Small or medium-scale focused research project (STREP) proposal
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Authoring and Directing Real-time InterActive New-media

ADRIAN

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(a) Advanced Authoring

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Proposal abstract

New storytelling-based media are poised to become a major component of digital entertainment, contributing to the convergence between interactive media (computer games, on-line worlds) and traditional ones (film and television). However, many innovations of such media, such as interactivity, conflict with the authorial control over story advancement. As a consequence, success cases of interactive storytelling are limited to video games, where narration is very limited.

The ADRIAN project will provide high-level authoring support for cross-platform, storytelling-based media productions. It will support linear and interactive narratives on different platforms, such as games, TV and web sites. ADRIAN differs from existing (mostly plot-based) approaches by providing a character-centred perspective on storytelling. Although we believe that the authoring support along the plot dimension is desirable, we claim that it is premature to provide authors with unfamiliar diagrammatic structures and we aim at providing a support based on a semi-formal model of characters' behaviours and changes within a story.

To this aim, we will determine a number of basic character traits; these traits will be selected by taking into account the requirement of narrative advancements, such as the level of determination to reaching one's goal; then we develop a description language and a reasoning framework. These will be used in an authoring tool for managing the complexity of potential encounters of characters in a scene. The system will be able to reason about potential behaviours of characters, based on the current traits and suggest next steps for narrative advancement.

The approach and authoring environment will be developed closely in conjunction with and evaluated in the facilities of the production partners. The solutions provided by the environment will support authors in finding credible narrative advancements though the user's interventions through interactivity.

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Section 1: Scientific and/or technical quality, relevant to the topics addressed by the call

1.1 Concept and objectives

The ADRIAN project is about **providing high-level support for storytelling-based media production**. The goal is to implement a software tool that can support authors in the storytelling process by assuming a character-centred perspective. Characters are the "flesh and blood" of a story (compared with the abstract nature of the diagram representing the plot): it is the characters' emotional state that becomes unbalanced at the beginning of a story, it is the characters' values that are put at stake to make the story proceed, and it is the characters who make a story advance through their behaviour. The ADRIAN authoring support tools will be built upon a model of the characters' traits that are relevant in the narrative realm. The project will implement a reasoning framework that will use such traits to suggest characters' behaviours to the author that are plausible for the state of affairs in a scene. In order to make the tool more accessible to the author, it will be equipped with a feature selection based graphical interface, that the author can use to build characters from a basic set of traits.

ADRIAN departs from previous plot-driven approaches to the support of storytelling by providing a character-centred perspective that is more meaningful to the author. This perspective is common to both traditional and interactive storytelling, and allows the sharing of characters' notions at a conceptual as well as the implementation level. The ADRIAN project approach will address the character part of the whole, leaving the support to the storytelling process as a whole, as well as the notions of plot, events, time, and space for further work.

The requirement for a tool such as the one proposed in the ADRIAN project arises from two considerations:

First, there is a general growing interest for storytelling-based media, most notably visible through several attempts to produce linear and interactive stories for the digital media, which illustrates a need for supporting authors in conceiving believable stories;

Second, the models proposed to support the creation of stories in digital media, which include interactivity, seem to rely more upon abstract schemata derived from computer science practice than the storytelling author's practice. We address these two issues in the next sections.

Growing interest for storytelling-based media

Interactive storytelling- (or drama-, narrative-) based media (Esslin 1987), which involve characters performing live actions according to some plot, are becoming increasingly more pervasive. Examples include versions of role-playing games (referring to *Dungeons and Dragons* paradigm, 1974) and virtual assistants' adaptive presentations (e.g., *Carletto the spider* (Damiano et al. 2006)), as well as experimental projects, such as interactive fictional TV series (e.g., *Accidental Lovers* from Finnish TV within NM2 project), the multi-platform interactive project *Egypt Interactive* from British Broadcasting Corporation, cinema movies used as an interface (e.g., *Late fragments* from National Film Board of Canada), and interactive drama (e.g., *Façade* (Mateas et al. 2003), http://www.interactivestory.net).

The examples mentioned above are only a few examples of the traditionalist approach, with scholars and developers perfectly aware that current results cannot compete with the productivity of traditional media, such as film, drama or literature. Here the Aristotelian poetics holds to a great extent, with authors that try to deal with interactivity within the limits offered by the plot. In *Accidental lovers* the control offered to the audience is to suggest possible evolutions of the story in a TV series where the protagonists are two odd lovers (a very young guy and an old woman); *Carletto the spider*, is a dramatic guide that organizes a monologue about a historical site according to a structure that is built in real time following the motion of the visitors; *Late fragments* is an interactive film with three independent storylines on three different characters, and the viewer can click anywhere on the screen to jump across storylines or to focus on a specific storyline of interest; *Façade* is an

interactive drama where the spectator is a character participating in a drama with other two characters through a natural language and limited gestural interface, with a plot that forces the two controlled characters to behave in ways that lead to an end.

Support of story creation

The support of the story creation has been a particularly flourishing applied research area, which has produced a number of paradigms of the authoring of linear stories (especially for the audiovisual industry). These paradigms, elaborated by the so-called "gurus" of successful writing, address the elements that are typically involved in a story.
The first systematization of storytelling elements dates back to Aristotle's account of drama, and is centred on the notion of *plot*. Aristotle conceived the action, or plot, of a play as of far greater importance than the characters. This conception he gained from the plays of the time, which, in general, centred around a personified passion rather than a character. Action was constrained by unity, which limits it to a single set of incidents which are related as cause and effect, "having a beginning, a middle, and an end." Other unities concerned time (limited duration) and place (locality constraint).
So, he insisted very clearly that in tragedy the plot does not rise out of the characters, but on the contrary the plot tests the characters through the working-out of destiny - "blind fate." Character comes in as subsidiary to the action. So, the drama interests us, not predominantly by its depiction of human nature, but primarily by the situations and only secondarily by the feelings of those therein involved.

This Aristotelian approach has been "corrected" by modern research towards an increased attention on characters, and then assumed by the widely acknowledged present day paradigms of linear storytelling. Two scholars have been fundamental for this "correction": Egri and Campbell. Lajos Egri (Egri 1946) assigned the character a paramount role in direct dependence of the story *premise*, that in turn defines the story goal. In the case of Romeo and Juliet, the premise can be that "*Great love defies all, even death*", while in Othello, it can be "*Jealousy destroys itself and the object of its love*" (italics from Egri). Characters are "… the fundamental material we are forced to work with, so we must know character as thoroughly as possible" (Egri, p. 32), regardless of the medium we are working. Characters, for being well written, must undergo a basic change; all "characters move relentlessly from one state of mind toward another; they are forced to change, grow, develop … " (Egri, p. 62).
Joseph Campbell (Campbell 1949) developed his theory of "monomyth" by exploiting Jung's archetypal approach to human psychology. His theory, also known as the "hero's journey", provides an excellent toolbox for creating a story around some character, the hero, that presents him/her-self with a "thousand faces" in the history of the human kind. The hero's journey model is an abstraction that provides a schema for a story that would certainly appeal on everyone. The hero is first introduced in his/her ordinary world, where he receives the call to an adventure that would lead him/(her) achieve a great gift - the goal or "boon" - which often results in important self-knowledge. He is reluctant at first but can be encouraged by a wise old man or woman to enter the adventure, where he must survive a number of challenges, which he faces alone or with helpers, until the most severe challenge that lets him achieve the "boon" (and is often challenged again on the road back to his/her world). He is transformed by this experience and, if his/her return succeeds, his/her world will benefit from the "boon".
Present paradigms of storytelling (developed by the so-called "gurus" of screenwriting) strongly rely on these character-based contributions (Dramatica, Field 2003; Hauge et al. 2003, McKee 1997; Seger 1984, 1990, 2003, Truby 2007, Vogler 1998). The notions of *character storylines*, *main character perspective*, and *character change* complement the notion of plot structure in these paradigms. The character storyline is a sequence of events going from the beginning to the end of story, thus formed by a set of interrelated storylines; paradigms prescribe the presence of more than one essential storylines in a story, with different meanings and mostly involving the notion of conflict in the interrelations of storylines. The main character, also known as *hero* or *protagonist*, is the character who undergoes the major changes in a story and providing one of the fundamental perspective on the story to the audience. Sometimes, main character and protagonist are not the same character, thus conveying multiple perspectives to the audience. Character change is the essential aspect of all theories and

refers to the journey of the hero, who returns transformed; this is sometimes split into a growth and a resolve of the character, and traces a dramatic or transformation arc. Change is also the force that connects the character motivations with his/her actions to the goal: Seger speaks of a “character spine”, with transformations occurring at attitude, action and emotional levels of the character (resembling the cluster of attributes proposed by Egri for describing a character, physiological, sociological, psychological).

Since most of the efforts of story paradigms have been in the direction of the movie industry, a few software tools exist to format screenwriting in ways that are suitable for subsequent shooting (see, e.g., Final Draft - http://www.finaldraft.com), Dramatica Pro (based on the Dramatica paradigm, which involves peculiarities in storylines, main character, character change) supports writers during story creation. It provides an interface for answering the questions posed by the Dramatica theory on the characters and the plot, and restricting the ways of telling a story to the one that best expresses the vision of the author. There are four stages:
1. *Story-forming* allows the selection of a story-form that incorporates structural, thematic, and dynamic elements of the plot and the characters. This occurs through a selection of feature values (but a freer method of sketching the basic story exists too). For example, a character resolve output can be CHANGE (Rick in Casablanca) or STEADFAST (Laszlo in Casablanca).
2. *Story-encoding* involves the symbols selected to illustrate a story. This is the process of developing scenarios and images to convey the underlying structure and dynamics of a story, i.e. a real world event that fulfills a dramatic function in the story (the function OBTAIN can be encoded as the event “inheriting a house”). The specific examples can concern the character arc, the story goal, the plot points, theme, and conflict. Dramatica allows a comparison of the story scenes with examples of great writers.
3. *Story-weaving* builds the order and emphasis used in presenting the story elements, hence the PLOT. Here the author makes the many different story threads converge into a potentially unique tapestry, organized into Acts, Scenes, or Chapters. With this plot outline the author writes a first draft.
4. *Reception* concerns the ways the audience interprets a finished story. This phase explores how a story impact is changed because of the personality of the audience.
One appreciated aspect that is reported of Dramatica Pro is the opportunity for writer growth, because it allows the access to the major controls of the story in a concise form and this contributes to an improved awareness of the writer’s capabilities. Dramatica does not include any form of reasoning that automatically inserts steps into the story.

The control of interactive storytelling production has been pursued in a few approaches, usually implemented into monolithic (commercial and open-source) tools that cover various aspects of storytelling-based media, e.g. cinematography or animation. In the case of storytelling authoring downright, the general orientation is to support the definition of the plot structure.
Erasmatron (Crawford 2002) and its successor Storytron (Crawford 2005) are focused in the creation of interactive stories. Their target is the gaming industry. In Erasmatron/Storytron the author defines a StoryWorld by assigning personality traits to non-player and player characters, defining their initial relationships, creating the milieu in which they interact, and designing the rules governing their interactions. A StoryWorld embeds multiple chains of events, with the indication of PlotPoints, that restrict the combination possibilities of action arrangements. It is possible to play the event chains of the StoryWorld several times to discover the flaws in the story as well as to check the sequential chain through the “inclination equations” that constrain the characters’ reactions; however, the system does not go beyond one step in checking validity with respect to goals or developing plans. There is not a support for the validation of pre-defined stories, and, if during the execution of a story some condition fails, the system declares the story as "poisoned". Some author reports to have used ERASMATRON (Mixon 1996), though we can say it has never become popular among authors.
Two recent EU projects have dealt with interactive storytelling environments. The NM2 project (http://www.ist-nm2.org), has provided a first systematization of storytelling forms along interactivity issues and production methods axes; the InScape project (http://www.inscapers.com) has defined a process method and a monolithic software tool that encompasses the overall production process of interactive stories through a story planner and editor, a stage editor, and a library of objects to be inserted into the stage, also including script programming capabilities. Here (Kafno 2007, Balet 2007), as in the case of Erasmatron above, the advancement of a story is

based on the triggering of many event-reaction rules. The event can be related to an explicit action of the player or to one of the story elements. The reaction can be any of the possible actions of the story elements. A typical example is the use of proximity sensors. To check whether advancing or not in a story, a proximity sensor is placed at a certain key position. If the user reaches the proximity sensor it means that he was able to meet all the characters along a path (and in general to accomplish all the actions required) and we can advance with the story events. The reaction is then to setup the initial conditions for a new scene, such as update the state and position of the characters in the story.
This approach constitutes an incommensurable advancement of the simple model of authoring implied by the tools for the development of interactive graphical interfaces, such as Macromedia Flash (http://www.adobe.com/products/flash/), in which the interaction with the user is mediated by objects in the two- or three-dimensional space and the system's reactivity is triggered by the actions executed by the users on these objects, which become available along the timeline according to a predefined score, and perform predefined, scripted behaviours when triggered. These tools do not contain any useful primitives for structuring a story, and rely on scripting languages to relate the user actions with the 'narration' expresses by the system.
However, due to the complexity of actual stories, this approach, refined as it may be by adding storytelling primitives and ad hoc representation structures, does not scale well with the number of elements in the story, and can lead the story to inconsistent states. This forces the authors to perform many successive refinements, test-and-trial, until no room for inconsistencies is apparently possible.

All the tools mentioned here incorporate some action chaining rules in a story environment. The InScape tool is definitely oriented to explore a number of events in a world and inserting conditions for the story advancement, thus relying definitely upon the plot structure. Erasmatron involves characters but the complexity of their traits as well as the system's reasoning abilities are very basic, with a control over the story elements that is not comparable with the linear tools such as Dramatica Pro. The definition of a character through a number of traits and rules for determining its behaviour, envisaged by this project proposal, is a specific realization of a semantic annotation to story elements with a reasoning framework that can take decisions over that description.

Semantic annotation for media production

Beside the traditional approaches to storytelling implemented by the systems mentioned so far, it is worth mentioning the peculiar field constituted by a family of narrative systems in which the author has a scarce control over the story development, both in terms of the level of detail supported by the systems, and in terms of the final outcome of the story, such as the simplistic narrative scenarios classified by Ryan (Ryan 2006) as "practical" or "metaphorical"; an example is the SOFT CINEMA system by Manovich. The template-based narrative approach can better address the requirements of "expansionist" and "traditional" categories, by working through tagging with individual attribute values or rules that calculate values to be assigned to units. Examples are the Agent Stories system (Brooks 1999) or the Disc systems (Geurts et al. 2003), respectively.
In the perspective of a character-based "traditional" approach to storytelling, however, only the story-based narrative form seems suitable for our concerns, since it merges story structure and domain knowledge, where the "flesh and blood" of story characters lies. Here we can find a number of different encodings of domain knowledge, from a coherence of the story with respect to a story planner that encodes characters intentions and implements characters as intelligent agents (Theune et al. 2003) to rhetorical and genre knowledge, such as the humour-oriented editing model Auteur (Nack 1996).
In the ADRIAN project, with its perspective on character specification that can be spanned through stories and settings, we will refer to a trait-oriented domain ontology that will include the emotional status, actional library and normative knowledge of the characters (Damiano et al. 2005). We believe that the character specification is better represented through the reference to an upper level ontology (such as DOLCE), to favour interoperability through domains and multiple applications of character traits. We plan to provide a formal description in terms of a high quality multimedia annotation ontology compatible with existing (semantic) web technologies.

AI research in storytelling systems and authoring support

A number of AI systems for communication and entertainment of the last decade have in common the use of artificial characters in storytelling frameworks. Such systems, that cover all the Ryan's categories above, range from entertainment (Mateas et al. 2005; Pizzi et al. 2007) to education (Si et al. 2005; Aylett et al. 2007) and information presentation (Kopp et al. 2005, Damiano et al. 2006). Taking a different perspective with respect to the semantic annotation above, they can be classified as story-based or character-based systems. Story-based systems feature centralized architectures, in which the behaviour displayed by the system, not necessarily through the medium of characters, is driven by the unifying principle of a story; the (interactive) story is usually underspecified in order to implement non-determinism and interactivity. Character-based systems rely on characters as a way to create interactions, which take the form of an emergent narrative; the story to be conveyed is usually specified in terms of the roles played by the characters, accompanied by an initial configuration in which the different characters' beliefs and goals conflict. In both cases, gaining the engagement of the user is postulated as a consequence of the system's ability to constrain the characters' behaviour in terms of a story, a feature that is normally put in relation with an emotional dimension.

In general, character-based systems take an improvisational approach to drama, resembling the ``comedy of the art'' tradition, first translated in a computational architecture by the work of Hayes-Roth (Hayes-Roth et al. 1995). This approach - whose realization has been encouraged by the availability of conceptual and practical tools to model characters as autonomous agents - conflicts with the realization of a specific direction. More importantly, the notion of directionality itself is at risk, since the emergent plot is not even guaranteed to realise any direction at all.
Together with direction, also conflicts are not explicitly and uniformly represented in most of the existing systems, and this causes a decrease of the dramatic impact on the audience. It is desirable that the future systems can develop a better connection between authorial control, through a clearly stated direction, and the actual performance control that the system operates through characters' actions.

Whatever the chosen approach - character-based or story-based - it is widely acknowledged that the control over the story is related with the issue of communicative effectiveness; at the same time, the author's control over the story must confront with the autonomy and the believability of the characters. For some specific forms of communication and entertainment, design strategies have emerged: for example, in video games, the quality of playability, anchored in a carefully shaped, strongly constrained story, is preferred over the definition of psychologically believable, full-fledged characters. AI systems envisage interactivity as a main objective, sustained by a rich literature on interactive storytelling and drama (Murray 1998; Ryan 2006; Wardrip-Fruin et al. 2007). These systems rely on agent theories to model characters, and adopt planning techniques to cope with non-determinism at the story level, often combined according to sophisticated architectural designs. However, a consolidated approach has not emerged yet that fully reconciles the two conflicting dimensions of story and characters.

By contrast, in AI research, the explicit support to writing is mostly confined to the design of the plot, with a particular concern for branching plots, needed to interactive systems.
The Zocalo framework by the Liquid Narrative Group at the NCSU is based on a technique, called narrative mediation (Saretto et al. 2003, Thomas-Young 2006), that allows the author to devise a branching plot by accounting for the traceability of the characters' intentions by the audience, in line with the requirements of expressivity posed by Senger (Senger 1999). Repositories of abstract plots, based on narratology and semiotics, have been proposed as a tool for helping both human authors and artificial systems to create effective stories (Theune et al. 2004; Hartmann et al. 2005).
Concerning purely character-based approaches, the dominant paradigm delivered to authors is given by the BDI model of agency (Bratman et al. 1987; Rao et al. 1991), normally augmented with a model of emotions, such as the cognitive theory by Ortony, Clore and Collins (Ortony et al. 1988). For example, the system described by Aylett (Aylett et al. 2007) incorporates an agent model, integrated with an affective component specifically aimed at modeling empathy. A non BDI-based, yet action-based definition of the characters can be found in Façade (Mateas et al. 2005), in which the authoring consists mainly in writing complex joint plans that encompass the roles of the characters and the user to reach one of a clearly stated set of outcomes; the generation

of the plot is obtained through a hierarchical plan language (ABL), that encodes multi-agent plans including the user. Through this language, the system allows the author to define a set of beats or storytelling segments that represent an interpersonal conflict among the characters; in the presence of alternative options, the behaviour of the system is guided by a measure of the plot's emotional value (which follows a reverse U-shape dramatic arc). In Façade, the author can strictly control the system reaction to the user through the definition of the plans, while the control of direction is again left to a try-and-test iterative design, only applicable to the individual stories.
In the system described by (Pizzi et al. 2007), based on Madame Bovary novel, the behaviour of each character is generated by a heuristic-search planner limited to one action; the planning operators represent `feelings' (from the novel informal ontology) that manipulate the mental state of the characters to change their beliefs. Like in the Erasmatron, the author defines the initial mental state of the characters, but the character behaviour respond to a more structured and high-level plan-based system rather than “reactive” inclination rules, without enforcing an explicit notion of direction and thus leading to a try-and-test methodology on characters' definition to tune the behaviour of the system.

Finally, in these approaches the author needs a competence in the logical and technical frameworks used for the encoding of characters behaviours and user interactions, thus diminishing the possibilities of these systems to be used by the mass of authors. We believe that it is possible to devise a supporting tool for authors, that features the descriptive sophistication and simulative environment of these approaches while offering an interface that is closer to the way authors conceive stories, starting from characters. However, we also believe that an encompassing approach that can reconcile plot and characters within a single framework is far from reachable given the current state-of-the-art. So, the ADRIAN project will limit the approach to the encoding of character traits (in a multiple character environment) in a descriptive language, which will be amenable to authors, and to perform an ontology-based reasoning to support the search of solutions for story advancements (in both the linear and the interactive contexts) within a single scene (and not an entire plot).

Storytelling and Machinima

There is an increasing interest in the gaming community in the phenomenon of machinima.
"Machinima (muh-sheen-eh-mah) is filmmaking within a real-time, 3D virtual environment, often using 3D video-game technologies. In an expanded definition, it is the convergence of filmmaking, animation and game development. ..." (http://www.machinima.org).

Machinima is an interesting case of non-professional users having the means to produce animated videos with little or no need of investements. In most of the existing systems used to do Machinima creations, the outcome of a production is equivalent to a movie. While the playback of the production is based on a real-time rendering engine, the outcome is based on a predefined sequence of commands. Interactivity and unpredictability are lost. This is mainly due to the fact that the rendering engines used today are deeply tighted to the interaction mechanism of the game they are devoted to. In most cases the engine is part of a First Person Shooter, where most of the interaction is achieved through the use of weapons. The generation of an interactive story would require an extensive use of the scripting mechanism of such rendering engines, which is a complex task that vast majority of the user cannot accomplish.

We believe that Machinima authoring systems would greatly benefit from a character-centred approach in producing stories. In ADRIAN the approach to Machinima would look as shifting from First Person Shooters (FPSs) towards Role Playing Games (RPGs). In RPGs, users are deeply focused in defining, monitoring and taking advantage of the characteristics of the single players, such as their race (human , elf, orc, gnome, ...), class (fighter, wizard, thief, ...), attributes (force, intelligence, constitution, ...) and props (weapons, armors, magical objects, ...). Given a quest to solve, where a quest is defined by an initial state of the world and a goal to achieve, it will be solved directly by each player, or a party of players, according to their specializations.
In ADRIAN, the Machinima authoring will be focused on the character description, which is a case of very successful, long-lasting, gaming schema that is involving millions of non-professional users all over the world (see games like World of Warcraft, Neverwinter Nights, Diablo).

Conclusions on the project context

The idea is that in the digital media context it is hard to manage storytelling through a strong authorial control of the plot, as in the case of traditional storytelling. The models that have been proposed either provide plot architectures that refer to computer science practice and are not suitable for the working methods that are typical of authors. Authors look for situations or characters that can emotionally engage the audience, rather than abstract plot structures that provide a neat and comprehensive organization of the story material. Also, the control of the plot seems too a hard problem to solve for the generic interactive context of new media: the reason seems to lie in the limited models of the users' cognitive capabilities that we own at the current stage of development. The result is that we cannot profitably take into account the interactive aspects of a story and develop plot structures that can effectively incorporate the interactive component under a strict authorial control of the story development.

So, the major idea behind the ADRIAN project is to go back to the principal components of the story that authors have in mind when they conceive a story and try to model those components to provide automatic support to authors. Characters represent a suitable departure point from plot-based approaches in this perspective. Characters are entities that authors deal with and at the same time have received a formal treatment through the AI-based approaches to emergent narrative. Characters, with their decisions and actions, which must be believable with respect to what we know from the story up to some point, make the story advances. The specific problem addressed by ADRIAN is the effective support to the author's task of devising a credible behaviour for a character in a story fragment.

Traditionally, authors split the plot of the story into units at different levels of abstraction (in film and theatre they are usually called *acts*, *sequences* and *scenes*, in decreasing abstraction order). The ADRIAN project focuses on the scene level, i.e. the minimal units that realise a story advancement. For each scene, in fact, the author wants to achieve some dramatic goal, and the characters who take part in the scene must behave in a credible way so that the goal is achieved. Let us consider, e.g., two characters. Dusk is the determinate chief of a partisan commando and has the goal of accomplishing a mission at any cost; Echo is his noble assistant and lets his humanity prevails over mission accomplishment. We can depict two scenarios.

1. The author states the initial conditions of a scene. Then the system elaborates one step of reasoning starting from the values at stake defined for the characters and proposes to the author some character behaviour. The author selects one of the possible behaviours or gets inspiration from the proposals to yield the actual behaviour for some character. For example, in the case above, the system can propose an event that challenge the mission accomplishment for Dusk and Dusk shows a resolute attitude towards the accomplishment of the mission; Echo must look for some action that lets him prove his generosity towards the human kind that will lead him to abandon (at least temporarily) the mission.
2. The author states the goal of the scene. Then the system elaborates proper characters' behaviours that lead to the accomplishment of the goal, not as a function of the character's definition, but as a function of the expressive goal of the scene. For example, in the story above, the author wants the commando to split. The system simulates possible characters behaviours that lead to the split of the commando; the development of the characters' behaviours is now constrained by the final result of the scene, rather then driven by the definition of the characters. The system proposes an event that is compatible for Echo to show his generosity and Dusk to resist in his determination to accomplish the mission. For example, the two discover that in a farm house one civilian is held and tortured by the soldiers; Echo decides to stop over to free the civilian, while Dusk is resolute to accomplish the mission; this leads to the splitting of the commando. So, the author selects one solution among the solutions that are consistent with the definition of characters and the situation at hand in order to make the story advance convincingly toward the dramatic goal he has devised for the scene.

In the first scenario, we have a look-ahead strategy over possible actions that characters can undertake in some contextual conditions set by the author. This situation is typical of the first act in the Hollywood film industry

when the author usually presents the characters and sets the stage for the audience to understand the incidents and the climax of the second act. Here we are exploiting the knowledge over the basic traits of the characters (a sort of meta-model). In the second scenario, we have a double constraint on the initial and the final conditions of a scene; so, the actions deliberated by the characters must be compliant with the frame conditions.
These proposals over characters behaviours can be addressed via a few methods devised in the AI tradition above, which have already been employed to some extent in the interactive storytelling research. The specific concern is for the deliberative components having reference to planning and execution of actions driven by their motivations and goals (Beliefs, Desires and Intentions in the BDI paradigm Bratman et al. 1987; Rao et al. 1991), logic representations of norms and social rules (Sgouros 1999), and personal goals and relations (Gratch 200?), behavioural strategies connected to characters' emotional response (Cavazza et al. 2002). Usually, such approaches have been geared to the control of characters in the implementation of a "weak" emergent narrative, i.e. a narrative not strictly controlled by an author, but that relies on the characters' autonomous behaviour for a number of decisions (Mateas et al. 2003; Cavazza et al. 2007; Aylett et al. 2007).
The working hypothesis of the ADRIAN project is that it is possible to fill a gap between the author's work on characters and the automatic control of characters' behaviours by realizing a tool that supports the author in finding solutions to the story advancement. Characters are pervasive to the authoring practice, which usually posits the creation of characters at an earlier stage with respect to the plot. Centring the project on the character perspective allows to bridging traditional and interactive storytelling forms, and regaining most of the insights provided by traditional scriptwriting and authorial practices (encoded in the paradigms outlined above). The character perspective is exportable across genres and media, while plot/structure, as revealed by the mentioned projects, is very dependent on specific stories or media products. Characters are the engines that make the story advance through their actions; such actions must be compliant with credible decisions with respect to the character personality and constrained to the plot lines defined by the author; finally, the combination of several characters' actions have to be coordinated in an individual story.

There are a number of possible scenarios concerning the authors' work.

> Abstracting from the example above, the system can provide automatic generation of characters' behaviours for the author to evaluate the compliance of such behaviours with the goals of the scene or to find inspiration for the story advancement. The system can investigate a limited look ahead over the possibilities offered by a certain state of affairs (otherwise the generation process becomes intractable) and the author can choose, possibly modifying, some solution (system propose mode) or validate authorial solutions with respect to a limited number of characters traits (system dispose mode).
>
> The author can investigate the consequences of adopting a certain cast in a scene: in this case, the author may realise that the way characters are defined is not compatible with certain advancements of the story; for example, this could be the case if the description of the characters is not likely to generate a conflict among them.

The system can establish relationships of characters' decisions onto a high-level description of the plot: in this case the author may specify situation constraints at both a scene, i.e. local, level and a story, i.e. global, level and the system may avoid solutions that prevent some further development; for example, the system may discover that, given a solution, the consequence is that the character comes to possess some information at a very early time, then preventing other developments later.

ADRIAN goals and methods

The goal of the ADRIAN project is to develop new authoring methods and tools for Interactive Storytelling which would ensure the continuity between current authoring methods, which are mostly character-centric, and those required by emerging media such as Interactive Storytelling. This should enable the development of Interactive Storytelling by facilitating the elicitation of media content, as well as improving its acceptance in traditional media communities. The ADRIAN project will implement a tool that supports the author in the definition of characters according to a number of basic traits, is able to automate reasoning about character traits and simulating character behaviour, and suggests possible solutions to story advancement, with an empirical validation through pilot productions.

Character traits to be modelled will be devised through a thorough analysis of a corpus of pre-production materials from the audiovisual and gaming industries and by extensively studying the literature sketched above and the systems that have been implemented in the commercial and research environments. As revealed by the story paradigms derived from the linear storytelling tradition, we expect different types of descriptive traits:

change or *stability*,

role type, ranging from Main Character (Field 2003), Protagonist (McKee 1997) and Hero (Vogler 1998) - which always play the principal part - to Impact Character (Dramatica) - that drives the audience's alternative reception of the story –, Antagonist (McKee 1997) - that engages in a conflict with the Protagonist -, etc.

values at stake, for creating unbalanced situations that need to be solved,

intentionality, for moving the course of events through the connections between characters' motivations and actions,

"transformation" (Seger) in characters' *attitudes* and *emotions*,

…

So, a first milestone of the project will be a survey of the character traits as revealed by this extensive study and test of systems. Traits will be arranged according to a meta-level knowledge over characters through stories and approaches as well as according to knowledge-level grouped according to foundational upper-level ontologies. A contribution from the production partners will be draft stories as well as stories from their previous experience to describe according to the traits. This will serve as a tester for the trait survey.
The deliverable of this phase will be a report of the findings, which will be publicly available.

Then we will devise a descriptive language based on an appropriate ontological framework in order to support interoperability though stories and automated reasoning through planning systems. One of the partners involved in ADRIAN (Teesside) has operated extensively with planning formalisms, both action-based and decompositional/hierarchical. Also, in devising the descriptive language we will be compatible with media annotation languages, in order to improve interoperability between pure authoring and media production based on the authored product. An example of media annotation language of this type is COMM, based on DOLCE foundational ontology and MPEG-7 standard, involving one the partners of this project (CWI) and supported by two projects of the 6th framework (K-Space and X-Media).
In particular, the academic partner of the project (CWI) are involved with work on specifying the structure of complex semantic annotations of non-textual data. This has resulted in COMM -- A Core Ontology for MultiMedia, based on the MPEG-7 standard and DOLCE, and expressed in terms of OWL. COMM ontology provides MPEG-7 compliance, semantic and syntactic interoperability, separation of concerns, modularity and extensibility. Semantic annotation will be used in the application to characters rather than story segments, leaving the story domain oriented annotation of the plot structure for future terms. In the line of semantic annotation and story authoring through an implementation of characters as intelligent agents there is a productive, though a niche, area of artificial intelligence, that have addressed the forms of communication and entertainment, and has also developed storytelling authoring systems.
The language will be used to encode the traits devised in the previous phase. So, a second milestone is a repository of traits encoded in the descriptive language. The repository will also include basic sample plans and constraints rules required to encode the draft stories provided by the production partners.
The deliverables of this phase will be the repository, accessible through a suitable interface, and a report describing the repository.

The software outcome of the ADRIAN project will be an authoring tool targeted to authors of linear and interactive stories. The authoring tool architecture will clearly separate the computational engine, at the core of the project, from its graphical interface. The system will allow the author to describe and store a set of characters and scenes. The author, through an appropriate interface, can build a character from a set of basic traits and test the trait values in a plan-based system that governs the character behaviour. S/he can also define constraints at the scene level. At run-time the author assigns the characters an initial state in a scene with some constraints; then the author can build the scene step-by-step; each step consists of a change in the state of a character, of

characters – possibly in conflict -; at each step, the system checks whether the state changes approved by the author do not collide with the constraints. Constraints rules can range from the basic needs of coherency in storytelling, such as avoiding repetitions (e.g., an argument cannot be used twice, or some object cannot be grasped if not visible in the scene), through more specific rules belonging to particular genres, to custom rules appropriately defined for a specific production. An example of a logic suitable for constraints is in (Sgouros 1999). So, as claimed above, the system won't be intended to help inventing the story, but to help verifying the compatibility, coherence and credibility of an action sequence performed by the participants to the story.

Since it is predictable that the definition of constraints rules could not be an easy task for authors, the ADRIAN system will be equipped with a basic set of constraint rules, emerged during the early stages of requirements definition, tested during development, and refined during the pilot production phases, respectively. Also, the system will be equipped with a graphical interface, developed by a skilled content creator and after an analysis of the user requirements carried out by one research partner in collaboration with the production partners. A first, basic version of the interface will be mostly based on the widely diffused WIMP paradigm (Windows, Icons, Mouse, Pointer). The author will interact through the use of widgets and most of the information (e.g., when the story is violating a rule) will be issued as text descriptions; different interaction paradigms (such as direct manipulation or command line) will be developed in the pilot production phase to support fine-grained control of the system by the author.
The milestone of this phase is a prototype of the ADRIAN system and the engine, with a report on the test over the draft stories. The deliverable is the prototype, released within the open-source paradigm and a manual of use for the system and the graphical interface.

In the final phase, the ADRIAN system will be tested in pilot productions with professional users. The production partners have experience in linear and interactive stories, and will involve authors and producers in testing the system, with consequences on refinements and debugging, on a real production that will be currently available at the time. The pilot productions will not be designed and carried out by relying on project resources; instead, the partners will select, among the ongoing projects of the production partners, the productions which seem more suitable for testing the validity of the ADRIAN system.
Submarine will deal with interactive stories connected to game development and involving well defined characters; the pilot production will test whether the system can improve the game designers to define characters (usually not well traced in the game industry) through the system support. BBC will establish a liaison with the production pipeline of interactive TV programmes; TV programmes can use a limited version of the interactivity (because of the technical limitations); we see whether the support to character behaviour generation can improve the immersion of viewers. VRMMP will test the system on the Machinima approach, by integrating the core ADRIAN into a 3D real-time authoring environment. The authoring system will be based on one of the many 3D engines freely available in the OpenSource movement, on which VRMMP is actively contributing to the development (www.ogre3D.org).
The milestones of this phase will be three pilot productions.
The deliverables will be both the productions and a report of the production activity with the evidence for the ADRIAN results.
The evaluation of the authoring systems will be the object of a deliverable, consisting of a written repost including all the evaluation data and conclusions. A deliverable with project preliminary results will be published for general audience.
In order to favour the commercial exploitation of the system, two deliverables will be published: the first one will consist of a survey of the business models into which the system can be employed (such as system development, system integration, stand-alone use, etc.); the second one will consist of a software suite including instruments for integration and content inclusion.

Relevance to the Work Programme

This proposal addresses the following objective of the 2007-2008 Work Programme (Intelligent Content and Semantics); it falls into the category of "ICT for Content Creativity and Personal Development":

“Advanced authoring environments for the creation of novel forms of interactive and expressive content enabling multimodal experimentation and non-linear story-telling. These environments will ease content sharing and remixing, also by non-expert users, by automatically tagging content with semantic metadata and by using open standards to store it in networked repositories supporting symbolic and similarity-based indexing and search capabilities, for all content types.”

Interactive Storytelling epitomises the notion of “digital resources that embody creativity and semantics”, which would enable creators to “design more communicative and participative forms of content”, providing enhanced user experience. By centring the storytelling process on the notion of character, the proposal aims at providing a computational and conceptual model – as well as a software tool – that simplifies the process of story design across platforms and media. The resulting technology is conceived with the goal of being exploited in a variety of interaction scenarios, such as game technology, virtual environments, computer animation, visualisation, and simulation.

The use of an ontology-inspired model of character envisage by the proposal lends itself to the encoding of semantic metadata for the created content, addressing the tasks of finding, remixing an sharing material in distributed, collaborative authoring scenarios, for professional or personal use.

Finally, the development of Interactive Storytelling technologies is primarily of interest to creative industries. The content sector in Europe accounts for 5% of the GDP and the creative sector employs approximately 3.5% of the EU workforce.

Milestones for verifying the advancement of the project

M1. Survey state-of-the-art (Month 6)
This survey will be in textual format and schemata for the description of character traits as they result from the analysis of the corpus of pre-production material and the existing approaches. The description will be oriented to the successive encoding of characters in the formal language devised in the WP 2. Here we will also individuate sample characters used for testing the encoding language and situations with which testing the tool capabilities.

M2. Model prototype (Month 12)
The model prototype is the character model tested on sample cases (as indicated in M1). It is a file format that implements the description language and a executable programme that provides the interface (through a semi-formal language) for describing characters in a . The Model prototype is used immediately in the definition of tool design (WP3).

M3. Character's model with examples (Month 15)
This is the complete model tested on a number of characters and debugged and refined with respect to the prototype in M2.

M4. Design of the tool architecture (Month 18)
This is a design of the tool architecture, with a clear indication of the modules that constitute the tool (and interfaced with the module for entering the character description - M3) and design of the tool interface with respect

M5. Engine prototype: a working system plus tests (Month 24)
Executable programme that implements the ADRIAN tool. It will equipped with a suitable interface for authors to define the characters and a reasoning module to determine their behaviour in some defined situation. It also comes with an interface the setting of a scene, that defines the frame condition for the characters to behave.

M6. Pilot productions: three pilots (Month 30)
This milestone consists of three pilot productions. They will be three products that involve storytelling with characters defined through the ADRIAN tool and with authorial decisions taken after the suggestions provided by the tool. Beyond the products themselved, this milestone includes projects in the ADRIAN format and logs of the author/tool interaction for the subsequent analysis and proposal of improvement to the tool.

M7. Final report (Month 36)
This is the collection of reports that results from the workpackages Evaluation, Dissemination and Exploitation. The three phases are scattered through the project, but we will collect a unique document that includes all the critical material that results from these packages. It is a textual plus schemata and log files from pilot executions.

1.2 Progress beyond the state-of-the-art

Storytelling authoring has a long-standing literature and a business status in linear narrative and a challenging debate with respect to new media developments. There have been several advancements in the recent years in the areas related to the project. In the following paragraphs we address each area by describing the state of the art as well as the advancements brought about by this project.

Authoring in storytelling systems
In the last decade, a number of AI systems for entertainment and communication have appeared that - notwithstanding different design goals and conceptions - share a set of common features, including the use of artificial characters in storytelling and drama. Such systems have been built for different applications, ranging from entertainment (Mateas et al. 2005; Pizzi et al. 2007) to education (Si et al. 2005; Aylett et al. 2007) and information presentation (Kopp et al. 2005, Damiano et al. 2006), rely on various modalities for the communication with the user, including natural language and graphics, and support different styles of interaction with the user, like dialogue, direct manipulation or even embodiment. Concerning the architectural aspects, various AI techniques have been employed to realise these systems, like planning techniques and agent technologies; centralized or distributed frameworks have been employed for system control, in the attempt to cope with the computational complexity of the problem (Nelson et al. 2006).
Given this heterogeneity of goals and instruments, a first, broad distinction has been established in the literature between character-based and story-based systems. Story-based systems are characterized by centralized architectures, in which the behaviour displayed by the system is driven by the unifying principle of a story. The story to be conveyed is usually underspecified in some way, so as to provide some (limited) support to non-determinism and interactivity. Conversely, character-based systems rely on characters as a way to create interactions, interpreted in terms of emergent narrative structures. The story to be conveyed, in this case, is normally specified only in terms of the roles played by the characters.

The INSCAPE Integrated Project (IST-2004-004150) was one of the first projects entirely dedicated to Interactive Storytelling. It had a strong emphasis on authoring, and on making authoring accessible to a wider audience, but was predominantly based on plot models (with some attempts at standardising such as the ICML markup language). In AI research, there is special concern for the design of branching plots, needed to realize interactive systems: the Zocalo framework by the Liquid Narrative Group at the North Carolina State University is based on a technique, called *narrative mediation* (Saretto et al. 2003), that allows the author to devise a branching plot by accounting for the traceability of the characters' intentions by the audience, in line with the requirements of expressivity posed by Senger (Senger 1999); repositories of abstract plots, based on narratology and semiotics, have been proposed as a tool for helping both human authors and artificial systems to create effective stories (Theune et al. 2004; Hartmann et al. 2005).
However, as pointed out in the previous section, the focus on structural aspects of stories, like plot, is not subscribed by authors, whose creative processes are better stimulated by characters, possibly accompanied by emotionally-charged moral or ethical conflicts. So, the ADRIAN project promotes a focus shift in this perspective, in order to meet the needs of authors. In a distributed, participative view of authorship as part of the communicative flows stimulated by the fast developing future media, authorship cannot be restricted to professional authors, but encompasses a population of amateur authors: by adopting a character-based language and tools as the starting point for the creation of stories, ADRIAN aims at bridging the gap between the widely acknowledged centrality of agency in human cognition and the creative process of storytelling, with a impact on the effectiveness of the system in the context of the use by larger sets of user, not restricted to professionals. By adopting a character-based perspective on characters, ADRIAN situates the concern for structural aspects (like plot) in the background of the characters' creation and vivification, demanding to expert intervention the management of plot-related issues, possibly accomplished in a computer-assisted way as a subsidiary aspect of the creative process.

Situated on opposite positions, character-based systems take an improvisational approach to drama, resembling

the ``comedy of the art'' tradition, first translated in a computational architecture by the work of Hayes-Roth (Hayes-Roth et al. 1995). The NICE (IST-2001-35293) project developed conversational characters in 3D worlds supporting storytelling. Here the concept was more on the character itself being some kind of storyteller, rather than the experience being Interactive Storytelling sui generis. This was essentially a Multimodal Interfaces project supporting dialogue with virtual characters in the context of storytelling and/or computer entertainment. VICTEC (IST-2001-33310) developed ECA as part of a tutoring system educating children on bullying issues. It is based on the generation of empathy towards virtual actors being bullied by fellow children as part of an interactive narrative. The FearNot! System developed as part of the project is an example of “Emergent Storytelling” based on synthetic characters’ behaviour. eCIRCUS (FP6) (IST-2006-027656) is somehow a continuation of the VICTEC project.
Concerning character-based approaches in AI research, the dominant paradigm delivered to authors is given by the BDI model of agency, possibly augmented with a model of emotions, such as the cognitive theory by Ortony, Clore and Collins (Aylett et al. 2007). In the system described by (Pizzi et al. 2007), the behaviour of each character is generated by a heuristic-search planner, and planning is limited to the selection of the next action, to cope with asynchronous user intervention without resorting to re-planning. The resulting initial situation is open to opposite endings, depending on the user's input, and the moment this input is provided, thus leading to hypothesize a methodology consisting of iterative testing and modifications of the characters' definition to tune the behaviour of the system to the author's expressive goals. The Façade system (Mateas et al. 2005) is designed to conduct the interactive drama to a clearly stated set of outcomes, in which the protagonist couple either splits or remains together, with the user being neutral or sympathizing for one of the two sides. In Façade, the richness of the user experience resides in the user becoming a protagonist of the story, triggering (but not entirely controlling) the evolution of the plot towards one of the available directions. The generation of the plot is obtained through a complex hierarchical plan language (ABL), that encodes multi-agent plans and requires a complex training of the author. A common aspect to character-based approaches is that the focus on characters’ autonomy - encouraged by the availability of conceptual and practical tools to model characters as autonomous agents - conflicts with the realization of a specific direction. More importantly, the notion of directionality itself is at risk, since the emergent plot is not even guaranteed to realize any direction at all.
It is desirable that future systems can develop a better connection between authorial control, through a clearly stated direction, and the actual performance control that the system operates through characters' actions. By introducing an ontology-based view on characters, ADRIAN will provide a clear interface between improvisational systems and plot manipulation, allowing an easier integration with plot-aware systematisations of storytelling.

Whatever the chosen approach - character-based or story-based - it is widely acknowledged that the control over the story is related with the issue of communicative effectiveness; at the same time, the author's control over the story must confront with the autonomy and the believability of the characters. For some specific forms of communication and entertainment, design strategies have emerged: for example, in video games, the quality of playability, anchored in a carefully shaped, strongly constrained story, is preferred over the definition of psychologically believable, full-fledged characters.
AI systems envisage interactivity as a main objective, sustained by a rich literature on interactive storytelling and drama (Murray 1998; Ryan 2006, Wardrip-Fruin et al. 2004). These systems rely on agent theories to model characters, and adopt planning techniques to cope with non-determinism at the story level, often combined according to sophisticated architectural designs. However, a consolidated approach has not emerged yet that fully reconciles the two conflicting dimensions of story and characters.
In general, the ADRIAN project is to have a positive impact on the integration among heterogeneous systems. In the near future, storytelling will strongly affect the evolution of media: stories will become actionable trough interactivity, personal experiences will become object of loose narratives in media-based social contexts, narrative patterns will emerge as a of the collective experience of the social web, and, in general, of a reality inhabited by network-based devices. So, in an implicit or explicit form, dedicated modules for story generation and control will become pervasive in a variety of systems, relying on different media and platforms. This scenario establishes a dramatic need for some form of integration, necessary to let collective and distributed forms of storytelling emerge, and encourage the establishment of workflow models for story creation in

distributed and cross-platform environments. In this perspective, the ontology-based language defined by ADRIAN will be an instrument for the integration of systems and models, since it relies on a key notion - the one of character - common to all approaches. The open nature of the software tools produced by the project aims at emphasizing even more this dimension, encouraging the integration among systems throught he inclusion of ADRIAN tools, their customization or the development of apposite plug-ins or adapters.

Tools that support writing

A significant part of the progress established by the ADRIAN project will consist of the integration into a theory-neutral, comprehensive framework, centred on the notion of character, of a variety of techniques developed by Artificial Intelligence, now applied in a range of individual systems, each based on a different theoretical perspective (structuralist, intention-based, affective, etc), which are not easily dealt with by human authors. In ADRIAN, the character is the medium through which the point of view of the author is imported in story creation tools, thus taking AI techniques off-the-shelf.

By adopting the techniques developed by AI into the field of story creation, then, the ADRAIN project will also inherit the strong inclination to deal with non-linear stories, to which AI storytelling systems have devoted most of their attention, by testing appropriate solutions for dealing with complexity and control over the narration, a feature which is not encompassed by traditional tools for linear stories like DramaticaPro. At the same time, the ADRIAN project creates a common ground between 'traditional', guru-inspired approaches and AI.

Notwithstanding the differences displayed by the various approaches to drama for what concerns the theoretical stance and aims of their investigation, the key role played by emotions seems to be a common aspect to most drama definitions, a role which is not easily dealt with without a strong focus on characters, as postulated by the ADRIAN project.

Research in computational drama has inherited from drama criticism the centrality of emotions Following the dominant paradigm of agents in AI, computational drama has implicitly equated characters to agents (Machado 2004; Petta 2005), thus establishing a perspective from which having a model of characters' emotions is necessary to improve the realism and the believability of the characters. In this approach (``character as agent''), emotions have been integrated in the characters' rational model, in line with a well-established trend in cognitive studies (Damasio 1995). For example, in (Theune et al. 2003) emotions provide an instrument for increasing the individual variability of behaviour in the automatic generation of plot.

More recently, computational drama has tackled the issue of emotions at the expressive level. Here, works range from the emotional properties of editing and mise-en-scene in interactive drama (Zagalo 2004), to the expression of emotions in avatars and virtual actors (Pelachaud 2005; Lisetti 2006).

The FP6 NoE HUMAINE (IST-2004-507422) dedicated to Affective Computing has included research in Interactive Storytelling and on affective agents. COMPANIONS (IST-2005-34434) is an FP6 Integrated Project dedicated to Embodied Conversational Agents (ECA), with an focus almost entirely on user-agent dialogue. It includes affective aspects but its applications are not in the area of storytelling and entertainment. NECA (IST-2000-28580) and MAGICSTER (IST-1999-29078) were previous projects on virtual characters, mostly dedicated to multi-modal communication with animated synthetic personalities, including affective aspects.

In order to account for the advancement brought about all the research lines cited above, in ADRIAN, the development of an ontology-based language for the description of characters will provide a neutral basis for encoding a large set of emotional specifications of characters (Vinayagamoorthy et al. 2006). The resulting language will be able to accommodate the definition of different emotional aspects, which affect the characters in many ways, spanning from static, long term influence (personality) to medium term, cognitively-relevant influence (mood) to short-term, reactively-relevant influence (emotions), each of which differently and unevenly acknowledged by current storytelling and story-authoring systems.

1.3 S/T methodology and associated work plan

Overall strategy of the work plan

The overall structure of the project can be broken down into two main segments. The first segment consists of the applied research effort delineated by the project description (section 1.1), while the second segment is devoted to the dissemination of the scientific research results in the perspective of supporting the industrial production.
The first step of the methodology consists of the gathering of the preliminary data that constitute the input for the development of a conceptual model of the research object (second step). The development of the model is the basis for the development of a software architecture aimed at providing the services which constitute the goal of the project (third step). Concerning the perspective of technological and industrial progress, the project envisages a phase in which pilot productions are conducted, prior to the proper dissemination of the results, in order to assess the modalities through which the delivered software can support the actual productions. Dissemination and exploitation follow the pilot productions.

The first research work package (Survey of character-based authoring and character-based storytelling), WP1, will be devoted to the survey of the methods adopted by authors for describing characters in storytelling practice and the methods enforced by the software tool designed to support the authoring process. In particular, the survey will account for evidence gathered from two important sources: on one side, the analysis of a corpus of pre-production material from media production (mostly television fiction, cinema, and game industry from the production partners); on the other, the up-to-date commercial tools for authoring will be analysed to come to know the level of abstraction supported by these tools.
The following work package, WP2 (Definition of the model of characters' traits in relation to narrative situations), aims at the design of a conceptual model of characters' traits as they emerge from the survey. As a first step, the alternative definition of the characters will be systematised by classifying them - when possible - according to the narrative and drama theories that have been influential on authoring practices. This comprehensive knowledge, formalized in the form of an ontology to support its deployment in the subsequent phases of the project, will be accompanied by an investigation of the author requisites, conducted through the conceptual instruments acknowledged by the discipline of human-computer interaction. The comprehensive model of character definition will be then refined into a restricted model of characters' traits that are relevant for storytelling, inspired by the specification of the author requisites. The model obtained, validated through the simulations conducted in selected application scenarios, constitutes the basis for the development of a software architecture for support of authoring, accomplished in WP3.
WP3 (Design of ADRIAN authoring tool) consists of the design of a user interface (again, by accounting for the author requisites from the previous work package, as to better support authors' creative process) and a software architecture for an engine that will assist the story creation from a character-based perspective. The implementation of this engine (WP4) will be based on the reuse of state-of-the-art reasoning and planning services aimed at supporting a simulation of the characters' behaviour in the story, given the trait-based specification delivered by the WP2. The core engine will then be enriched by plug-ins and exporters designed for its use in the platforms and monolithic tools by which the pilot production will rely on. Testing and debugging will complete the work package.

WP5 (Pilot production) consists of a set of pilot productions, aimed at assessing, on the one side, the modalities through which the engine implemented in WP5 can assist and improve the authoring processes in storytelling media productions; on the other side, pilot productions across different platforms and genres will permit an evaluation of the extent to which the tool supports creativity, productivity and cost-effectiveness of the production process. This work package will also provide a user feedback to be incorporated in the cycle iterative design of the engine and of its interface.

A dedicated work package for the evaluation of the tool (W6, Evaluation) will asses its cost effectiveness in supporting the workflow of storytelling productions, its adequacy to the need of the users belonging to the

different categories involved as authors in the pilot productions and will possibly determine limited, focussed re-engineering of the tool and of its interface.

WP7 (Dissemination) serves the purpose of propagating the results achieved by the project with regard to the model of characters' traits and the engine build on the basis of this model. Dissemination will be conducted through the communication channels of the scientific and research communities to which the project is relevant and through the participation to the events and communities of industrial companies and professional users. This work package also includes the creation of a dedicated web forum and community to support the dissemination of the results and to promote a project-long discussion with the scientific and professional audiences. Web-based, collaborative platform will be the instruments for the delivery of software and documentation related with the project.

The exploitation of the results of the project (WP8, Exploitation) will be mainly supported by the adoption of the open-source paradigm of software distribution, as a main instrument to promote and encourage the use and customization of the character-based storytelling authoring engine and its integration into existing software tools and artefacts.

From the perspective of the project management, a dedicated work package (W0) will account for management issues. This work package, which will stretch along the entire duration of the project, will see to it that the appropriate communication and coordination occur among the partners through the action of the technical and steering committees, by means of the project deliverables, milestones and progress reports. At the same time, this work package will take care of the communication and coordination between the project and the EU referents.

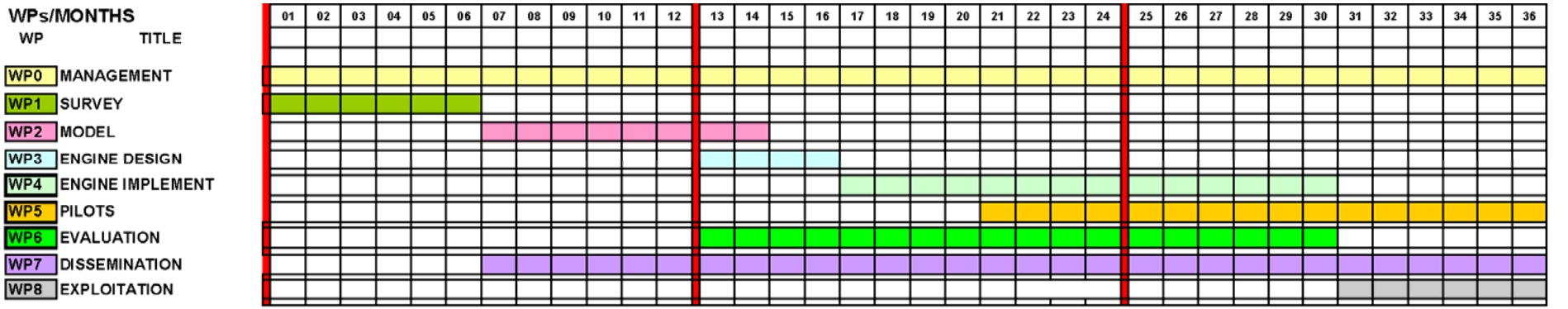

WPs/MONTHS
WP
TITLE
WP0 MANAGEMENT
WP1 SURVEY
WP2 MODEL
WP3 ENGINE DESIGN
WP4 ENGINE IMPLEMENT
WP5 PILOTS
WP6 EVALUATION
WP7 DISSEMINATION
WP8 EXPLOITATION
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

Table 1.3 a: Template - Work package list

Work package list

Work package No		Type of activity	Lead partic no.	Lead partic. short name	Person - months	Start month	End month[1] [4]
0	Management	MGT	1	VRMMP	18	1	36
1	Survey of character-based authoring and character-based storytelling	RDT	4	TEESIDE	34	1	6
2	Definition of the model of characters' traits in relation to narrative situations	RDT	5	UNITO	31	7	14
3	Design of ADRIAN authoring tool	RDT	2	CWI	14	13	16
4	Implementation of ADRIAN authoring tool	RDT	1	VRMMP	68	17	30
5	Pilot productions	DEM	3	BBC	38	21	36
6	Evaluation	RDT	3	BBC	12	13	30
7	Dissemination	RDT	1	VRMMP	20	7	36
8	Exploitation	RDT	1	VRMMP	5	31	36
	TOTAL				240		

Table 1.3 b: Deliverables List

List of Deliverables

Del. no.	Deliverable name	WP no.	Nature	Dissemi-nation level	Delivery date (proj. month)
D1.1	Initial Survey of authoring tools and narrative formalism	1	R	PP	6
D1.2	Survey of character traits	1	R	PP	6
D2.1	Repository of character traits, constraints and plans (character model)	2	P	RE	14
D2.2	Repository description	2	R	RE	14
D3.1	ADRIAN authoring tool architecture specification	3	R	PU	16
D4.1	ADRIAN authoring tool prototype	4	P	RE	24
D4.2	ADRIAN testing over draft stories	4	R	RE	24
D4.3	ADRIAN manual of use	4	R	RE	26
D4.4	Contents for usage with the authoring tool	4	P	PU	30
D5.1	Broadcasting pilot production	5	D	PU	30
D5.2	Game pilot production	5	D	PU	30
D5.3	Machinima pilot production	5	D	PU	30
D5.4	Report on pilot productions	5	R	PU	30
D6.1	Evaluation results	6	R	PU	30
D7.1	Report on preliminary project results	7	R	PU	24
D8.1	Business models for exploitation	8	R	PU	34
D8.2	Integration suite of plug-ins and adapters	8	P	RE	34

Table 1.3c - List of milestones

Milestones

Milestone number	Milestone name	Work package(s) involved	Expected date	Means of verification
1	Survey state-of-the-art	WP1	Month 6	Survey released
2	Model prototype	WP2	Month 12	Prototypes validated by relevance to narrative theories and methods
3	Character's model with examples	WP3	Month 15	Model validated by application on draft stories
4	Engine design: system architecture	WP4	Month 18	Documented model of software architecture
5	Engine prototype: a working system plus tests	WP5	Month 24	Software completed and running
6	Pilot productions: three pilots	WP6	Month 30	Demonstrators completed and published
7	Final report	WP7	Month 36	Report submitted and distributed

Table 1.3 d: - Work package description

Work package description

Work package number	WP0	**Start date or starting event:**		Month 1		
Work package title	Management					
Activity type	MGT					
Participant number	1	2	3	4	5	6
Participant short name	VRMMP	CWI	BBC	TEES	UNITO	SUBMAR
Person-months per participant	11	2	1	2	1	1

Objectives

- To guarantee internal communication and coordination
- To guarantee communication and coordination with the EU
- To monitor project progress and adherence to the its technical objectives and to the relevant call
- To perform the operational planning for the management of the project

Description of work and role of partners

We define two levels of Project management for the duration of the Project. The first one, the Technical Project Committee (TPC), takes care of Technical issues. Each work package is placed under the direct responsibility of a Work package Leader, belonging to the TPC. The Technical Project Committee reports to the Project Steering Committee (PSC), keeping it informed about the status of advancement of the Project.

Task 0.1 Management of administrative aspects of the project

It is the responsibility of the Project Steering Committee:

- to review project progress and assess project performance
- to ensure the project maintains its technical objectives
- to ensure the project maintains its relevance within the specific program

The Project Coordinator will oversee and coordinate all administrative aspects of the project
Responsible: VRMMP

Task 0.2. Management of technical aspects of the project (Month 1 – Month 36)

It will be the responsibilities of the Technical Program Committee:

- to maintain regular contact with the Work package Leaders in order to ensure effective progress of the project
- to prepare and enforce the project operational planning
- to review work progress
- to check the technical consistency between work packages and tasks
- to ensure that the overall project schedule is maintained through operational planning, and to anticipate and resolve deviations, whether from a technical or schedule standpoint
- to negotiate and confirm dates, venues and content for Technical Reviews
- to monitor the preparation, production and distribution of all deliverables
- to report project progress at PSC and to report any problems as they arise

The project management will see to it that the information flow concerning all the administrative and

technical aspects of the project is guaranteed among the partners, and that coordination among them is achieved through the actions brought about by the Technical and Project Steering Committees, thus ensuring the project progress in line with its technical objectives. Primary instruments of coordination and communication will be reports of the progress of the project, deliverable and milestones, together with project file for internal and external reference, containing all approved technical documents, agendas, minutes of meetings, etc.
The project management will ensure that the project partners remain in contact with the Commission regarding all contractual and administrative aspects of the project and that they maintain regular contact with all local administrative contacts. It will also negotiate dates, venues and content for Technical Reviews.
Responsible: VRMMP

Work package number	WP1	**Start date or starting event:**		Month 1		
Work package title	Survey of character-based authoring and character-based storytelling					
Activity type	RTD					
Participant number	1	2	3	4	5	6
Participant short name	VRMMP	CWI	BBC	TEES	UNITO	SUBMAR
Person-months per participant	3	10	2	9	9	1

Objectives

To gain an understanding of current practice in authoring and storyboarding and to formalise it from the perspective of characters
To review character-based storytelling from the perspective of the previous analysis
To implement a compatible approach to character-based storytelling which will embed authoring mechanisms compatible with, and offering a smooth transition from current practice

Description of work and role of partners

Task 1.1. Analysis of current practice and requirements for character-based authoring (Month 1 – Month 6)
While most Interactive Storytelling systems take as a postulate that plot representations should be the basis for story generation, this somehow conflicts with authoring practice in traditional storyboarding, which is very often centred on characters and their personalities. This task will review current practice through an evidence-based approach and attempt at formalising the authoring data available so as to determine under which conditions current methods of storyboarding can serve as a starting point for Interactive Storytelling formalisms. Findings will be reported in Deliverable D.2.1 as well as a proposal for a formalism to be used in the remainder of the project.
Risks: lack of data; difficulties in formalising data
Contingency plans: access to databases of storyboards; consideration of alternative formalisms
Responsible: CIRMA

Task 1.2. Analysis of Character-based Interactive Storytelling (Month 1 – Month 6)
This task will review current technical approaches to Interactive Storytelling by comparing those considered as plot-based to the character-based ones. This will be also carried out considering other elements of characters' descriptions than their actions and motivations, e.g. affective elements that can be related to the plot. This review will revisit the duality between character and plot and its methodology will include meta-analysis (where data are available) and systematic reviews. There will be a specific emphasis on how narrative formalisms can be made to support predominantly a character-based approach. The starting point from a technical perspective will be the experience of TEES in the implementation of character-based storytelling.
Risks: lack of data ; too few storytelling systems based on characters' descriptions
Contingency plans: analysis of in-house systems (TEES) ported to other applications/narratives by consortium

members
Responsible: TEES

Task 1.3. Survey of Character description (Month 1 – Month 6)

This task will define a new definition of Character for Interactive Storytelling based on the analysis carried out in the two previous tasks. Previous work in the area, in particular by TEES, has not relied extensively on characters' personalities and their relations to intentions and motivations. Previous systems have been based on characters' plans directly equated to their roles, or on emotional planning using feelings described as part of the narrative. This definition will attempt at better relating narrative aspects to characters' "psychology", avoiding the pitfalls of folk psychology. Most importantly, this definition should incorporate elements of authoring from the onset, so as to facilitate the transition from traditional storyboarding to the authoring of Interactive Storytelling. Since characters' traits are expected to reflect different storytelling paradigms and different theoretical perspectives on storytelling, the overall language will be theory-independent, in order to accommodate this variety of stances. No consistency among different systematizations of traits is required at this stage.

Risks: incompatibility of formalisms ; computational complexity
Contingency plans: examine alternative formalisms ; use pivot representations
Responsible: CIRMA

Deliverables (brief description) and month of delivery

D1.1: Initial survey of authoring tools and narrative formalisms (Month 6)
D1.2: Survey of character traits (Month 6)

Work package number	WP2	**Start date or starting event:**		Month 7		
Work package title	Definition of the model of characters' traits in relation to narrative situations					
Activity type	RTD					
Participant number		2	3	4	5	6
Participant short name		CWI	BBC	TEES	UNITO	SUBMAR
Person-months per participant		11	6	3	9	2

Objectives

To map the components of the language for character description into specific categories of knowledge.
To establish a prototype model, in a ontological form, of the traits which concur to the definition of characters.
To define reasoning rules which account for the story/character relations
To evaluate the coverage of the character definition against a corpus of production data

Description of work and role of partners

Task 2.1. Arrangement into knowledge and meta-knowledge levels for subsequent formal encoding (Month 7 – Month 12)

The semi-formal encoding of the trait-based model of characters obtained from T1.2 will be examined to delimitate model-specific knowledge from other types of knowledge that contribute to the definition of the model (e.g., general world knowledge; epistemic, meta-level knowledge).
Risks: proliferation of non model-specific knowledge.
Contingency plans: imposing delimitations to the scope of the model as to limit the involvement of external sources of knowledge.
Responsible: CIRMA

Task 2.2. Ontology-based encoding of survey traits and of constraints into character prototype (Month 7 – Month 12)

The prototype of character defined in the previous tasks will be encoded in an ontological form. The encoding task will include a careful evaluation of the ontology language available, with a specific attention to the standardization efforts brought about by the Semantic Web initiative (e.g. the Ontology Web Language), and an accurate trade off between the expressivity requirement s and the complexity issues concerning the setup and maintenance of the knowledge based and the reasoning performed on it. Whenever possible, the use of existing ontologies (like the COMM ontology for multimedia description and the DOLCE ontology) and the integration with existing ontologies and languages will be privileged. The ontology will be designed by taking into account state-of-the-art ontology design methodologies, of which the OntoClean methodology is an example.

Risks: excessive complexity of the character language to be encoded in the ontology. Emergence of inconsistence.

Contingency plans: implementation of a core prototype with separate extensions.
Responsible: CWI

T.2.3. Reasoning tools applied to character prototype and story-character interaction (Month 7 – Month 12)

Given the ontology designed and implemented in T2.2, a set of reasoning tools will be developed for querying the ontology and performing specialized types of reasoning which formalize the relation between the ontology content and its mapping to narrative models examined and made explicit in T2.2. In order to keep the character encoding (represented in the ontology) and the structural knowledge about story separated, the representation of latter, as a background type of knowledge which does not constitute the primary aim of the project, will be confined in a set reasoning rules that encode the story-character interaction.

Risks: performance and complexity issues.

Contingency plans: Reduce the subset of available rules, reduce expressiveness of rules.
Responsible: CWI

T.2.4. Evaluation and refinement of the character model prototype on corpus and pilot drafts (Month 13-Month 14)

The ontology-based model of character defined in the task 2.2 and the reasoning system designed and implemented in T2.3 will be tested for coverage and accuracy against the corpus employed in WP1 to produce the survey of character definitions and the drafts of the pilot production, so to allow minor integrations and modifications to the model itself.

Risks: Incomplete coverage of the prototype

Contingency plans: circumscribe relevant portion of the corpus and re-focalise pilot drafts.
Responsible: TEES

Deliverables (brief description) and month of delivery

D2.1: Repository of character traits, constraints and plans (character model) (Month 14)

D2.2:Repository description (Month 14)

Work package number	3	**Start date or starting event:**		Month 13		
Work package title	Design of the ADRIAN engine and authoring tool					
Activity type	RTD					
Participant number	1	2	3			

Participant short name	VRMMP	CWI	BBC			
Person-months per participant	6	6	2			

Objectives

- To analyse the requirements for the authoring tool from the end-user (author) perspective
- To design the graphical user interface (GUI) of the authoring tool
- To design the overall architecture of the authoring tool, focusing on modularity and reusability
- To develop the authoring tool according to the previous specifications
- To monitor the use of the implemented authoring tool on a pilot draft, in order to provided and debug support and small features enhancement

Description of work (possibly broken down into tasks) and role of partners

Task 3.1. Analysis of the user requirements from authors (Month 13 - Month 14)
The user requirements for the functional design of the ADRIAN tool will be collected by interviewing authors in the field of story writing. We will consider authors pertaining to both a traditional school and to a more modern school, possibly already experienced in interactive storytelling productions. We will outline an average working methodology, analysing in detail the role of the character description in the creation of stories.

Risks: Unavailability of a consistent set of authors available for the interviews. Reluctance to innovative authoring methods and technologies
Contingency plans: Rely on authors directly involved in the project or collaborating with the partners involved in the project
Responsible: BBC

Task 3.2. Design of interface for characters' definition (Month 15 - Month 16)
In this task the interface of the authoring tool will be designed. The design of the interface will be based on the outcome of Task 3.1. Moreover, the design will take place in collaboration with a subset of the authors participating to Task 3.1.
We will consider different technologies in building user interfaces, ranging from the use of widely diffused widget libraries, towards dynamically generated html pages on a client/server architecture, to more innovative approaches such as vector-based zoomable interfaces. Hence, the decisions taken in this task will have implications to the technology that will be used in the implementation (WP4).

Risks: Reluctance of the authors in the use of non traditional means (pen and paper). There is also the risk to design an interface customized on the tastes and needs of the few interviewed authors, but clumsy to others.
Contingency plans: Rely on traditional, industry standard, widget-based interface and paradigms
Responsible: VRMMP

Task 3.3. Define ADRIAN engine architecture (Month 13 - Month 16)
In this task the overall architecture of the system will be designed. The design will ensure the independence/reusability of the three basic components: data repository, core engine and graphical user interface. The purpose is to ensure: (i) the reusability of the data (characters description) in other contexts, (ii) the embeddability of the core engine in other applications, (iii) the independence from the user interface which can be, in future, improved or substituted. Hence, the architecture definition will require the definition of protocols or application programming interfaces (APIs) for the intercommunication among the three main modules.
The definition of the architecture will run in parallel with the definition of the user interface (Tasks 3.1 and 3.2).

Risks: Definition of protocols and APIs too complex and hard to be adapted to different applications.
Contingency plans: Sacrifice the independence of the data from the core engine: this is likely to be a complex part and there are no concrete evidences that the character descriptions will be reusable in different contexts.
Responsible: CWI

Deliverables (brief description) and month of delivery

D3.1: ADRIAN authoring tool architecture specification (Month 16)

Work package number	4	**Start date or starting event:**		Month 17		
Work package title	Implementation of ADRIAN engine and authoring tool					
Activity type	RTD					
Participant number						
Participant short name	VRMMP	CWI		TEES	UNITO	SUBMAR
Person-months per participant	29	11		17	9	2

Objectives

- To develop the engine and the authoring tool according to the specifications of WP3
- To monitor the use of the implemented authoring tool on a pilot draft, in order to provided and debug support and small features enhancement

Description of work (possibly broken down into tasks) and role of partners

Task 4.1. Engine implementation (Month 17 - Month 24)
In this task the whole architecture will be implemented, including the repository technology for the characters descriptions, the core engine and the user interface. The different parts will be implemented by different partners and finally assembled together. The partners will firstly agree on the technologies to be used for the implementation in order to minimize the integration effort.
During the implementation the system will be tested and debugged on the basis of a little set of data, while a more comprehensive test and debug will follow during the pilot production (Task 4.2).
Whenever possible, the implementation will be based on freely available open source technologies and environments. All the outcome of the project will be released as open-source software under one of the widely used licenses, such as GPL or LGPL.
Risks: Difficult integration of the components due to weak or incomplete specifications at early stages.
Contingency plans: In the worst case, the outcome of the implementation will be a set of independent tools, and the overall system will work through the input/output of files (of well-defined formats).
Responsible: VRMMP

Task 4.2. Test, debug, refinement of the ADRIAN tool on pilot drafts (Month 25 – Month 30)
The authoring tool implemented in task 4.1 will be extensively used during the pilot productions. The development team will monitor the use of the tool and ensure a quick fix and re-release cycle on the basis of the users reports. Wherever there is not a priority in fixing critical bugs, the development of new core features or the enhancement of existing ones will be considered.
Risks: The tool has not been sufficiently tested and debugged during the implementation and results unusable. The authoring of a story with the authoring tool is slower than with traditional means and the production plans are altered.
Contingency plans: All the authoring work is annotated and stored and will be re-written through the use of the authoring tool by a different author, in parallel with the traditional work, without negatively impacting on the production timetable.
Responsible: TEES

Deliverables (brief description) and month of delivery

D4.1: ADRIAN authoring tool prototype (Month 24)
D4.2: ADRIAN Manual of use (Month 24)
D4.3: Testing over draft stories (Month 26)
D4.4: Contents for usage with the tool (Month 30)

Work package number	5	**Start date or starting event:**		Month 21		
Work package title	Pilot productions					
Activity type	RTD					
Participant number						
Participant short name	VRMMP	CWI	BBC	TEES	UNITO	SUBMAR
Person-months per participant	12	6	5	6	3	6

Objectives

To test the ADRIAN authoring tool in different production types on different platforms.
To debug and refine the tool based on the results of the use cases.

Description of work (possibly broken down into tasks) and role of partners

Task 5.1. Production activity to experiment with the ADRIAN tool (radio, TV, or online interactive content) (Month 24 – Month 30)

The character-based tool for the support of authoring in storytelling (designed and implemented in WP3 and WP4) will be tested through its use in the production of a small interactive online broadcast pilot. For this, we will 'piggy-back' off a production that has already been commissioned. We will choose a pilot production, authored by a producer with experience in both traditional and interactive story productions, and hence appropriately disposed to trying-out new tools and giving meaningful feedback. They will be advised and supported with regard to the usage of the tools and user platform, but will largely be left to their own devices in developing the content. The aim is to involve an end-user in the development process, allowing user feedback to actually 'feedback' into the process.

Responsible: BBC

Task 5.2. Production activity to experiment with the ADRIAN tool (game) ()

The ADRIAN tool will be tested in the production of a cross-medial, multiplatform game. The hypothesized video game is an alternate reality game which sees direct involvement of the user into a post-modern thriller centred on the solution of an intriguing puzzle.
Risks: Insufficient support for multiple-platforms by the tool. Long production times.
Contingency plans: Limitation of the supported platforms.
Responsible: SUBMARINE

Task 5.3. Production activity to experiment with the ADRIAN tool (machinima)

The Adrian tool will be also tested in a Machinima film production, in order to assess its compatibility with less complex narratives and its suitability to satisfying the need of non professional authors, such as standard Machinima authors.
Risks: Tool language redundant for machinima authors
Contingency plans: Professional perspective on the production from the project partners
Responsible: VRMMP

Task 5.4. Test, debug and refinement of pilot productions
During the production of the pilots, the progress of the production will be monitored so that the production plans can be adapted according to the ongoing interaction with the ADRIAN tool development. This will maximise the testing potential provided by the productions and the benefit they gain from the use of the tool. The experiences from the various productions will be disseminated among the productions in order to facilitate this process.
Risks: incomplete data/reports from production
Contingency plans: plan production progress reports
Responsible: BBC

Deliverables (brief description) and month of delivery

D5.1: Broadcasting pilot production (Month 30)
D5.2: Game pilot production (Month 30)
D5.3: Machinima pilot production (Month 30)
D5.4: Report on pilot productions (Month 30)

Work package number	6	**Start date or starting event:**		Month 13		
Work package title	Evaluation					
Activity type	RTD					
Participant number	1		3	4		6
Participant short name	VRMMP		BBC	TEES		SUBMAR
Person-months per participant	3		2	5		2

Objectives

- To assess the usability of the ADRIAN tool
- To evaluate the cost-effectiveness of ADRIAN tool in media production
- To exploit feedback from production for reengineering

Description of work (possibly broken down into tasks) and role of partners

Task 6.1. Usability evaluation (Month 13 – Month 30)
The usability of the ADRIAN tool will be evaluated by means of appropriate instruments such as interviews with the users, questionnaires, execution of controlled tasks, in order to assess if the functions incorporated in the tool meet the needs of the different categories of users involved in the production process (professional and non-professional authors, occasional users, etc.). The effectiveness of the interface design will be assessed through appropriate tests.
Risks: difficulties in operating with real users. Lack of experimenting users.
Contingency plans: non intrusive observations; resort to non professional, volunteering users.
Responsible: CIRMA

Task 6.2. Cost effectiveness evaluation (Month 13 – Month 30)
The effectiveness of the tool in reducing the production costs and time will be evaluated by comparing the actual data from the pilot productions (plans, schedules, costs) with the expected equivalents in standard productions. This comparison will allow evaluating if the tool actually fits the production workflow through different platforms and media, and the extent of the support provided.
Risks: Unsustainable time requirements for collection of data. Imprecise data
Contingency plans: partially substitution of actual data with approximated estimations.
Responsible: VRMMP

Task 6.3. Reengineering (Month 13 – Month 30)
The feedback gathered from users and institutions during the pilot productions (WP5), the usability evaluation (T6.1) and the evaluation of economical impact (T6.2) will be exploited to provide input for the reengineering of the tool, with the commercial exploitation in view.
Risks: critical failures to meet the user requirements. Incomplete data.
Contingency plans: conduction of heuristic evaluation to drive reengineering.
Responsible: VRMMP

Deliverables and month of delivery

D6.1: Report on evaluation (Month 30)

Work package number	7	**Start date or starting event:**		Month 7		
Work package title	Dissemination					
Activity type	RTD					
Participant number	1	2	3	4	5	6
Participant short name	VRMMP	CWI	BBC	TEES	UNITO	SUBMAR
Person-months per participant	5	5	1	5	3	1

Objectives

- To propagate the scientific results of the project in the relevant scientific communities
- To propagate the technological results to the industrial community and to professional developers
- To create a web site for the promotion of the project results and the creation of a community of users.

Description of work (possibly broken down into tasks) and role of partners

Task 7.1. Scientific communication (Month 7– Month 36)
The scientific results of the project (the model of characters' traits, the architecture of the ADRIAN tool for support of authoring, the evaluation of the tool) will be propagated to the relevant scientific communities (digital storytelling, intelligent agents, semantic representation, media production studies, human-computer interaction) through the submission of contributions to conferences and journals and the participation to workshops.
Risks: lack of interest by the relevant communities
Contingency plans: publication of technical reports
Responsible: CIRMA

Task 7.2. Technological communication (Month 7– Month 36)
The technologies developed by the project and their effectiveness to support the authoring of storytelling productions will be advertised through the participation to media-related fairs, exhibitions, and by issuing press releases. The presentation of the projects results at all stages of advancement though demos and pilots is envisaged by the project as an important instrument to gain additional feedback from potential audiences and public forums. Cultural events will be also covered in order to gain the attention of traditional media authors.
Risks: Time consumption and cost impact related with the preparation of the activities and the participation to the events.
Contingency plans: use of web-based communication, email, etc.
Responsible: VRMMP

Task 7.3. Web-based community creation (Month 7– Month 36)
Since the early phases of the project, the partners will set up a web site for the dissemination of the project results in the academic, industrial and generic audiences. All the deliverables and the reports of the project

will be published on the site, which will constitute also the primary channel for the distribution of demos, software releases, documentation, and to publish the agenda of the events in which the project is involved. The web site will include a newsletter and forums on project topics and dedicated topics for authors and developer, to provide full realization to the open-source philosophy of dissemination subscribed by the project.
Risks: costs and development times
Contingency plans: reduction of web design development, analysis of critical communication issues.
Responsible: CIRMA

Deliverables (brief description) and month of delivery

D7.1: Report on preliminary project results (24)

Work package number	8	**Start date or starting event:**		Month 31		
Work package title	Exploitation					
Activity type	RTD					
Participant number	1		3			6
Participant short name	VRMMP		BBC			SUBMAR
Person-months per participant	2		1			2

Objectives

- To promote the adoption of the tool by industrial partners, developers and authors.
- To provide complete assistance to the users of the ADRIAN tool

Description of work (possibly broken down into tasks) and role of partners

Task 8.1. Promotion (Month 31 – Month 36)
The project partners will elaborate business plan models to be handed by potential users of the project results. To elaborate business plan models, the partners will consider both the adoption, by third parties, of the semantic models for the purpose of system design and integration, and the direct use of the software tools for the authoring for the development of stories and interactive stories.
Risks: Lack of interest, incorrect communication with audiences.
Contingency plans: Development of further productions for demonstration purpose.
Responsible: CIRMA

Task 8.2. Distribution and assistance (Month 31 – Month 36)
The project will rely on the paradigm of open source and on its related business models to exploit the project results. In particular, to favour the adoption of the models and tools produced by the project, the partners will provide basic contents for the usage with the tool, and on-line assistance to the author in the usage of the tool. Moreover, the partner will work to maximize the compatibility of the character model and of the character design/control tool with the engines used in game development. Compatibility with storytelling and interactive storytelling systems will be also taken onto account as a major objective for exploitation.
Risks: incompatible contents or systems for inclusion/integration
Contingency plans: development of custom versions of the system to address specific system integration and content inclusion problems
Responsible: TEES

Deliverables (brief description) and month of delivery

D8.1: Business model for exploitation (Month 34)

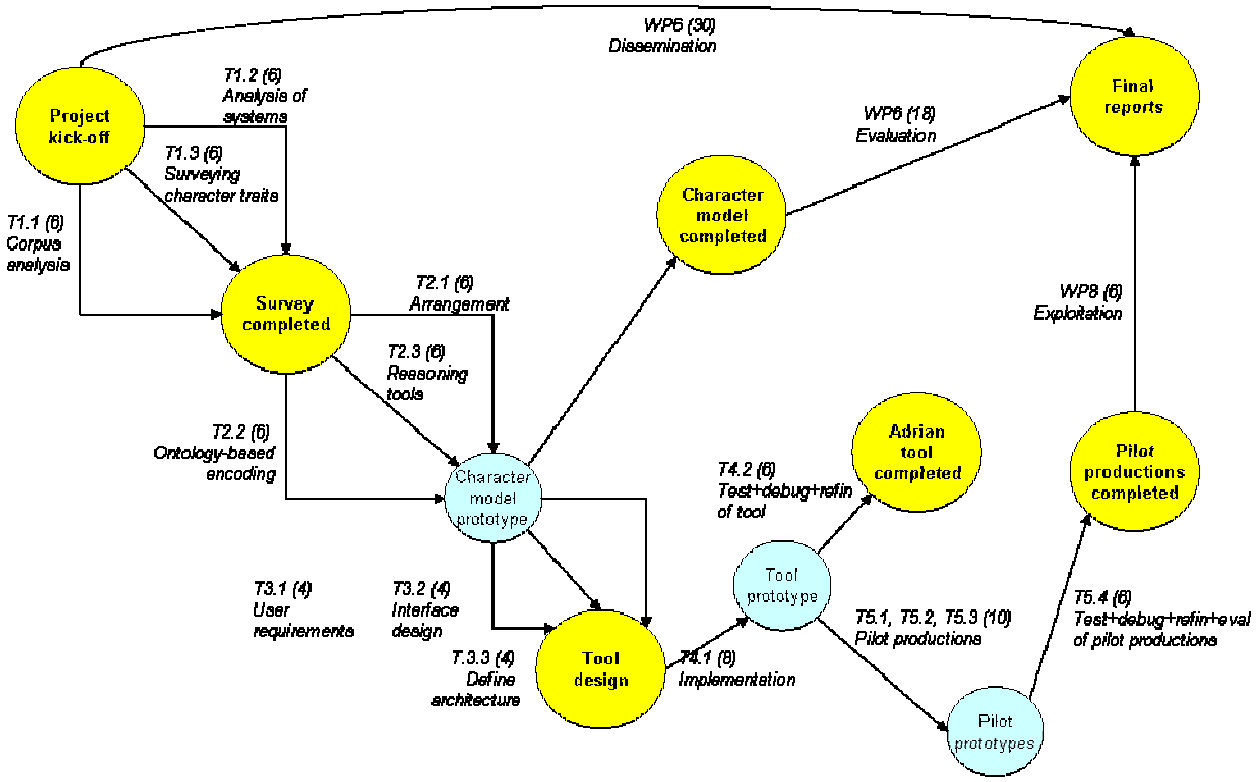
D8.2: Integration suite of plugins and adapters (Month 34)

Table 1.3e Summary of effort

Summary of effort

Partic. no.	Partic. short name	WP0	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	Total person months
1	**VRMMP**	**11**	3	-	6	**29**	12	3	**5**	**2**	71
2	**CWI**	2	10	11	**6**	11	6	-	5	-	51
3	**BBC**	1	2	6	2	-	**5**	**2**	1	1	20
4	**TEESSIDE**	2	**9**	3	-	17	6	5	5	-	47
5	**UNITO**	1	9	9	-	9	3	-	3	-	34
6	**SUBMAR**	1	1	2	-	2	6	2	1	2	17
Total		18	34	31	14	68	38	12	20	5	240

PERT DIAGRAM



Section 2. Implementation [TORINO]

(Recommended length for Section 2.1 - five pages)

2.1 Management structure and procedures

Describe the organisational structure and decision-making mechanisms of the project. Show how they are matched to the complexity and scale of the project.

Project Internal Management

A consortium agreement will define two levels of Project management for the duration of the Project. The first one, the Technical Project Committee, takes care of Technical issues. Each work package is placed under the direct responsibility of a Work package Leader, belonging to the TPC. The Technical Project Committee reports to the Project Steering Committee (PSC), keeping it informed about the status of advancement of the Project.

Project Steering Committee (PSC)

The Project Steering Committee consists of a signatory representative of each partner. The condition of membership is that this representative has sufficient authority within its organisation to take any corrective actions deemed necessary by the board. It is chaired by the Project Coordinator.

It is the responsibility of the Project Steering Committee:

1 to review project progress and assess project performance
2 to ensure the project maintains its technical objectives
3 to ensure the project maintains its relevance within the specific program
4 to resolve any technical, administrative or contractual issues where lower levels of the management structure have been unable to do so

Project Coordinator

The Project Coordinator will oversee and co-ordinate all administrative aspects of the project. Its responsibilities in this respect are as follows:

5 to coordinate, collate and distribute all administrative and progress reports
6 to maintain records of costs, resources and time-scales associated with the project
7 to collect and submit to the Commission all individual cost statements of the partners
8 to ensure prompt financial flows within the Consortium
9 to remain in contact with the Commission regarding all contractual and administrative aspects of the project
10 to maintain regular contact with all local administrative contacts
11 to maintain regular contact and to meet regularly with the TPC to ensure effective progress of the project.

Technical Project Committee (TPC)

The Technical Project Committee is composed of one member from each of the organisations involved in the Consortium.

The TPC sets up a project file for internal and external reference. It contains all approved technical documents, agendas, minutes of meetings and details of expenditure.
The TPC is chaired by the Project Co-ordinator or by the Work Package Leader of the current Work Package.
The TPC responsibilities will be as follows:

12 to maintain regular contact with the Work package Leaders in order to ensure effective progress of the project
13 to prepare and enforce the project operational planning
14 to review work progress
15 to check the technical consistency between work packages and tasks
16 to ensure that the overall project schedule is maintained through operational planning, and to anticipate and resolve deviations, whether from a technical or schedule standpoint
17 to negotiate and confirm dates, venues and content for Technical Reviews
18 to monitor the preparation, production and distribution of all deliverables
19 to report project progress at PSC and to report any problems as they arise
20 to ensure that all demands voiced in a technical review report are fully and promptly resolved

Decision Process

Project management decisions are taken by the PSC by majority vote of the present partners. Decisions for work programme and contract reviews and amendments, for information dissemination are reached unanimously. If a partner is defaulting, PSC decisions will be reached unanimously with the exception of the defaulting partner.
The PSC will meet two times in the first year and a half and three times in the last year and a half of the project, for reviewing points and milestones. It may also be called together at the request of the project co-ordinator or any one of the members. At least one week before each meeting, the co-ordinator will notify all members of the scheduled meeting and proposes a detailed agenda containing all points on which PSC has to take a decision.

The TPC takes all the technical and operational decisions, under the guidance of the Work Package Leaders. The work package leaders will be under the supervision of the TPC.
The TCP will meet at start and end of each work package or at the request of any work package leader, about two times a year. Technical meetings on specific topics with a restricted number of researchers will be possible; also these meetings have a detailed agenda and will be chaired by the work package leader, who ill report directly to TCP. All the decisions taken by the TPC will be under the consensus basis. The TPC reports directly to the PSC and informs – through the Project Coordinator - the PSC of all the problems which, by its nature, are under the responsibility of the PSC and has to be solved at the highest level of decision of the project.

Information flow

The necessary information flow will be produced inside the project in order to assure the precise information of every partner:

The Project Coordinator enforces the information flow between the PSC and the TPC and among the partners
1 All the partners provide the Co-ordinator with their administrative information in order to facilitate the necessary relationship with the European Commission.
All the partners provide the Work Package Leaders with the required information on resource management
1 The Work Package Leaders provide the required input and information to the partners involved in advancement of the work packages.
2 All documents produced in the project are made available to all partners.
3 Project documents will be whenever possible distributed through electronic means.
4 Free format communication and exchange between the various participants are encouraged

Planning and reporting

All strategic planning is taken by the PSC; the operational planning process are be taken by the TPC.
Internal monitoring reports are foreseen every two months and self-evaluation reports are foreseen every six months. A project milestone is defined in month 18 for the mid-term audit.

Deliverables Handling

The TPC will set up a project file for internal and external references. It will contain, apart of all approved technical documents, agendas, minutes of meetings and details of expenditure, the deliverables provided from the project.

Contract Management

Before contract signature, the partners agree to sign a consortium agreement that will govern their relations during the project.

2.2 Individual participants

(Maximum length for Section 2.2: one page per participant. However, where two or more departments within an organisation have quite distinct roles within the proposal, one page per department is acceptable.
The maximum length applying to a legal entity composed of several members, each of which is a separate legal entity, is one page per member, provided that the members have quite distinct roles within the proposal.)

For each participant in the proposed project, provide a brief description of the legal entity, the main tasks they have been attributed, and the previous experience relevant to those tasks. Provide also a short profile of the individuals who will be undertaking the work.

BBC

The BBC's Research and Innovation department has an excellent track record of work concerned with the application of 3D interactive technology for broadcast. This began with its participation in the RACE project MONA LISA, which demonstrated the first live virtual studio and vision-based camera tracking system at IBC'94. A few years later, work turned to look at production, delivery, and display of 3D TV content using commodity computer technology, with the UK government funded PROMETHEUS project. From this, we demonstrated a live end-to-end 3D content production system at IBC'02. The main outcome of the project was the understanding that research and development in this field should be focused towards new interactive home platforms: how do we get content onto them and what form would that content take?

This led us to the development of the open source '3D Interactive Media Lounge' research software, which explored the notion of mixing streamed linear and 3D interactive content, and which was a means for engaging BBC producers in discussions on content. The demo was shown at SIGGRAPH 2005 and led to the BBC's broadcast of a special 'Radio1 roadshow' into 'SecondLife' in 2006. Since then, our effort has been focused on developing a freely available software platform (BBC-funded 'Homura' project) and research in support of authoring meaningful content for it – i.e. 'interactive story-telling' – including our involvement with the EC FP6 CALLAS project.

The BBC Research and Innovation facility has the ability to develop and document software tools in common languages such as Java, C/C++, Python, etc. The department has specific experience in 3D interactive software development with various SDKs and APIs, and in constructing multi-PC real-time rendering systems for public demonstrations. The department is also experienced at user requirements capture, subjective testing, and evaluation, including the usability evaluation of interactive platform interfaces.

Participants

Marc Price is a Senior Engineer at the Research and Innovation Department of the BBC. Marc has a BEng in Electronics Engineering and a PhD in Electronics Engineering. He has been with the BBC since 1996, and for the past 6 years has pursued his interests in 3D interactive media/content technology for home entertainment systems. Marc's main research interests are in the technological application of Cognitive Linguistics and Embodiment Theory to content and interface devices.

DIPARTIMENTO DI INFORMATICA - CIRMA
UNIVERSITA' DI TORINO
http://www.cirma.unito.it/index.html

CIRMA (Centre for Research on Multimedia and Audiovisuals) is an interdisciplinary research centre of the University of Torino that involves three participant departments: Computer Science (Dipartimento di Informatica), Disciplines of Fine Arts, Music and Drama (DAMS) and Literary and Philological Sciences. It includes scholars from the three departments, with research and lecturing positions at the University and Polytechnic of Turin and pursue interdisciplinary aspects of research.

CIRMA carries on and promote research on the relationships between new and traditional media, with particular interest for artistic productions, practical applications and open-to-the-public installations. CIRMA works with resources from public and private institutions (Local funding, the Italian National Ministry of Culture, the European Union – Culture 2000 programme, Piedmont region, Fondazione Lagrange - CRT). CIRMA also participates into training programmes in multimedia production and storytelling models (second level degree programmes), organizes seminars and promote between scholars in the new media area, and disseminate results through publications and applications.

Recent projects of CIRMA: 2006/07, the Dramatour project (dramatour.di.unito.it), sponsored by Italian Ministry of Culture, a virtual storytelling character guide for a historical site on a mobile device; 2005-06, the Virtual Electronic Poem (VEP) project, sponsored by the European Union – Culture 2000 programme, a VR reconstruction of the 1958 Poème électronique by Le Corbusier; 2006/08, the GeoGraphy project, sponsored by the CRT foundation, a graph-based algorithmic music compositional system; 2005/06, the Alternando project, sponsored by Piedmont region, a concert-performance in memory of Alighiero Boetti.

Principal investigators in the ADRIAN project

Antonio Pizzo is an Associate Professor in Drama studies at the University of Turin, where he teaches courses in Contemporary Drama and in Procedural Drama. He is an author and director of drama and a consultant in the production of events. In the last decade, he has been investigating the relationships between new media and drama through essays and projects (Officine Sintetiche 2008 project, production Workshop of Digital Performing Arts, "Membrana a Torino" project, 2007, production workshop directed by Marcel lì Antunez Roca).

Rossana Damiano is an Assistant professor in Computer Science at the University of Turin (School of Multimedia and Arts). She graduated in Communication Studies in1997 and obtained a PhD in Computer Science from the same university in 2001. Her research interests span from intelligent agents and agent communication languages to interactive drama and storytelling. She participated in several application research projects in Natural Language and Multimedia.

Relevant publications
(Damiano et al. 2005; Damiano et al. 2006; Damiano et al 2008; Damiano et al 2008b; Nunnari 2008; Valle 2007)

Centrum voor Wiskunde en Informatica (CWI), Netherlands

The Semantic Media Interfaces group at the Centre for Mathematics and Computer science (CWI) carries out research on improving models and tools for presenting multimedia information to end-users on a variety of platforms. CWI is the research institute for mathematics and computer science research in the Netherlands. CWI's mission is twofold: to perform frontier research in mathematics and computer science, and to transfer new knowledge in these fields to society in general and trade and industry in particular. CWI has always been very successful in securing considerable participation in European research programs and has extensive experience in managing these international collaborative research efforts. CWI is also strongly embedded in Dutch university research: about twenty of its senior researchers hold part-time positions as university professors and several projects are carried out in cooperation with university research groups. In addition, CWI has strong links to the World Wide Web consortium, and houses the Benelux office.

CWI has a staff of 210 fte (full time equivalent), 160 of whom are scientific staff. CWI operates on an annual budget of EURO 13M. CWI's research is organized in research themes, including: Data mining and Knowledge Discovery, Semantic Media Interfaces and Visualization and 3D Interfaces.

Key Persons:
Prof. Dr. Lynda Hardman is the head of the Semantic Media Interfaces group and part-time full professor at the Technical University of Eindhoven. She obtained her PhD from the University of Amsterdam in 1998, having graduated in Mathematics and Physics from Glasgow University in 1982. During her time in the software industry she was the development manager for Guide, the first hypertext authoring system for personal computers (1986). Her favourite chocolates are from Puccini, Amsterdam.

Dr. Jacco van Ossenbruggen is a senior researcher, having obtained his PhD from the Vrije Universiteit Amsterdam in 2001. He was a member of the W3C working group that developed the SMIL recommendation. He is currently active in the MultimediaN E-culture Project, which won the first prize at the Semantic Web Challenge at ISWC ’06. His current research interests include multimedia on the Semantic Web and the exploration of heterogeneous media repositories.

Dr. Zeljko Obrenovic is a researcher, having obtained his PhD from the University of Belgrade in 2004. His current research interests include design of interactive systems, universal accessibility, software engineering, service-oriented computing and semantic web. He was a member of the W3C Incubator Group on Multimedia Semantics and is a guest lecturer at the Vrije Universiteit Amsterdam.

Dr. Frank Nack is the researcher and lecturer in the Human-Computer Studies Group (HCS) at the Informatics Institute of the University of Amsterdam (UvA). He is also an associated member of the Semantic Media Interfaces theme at the Centrum voor Wiskunde en Informatica (CWI). His research interests include the representation, retrieval and reuse of media in hypermedia systems, context and process aware media knowledge spaces, representation and adaptation of experiences, interactive storytelling, and computational applications of media theory and semiotics. He was responsible for research on MPEG-7, MPEG-4, and is associated editor in chief for IEEE MultiMedia. He also serves on the board for the IEEE Transactions on Computational Intelligence and AI in Games.

SUBMARINE
www.submarine.nl - www.submarinechannel.com

Submarine is an Amsterdam production company specialized in documentaries and new media productions. The company's managing directors are Femke Wolting and Bruno Felix. Since its formation in January 2000, Submarine has produced documentaries such as 'The story of Hans Joachim Klein' and 'My Second Life', the first documentary shot inside second life. Submarine created an extensive game for renowned director Peter Greenaway and is currently producing Greenaway's documentary J'Accusse. Also Submarine produced a variety of games and animation series such as The Amazing Adventures of Kika & Bob. Submarinechannel.com is part of the production company Submarine. It is both a distribution and a production platform for filmmakers and interactive artists who explore the potential of the web and set out to cross the boundaries of traditional media. SubmarineChannel provides a showcase for work aimed at a young but critical audience, one with a global perspective on digital culture.

Principal Investigators

Femke Wolting is one of Holland's leading independent media producers. In 2000 she was one of the founders of Submarine. From 1994 to 2002 Femke Wolting was the initiator and programmer of Exploding Cinema - part of the International Film Festival Rotterdam – which explored the future of media, and featured exhibitions, conferences and filmprograms. Between 1995-2000 she worked at the Dutch national public broadcasting network VPRO as staff member of the digital department and from 1998 as editor and director for VPRO's documentaries. Since 1999 Femke Wolting has directed documentaries such as It's The End Of TV As We Know It, the cross media documentary Sneakers and Viktor & Rolf: Because We Are Worth It.

Bruno Felix is one of Holland's leading independent new media producers. In 2000 he co-founded Submarine. The company works with an extensive international network of the most innovative and creative storytellers to develop crossmedia formats that combine the representational richness of film, the immersive quality of television, with the interactivity and openness of the internet. Previously, he was responsible for the new media strategy of Dutch Public broadcaster VPRO.

Productions

Film and Television: 'The Terrorist Hans Joachim Klein' (Alexander Oey, VPRO, 2005, 70 minutes), Jungle Rudy (Rob Smits, NPS, 2006, 90 minutes), The Incredible Adventures of Kika & Bob (Colette Bothof and Vincent Bal, 26 episode tv series + website, 2006), Celebration (Quirine Racké and Helena Muskens, NPS, 2005, 55 minutes), Viktor & Rolf; because we're worth it. (Femke Wolting, AVRO, 2005, 60 min), Sneakers (Femke Wolting, VPRO, 2003, 52 minutes) , Naked (6 part animation series, Mischa Kamp, VPRO, 2006), Moral Panic (Rob Schroder, 2005, 60 minutes), Kortgehouden (10 x 25 min series, Freek de Jonge, VPRO, 2005), Bonanza – MTV Voorbij (Femke Wolting, VPRO, 2002, 40 minutes), 12x12.nl (Inge Willems and Ali Haselhof, VARA, 2000), Alan Davidson, All about Fish (Rene Seegers, VPRO, 2003) , It's the end of TV as we know it (Femke Wolting & Bruno Felix, VPRO 2000, 2 x 50 minutes).
Games: Crusade in Jeans (online multiplayer game, in production, release fall 2006), The Tulse Luper Journey (Online game, Peter Greenaway, 2005), Crisis (NPS, 2002)
Submarinechannel: Hotel (interactive animation series, Han Hoogerbrugge, 2004), Mr Kahoona (interactive character, Ra.nj, 2003), The ultimate guide to Geekchic (online PDF magazine, Neil Feineman & Coup, 2004), Valley Of The Cnuties (animated series, Graig Robinson, 2005), The Ringtone Society (Ringtone website, Madelinde Hageman, 2005), The American I Never Was (Chris Keulemans, 2003/2004), Lou Paradis (interactive character, Bechamel/Radical Suzuki, 2005), To Get Rich is Glorious (radio documentary and trave log Martijn de Waal and Chris Bajema, VPRO, 2004), Pause (interactive Jukebox, Christiaan de Rooij, 2003), The Killer (interactive graphic novel, Fons Schiedon, 2002), CityTunes (3-part animation series, various artists, 2002).

UNIVERSITY OF TEESSIDE

The School of Computing of the University of Teesside has been active in the field of Interactive Storytelling since 2000 and is recognised internationally for its research and the specific approach it has developed, "character-based interactive storytelling" (Cavazza et al. 2002).
This research was awarded the "best paper prize" at the First International Conference on Virtual Storytelling in 2001, and again at the Second International Conference on Virtual Storytelling in 2003. Its results have been regularly published in the best international conferences (ACM AAMAS 2002 (Cavazza et al. 2002); 2004 (Charles et al. 2004), ACM Multimedia 2007) and journals (IEEE Intelligent Systems (Cavazza et al. 2002a), IEEE Multimedia), and some of these publications are amongst the most cited in the field according to Google Scholar.
http://scholar.google.co.uk/scholar?q=interactive+storytelling&hl=en&lr=&btnG=Search

A complete set of Interactive Storytelling publications available at:
http://www-scm.tees.ac.uk/users/f.charles/

Teesside has been involved in several research projects on Interactive Storytelling in partnership with industry, both computer games industry and traditional media. The BARDS project (a UK DTI Technology Programme) investigates Interactive Storytelling for the future generation of computer games, in partnership with Eidos Interactive Ltd, one of the largest independent games company in Europe.
In the CALLAS project (FP6, IST-2005-034800), Teesside is working alongside the BBC to develop Interactive Storytelling for Interactive TV applications.
Examples from Teesside's research in Interactive Storytelling have been used to illustrate courses in computer animation and multimedia in several universities worldwide, in the USA, Germany, Finland, etc. This research and its potential applications have been featured in the national and international press, among which the Daily Telegraph, The Times "T2", Le Monde (France), Il Sole 24 Ore (Italy), Radio France Internationale, the Danish national radio, the Belgian Television, Game On TV, and the ACM News.

CV of Principal Investigator
Marc Cavazza is Professor of Intelligent Virtual Environments at the University of Teesside. He has published over 170 papers in the field of Artificial Intelligence and Interactive Systems, 30 of which on Interactive Storytelling. He has been an invited speaker on Interactive Storytelling at various conferences, including the ACM Virtual Reality Software and Technology 2003 (Osaka, Japan), Imagina 2003 and 2005 (Monte Carlo), Technologies for Interactive Digital Storytelling and Entertainment (TIDSE) 2006, Artificial Intelligence and Simulation of Behaviour (AISB) 2007 and Immerscom 2007.
He has served on the programme committee of most conferences on Interactive Storytelling and virtual agents since 2001, including the International Conference on Virtual Storytelling (ICVS) 2001, 2003; Intelligent Virtual Agents (IVA) 2001, 2003, 2005, 2006, 2007, 2008 (Senior Programme Committee for 2008); TIDSE 2003, 2004, 2006; ACM Autonomous Agents and Multi-Agents Systems (AAMAS) 2004, 2005, 2006, 2007, 2008 (Senior Programme Committee for 2008); ACM Advances in Computer Entertainment (ACE) 2005, 2006, 2007; etc. In 2007, he was co-chair (with Stephane Donikian) of the International Conference on Virtual Storytelling.
He was project co-ordinator for the ALTERNE FP5 project on Virtual Reality Art (IST-2001-38575) and is currently involved in the FP6 Integrated Projects CALLAS (IST-2005-34800) and COMPANIONS (IST-2005-34434).

VR&MM Park - Virtual Reality & Multi Media Park S.p.A
http://www.vrmmp.it

Virtual Reality & Multi Media Park S.p.A. is a public owned technological institution for multimedia production and applied research. The multimedia production features interactive video applications and services for customers such as FIAT IVECO, Martini, Ferrero, Regione Piemonte and the cinema/TV industry. It owns the 100% of the production company Lumiq Studios, that has experience in TV animated series and cinema production, from the story to the final product (recent film distributed in Europe, animated *Donkey Xote*, see the teaser at http://www.youtube.com/watch?v=vKB6SAreoQE or www.lumiq.com). Applied research (in collaboration with the production pipeline) concerns new formats for TV production (with applications for RAI and MTV), interactive computer graphics applications for industrial simulations and artistic/cultural/communication purposes.
Recent projects: VIRTHUALIS (www.virthualis.org), sponsored by EU 6th FP-IST, for security management in industrial sites (VRMMP is leading the whole technical development); CITIZEN MEDIA (www.ist-citizenmedia.org), sponsored by EU 6th FP-IST, for computer graphics applications on mobile device; NeuroVR (www.neurovr.org), in collaboration with Istituto Auxologico Italiano, for neuro-medical applications; DramaTour (http://dramatour.di.unito.it, in collaboration with CIRMA, where VRMMP leads the whole technical development and the content production); Virtual Electronic Poem, sponsored by EU Culture 2000 (http://www.edu.vrmmp.it/vep/), where the VR&MM Park developed the visualization module and led the overall software integration, in collaboration with CIRMA. Concerning the Virtual Electronic Poem, a relevat article has been published for the ACM conference of Multimedia (Lombardo et al. 2006).

Principal investigators

Vincenzo Lombardo heads the Art-Science-Allies laboratory at the VRMMP. He is an Associate Professor of Informatics at the School of Multimedia and Arts of the University of Torino. He has been the main creator and the coordinator of the Dramatour and the VEP projects. He has researched on natural language processing, cognitive systems and computer music; his current interests are in formal models and practical systems for storytelling production and AI applications for interactive computer graphics. He regularly directs and produces short audiovisuals and interactive installations for social communication and artistic purposes.

Fabrizio Nunnari received in 2005 a PhD in Computer Science from the University of Turin. He is currently working as researcher and developer at the ASA-Lab at the Virtual Reality & Multimedia Park. His main research topics are: information visualization through the use of Virtual Reality techniques, systems and architectures for Virtual Reality and multimedia systems. He has been the chief software engineer in a number of projects, including Dramatour and VEP.

Pino Cappellano is an actor, art director, and visual designer. In 2000 he graduated in Fine arts and in 2004 in Multimedia and arts studies . In 2006/07 he has been a researcher for the CRT-funded “Lagrange Project”. Currently he is working at ASA-Lab at VRMMP. His interests are in multimedia system design and programming and interactive storytelling. He is trained as an interpreter for Motion Capture animation.

Short Film Productions: Gender (Alessandro Dominici, 2007, 9’00”); 1944 (Alessandro Scippa, 2008, 12’00”), New Media Love (Vincenzo Lombardo, 2008, 5’50”)
Spots: Equal opportunities campaign 2007 (three 30” commercials for Piedmont region); Black Pacman (30” promotional Flash movie for Africa support)
Music videoclip: Devo andare via domain (Alejandro for Petrol, 4’)
Feature films – Lumiq Studios: Donkey Xote (Josè Pozo, 2007, 90’); The stone merchant (Renzo Martinelli, 2007, 107’); I demoni di San Pietroburgo (Giuliano Montaldo, 2008, 108’)

2.3 Consortium as a whole

The constituency of the ADRIAN project achieves the appropriate balance between academic research, industrial research and media production. In this context, research institutions provide the necessary competence for process formalization and the development of new authoring methods and supporting technologies; production companies provide the competence for orienting the technical solutions in directions that are compatible with the commercial exploitation of the project results.
In the ADRIAN project the research department of the production companies will ensure a liaison between the research part of the project and the production part, which will deliver a few pilot productions to test the validity of the approach.

The coordinator of the project is the Virtual Reality & Multi Media Park, a technological institution with competences in production and applied research. It owns the 100% of a production company Lumiq Studios, that has experience in TV animated series and cinema production, from the story to the final product (its most recent animation film released in Europe has been *Donkey Xote*, see the trailer at http://www.youtube.com/watch?v=vKB6SAreoQE). It also includes a production facility and carries on advanced small-scale projects and develops applied research in three labs (that collaborate with the production pipeline), new formats for TV production, virtual reality applications for security in industrial sites (EU project VIRTHUALIS) and computer graphics applications for mobile devices (CITIZEN MEDIA), interactive applications for cultural heritage presentations (National project Dramatour and EU-Culture 2000Virtual Electronic Poem, in collaboration with CIRMA).
Given its experience in software development, VRMMP will coordinate the development of the ADRIAN tool and its application to an interactive application within the Machinima paradigm.

The three research partners have experience in the areas necessary for the achievement of the project results and feature complementary competences. These are the University of Teesside in UK (with the School of Computing), the Center for Mathematics and Informatics of Amsterdam (with the Semantic Media Interface group) and the University of Torino in Italy (with the interdisciplinary centre CIRMA).

The University of Teesside has a long-standing activity in the field of Interactive Storytelling, and with particular reference to the character-based approaches that are central to this project. They will ensure a state-of-the-art competence in the application of the planning techniques to the modelling of character behaviour. Since they have also implemented a number of systems in partnership with industries, they are aware of the constraints of real-world content production process, as well as relationship with authors and storyboarders.

CWI has experience in the field of semantic annotation and reasoning for media production, including storytelling-based media. They have extensively studied the media production, with a deep understanding of the data structures and the processes involved, starting from the main idea of a product and going down through storytelling and visualizing. Their competence for the project will serve the definition of a suitable descriptive language for the representation of character traits and appropriate ontological reasoning in support. Their experience with service-based hypermedia systems will also contribute to the implementation of the software tool.

The CIRMA-University of Torino is an interdisciplinary research group that involve computer scientists (from the Computer Science department) and drama scholars (from the Drama Studies department). The competence of CIRMA is in the study of formal systems for the representation of the facts about the storytelling practice. Their formal systems have been applied to the characterization of traditional storytelling, while they have also developed applications of interactive storytelling for information presentation goals. They will address the problem of linking the knowledge from the linear to the interactive approaches. CIRMA has already been a partner of VRMMP in production projects (such as Dramatour).

BBC is a production partner that has a long-standing experience in the exploitation of the interactive and augmented capabilities in practical applications. In particular they have carried out experiences on both the technical aspects of combining the viewer's feedback and on the authorial effort for the new formats. BBC will provide the collection of user requirements for the interface design of the two, will provide a liaison with the production department for the application of the tool in one pilot production and will coordinate the pilot production workpackage.

Submarine is a multimedia production SME of Netherlands with a particular interest in games. The gaming industry is one of the recipients of a thorough study and modelling of characters. They will use the ADRIAN tool in a game production involving two characters and will contribute to its development by providing feedback as far as multimedia and game production is concerned.

VRMMP, beyond the tasks of software integration and in collaboration with the production partner Lumiq Studios, will also exploit its production capabilities by carrying out a pilot production based on the re-use paradigm of Machinima, thus contributing to the verification of the validity of the approach and the soiftware tool.

So, the consortium features three complementary research centres (semantic annotation - CWI, interactive storytelling applications- TEESSIDE, formal models for storytelling - CIRMA) and three complementary production companied (interactive and augmented TV - BBC, computer graphics applications - VRMMP, game and multimedia production - SUBMARINE). Two of the production companies also involve a research department that will contribute to software development (VRMMP) and the identification of user requirements (BBC). The industrial involvement improves the possibilities that the project results will be exploited in current production projects or project that will be available during the three-year project.

All the participants have participated or are participating in European projects related to ADRIAN (specificied in the individual descriptions).

Existing partnerships between TEESSIDE and BBC (on interactive storytelling themes) and CIRMA and VRMMP (on computer graphics applications with animated characters) will help dialogue and ideas exchange in this highly interdisciplinary field.

2.4 Resources to be committed

The resources necessary for the project will be devoted to six categories of activities: management, research, development, production, dissemination, exploitation.

Management
The management activities are carried out in WP0. They include:
- Organization of the meetings of the steering committee
- Travelling of the managers to the country selected for the meeting
- Exchanges between the partners, which is absolutely required to favour the exchange of knowledge in out highly interdisciplinary group
- Salaries for the project managers

Research
The research activities are carried out in WP1 and WP2. They include:
- Organization of the meeting of the personnel involved in a research activity
- Travelling of the personnel to the country selected for the meeting
- Exchanges between the partners, which is absolutely required to favour the exchange of knowledge in out highly interdisciplinary group
- Purchase and maintenance of all the HW and SW equipment needed to carry out the research activity, such as low-performance PCs and Office tools
- Salaries for the coordinator and personnel belonging to the RTD (research and technology development)

Development
The development activities are carried out in WP3. They include:
- Organization of the meetings, particularly important during the definition of the architecture and during the integration phases
- Travelling of the personnel to the country selected for the meeting
- Purchase and maintenance of all the HW and SW equipment needed to carry out the research activity, such as high-performance PCs, development tools, and any authoring tool needed to produce material for the early tests. These expenses for the SW are likely to be reduced since most of the development will be carried out through the use of freer open-source software.
- Salaries for the coordinator and personnel belonging to the RTD (research and technology development)

Production
The production activities are carried out in WP4 and WP5. They include:
- Organization of the meetings needed to coordinate researchers, authors and producers belonging to different countries
- Travelling of the personnel to the countries selected for the meetings
- Purchase and maintenance or rental of any HW or SW needed to accomplish the pilot productions. This expense is likely to be limited since the pilot production will take advantage of the ongoing production organized by some of the participants (BBC for interactive TV, Submarine for a game and VRMMP for the machinima approach)
- Salaries for the personnel involved in the RTD and for the authors that will use the authoring tool developed in WP3. Additionally, salaries for the coordinator and the producers involved in the evaluation of the pilot productions.

Dissemination
The dissemination activities are carried out in WP7 and WP8. They include:
- Subscription to international conferences and workshops selected for publication.
- Travelling of the personnel to the countries hosting the conferences or the workshops where publications

were accepted.

- Salaries for the coordinator and the personnel belonging to the RTD

Exploitation

The exploitation activities are carried out in WP8. They include:

- Organization of the meetings of the personnel involved in WP8
- Travelling of the personnel to the countries selected for the meetings
- Salaries for the coordinator and the producers selected for the exploitation of the results

WPs		type	month	COST month	TOTAL
WP0	**MANAGEMENT**				
Personnel					**€ 116.118,00**
1	manager VRMMP	Manage	11	€ 6.451,00	€ 70.961,00
1	manager CIRMA	Manage	1	€ 6.451,00	€ 6.451,00
1	manager TEESSIDE	Manage	2	€ 6.451,00	€ 12.902,00
1	manager CWI	Manage	2	€ 6.451,00	€ 12.902,00
1	manager SUBMARINE	Manage	1	€ 6.451,00	€ 6.451,00
1	manager BBC	Manage	1	€ 6.451,00	€ 6.451,00
WP1	**SURVEY**				
Personnel					**€ 156.038,00**
1	chief software eng VRMMP	RTD	3	€ 4.253,00	€ 12.759,00
1	senior researcher CIRMA	RTD	3	€ 6.451,00	€ 19.353,00
1	researcher CIRMA + PhD	RTD	6	€ 4.253,00	€ 25.518,00
1	senior researcher TEESSIDE	RTD	3	€ 6.451,00	€ 19.353,00
1	junior researcher TEESSIDE	RTD	6	€ 2.900,00	€ 17.400,00
1	senior researcher CWI	RTD	4	€ 6.451,00	€ 25.804,00
1	junior researcher CWI	RTD	6	€ 2.900,00	€ 17.400,00
1	author SUBMARINE	RTD	1	€ 6.000,00	€ 6.000,00
1	researcher BBC	RTD	1	€ 6.451,00	€ 6.451,00
1	author BBC	RTD	1	€ 6.000,00	€ 6.000,00
WP 2	**CHAR'S TRAITS MODEL**				
Personnel					**€ 170.630,00**
1	senior researcher CIRMA	RTD	3	€ 6.451,00	€ 19.353,00
1	researcher + PhD CIRMA	RTD	6	€ 4.253,00	€ 25.518,00
1	senior researcher TEESSIDE	RTD	3	€ 6.451,00	€ 19.353,00
1	researcher TEESSIDE	RTD	5	€ 2.900,00	€ 14.500,00
1	senior researcher CWI	RTD	3	€ 6.451,00	€ 19.353,00
1	researcher CWI	RTD	8	€ 2.900,00	€ 23.200,00
1	author SUBMARINE	RTD	2	€ 6.000,00	€ 12.000,00
1	researcher BBC	RTD	3	€ 6.451,00	€ 19.353,00
1	author BBC	RTD	3	€ 6.000,00	€ 18.000,00
WP 3	**ENGINE DESIGN**				
Personnel					**€ 120.590,00**
1	interface designer VRMMP	RTD	6	€ 4.000,00	€ 24.000,00
1	senior researcher CWI	RTD	8	€ 6.451,00	€ 51.608,00
1	researcher CWI	RTD	11	€ 2.900,00	€ 31.900,00
1	researcher BBC	RTD	2	€ 6.541,00	€ 13.082,00
WP 4	**ENGINE IMPLEMENT**				
Personnel					**€ 223.925,00**
1	chief software eng VRMMP	RTD	14	€ 4.253,00	€ 59.542,00
1	software developer VRMMP	RTD	15	€ 2.900,00	€ 43.500,00
1	researcher + PhD CIRMA	RTD	9	€ 4.253,00	€ 38.277,00
1	senior researcher TEESSIDE	RTD	6	€ 6.451,00	€ 38.706,00
1	researcher TEESSIDE	RTD	11	€ 2.900,00	€ 31.900,00
1	author SUBMARINE	RTD	2	€ 6.000,00	€ 12.000,00

WPs		type	month	COST month	TOTAL
WP5	**PILOT PRODUCTIONS**				
Personnel					**€ 178.685,00**
1	researcher BBC	RTD + DEMO	2	€ 6.451,00	€ 12.902,00
1	chief software eng VRMMP	RTD + DEMO	6	€ 4.253,00	€ 25.518,00
1	software developer VRMMP	RTD + DEMO	6	€ 2.900,00	€ 17.400,00
1	researcher + PhD CIRMA	RTD + DEMO	3	€ 4.253,00	€ 12.759,00
1	senior researcher TEESSIDE	RTD + DEMO	3	€ 6.451,00	€ 19.353,00
1	researcher TEESSIDE	RTD + DEMO	3	€ 2.900,00	€ 8.700,00
1	senior researcher CWI	RTD + DEMO	3	€ 6.451,00	€ 19.353,00
1	researcher CWI	RTD + DEMO	3	€ 2.900,00	€ 8.700,00
1	author SUBMARINE	RTD + DEMO	6	€ 6.000,00	€ 36.000,00
1	author BBC	RTD + DEMO	3	€ 6.000,00	€ 18.000,00
WP6	**EVALUATION**				
Personnel					**€ 43.353,00**
1	coordinator VRMMP	RTD	3	€ 6.451,00	€ 19.353,00
1	producer SUBMARINE	RTD	2	€ 6.000,00	€ 12.000,00
1	producer BBC	RTD	2	€ 6.000,00	€ 12.000,00
WP7	**DISSEMINATION**				
Personnel					**€ 93.624,00**
1	coordinator VRMMP	RTD	2	€ 6.451,00	€ 12.902,00
1	chief software eng VRMMP	RTD	3	€ 4.253,00	€ 12.759,00
1	researcher CIRMA	RTD	3	€ 4.253,00	€ 12.759,00
1	senior researcher TEESSIDE	RTD	2	€ 6.451,00	€ 12.902,00
1	researcher TEESSIDE	RTD	3	€ 2.900,00	€ 8.700,00
1	senior researcher CWI	RTD	2	€ 6.451,00	€ 12.902,00
1	researcher CWI	RTD	3	€ 2.900,00	€ 8.700,00
1	author SUBMARINE	RTD	1	€ 6.000,00	€ 6.000,00
1	researcher BBC	RTD	1	€ 6.000,00	€ 6.000,00
WP8	**EXPLOITATION**				
Personnel					**€ 30.902,00**
1	coordinator VRMMP	RTD	2	€ 6.451,00	€ 12.902,00
1	producer SUBMARINE	RTD	2	€ 6.000,00	€ 12.000,00
1	producer BBC	RTD	1	€ 6.000,00	€ 6.000,00

Software					TOTAL
	licences (2000 EUR per partner + 4000 per VRMMP)			**€**	**12.000,00**
Hardware					
	4000 EUR per PC, 2 PCs per RTD partner, 1 PC per production partner, 1,5 per mixed (e.g. BBC)			**€**	**32.000,00**
Traveling					
	coordination traveling (3 per year, 1,5 avg persons per participant, 3 years) 1000 EUR avg	€	13.500,00	**€**	**77.500,00**
	Conferences traveling to US and EU (2 per year, 1,5 avg persons per participant, 3 years) 3000 EUR avg	€	27.000,00	**€**	**118.000,00**

Section 3. Impact

3.1 Expected impacts listed in the work programme

The impact of the ADRIAN project in terms of the i2010 EU policy framework, adopted by the European Commission in June 2005, aims at fostering growth and job creation in the information society and media industries, would be in terms of supporting the development of storytelling/narrative-based cultural assets and the improvement of the creativity capabilities. The i2010 initiative[1] has recognised the importance of the ICT industry and ICT applications, especially in the aspects of convergence with the creative industries. A major trend resulting from convergence is the development of new applications building on the capacity of ICT to involve users in the content creation and distribution process.
The creative content sector is becoming a driver for the economic growth across the world, estimated to account for more than 7% of the World's GDP and growing at an annual rate of between 5 and 20% in the OECD countries[2]. US export (see http://portal.unesco.org/culture) started to be led in 1996 by the cultural products (films, music, television programmes, books, journals and computer software), surpassing for the first time all other traditional industries, such as automobiles, agriculture, aerospace or defence (culture[3] is considered a subset of creative sector). In Europe, the content sector accounts for 5% of the GDP and employs approximately 3.5% of the EU workforce, mostly relying on micro firm organization with a substantial involvement of SMEs. The ADRIAN involves one such SME in the creative content sector (Multimedia and Game production), thus having an impact in terms of "Involving SMEs and feeding innovation".

Among the ways of creating content, storytelling has been the natural human means for conveying information and learning. The support to storytelling is of primary interest to media and entertainment industries. Europeans preferences for entertainment go to cinema shows (mostly US films, followed by French and British films), where models of storytelling are locked in severe constraints to ensure the film success on a mass audience. But stories have manifested in unexpected formats, such as jokes, comic strips, sitcoms, advertising, urban legends (!?!), soap operas, …, but also movies, plays, cave paintings, literature, and other modern dramatisations – indeed, even recorded history is a story. An everyday example is the fact that news articles are often stories, and today they are sometimes told in multimedia format[4].
However, the modern media business landscape is changing, giving rise to a deficit in the ability to support this fundamental human need. Over recent years, the level of commercial advertising revenue on TV and radio has declined and the trend suggests that this will continue[5]. Meanwhile, the consumer demand for greater choice of content on a greater choice of platforms is increasing. This even applies pressure on public broadcasters, given the same consumer demands with reducing public funds. The upshot is a need to increase productivity, which without any intervention is likely to result in the decline in quality of production and narrative.
There is not ever going to be a single intervention that alone will resolve this issue. It needs to be approached from many angles; increasing productivity in all production activities, while maintaining (or better still, increasing) creativity. ADRIAN gives the writer new tools for rapidly testing and synthesising appropriate character attributes and behaviours within the story, hence **increasing productivity**. Moreover, it will

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[1] "i2010 - A European Information Society for Growth and Employment" Annual Progress Report, 2007; see more at http://europa.eu.int/information_society/eeurope/i2010/index_en.htm
[2] Carmen Marcus , "Future of Creative Industries: Implications for Research Policy", April 2005; Foresight Working Document series (EUR 21471).
[3] The Economy of Culture in Europe, October 2006 available at http://ec.europa.eu/culture/eac/sources_info/studies/economy_en.html
[4] See, for example, the number of seminars and round table around the topic of storytelling applied to news reports at RTNDA-07 (Radio and Television News Directors Association) at http://www.rtnda.org/conv07/program/ and the article by Laura Ruel and Nora Paul, Multimedia storytelling: when is it worth it?, Online Journalism Review, Annenberg School for Communication at USC, Posted: 2007-02-12, available at http://www.ojr.org/ojr/stories/070210ruel/
[5] Vincent Letang, 'Advertising market under pressure: TV ad revenues struggle to match GDP economic growth', Screen Digest mini report , January 2008.

potentially increase the variety and novelty of linear dramatisations, making them seem less formulaic – hence **increasing creativity**.

Storytelling has been pointed out as an effective modality for presenting and conveying information in a highly compact and understandable form (Gershon-Page 2001). For these reasons, storytelling has been successfully applied to practical systems the fields of education and training (FearNot, Mission Rehearsal and subsequent projects, Carmen's bright ideas) and cultural heritage mediation (Dramatour project, other narrative systems from ICVS), often associated to the related notion of drama to enhance the engagement of the users. The use of artificial characters has been proved to substantially improve the effectiveness and naturalness of the interaction with such systems, allowing the users to establish an emotional bond with the system, possibly mediated by the process of identification favoured by human-like appearance and believable behaviour. A major bottleneck of these systems, however, is constituted by authoring. While story- and character-based systems are designed and programmed by interdisciplinary teams of AI experts, HCI experts, knowledge engineers and programmers, content authors are scarcely involved in the development and testing loop, so that the creation of contents requires extensive training of the authors, who are provided insufficient and poor instruments to support their creativity, not to speak of non-specialized content creators for enforcing universal access to authoring in **many-to-many schemas** of **knowledge creation, reuse and dissemination**.

Based on the assumption, amply discussed and argued for in the part 1 of this proposal, that a character-centred approach is necessary to enhance the authoring of story- and drama-based systems and application (spanning from traditional media to new media through a variety of formats and applications), the ADRIAN project aims at improving the processes of content creation and authoring in storytelling by using the instruments of AI to support the creative process. **Cost effectiveness** derives from the use of off-the-shelf AI techniques technologies for planning and reasoning to address exploratory activities in the creative process, aimed at improving the quality of the output and the development time. The use of a corpus-based ontology story-related character features, collectively negotiated and tested among the participants of the creative **workflow process**, guarantee the shared understanding of the applications elementary and compound content elements, favouring their **reuse and recombination** across systems and applications. The resort to semantic annotation of contents makes them easily reused by human content creators and automatic and semi-automatic **content assemblers**. Semantic annotation in character-based storytelling systems is also the key to **personalization**, for what concern both the distributed content (which would support forms of context- and ambient-based adaptation and personalization, mostly in the presence of wireless, large band networks in **ubiquitous computing** scenarios) and the individual preferences of users concerning the character mediation in the content distribution itself (in line with the advancements of user modelling).

In the long term, the establishment of AI-based platforms for character-based storytelling across different development and exploitation scenarios provide undoubtedly valuable **benchmarks for the validation of the AI techniques and models involved**, with a specific concern for the techniques for addressing the complexity issues in real systems, such as computer-tractable knowledge about story structures and complex, believable characters and the interaction among the two. In particular, it provides a **test bed for the effectiveness of the models** of characters (expressiveness, realism, persistent traits and cognitive models) created by the interdisciplinary research on artificial characters posited at the junction of psychology, cognitive science, artificial intelligence and social studies.

AI-based approach is also the key for innovation in the rapidly growing game and interactive entertainment industry. In fact, the change in the demographic landscape brings an increasing population of 'gamers' as each generation grows-up with the demand for greater participation in their media experiences[6]. However, the games market has so far 'short-changed' the public in meeting the fundamental human need for information and learning through story, as experienced in linear media. Many producers and writers in the media business are 'chomping at the bit' to create interactive dramatisations that tell richly narrative stories – something that is as

[6] [EurMon07] Anon, 'The World Market for Toys and Games', Euromonitor International Market Report, October 2007.

yet unseen on interactive platforms.

It is fair to recognize that the game market is truly conservative with respect to game genres and gameplay, with companies playing safe in concentrating on game sequels or little courageous titles. AI can play a major role in appealing to a wider audience (see the eminent case "The Sims"™, where AI technology has been the differentiating factor). Addressing seems an incontrovertible fate for the game industry. As stated by Ernest Adams[7], one of the gurus of the game design, "interactive storytelling is rapidly becoming a financial necessity, the hardcore gamers notwithstanding. A game's lead character is its most valuable intellectual property. In order to be meaningful and appealing, that lead character must appear in compelling situations, and that means storytelling." Also, "there's a far larger market of casual players opening up with different interests and priorities for the way they play - and among those interests, especially with female players, are compelling characters and stories. If you don't offer them, you won't get access to that market." And, finally, "Façade's biggest achievement was its visual representation of conflicting emotions. That kind of thing is hard to do, but it doesn't cost much. It's AI, and AI is much cheaper than filmed content." (on Façade see Part 1). This is a hot topic at game conferences, as we can notice from the sessions devoted in game conferences (e.g. GDC, see below). All these issues are taken into account by the ADRIAN tool, which focuses on building engaging characters into interactive dramatisations. The result of this is likely to be an expansion of the games market towards female players, merging its boundaries with those of linear media markets. Most importantly, it is likely to **widen the appeal, relevance, and meaning** of interactive media to the general public.

In order for the ADRIAN tool to have an impact on media production industry a few steps need to be addressed:

1. User-centred development of prototype tools

This can be obtained by working closely with producers on pilot productions. The strategy we are pursuing in this project, i.e. to put together ICT research and development institutions and media production companies, has to be pushed forward. Given the prototype we are developing in the project and the testing we are carrying in the pilot productions, we will produce an evaluation that can individuate good practices and pitfalls of the approach. A software company should learn from this experience in engineering the ADRIAN tool and providing facilities that can help the penetration of the method in the author practice.

2. The tool is to be made freely available (downloadable from web site)

Following the approach pursued in this project the ADRIAN tool should be freely available to authors from the beginning. The business model we are proposing here is of an open-source system, that can be sustained through the deployment of the generic prototype for specific categories of writers: news reporting journalists, choreographers of drama-inspired dances (where dialogue is of no use), historical reconstructions for fictional purposes. Also, the tool must involve a community of developers that will add features to the current development that can enhance the acceptance on behalf of the authors. The engineering of the software instruments designed and implemented in the project are a necessary step to ensure their easy and immediate fruition on the largest possible articulation of software and hardware configurations. The adoption of an open-source software development schema is the key to the integration and testing of the solutions envisaged by the project within the context of commercial content development (and distribution) platforms and devices, ranging from professional tools for advanced authoring of multimedia presentations, videogame design, scripting of tv / cinema / new media products and formats, to the individual and collective creation of contents by end-users.

3. Promoting the tools through internal channels and at appropriate industry conferences

There are a number of events connected with both the interdisciplinary conferences such as Interactive

[7] Ernest Adams, Secrets of Interactive Storytelling, Next Generation online journal, available at http://www.next-gen.biz/, Updated: Monday, 24 July 2006 or http://www.designersnotebook.com/Online_Articles/Secrets_of_Interactive_Storytelling.pdf

Storytelling[8], Game Developer Conference[9], Virtual Storytelling[10], and the event organized for the presentation of the latest achievements in technology and production support for the audiovisuals and the game industries (such as International Broadcasting Conference[11] and National Association of Broadcasters[12]), or mixed events like ACM SIGGRAPH conference[13].
The first type of conferences can give access to authors and professionals that are interested in digital environments and practical systems for improving their writing capabilities; the second type of events allows to reach producers and project leaders that can introduce the usage of the authoring tool in their production teams as well as providing comments for connecting the tool to other production facilities.

There are several reasons for the European approach to content creation sector, where the ADRIAN project, which builds a tool in support of storytelling, is posited.

The first is that content production, especially if involving storytelling, needs a European approach rather than a national approach. As outlined above for cinema consumption of Europeans, the market competition with American and Asian productions needs a European effort. On the authoring perspective this is reflected by the creation of stories that engage audiences across countries. As the gurus of storytelling claim, stories must have an appeal to universal principles rather than being nationally bordered. So, support to storytelling requires avoiding being influenced by national peculiarities, and a European level consortium improves the dialogue between different authoring experiences. The ADRIAN tool will benefit from the method comparison offered by several authors from different countries as well as authors for different products and media.

The second is that recent reports assess that "… creative industries are less national, and more global and local/regional … Their characteristic organisational mode is the micro-firm to small to medium-sized enterprise (SMEs) relating to large established distribution/circulation organisations". (Cunningham, 2001, p. 6)[14]. So, the idea is that content creation operates through a network of SMEs (except a few major companies) that are scattered around Europe and that need to be networked in order for their products to be distributed. The ADRIAN tool will offer a method for encoding in a shared way the content concerning the characters of a story; this will prompt the re-use of content and increase the productivity.

Also, the application of the ADRIAN tool in pilot productions will allow the circulation of ideas and methods through the pilots themselves; this will ensure that practices from one country can pass to others.

Finally, it is not easy to find, especially in countries such as Italy or Netherlands a sufficient mass of academic and industrial research partner on advanced topics of content creation; so, the European project can provide applicability and then visibility to approaches that otherwise would remain at the laboratory level of application and would hardly attract the interest from Media Industry.

Relationship to National or International Initiatives

The ADRIAN project builds upon the experiences of NM2 and InScape projects (the latter is still going). The ADRIAN project will take into account language and tools developed in that project in order to be compatible

[8] http://www.zgdv.de/TIDSE06/, with a continuation announced for 2008.
[9] http://www.gdconf.com/
[10] http://www.virtualstorytelling.com/indexVS.htm
[11] IBC, http://www.ibc.org
[12] NAB, http://www.nab.org
[13] http://www.siggraph.org
[14] Cunningham, Stuart (2001) From Cultural to Creative Industries: Theory, Industry, and Policy Implications, Creative Industries Research and Application Centre, Queensland University of Technology.

for possible further developments in the sense of the plot structure. Also, we will be related with the COMM[15] ontology initiative in order to take advantage from the reasoning abilities and the compatibility with multimedia semantic encoding developed therein.
An interesting relationship is the adherence, in one of the pilot productions, to the Machinima paradigm. This will open the ADRIAN tool to a vast community of writers and producers that are akin at the re-use of material from game content and engines. Also, these authors are not professional authors, and this will improve the penetration of the ADRIAN among occasional writers.

To a large extent, this proposal capitalises on previous UK initiatives, for instance in the UK (DTI Technology Programme and Technology Strategy Board Programme for the Creative Industries), whose results stands at the background of the ADRIAN project.
The Dramatour project[16], funded by the Italian Ministry of Culture for the realization of a virtual guide to a historical site based on a storytelling-based content presentation, has allowed CIRMA and VRMMP to be aware of the practical approaches to storytelling. All the insights in the relationship between software encoding and authorship will be put at work in the ADRIAN project.

All the people of the ADRIAN project will monitor further national initiatives and may be involved in them as well.

The external factors that can influence the achievement of the impact concern the economical development of the new media and game industry in Europe, namely:

- the advancement of computational resources commonly available for graphical generation in support of real-time character-based applications
- establishment of shared workflows in media and multimedia production on which the development of the models in the project and their implementation can rely on,
- persistence of the open-source paradigm in software development
- expansion of the market of new media and multimedia products, personal & portable devices and in general of platforms that can bring new interest in character-centred storytelling techniques.

The best conditions for maximum impact would be that a thriving European media industry (Computer Entertainment, Broadcasters, TV/Film Production) and the absence of standardised industrial solutions coming, e.g. from the USA. The development of novel content and novel interaction devices (e.g. in computer entertainment) are also positive factors for the emergence of a character-centred approach to storytelling.

In the medium term, the development of computer entertainment, on both the storytelling-based computer games side and the creation of engaging characters for games definitely, is likely to be the critical factor influencing the impact of the ADRIAN tool. The market saturation on traditional game genres, the increasing average age of their audience and the expansion of on-line entertainment, will foster customers' desire for new game genres, possibly more sophisticated ones, resulting in novel gaming experiences.

[15] http://comm.semanticweb.org/
[16] http://dramatour.di.unito.it

3.2 Dissemination and/or exploitation of project results, and management of intellectual property

Describe the measures you propose for the dissemination and/or exploitation of project results, and the management of knowledge, of intellectual property, and of other innovation-related activities arising from the project.

In this section we describe the area in which the dissemination and exploitation activity will be carried out: from the scientific community to the content creation community, from EU and National institutions to the private sector (publishers and lawyers). It describes the contacts available*** to the parnters which will be used in the exploitation and the actions that will be taken.
Moreover, the project will provide a specification document and a business plan to describe how to localize the developed framework in further languages and domains.

Dissemination Plan

Results from the ADRIAN project should be of broad interest to various constituencies, from the traditional storytelling research community to content providers and the entertainment industry. This is why the dissemination plan is organised according to the various target audience. The dissemination plan will address several routes, from traditional scientific publication to event organisation or contacts with the press.

Scientific Publication

The following scientific publications will be targeted by the consortium:

Journals: ACM Computers In Entertainment, IEEE Multimedia, Artificial Intelligence Journal (Elsevier).

Conferences: Artificial Intelligence and Interactive Digital Entertainment (sponsored by AAAI), European Conference on Artificial Intelligence, International Joint Conference on Artificial Intelligence, ACM Multimedia, ACM Advances in Computer Entertainment, IFIP International Conference on Entertainment Computing, ACM Siggraph Symposia (on Games and Interactive 3D Systems), International Conference on Virtual Storytelling (Proceedings in Springer LNCS), ACM International Conference on Digital Interactive Media in Entertainment and Arts, AAAI Conference on Artificial Intelligence.

Professional Conferences

Presentation of recent advances in technology for the Entertainment industry tends to take place as specialised industrial events rather than through mainstream scientific conferences. One traditional example is the Games Developers Conference (www.gdconf.com). In recent years academic presentations targeting the entertainment industry have been invited at these venues, and the project plans to present its results in that context as well. Other targeted conferences of this genre are the Australian Game Developers Conference (www.agdc.com.au), and the IBC (www.ibc.org) in Amsterdam.

Participation in events / organisation of events

Several investigators of this proposal (Cavazza) are actively involved with the most important Entertainment Computing conferences (e.g., IFIP International Conference on Entertainment Computing) and with Information presentation connected with Cultural Heritage (PATCH). Investigators from CWI

Traditional dissemination : web site

The ADRIAN project will promote and maintain a project-specific web site. This site will be populated by background research from various partners in addition to the specific infeed from the ADRIAN results.
In order to reduce the cost and the effort of the site management, the web site will be based on one of the many freely available open-source Content Management Systems (CMSs), such as : Drupal (www.drupal.org), joomla (www.joomla.org) or wordpress (www.wordpress.org).
These systems offer different forms of content distribution (plain pages, picture galleries, downloadable files, blog, forums, polls, ...) as well as a user access control mechanism. The latter, makes these system also suitable to improve the cooperation of the various distributed teams.

Web 2.0 dissemination
The Interactive Storytelling productions and other forms of media experiences that can be recorded as video, as well as 3D animations which correspond to the media content of some of the Interactive Narratives generated will also be disseminated via Web 2.0 sites such as YouTube™ or Dailymotion™. This is expected to improve the ADRIAN project outreach to the general public.
Press and Media

Several of the investigators from the ADRIAN consortium have already a significant experience of media coverage, though such media as; major newspapers, radio stations and Television. Television broadcasting is ensured since some of the partners belongs to the television broadcasting industry (BBC).
It is envisioned that traditional media's interest will be in Future Entertainment paradigms and in the societal implications of such entertainment. While dissemination to traditional media is certainly an asset, care will be taken that the message disseminated is consistent with the best practice in scientific research.

Section 4. Ethical Issues

ETHICAL ISSUES TABLE

	YES	PAGE
Informed Consent		
• Does the proposal involve children?	NO	
• Does the proposal involve patients or persons not able to give consent?	NO	
• Does the proposal involve adult healthy volunteers?	NO	
• Does the proposal involve Human Genetic Material?	NO	
• Does the proposal involve Human biological samples?	NO	
• Does the proposal involve Human data collection?	NO	
Research on Human embryo/foetus		
• Does the proposal involve Human Embryos?	NO	
• Does the proposal involve Human Foetal Tissue / Cells?	NO	
• Does the proposal involve Human Embryonic Stem Cells?	NO	
Privacy		
• Does the proposal involve processing of genetic information or personal data (eg. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)	NO	***
• Does the proposal involve tracking the location or observation of people?	NO	
Research on Animals		
• Does the proposal involve research on animals?	NO	
• Are those animals transgenic small laboratory animals?	NO	
• Are those animals transgenic farm animals?	NO	
• Are those animals cloned farm animals?	NO	
• Are those animals non-human primates?	NO	
Research Involving Developing Countries		
• Use of local resources (genetic, animal, plant etc)	NO	
• Benefit to local community (capacity building i.e. access to healthcare, education etc)	NO	
Dual Use		
• Research having direct military application	NO	
• Research having the potential for terrorist abuse	NO	
ICT Implants		
• Does the proposal involve clinical trials of ICT implants?	NO	
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	YES	

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