

Resource name
portal
portalSound
voiceOff_ID1
externalLightSet

Scene state machine

scWelcome State Machine

«»
Fade in exterior scenery

«»
Camera animation → «»
Welcome → «»
Fade out exterior scenery → «End State»
exit to scIntroduction
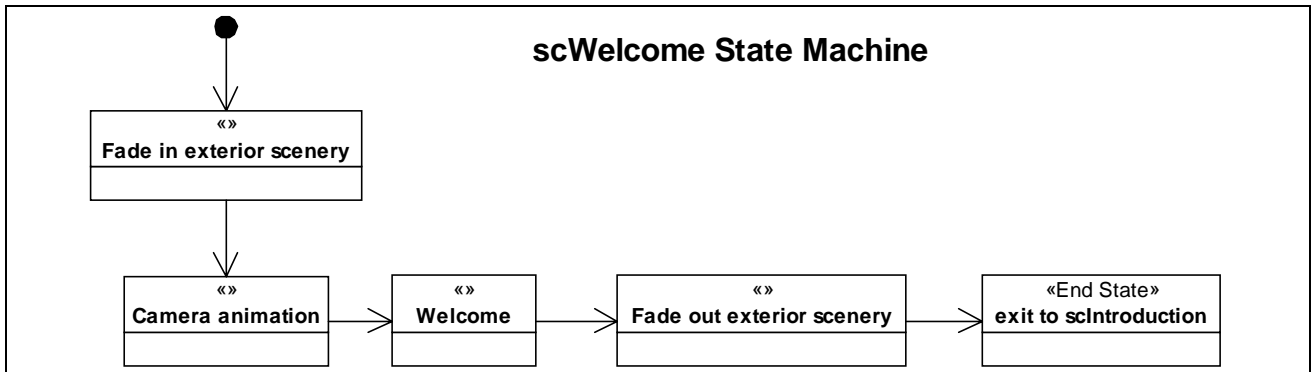
Figure 3: scWelcome state machine.

SCENE [scIntroduction]

Scene name
scIntroduction

Scene description

The inner volume of the Baptistery is revealed and its acoustics too, as we hear the echoes of the door closing behind. The light passing thru the stained glass windows shows the architectural shape of the building as well as the Pulpit, the Presbytery and the Christening Font.

While the *menu bar* appears in a corner of the screen, here the user meets the first automatic *guide* that tells him that now he can start exploring the building independently [scFree-] or access an automatically guided tour [scGuided-] by choosing the mode on the *menu bar*. The guide also says that the user will be able to do other things, such as climbing upstairs to the Women's' Gallery, changing the lighting of the scene (from dawn to night), making a cross-section of the building or experimenting the special acoustics of the Baptistery.

Scene time
Scene duration: 30 sec.

Scenery pictures
Picture 4 The interior view (model).
Picture 19: Model views.

Scene requisite overview

Requisite name	Ressources
autonomousChar_ID1	auChar1Model, auChar1Speech_ID1, auChar1Animation_ID1
myCamera	cameraAnimation_ID2

Scenery resources overview

Resource name
groundFloor
womenGallery
pulpit
presbytery

font
deafaultLightsSet

Scene state machine
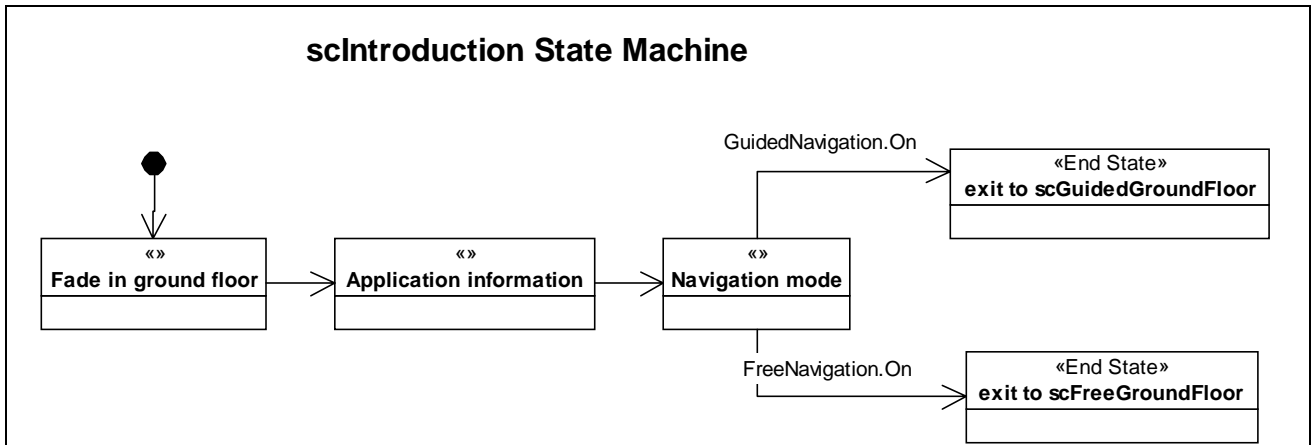
Figure 4: scIntroduction state machine.

SCENE [scFreeGroundFloor]

Scene name
scFreeGroundFloor

Scene description
The user starts exploring the space of the Baptistery. Three automatic *guides* (the first one already met in the previous scene) stands in proximity of some points of interest: *guide1* - the *Pulpit / Presbytery / Christening Font* zone (near the center of the building); *guide2* - the *column ring*; *guide3* - the door of the staircase leading to the Women's Gallery (near to the external wall). When the user approaches them for the first time, these *guides* tell him respectively: he can get audiovisual information about the three artistic objects (Pulpit / Presbytery / Christening Font); he can get audiovisual information about the story of the construction of the Baptistery; he can climb upstairs to the Women's Gallery. The second time the user gets in proximity of one of the guide, the guide asks him if he wants to hear a try of the special acoustic effects of the Baptistery. This is particularly interesting since the guides are placed, concentrically, in three different acoustic zones of the building.

Scene time
There is a time limit (10 min).

Scenery pictures
Picture 6: Presbytery and font view (photo).
Picture 8: Christening font, view from top (photo).

Scene requisite overview

Requisite name	Resources
pulpit	pulpitModel, pulpitTexture
presbytery	presbyteryModel, presbyteryTexture
font	fontModel, fontTexture
groundColonnade	colonnadeModel, colonnadeTexture
autonomousChar_ID1	auChar1Model, auChar1Speech_ID,

	auChar1Animation_ID
aunomousChar_ID2	auChar2Model, auChar2Speech_ID, auChar2Animation_ID
autonomusChar_ID3	auChar3Model, auChar3Speech_ID, auChar3Animation_ID

Scenery resources overview

Resource name
groundFloor
womenGallery
staircaseEntrance
backgroundNoise_ID
defaultLightSet

Scene state machine
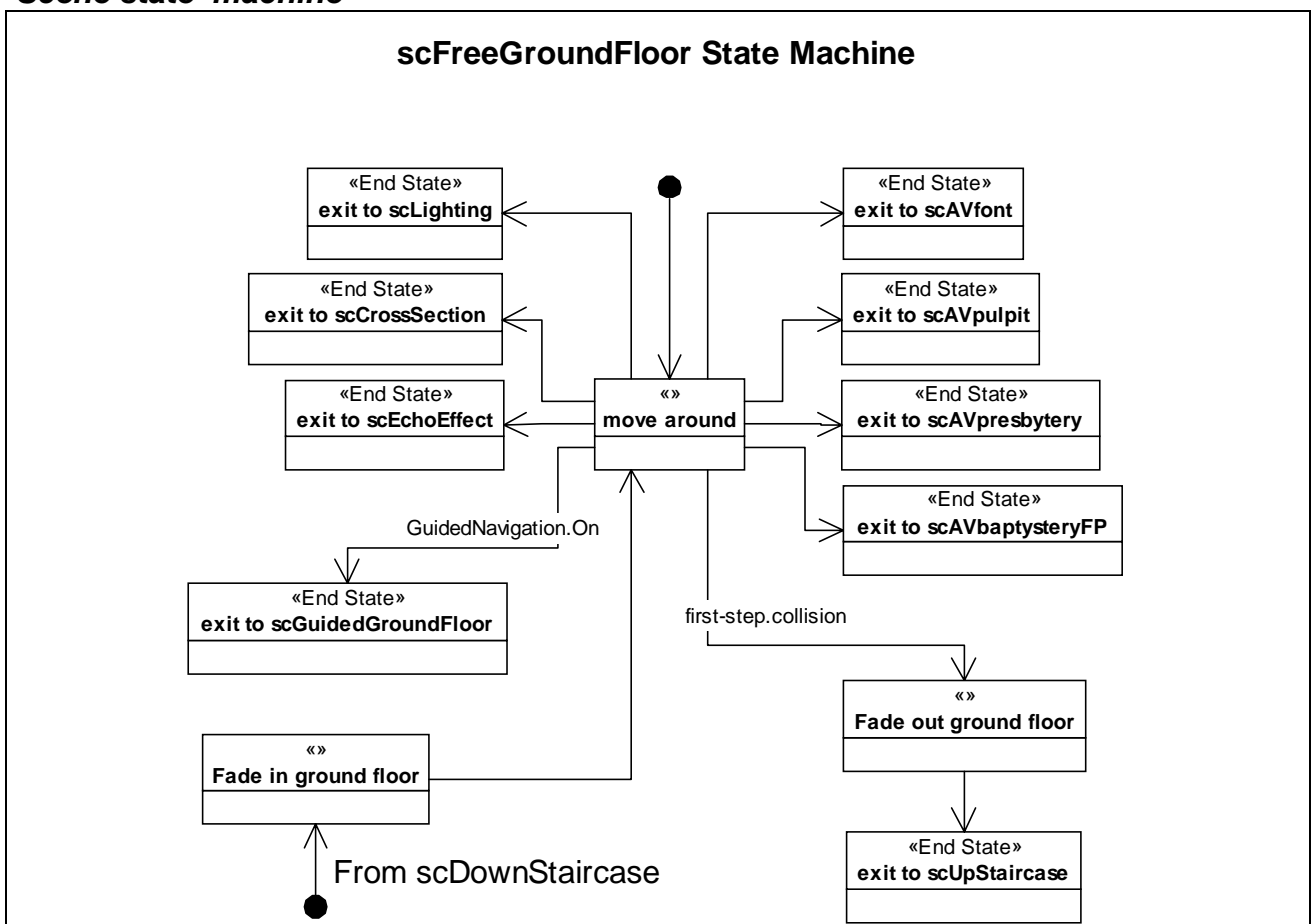
Figure 5: scFreeGroundFloor state machine.

SCENE [scAVpulpit]
SCENE [scAVpresbytery]
SCENE [scAVfont]
SCENE [scAVbaptysteryFP]

Scene name
scAVpulpit
scAVpresbytery
scAVfont
scAVbaptysteryFP

Scene description

Each of these scenes is activated when the user selects the related object (the Pulpit; the Presbytery; the Christening Font; the Column Ring). The objects can be selected only once the user gets in proximity of them (i.e. he cannot select an object far from him). When the user activates the scene, a window is opened over the 3D interface, conveniently placed in a portion of the screen, and audio-video clips starts playing. The user can pause, rewind, fast-forward and stop the clip by the controls placed on the menu bar.

The clips give the user audiovisual information about the main artistic objects and the history of the construction of the building, and may contain comparisons with external objects and monuments, artistic details, and so on.

Scene time
Scene duration 1 min.

Scenery pictures
Picture 5: Presbytery view (model).
Picture 7: Pulpit (photo).
Picture 8: Christening font, view from top (photo).
Picture 9: Christening font view (model).
Picture 20: Pulpit, AV window and menu bar.

Scene requisite overview

Requisite name	Resources
/ pulpit / presbytery / font / groundColonnade	[/ pulpit / presbytery / font / groundColonnade] Model, [/ pulpit / presbytery / font / groundColonnade] Texture, [/ pulpit / presbytery / font / groundColonnade] AV

Scenery resources overview

Resource name
groundFloor
[/ pulpit / presbytery / font / groundColonnade]
autonomousChar_ID1
aunomousChar_ID2
autonomusChar_ID3
staircaseEntrance
defaultLightSet

Scene state machine

Figure 6: scAVfont state machine.

SCENE [scEchoEffect]

Scene name

scEchoEffect

Scene description

This scene is activated when the user gets in proximity of one of the three automatic *guides*. The guide asks the user if he 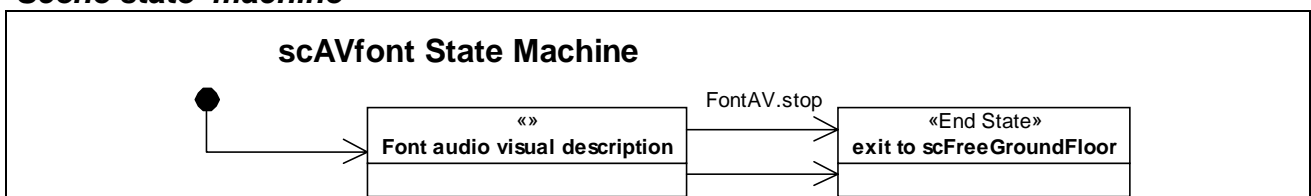wants to hear a try of the echo effect. If the user accepts, by clicking the guide himself, the *guide* sings a note that echoes in the building. In addition to this, the user may experiment with his own voice or by selecting between various sounds on the menu bar. The user ends the scene by walking away from the guide.

NOTE: in a multi site configuration, this effect is visible only in the site that activates it. Other remote-connected users don't see the same effect unless the user who activates it is a super-user with *expert* privileges.

Scene time
Time limit.

Scenery pictures
None.

Scene requisite overview

Requisite name	Resources
autonomousChar_ID1	auChar1Model, auChar1Animation_ID, prerecSoundWithEcho_ID
autonomousChar_ID2	auChar2Model, auChar2Animation_ID, prerecSoundWithEcho_ID
autonomousChar_ID3	auChar3Model, auChar3Animation_ID, prerecSoundWithEcho_ID

Scenery resources overview

Resource name
groundFloor
pulpit
presbytery
font
groundColonnade
womenGallery
staircaseEntrance
defaultLightSet

SCENE [scCrossSection]

Scene name
scCrossSection

Scene description

This scene is activated when the user selects the "Cross section" button on the menu bar. This button is available only when the user is in proximity of the Column Ring.

The scene, one of the climax point of the story, cuts the whole geometry of the building in two halves: then, the first half smoothly vanishes. The user can now walk in the Baptistery and have a complete sight of its inner structure, particularly of the double-shaped dome (composed of an external spherical dome and an internal conical one). The user puts an end to the cross section effects and "restores" the Baptistery by clicking the button on the menu bar.

NOTE: in a multi site configuration, this effect is visible only in the site that activates it. Other remote-connected users don't see the same effect unless the user who activates it is a super-user with *expert* privileges.

Scene time
Time control.

Scenery pictures
None.

Scene requisite overview

Requisite name	Resources
baptistery	baptisteryHalf_ID1, baptisteryHalf_ID2, baptisteryTransparency

Scenery resources overview

Resource name
defaultLightSet

SCENE [scLighting]

Scene name
scLighting

Scene description

The scene is activated when the user selects the "Light Change" button on the menu bar. This button is available only when the user is in proximity of the Christening Font.

This scene, one of the climax point of the story, allows the user to change the whole lighting effect of the Baptistery, choosing between five different light states placed on the *Light dimming control* that appears on the menu bar. The five states are: dawn, noon, afternoon, sunset, night. The user exits this effect by clicking the Light Change button on the menu bar.

NOTE: in a multi site configuration, this effect is visible only in the site that activates it. Other remote-connected users don't see the same effect unless the user who activates it is a super-user with *expert* privileges.

Scene time
Scene duration: 30 sec.

Scenery pictures
None.

Scene requisite overview

Requisite name	Resources
lightingDawn	lightSetDawn, btyModelDawn
lightingNoon	lightSetNoon, btyModelNoon
lightingAfternoon	lightSetAfternoon, btyModelAfternoon
lightingDusk	lightSetDusk, btyModelDusk
lightingNight	lightSetNight, btyModelNight

Scenery resources overview

Resource name
groundFloor

Scene state machine

scLighting State Machine
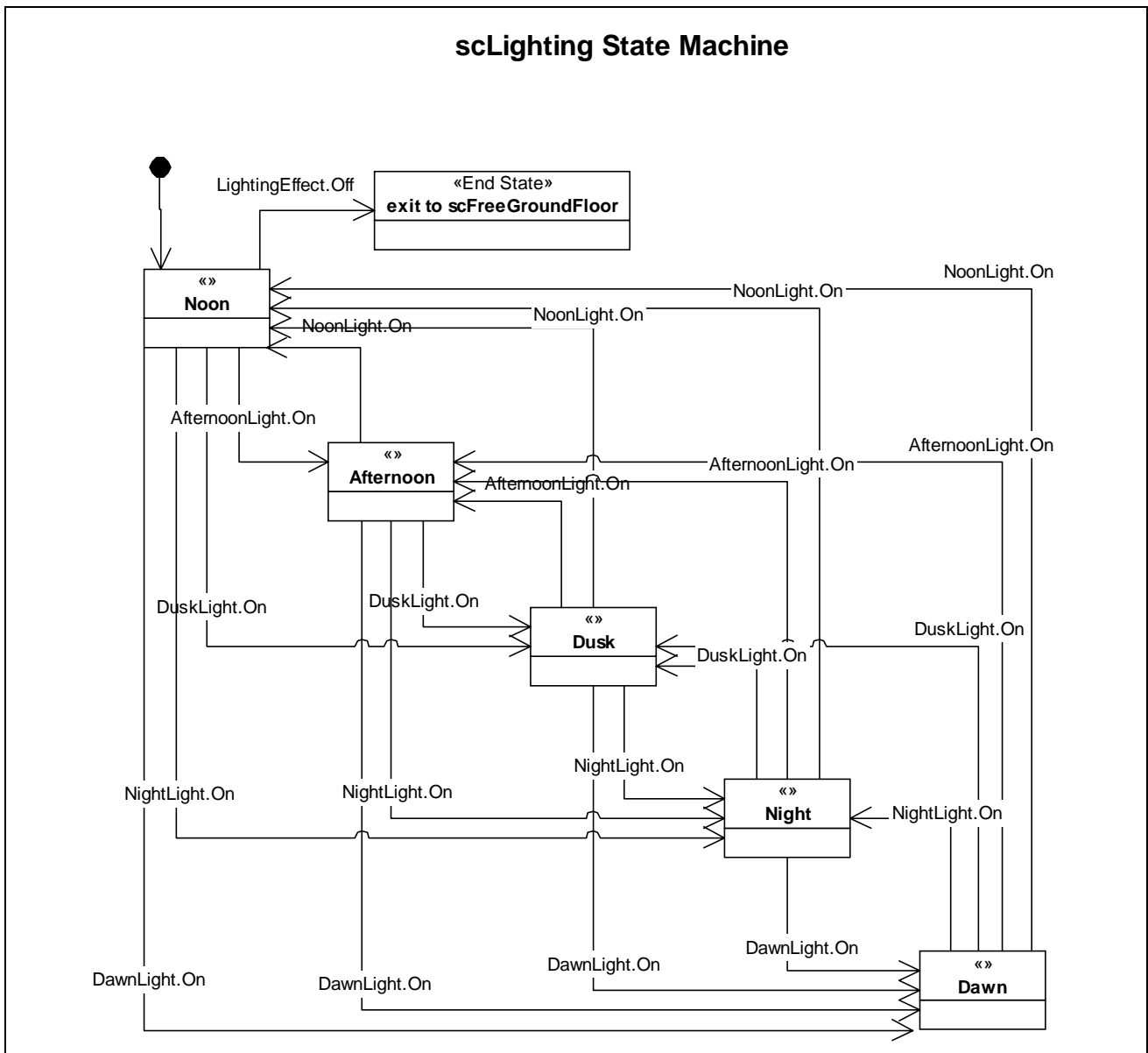
Figure 7: scLighting state machine.

SCENE [scUpStaircase]

Scene name
scUpStaircase

Scene description
This is a transition scene that is activated once the user passes thru the door of the staircase. A pre-computed path automatically leads the user up to the Women's Gallery.

Scene time
Scene duration: 5/10 sec.

Scenery pictures
Picture 10:Staircase.

Scene requisite overview

Requisite name	Resources

myCamera	cameraAnimation_ID4

Scenery resources overview

Resource name
staircase
womenGallery
staircaseLightSet

Scene state machine

scUpStaircase State Machine

Fade in staircase scenary «»

Camera animation «»

Fade out staircase scenary «»

after: 5 sec[FreeNavigation.activated]

after: 5 sec[GuidedNavigation.activated]

«End State»
exit to scFreeWomanGallery

«End State»
exit to scGuidedWomanGallery
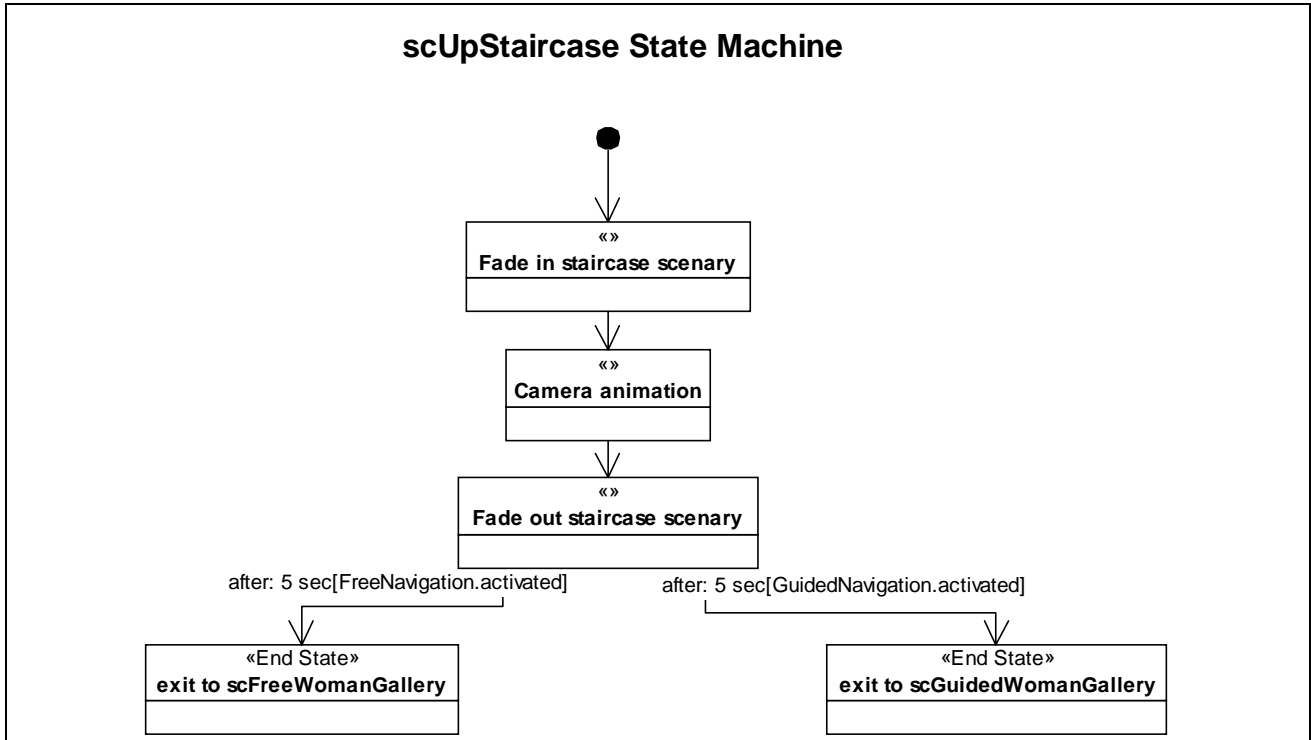
Figure 8: scUpStaircase state machine.

SCENE [scDownStaircase]

Scene name
scDownStaircase

Scene description
This is a transition scene that is activated once the user passes thru the door of the staircase. A precomputed path automatically leads the user back to the Ground Floor.

Scene time
Scene duration: 30 sec.

Scenery pictures
Picture 10:Staircase.

Scene requisite overview

Requisite name	Resources
myCamera	cameraAnimation_ID5

Scenery resources overview

Resource name
staircase
groundFloor
staircaseLightSet

Scene state machine

scDownStaircase State Machine

Fade in staircase scenary

camera animation

Fade out staircase scenary

«End State»
exit to scFreeGroundFloor
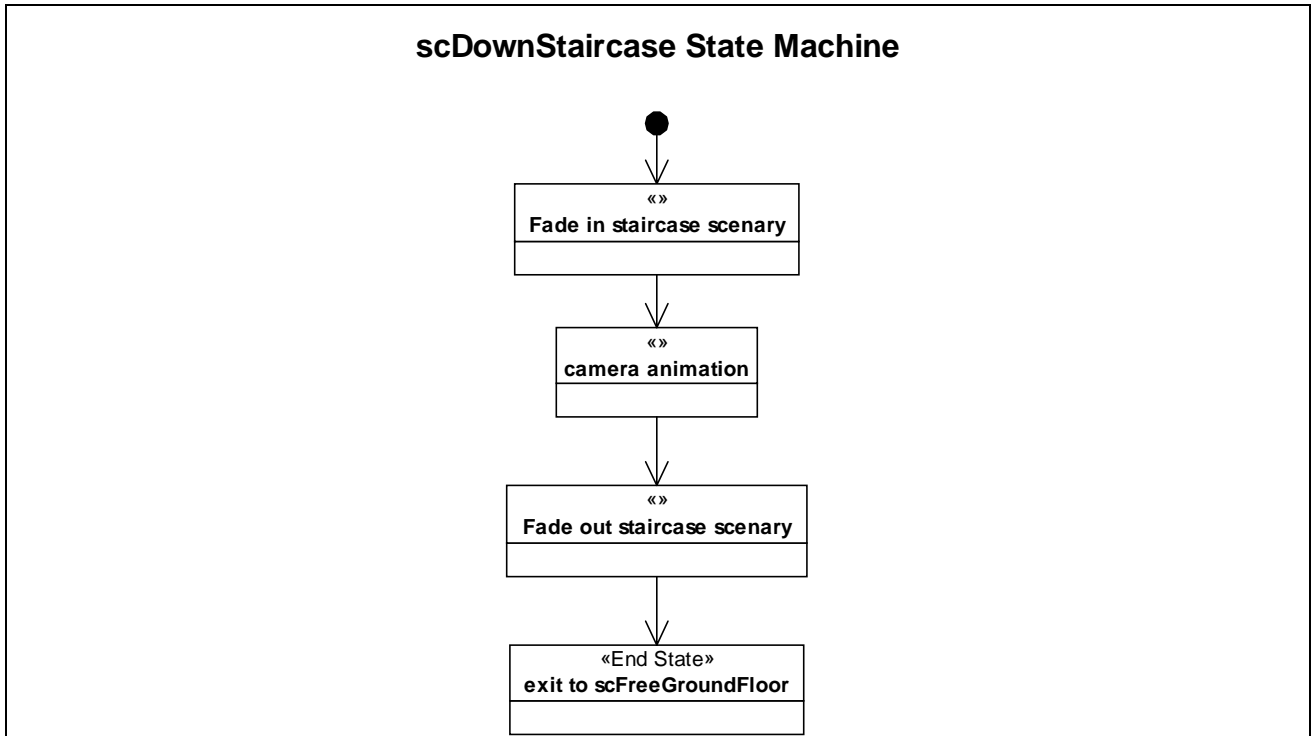
Figure 9: scDownStaircase state machine.

SCENE [scFreeWomanGallery]

Scene name
scFreeWomanGallery

Scene description

Once up in the Women's Gallery, the user can walk thru the balcony around the center of the Baptistery and look downward to see the Christening Font, the Pulpit or the mosaic floor from a higher point of view.

The user here meets the fourth automatic *guide*, that suggests him to look thru the windows to get further information about the history of the site or to select the upper column ring to have audiovisual information that complete the story of the construction of the Baptistery.

Scene time
There is a time limit (8 min).

Scenery pictures
Picture 11: Women's gallery floor.
Picture 14: Presbytery and font top view (photo).
Picture 15: Mosaic top view (photo).
Picture 16: Women's Gallery vault (photo).
Picture 17: Presbytery top view (model).

Scene requisite overview

Requisite name	Resources
autonomousChar_ID4	auChar4Model, auChar4Speech_ID, auChar4Animation_ID
galleryWindow_ID	windowModel_ID, windowTexture_ID,

Scenery resources overview

Resource name
womenGallery
groundFloor
pulpit
font
presbytery
galleryColonnade
defaultLightSet

Scene state machine
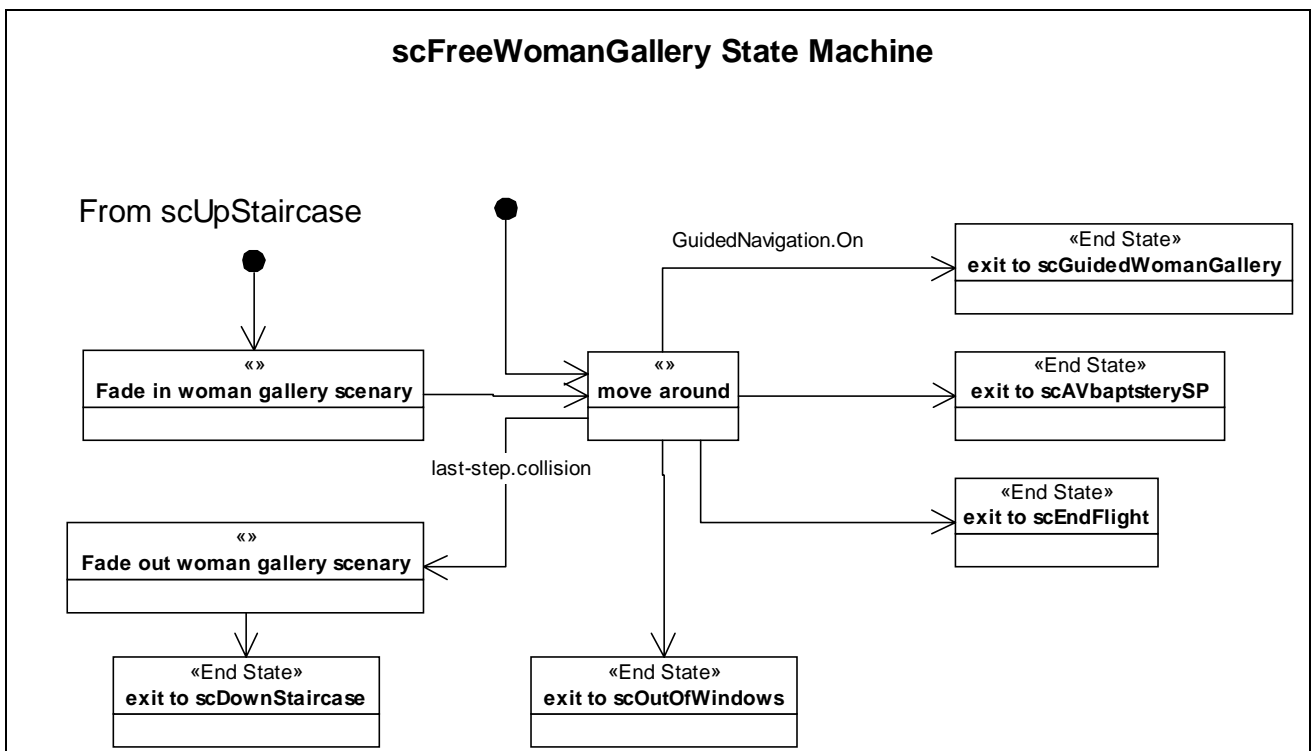
Figure 10: scFreeWomenGallery state machine.

SCENE [scAVBaptysterySP]

Scene name
scAVBaptysterySP

Scene description
This scene is the logical continuation of the first one available at the ground floor. The user activates it by selecting the columns of the Women's Gallery once in proximity of them. A window is opened over the 3D interface, conveniently placed in a portion of the screen, and audio-video clips about the construction history of the Baptistery (especially of the

dome) starts playing. The user can pause, rewind, fast-forward and stop the clip by the controls placed on the menu bar.

Scene time
Scene duration 2 min.

Scenery pictures
None.

Scene requisite overview

Requisite name	Resources
galleryColonnade	galleryColonnadeModel, galleryColonnadeTexture, galleryColonnadeAV

Scenery resources overview

Resource name
womenGallery
auChar4
staircaseTop
defaultLightSet

SCENE [scOutOfWindows]

Scene name
scOutOfWindows

Scene description

This scene is activated when the user gets in the very proximity of the windows of the Women's Gallery. Some panoramic images of the place, as seen from the windows of the Baptistery, are shown, while the voice-off gives some information about the history of the Piazza and its surroundings. The user can pause and stop (exiting the scene) the narration by clicking on the controls placed on the menu bar.

Scene time
Scene duration 2 min.

Scenery pictures
Picture 12: Women's gallery windows.

Scene requisite overview

Requisite name	Resources
galleryWindow_ID	windowModel_ID, windowTexture_ID, piazzaPanoramicImages_ID, voiceOff_ID

Scenery resources overview

Resource name
womenGallery
defaultLightSet

SCENE [scEndFly]

Scene name
scEndFly

Scene description

Even if the user can stop and exit the story in any moment by clicking the control on the menu bar, this scene is the natural conclusion of the tour. It is activated by clicking the "Fly out" button on the menu bar, that is available only once the user has made a complete tour of the Baptistery. After a farewell by a voice-off, the user starts some kind of "flight" from the Women's Gallery (following a pre-computed path) out of the entrance door, fading out.

Scene time
Scene duration 2 min.

Scenery pictures
None.

Scene requisite overview

Requisite name	Resources
myCamera	cameraAnimation_ID6

Scenery resources overview

Resource name
baptistery
defaultLightSet

SCENE [scGuidedGroundFloor]

Scene name
scGuidedGroundFloor

Scene description

In this scene, the user is guided sequentially via a pre-computed path thru the various main objects and features of the ground floor of the Baptistery. The path is articulated in various *narrative nodes* (for example: general introduction to architecture; the Christening Font; the Presbytery; the Pulpit and Nicola Pisano; the construction across the centuries; etc..), each one related to a specific location in the Baptistery. A voice-off narrates the information while the user is led thru.

The user can stop, skip, forward and rewind the narration thru the nodes by the standard buttons placed in the *menu bar*, and can exit the scene in every moment. He can also re-access the *automatically guided* mode at any time, starting from the *nearest narrative node* (for example, if he is in proximity of the Pulpit, the node will be the one about that object) using the button Guided Tour placed on the *menu bar*.

This scene flows automatically into the guided tour of the Women's Gallery [scGuidedWomensGallery] via the transition scene of the stairs [scUpStaircase].

Scene time
Duration time: 5 min

Scenery pictures

Picture 17: Presbytery top view (model).

Scene requisite overview

Requisite name	Resources
myCamera	cameraAnimation_ID3, voiceOff_ID2

Scenery resources overview

Resource name
pulpit

presbitery
font
groundColonnade
autonomousChar_ID1
aunomousChar_ID2
autonomusChar_ID3
staircaseEntrance
defaultLightSet

Scene state machine

scGuidedGroundFloor State Machine
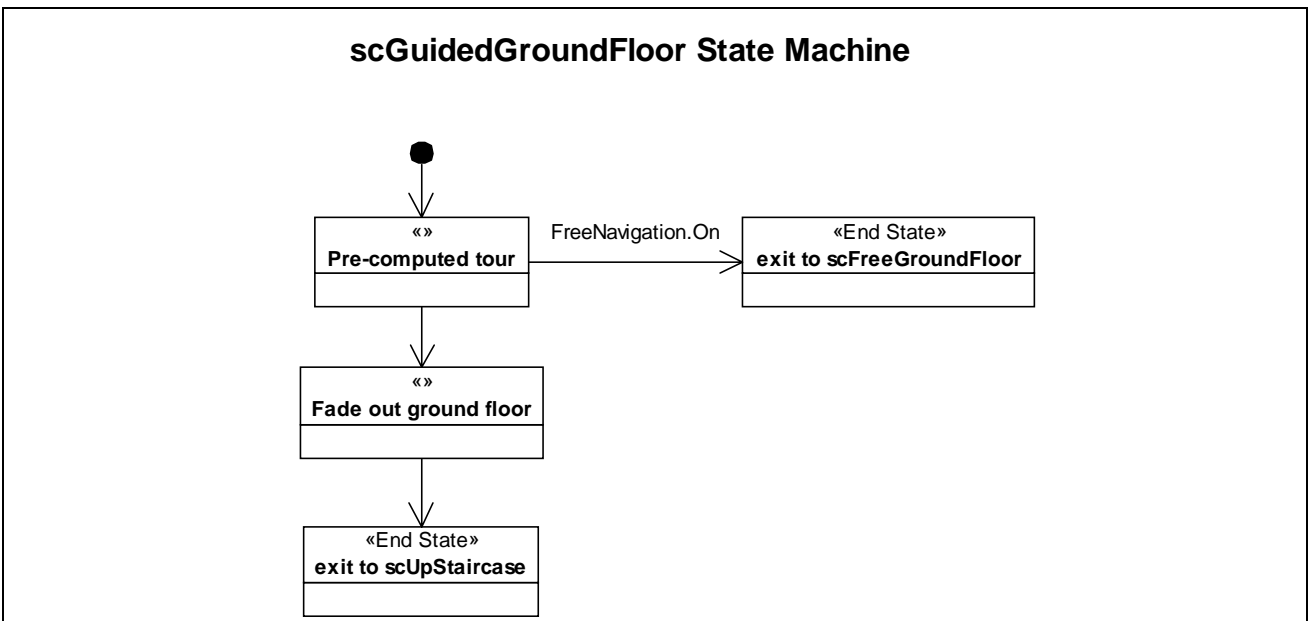
Figure 11:scGuidedGroundFloor state machine.

SCENE [scGuidedWomanGallery]

Scene name
scGuidedWomanGallery

Scene description
This scene follows immediately the guided ground floor tour [scGuidedGroundFloor] via the transition scene [upStaircase]. The user is guided sequentially via a pre-computed path thru the Women's Gallery. A voice-off narrates the information while the user is led thru.

The user can stop, skip, forward and rewind the narration thru the nodes by the standard buttons placed in the *menu bar*, and can exit the scene in every moment.

Scene time
Scene duration: 3 min.

Scenery pictures
Picture 13: Women's gallery vault (photo).
Picture 18: Women's Gallery vault (photo).

Scene requisite overview

Requisite name	Resources

myCamera	cameraAnimation_ID7, voiceOff_ID3

Scenery resources overview

Resource name
womenGallery
groundFloor
pulpit
font
presbytery
galleryColonnade
defaultLightSet

Scene state machine

scGuidedWomenGallery State Machine
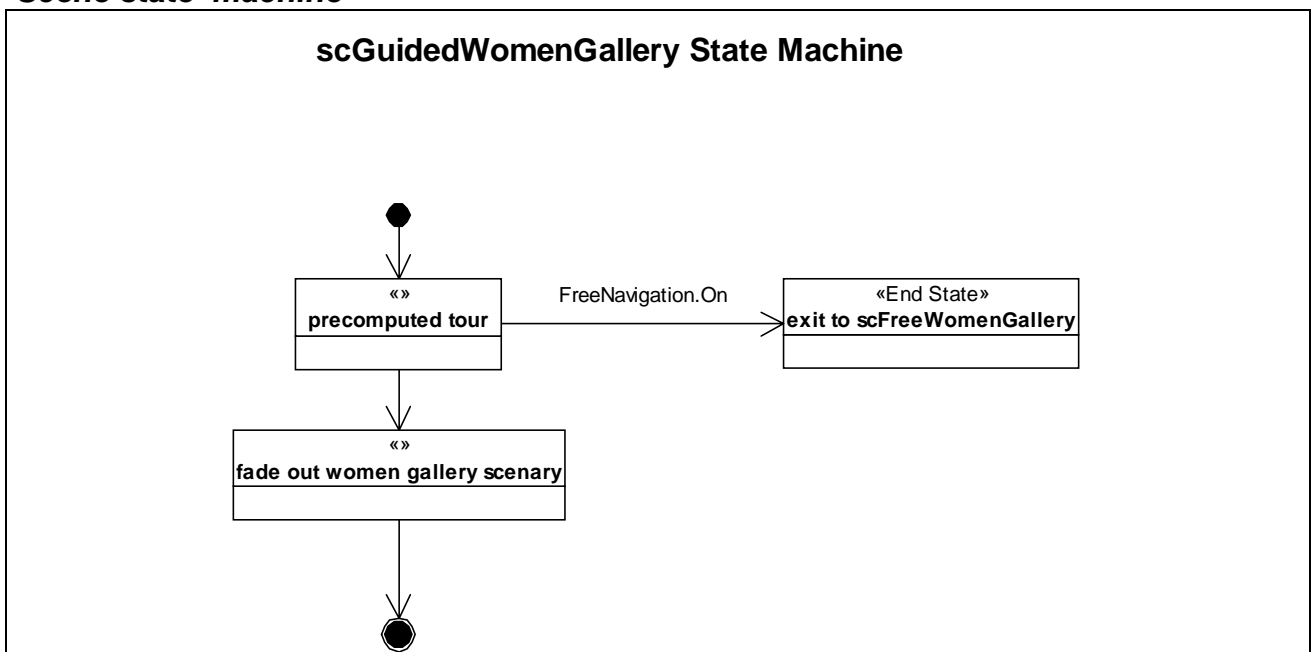
Figure 12: scGuidedWomenGallery state machine.

REQUISITE OVERVIEW

The following table is used to describe which requisites are used in the story, in which scenes they appear, and which possible pictures can be found at the end of the document.

Requisite name	Description	Pictures	Scenes
myCamera	Point of view of the user	-	scWelcome, scIntroduction, scGuidedGroundFloor, scUpStaircase, scDownStaircase scEndFly, scGuidedWomenGallery
autonomousChar_ID1	Automatic guide	20, 21, 22	scIntroduction,

			scFreeGroundFloor,
autonomousChar_ID2	Automatic guide	20, 21, 22	scFreeGroundFloor, scEchoEffect
autonomousChar_ID3	Automatic guide	20, 21, 22	scFreeGroundFloor, scEchoEffect
autonomousChar_ID4	Automatic guide	20, 21, 22	scFreeWomenGallery
pulpit	Interesting monument	7	scFreeGroundFloor, scAVpulpit
presbytery	Interesting monument	5	scFreeGroundFloor, scAVpresbytery
font	Interesting monument	8, 9	scFreeGroundFloor, scAVfont
groundColonnade	Columns ring in the ground floor	4, 9, 17	scFreeGroundFloor, scAVbaptysteryFP
galleryColonnade	Columns ring in the gallery	18	scFreeWomenGallert, scAVbaptysterySP
galleryWindow_ID	Set of windows	12, 13	scFreeWomenGallery, scGuidedWomenGallery
baptystery	Overall objects	-	scCrossSection
lightingDawn	Lighting model	-	scLighting
lightingNoon	Lighting model	-	scLighting, each scene
lightingAfternoon	Lighting model	-	scLighting
lightingDusk	Lighting model	-	scLighting
lightingNight	Lighting model	-	scLighting

Table 1: Requisite overview

RESOURCES

The following table gives ordered overview of resources in use in the story. Speech is handled separately under avatar.

Data type legend:
G   geometry
L   light
S   sound
V   video
SML   smell
SIM   simulation

Name (ID)	Data-type	Description
portal	G	The Baptistery entrance door
groundFloor	G	Overall ground floor model
pulpit	G	Pulpit object
pulpitModel	G	Geometry
pulpitTexture	G	Texture maps
presbytery	G	Presbytery object

presbyteryModel	G	Geometry
presbyteryTexture	G	Texture maps
font	G	Font object
fontModel	G	Geometry
fontTexture	G	Texture maps
groundColonnade	G	Columns ring in the ground floor
colonnadeModel	G	Geometry
colonnadeTexture	G	Texture maps
staircaseEntrance	G	Entrance to staircase
staircaseEntranceModel	G	Geometry
staircaseEntranceTexture	G	Texture maps
staircase	G	Staircase object
womenGallery	G	Overall Women gallery model
staircaseTop	G	Top staircase entrance
galleryWindow_ID	G	Windows in the gallery
windowModel_ID	G	Geometry
windowTexture_ID	G	Texture maps
baptisteryHalf_ID1	G	One half of the Baptistery
baptisteryHalf_ID2	G	One half of the Baptistery
auChar1Model	G	Model of autonomous char 1
auChar2Model	G	Model of autonomous char 2
auChar3Model	G	Model of autonomous char 3
auChar4Model	G	Model of autonomous char 4
btyModelDawn	G	Geometry with specific texture maps
btyModelNoon	G	Geometry with specific texture maps
btyModelAfternoon	G	Geometry with specific texture maps
btyModelDusk	G	Geometry with specific texture maps
btyModelNight	G	Geometry with specific texture maps
defaultLightsSet	L	Interior lighting (equal to one daylight)
externalLIghtSet	L	Group of lights for exterior
staircaseLightSet	L	Group of lights for staircase
lightSetDawn	L	Group of lights
lightSetNoon	L	Group of lights
lightSetAfternoon	L	Group of lights
lightSetDusk	L	Group of lights
lightSetNight	L	Group of lights
portalSound	S	The opening/closing door sound
backgroundNoise_ID	S	Environment sounds
prerecSoundWithEcho_ID	S	Echo effects
voiceOff_ID1	S	Voice off in scWelcome
voiceOff_ID2	S	Voice off in scGuidedGroundFloor
voiceOff_ID3	S	Voice off in scGuidedWomenGallery
voiceOff_ID	S	Voices off explaining panorama from different windows
cameraAnimation_ID1	SIM	Predef. path in scWelcome
cameraAnimation_ID2	SIM	Predef. path in scIntroduction
cameraAnimation_ID3	SIM	Predef. path in scGuidedGroundFloor

cameraAnimation_ID4	SIM	Predef. path in scUpStaircase
cameraAnimation_ID5	SIM	Predef. path in scDownStaircase
cameraAnimation_ID6	SIM	Predef. path in scEndFly
cameraAnimation_ID7	SIM	Predef. path in scGuidedWomenGallery
auChar1Animation_ID	SIM	Predef. animation(s) of autonomous char 1
auChar2Animation_ID	SIM	Predef. animation(s) of autonomous char 2
auChar3Animation_ID	SIM	Predef. animation(s) of autonomous char 3
auChar4Animation_ID	SIM	Predef. animation(s) of autonomous char 4
hBtyTransparency	SIM	Transparency change for Cross Section
piazzaPanoramicImages_ID	V	Set of panoramic views from different windows
pulpitAV	V	AV description
presbyteryAV	V	AV description
fontAV	V	AV description
groundColonnadeAV	V	First part general Bty. description
galleryColonnadeAV	V	Second part general Bty. description

Table 2: Resources table

AVATAR and AUTONOMOUS CHARACTER

The story contains two types of characters: Remotely Guided (*avatar*) and Autonomous. The Remotely Guided Character is interactively controlled by a remote operator, the Autonomous Character performs pre-defined animations. In both cases character's motions is based on pre-defined animation clips. The Speech section contains the description of speeches of autonomous characters.

Character pictures
Picture 21: Study for character model.
Picture 22: Study for character model: body views.
Picture 23: Study for character expressions.

GESTURES
This section contains the description of the main movements. The clip of a principal movement will include secondary movements to improve the realism of the animation.

Character gesture ID
walk

Character gesture description
The avatar can walk in any direction, either along a straight or a curved path. Its feet adhere to the floor. There are two walking levels in the Baptistery: the ground floor, and the woman gallery. The remote operator controls the Remotely Guided Character walking using his point of view control. An Autonomous Character automatically plays pre-defined animations.

Character gesture ID
goUpstairs, goDownstairs

Character gesture description

Going up is a pre-defined motion that starts when the character comes close to the staircase. The remote operator doesn't control the character when rising staircases.

Character gesture ID
lookToTarget

Character gesture description
The avatar turns the head toward an object.

Character gesture ID
pointToTarget

Character gesture description
The avatar raises its arm to point to an object.

Character gesture ID
rotateHead

Character gesture description
The avatar rotate its head under the interactive control of the remote operator.

Character gesture ID
rotateBody

Character gesture description
The avatar rotate its body under the interactive control of the remote operator.

Character gesture ID
phonemes_ID

Character gesture description
Applied to autonomous characters and avatar.

Character gesture ID
expressions_ID

Character gesture description
Applied to autonomous character.

Character gesture ID
eyesBlinking_ID

Character gesture description
Applied to autonomous characters and avatar.

SPEECH

Speech group ID
liveGeneralSpeechID

Technique
Live speech of the remote operator. To be applied to the Remotely Guided Character.

Speech category
General speech.

Speech group ID
auChar1Speech_ID1

Technique
Pre-recorded speech used in *scIntroduction*.

Speech category
General speech.

Speech description
Application information.

Speech group ID
auChar1Speech_ID

Technique
Pre-recorded speeches used in *scFreeGroundFloor*.

Speech category
General speech.

Speech description
Invitation to go upstairs.

Speech group ID
auChar1Speech_ID
auChar2Speech_ID
auChar3Speech_ID

Technique
Pre-recorded speeches used in *scFreeGroundFloor*.

Speech category
General speech.

Speech description
Invitation to echo test.

Speech group ID
auChar2Speech_ID

Technique
Pre-recorded speeches used in *scFreeGroundFloor*.

Speech category
General speech.

Speech description
How activate AV clips about the first part of the building history.

Speech group ID
auChar3Speech_ID

Technique

Pre-recorded speeches used in *scFreeGroundFloor*.

Speech category
General speech.

Speech description
How activate AV clips about pulpit, presbytery, and font.

Speech group ID
auChar4Speech_ID

Technique
Pre-recorded speeches used in *scFreeWomenGallery*.

Speech category
General speech.

Speech description
How activate AV clips about the second part of the building history and look out the window.

PICTURES

Picture 1: Baptistery exterior (photo).

Picture 2 The portal (photo).

Picture 3: The open portal (photo).
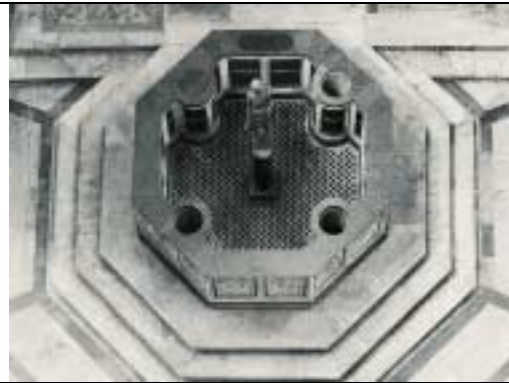

Picture 4 The interior view (model).

Picture 5: Presbytery view (model).

Picture 6: Presbytery and font view (photo).

Picture 7: Pulpit (photo).	**Picture 8: Christening font, view from top (photo).**
Picture 9: Christening font view (model).	**Picture 10:Staircase.**
Picture 11: Women's gallery floor.	**Picture 12: Women's gallery windows.**

Picture 13: Women's gallery vault (photo).

Picture 14: Presbytery and font top view (photo).
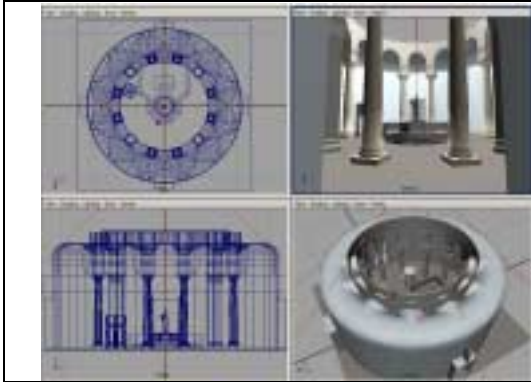

Picture 15: Mosaic top view (photo).

Picture 16: Women's Gallery vault (photo).

Picture 17: Presbytery top view (model).
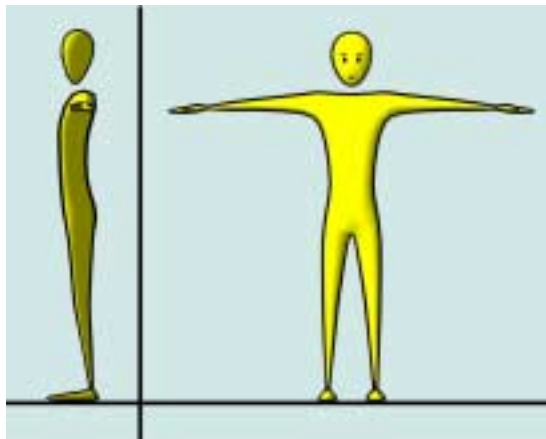

Picture 18: Women's Gallery vault (photo).

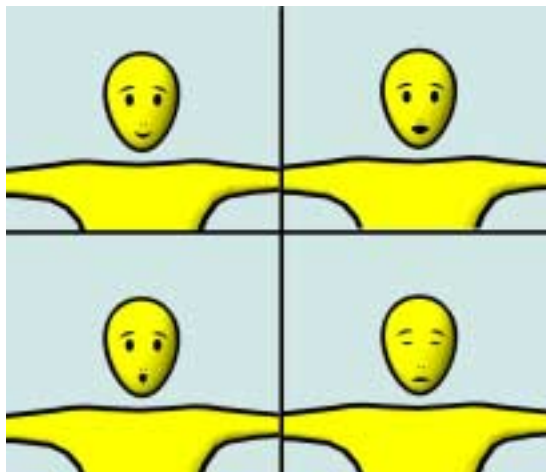|	
Picture 19: Model views.	**Picture 20: Pulpit, AV window and navigation bar.**

Picture 21: Study for character model.

Picture 22: Study for character model: body views.

Picture 23: Study for character expressions.