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### **TARGET DIMENSIONS OF USER-CENTERED EVALUATION IN INTERACTIVE STORYTELLING**

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## Abstract

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This reports summarizes theoretical and empirical (expert consultations) preparations for the definition of a dimensional architecture of user-centered evaluation in interactive storytelling. Based on literature reviews in entertainment research and interviews with 20 international experts (both from the IRIS network and other teams), a three-partite structure of the envisioned measurement toolbox is derived that includes 13 facets of evaluation-relevant user experiences, such as usability, curiosity, and specific emotional user state. This preliminary measurement architecture is to be elaborated to an operational set of measures, which will be applied in pilot studies during the further progress of the IRIS research activities.



## 1. Introduction

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Interactive storytelling is a vision for future entertainment media. Building on various streams of innovation in computer science, such as intelligent agents and immersive visualization, scientists and creators are exploring new modes of artificial expression and media entertainment. So far, social research on how target audiences – “the users” – will perceive and experience these new modes of narrative and entertainment is scarce. However, acceptance and desire by users is an important precondition for the innovative vision of interactive storytelling to turn into an economically and culturally successful communication technology. More specifically, as of today, the options for what ‘finished’ interactive storytelling systems may look like in the future – in the home, in public entertainment venues, or elsewhere – are highly diverse, and it is likely that only some manifestations of interactive storytelling will fit to audience demands and achieve users’ satisfaction and enjoyment. Social research is thus important to provide exploratory insight on how users of interactive storytelling pilot systems perceive and experience the interactive narrative and their interaction with the underlying technology. With user-centered data, it will be possible to distinguish more promising pathways in systems design from less promising options.

For this reason, the IRIS project includes an element of user-centered social research (Work Package 7). The objective is to introduce standardized social-scientific methodology to user research in Interactive Storytelling, which includes conceptual work as well as method development. Serving the function of Networks of Excellence, IRIS is to construct a measurement toolkit that can help scientists and creators who are active in the field to conduct user-centered research for their specific prototype of interactive storytelling. At the same time, the studies implemented for the purpose of method development and measurement definition are intended to mark initial advances in quantitative user-centered research on interactive storytelling.

The present report summarizes the first activities that IRIS partner VUA has pursued on the pathway towards the IRIS measurement toolkit. Following the project’s workplan, the studies for method development need to be prepared by systematic top-down (i.e., literature) and bottom-up (i.e., data collection) acquisition of information on relevant dimensions of user experiences in Interactive Storytelling. VUA’s first goal was therefore to lay out the conceptual foundations on which measurement methods for user studies with actual interactive storytelling applications can be designed. The main operations carried out for this purpose are literature and concept work (section 2.) and an interview study with experts from the interactive storytelling community (including IRIS partners, section 3.). From these research activities, conclusions are drawn that will flow into the next stage of VUA activities within WP7. This refers to the generation of actual measurement drafts and their testing in experimental setups that involve an interactive storytelling prototype (section 4.)



## 2. Conceptual Review

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The first step to accomplish this mission is theory work. Existing technological approaches have been examined from the perspective of entertainment research: What is “in” for the user of interactive storytelling systems? What is the implicit or explicit intention of system designers concerning the user experience? The conceptual strategy is to look at existing state of the art prototypes of interactive storytelling from the perspective of *entertainment research*. In communication science, research on conventional (past and present) mass media entertainment is a growing field that has advanced various conceptual approaches (Bryant & Vorderer, 2006). Because interactive storytelling systems share key features with ‘old entertainment’ (such as narratives, characters, visual aesthetics) and ‘rather new entertainment’ (such as video games), theories of media entertainment are a useful conceptual starting point for the IRIS WP7 mission (e.g., Klimmt & Vorderer, 2003). Applying existing theories of media entertainment to interactive storytelling is a conservative strategy in the sense that it is unlikely to discover entirely new experiential qualities that may come along with the unique combination of pre-produced narrative content and interactivity-based dynamics that interactive storytelling is about. However, because so many of the elements that interactive storytelling systems arrange in a unique way are already existent in conventional modes of media entertainment, related theory can serve as a pool of concepts from which a model of ‘the new user experience’ can be synthesized.

Therefore, various interactive storytelling systems (and their descriptions in the literature) have been analysed from the perspective of entertainment theory. Among the applications used for this theoretical reflection were, for instance, the prototype system “Façade” (Dow, Mehta, Harmon, MacIntyre & Mateas, 2007), the cinematic shooter video game “Call of Duty 4: Modern Warfare” (Infinity Wards / Activision), and the adventure video game “Tunguska” (one of the best-selling adventure games in Germany). Reflecting on existing theories and models from classic media entertainment in the context of interactive storytelling pilots thus represents the top-down component of the conceptual preparation for the development of the envisioned IRIS measurement and evaluation toolkit. It led to the definition of user experiences that were found most important in the IRIS context, that is, the experiential qualities that interactive storytelling media are most likely to evoke and for which they are most likely to achieve user acceptance.

### 2.1 Curiosity

“What will happen next?” Curiosity is a state that users of conventional media entertainment experience very frequently. Reading a novel, for instance, generates knowledge on characters and situations, which allows readers to conclude what may happen next, what should happen next, and what is likely to happen next. Good writers attract readers’ interest (e.g., Krapp, 1993), which includes the motivation to learn about what will happen next (please also see narrative theories of Work Package 1 Narrative Formalisms). Being curious is thus common for users of conventional entertainment, and curiosity occurs in various modes. For instance, in video games, curiosity may refer to the progress of the story, but also to the action possibilities that players can try out (“What will happen if I do this?”). During movie consumption, curiosity may also refer to artistic or formal issues rather than the faith of the characters (e.g., “How will the director visualize this?”).

Because various genres of media entertainment build on curiosity so frequently, it is likely that curiosity is pleasant in itself and thus contributes to overall appreciation. Several theorists argue for a psychophysiological base of the pleasantness of curiosity (e.g., Berlyne,



1960). When curiosity occurs, users (viewers, players etc.) first perceive a state of uncertainty, which comes along with increased physiological activation. To the extent that this uncertainty is not too strong, most users seem to enjoy such (temporary) activation (Berlyne, 1960). When uncertainty is reduced (e.g., readers turn the page and find out what actually happens next), users experience a sense of closure or completion, which renders the increased physiological activation a positive, pleasant experience (Zillmann, 1996a). If the state of curiosity is followed by a surprise (i.e., something unexpected happens), these affective user responses often turn into exhilaration (Zillmann, 2000). Entertainment media that generate circles of increased curiosity and resolved curiosity thus create a chain of pleasant affective dynamics. Because curiosity is a future-focused emotional state (i.e., it is driven by expectations and thoughts about events to come rather than events that already happened), curiosity holds a unique potential to bind sustained user engagement in a media experience.

Such curiosity experiences are important for many (if not all) interactive storytelling systems, and have been defined very early as a key goal in video game development (Malone, 1981). Users can be curious about multiple dimensions, including pre-scripted story progress (“What will happen next?”), interactive story progress (“What will happen if I decide this way?”), system response (“How will this agent respond if I start cursing?”) or technological capacity of the system (“How will the system visualize my view into this tunnel?”). Because interactive storytelling systems unite elements from diverse conventional media, they may combine different mechanisms of curiosity, which should result in a high frequency and intensity of curiosity-based affective dynamics. Overall, then, curiosity is from a theoretical perspective an integral element of media entertainment experiences in general and of interactive storytelling experiences in particular.

## 2.2 Suspense

“Will they survive?” For some types of entertainment media, this question occurs in users very frequently, such as in thriller novels, action movies, and shooter games. Because users are left in a state of uncertainty, the related user experience is similar to the (rather pleasant) curiosity process (see 2.1.). However, the experiential state typically referred to as “suspense” is also fueled by aversive emotional components, such as anxiety or empathic concern (e.g., a viewer fearing the defeat of a movie protagonist; cf. Zillmann, 1996b). Suspense thus differs from curiosity in the sense that users experiencing suspense have a strong interest in a specific outcome of a story episode, such as “My character must win the fight”. In contrast to curiosity, suspense is rooted in emotional involvement with characters. This emotional interest makes users long for specific outcomes and generates the concern that these specific outcomes may not occur. Therefore, suspense is a rather stressful mode of entertainment. However, if the desired outcomes occur, strong experiences of relief and satisfaction occur in most cases (“happy end”; Zillmann, 1996a). Research in media psychology suggests that both the aversive stage of suspense and the rewarding relief contribute to user enjoyment (Vorderer, Wulff & Friedrichsen, 1996; Knobloch, 2003).

Suspense has been found to occur both in linear entertainment such as novels and in interactive media such as video games (Klimmt et al., 2009). In interactive media experiences, suspense is frequently a by-product of challenge and competition (Vorderer, Hartmann & Klimmt, 2006) – players of competitive video games feel a high level of uncertainty about whether they will master a current challenge or not while they hold a very strong preference to win. Challenge and competition can thus foster similar affective user responses as character-driven emotions (empathy) do in linear entertainment.

Interactive storytelling systems are likely to facilitate suspense as well. More precisely, interactive storytelling applications can establish emotional involvement with characters and



situations (e.g., Paiva et al., 2004). They may simultaneously generate a perception of personal challenge in users. For example, an interactive crime drama may situate the user in the role of a police detective who is facing the climax confrontation with the villain. At this moment, suspense should be high for narrative reasons (as stakes are high in terms of plot development) and for interactivity reasons (as the user must make the “right” decisions to succeed in the confrontation). Therefore, interactive storytelling systems may also generate unique user experiences because they may facilitate high levels of cyclic suspense and relief experiences (see also the *IRIS D1.1* hypertext documentation for more detailed considerations on suspense in interactive storytelling).

## 2.3 Aesthetic pleasantness

“Beautiful!” is another typical user response to different content elements in conventional entertainment media. Such positive evaluations may relate to the physical appearance of characters, landscape imagery, or romantic episodes, for instance; they may also relate to attributes that constitute a media application as a piece of art. For example, movie experts may find the cinematic implementation of a special scene “beautiful”. In Oatley’s (1994) terms, aesthetic pleasantness may hence occur in users “entering the world of the story” and in users who remain “outside of the story” (and rather analyze it as a piece of art). Aesthetic pleasantness shares physiological roots with curiosity and suspense (Berlyne, 1960), yet it is shaped to a stronger degree by individual factors (biography, sense of taste, social status) and is not necessarily bound to uncertainty reduction. In many cases, aesthetic appreciation is linked to users’ construction of personal meaning from a story or piece of art (Rowold, 2008), another important facet is recognizing citations (e.g., a melody from a famous old movie being cited in a contemporary movie). Aesthetic enjoyment has thus been found to depend on individual preconditions, such as expertise and absorption tendencies (Wild, Kuiken, & Schopflocher, 1995).

Given the importance of aesthetics in conventional entertainment (Cupchik & Kemp, 2000), it is likely that interactive storytelling systems can have profound aesthetic impact on their users. The quality of this aesthetic experience may differ across applications: Some prototypes may facilitate affective responses through ‘beautiful’ imagery (e.g., digital landscapes). Other applications may address users aesthetic perception with creative plot development, character attributes, dialogue evolution, or puzzle tasks (e.g., as in the “Myst”™ video games). The element of ‘deep’, intellectually challenging narrative is certainly key to the aesthetics of interactive storytelling (e.g., Cavazza et al., 2007). Consequently, there are many routes that interactive storytelling systems may take to generate aesthetic pleasantness in their users. Especially interactivity and sensory immersion may add to this capacity. Aesthetic is a key element of creating a certain atmosphere and moods (e.g. curiosity and suspense). Along with the use of dialogue, music and visual effects, camera movement and cuts also play an important role. Work Package 5 focuses on cinematography, mostly from a technical perspective though. Still, the work of WP5 is strongly connected to aesthetic pleasantness.

## 2.4 Self-Enhancement

“We are great!” – Entertainment media of various kinds have been shown to affect users’ self-perception and self-worth. Video games have been argued to increase players’ self-esteem by providing experiences of success (Vorderer et al., 2006) and reward (Bateman & Boon, 2005). Another mode of video games affecting player self-perception is identification (Klimmt, Hefner & Vorderer, in press). Identifying with a game character allows to feel like somebody



one desires to be, such as a hero, a rock musician, or a powerful decision maker. Fulfilling desires of being like one wants to be generates positive emotions (such as pride), and this response of reduced self-discrepancy has been linked to video game enjoyment (Bessiere, Seay, & Kiesler, 2007).

To the extent that interactive storytelling systems facilitate identification with characters and/or provide experiences of competence and success, they are also likely to lift users' self-esteem. The sense of active participation (Klimmt, Hartmann & Frey, 2007) is a plausible mechanism that renders users' self-enhancement an important dimension of the user experience in interactive storytelling: Because users are directly involved (or at least believe to be directly involved) in what happens in the story, they can attribute positive events to themselves (e.g., *they* manage to fix a relationship problem in "Facade"). Interactivity thus opens the pathway to users' self-enhancement. If users leave an interactive story with the impression "I have achieved something great!", their experience rests on competence and success, which comes along with very positive emotions.

## 2.5 Optimal task engagement ("Flow")

"Don't disturb me!" – many video game players can be found strongly engaged in their activity and trying to block out any external input that could distract them. Such players are commonly described as being in the state of 'flow' (Csikszentmihalyi, 1990). Users experiencing flow find themselves resolving a sequence of tasks that is exactly as difficult as they can handle if they work with full dedication, and this experiential state (in the middle between boredom and anxiety) is found highly pleasant in many situations. Flow has been applied to study user responses to interactive media such as websites (Chen, Wignad, & Nilan, 2000) and video games (e.g., Keller & Bless, 2008).

Participating in an interactive story by making decisions and pushing a plot line forward can be construed as a task-type of activity, especially since most interactive storytelling applications set rules and limits to what users can decide on and do. Shaping a storyline while complying with such limitations may feel like resolving tasks – just as playing adventure games requires users to solve puzzles to move the story forward. If the timing and difficulty of users' participation in the development of the story is 'right', users may 'get lost' in the activity of giving input, or, more generally speaking, in co-narrating the story. Flow (or similar concepts such as immersion) may thus turn out as an experiential dimension important to users of sophisticated well-structured interactive storytelling systems that provide reasonable challenges and defined tasks to their audience (e.g., Mallon & Webb, 2005; Sherry, 2004).

## 2.6 Concluding Remarks

The theoretical analysis offered here is an attempt to focus the existing conceptual literature on media entertainment to a set of dimensions that are well-compatible with what the emerging art and technologies of interactive storytelling is about from a user perspective. Such a focus is required to link the new applications (interactive drama) to the existing body of theory and to come up with a set of theoretical inputs that can be handled in empirical, systematic research. A list of 27 experiential qualities (instead of the five dimensions presented above) would, for instance, be impossible to manage in empirical user-studies that move beyond a qualitative approach that merely describes what single users did and felt when confronted with a pilot system. Remaining too broad in terms of the number of experiential qualities theorized would also imply the risk of exceeding the conceptual processing capacities of researchers and designers, as they would necessarily remain



'shallow' in their understanding and implementation of each of so many dimensions. Therefore, the presented set of five theoretically meaningful and - concerning the object of interactive storytelling – very reasonable types of experiences (curiosity, suspense, aesthetic pleasantness, self-enhancement, and flow) appears as a viable solution of linking entertainment theory, interactive storytelling practice, and social-scientific evaluation measurement to each other. This implies that empirical research based on these dimensions will be able to assess the extent to which each motivational factor contributes to user acceptance and enjoyment in interactive storytelling, and to find out how well a given interactive storytelling system 'performs' from a user-perspective.



## 3. Expert Interview Study

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### 3.1 Introduction

The next step in preparing the development of the IRIS evaluation toolkit is to confront the conceptual perspectives on the user experience in interactive storytelling with expert views. Specialists involved in theorizing, planning, and/or implementing interactive storytelling systems clearly hold their own views of what users (should) experience, and these views may or may not match with the conceptual approach developed in advance, for instance, due to different disciplinary viewpoints or practical experiences that certain modes of entertainment simply “don’t work”. Before instrument development for evaluation measures can begin, the theoretical preparations are thus in need of expansion, elaboration, and possibly also correction through consultations with experts in the field.

Consequently, an expert interview study was conducted to explore practitioners’ and developers’ perspectives on the intended and expected user experiences in interactive storytelling environments. The research goal of the study was to generate a set of dimensions of user experience from expert viewpoints that can be compared to the theoretical (top-down) set of dimensions elaborated previously (see chapter 2.). A compilation of expert views will then allow to be synthesized with the perspective of entertainment theory to come up with a qualified set of experiential dimensions that a user-centered evaluation of interactive storytelling media needs to address. This synthesis will also mark an important step in interdisciplinary integration, for the viewpoints of many researchers and creators in interactive storytelling are rooted in computer science, whereas most entertainment theory has been advanced in communication science. An examination of potential points of confluence in the theoretical assumptions of both fields (interactive storytelling and entertainment theory) will therefore help to improve the conceptual base both within the IRIS network and in the interactive storytelling community.

### 3.2 Methodology

Expert knowledge is an important source of empirical information in the social sciences, especially at the stage of initial data collection and field exploration. It can best be gathered with qualitative methods, because expert knowledge is highly individualized, hard to verbalize, and difficult to translate for the knowledge system of non-experts. Standardized approaches of data collection (such as a questionnaire with rating questions) therefore typically fail to generate the maximum insight out of expert interviews. For this reason, a qualitative interview methodology was applied. Based on the conceptual reflections (see chapter 2), a brief list of broad, open questions was created that addressed the experts’ views on the user experience in interactive storytelling. Broadness of the questions was chosen as interviewing strategy because of the heterogeneity of approaches pursued in the technical implementation of interactive storytelling and the variance in experts’ domain of research (e.g., intelligent agents versus cinematography). Broader questions were intended to allow all experts to express their personal perspective on the user experience in spite of their highly different (scientific or artistic) roots; too narrow questions (e.g., questions that “check” the importance of a single experiential quality such as suspense) would have come with the risk that some experts might not be able to connect to the question at all.

Therefore, the participating experts were confronted with three main questions. The first was “According to your experience with Interactive Storytelling projects, prototypes, and visions,



how would you describe the feelings or experiences that authors and makers of IS systems intend to facilitate in the users?” – it directly addressed the core research interest of the study. The question framed the topic of user experience from a phenomenological or psychological perspective. To ensure that all experts (especially those with a strong background in computing technology) would be able to respond accurately, the second main question framed the topic of the user experience rather from the perspective of system elements required to make users experience the interactive story the way they should do: “Which design elements of IS systems do you regard critical and/or particularly difficult in facilitating such user experiences?”. Finally, the third major question attempted to collect experts’ abstraction of what they perceive to be important trends in interactive storytelling that will endure beyond today’s state of the art. An assessment of what experts expect to be the user experience of near-future interactive storytelling systems was intended to uncover what the long-term goals and visions of experienced practitioners and designers may be. A look into the future of the field from a user-perspective was also added to the question list in order to ensure that the measurement toolkit to be developed would still be up-to-date when it is completed in 2011. The future outlook question for the expert was formulated as follows: “In which ways do you expect IS systems of the near future (5 to 10 years) improve in terms of facilitating user experiences? How will the IS user experience of the future be?”

To identify and contact experts in interactive storytelling, the partners of the IRIS network were of course the best starting point (we thank all IRIS partners for their support of the expert study). A multi-step strategy was pursued to generate a sample of internationally recognized experts in interactive storytelling.

- First, a significant group of experts is represented by the IRIS partners themselves. Therefore, a major portion of the qualitative material generated for the study was obtained from a workshop session during an IRIS partner meeting in Rennes (FR) in April 2009. Each IRIS partner who attended the meeting contributed his views to the research questions of the study, and after individual statements, a discussion was led to compare and synthesize partners’ perspectives.
- Second, a list of experts who do not belong to the IRIS network was compiled with the help of project partners. These researchers, designers and practitioners were contacted via electronic mail and invited to participate in the interview study through email-responses to the open-ended questions described above. E-Mail turned out as suboptimal channel to address experts and conduct the interviews, however, and this step delayed the completion of the study significantly, as response rates and durations were quite dissatisfying.
- Third, a revised list of experts (following additional literature examinations and desktop research about ongoing projects in interactive storytelling, especially outside of Europe) was compiled, and experts from this list were invited to a telephone interview. With this procedure, much better response rates and times were achieved, and the number of qualified experts whose views could be processed for the study was increased significantly. One interview was conducted face-to-face, and the respondent preferred not to run an audio recording (which had been done for all other interviews, both at the IRIS workshop discussion and the telephone interviews with individual additional experts). From this single interview, only interviewer notes (instead of a transcription of the expert’s actual statements) could be analyzed.

With these recruiting measures, a sample of 20 experts from various countries inside and outside of Europe participated in the study, which represents a significant amount of practical knowledge of the field and the most advanced projects. The perspectives that can be learned from these expert interviews should thus be considered as most valuable information concerning the conceptual foundation of the IRIS evaluation toolkit.

Because virtually all experts preferred to remain anonymous, no personal citation will be offered when original verbal material is presented in the results section. Moreover, experts



who do not belong to the IRIS network are not identified in this report or subsequent publications. If a need for participant verification should occur (e.g., for the purpose of reviewing the IRIS project), VUA can provide a confidential list of expert participants to authorized investigators.

Analysis of the interview and discussion transcripts began with an open reading to assess the experts' general perspective on the issue of user experience. Subsequently, the processing of transcripts focused on the identification of terms and descriptions related to user experience. Specifically, statements that (1) mirror theorized categories of user experience (see chapter 2) or (2) that mark specific, new, and/or unexpected dimensions of the user experience in interactive storytelling were examined in detail. The according findings are summarized in the next sections; original citations from the transcripts are only given for illustration reasons and not as the main instrument of reporting. Citations are marked by a grey-colored frame around them.

### 3.3 Results

#### 3.3.1 General Perspectives on User Experience and Interactive Storytelling Design

A first and primary finding across virtually all expert statements is that from a designer or author perspective, most psychological categories of user experience that were derived from the literature review in entertainment research are too detailed and too specific in order to describe their perspective. In fact, most experts found it very difficult to connect their view to a specified psychological construal of what the users will think, feel, and experience when they are exposed to an interactive storytelling medium. The main reason for this discrepancy between the communication science perspective pursued at the theoretical level and the interactive storytelling experts' perspective is that highly *diverse* interactive storytelling systems can be (and have been) designed; just as different types of conventional narratives can foster varying types of emotions in readers, there is no single or typical user experience in interactive narrative.

"You can imagine any range of emotions coming through. And in some ways I think your whole endeavour is tricky. I do not think there is a general way to evaluate these experiences because they are going to be so varied in nature." [Expert No. 17]

So the expert perspective is that the approach of focussing on selected dimensions of user experience is difficult (if not impossible), as there is the considerable risk of missing some types of user experience that are relevant to certain interactive storytelling systems (or specific episodes within certain systems). Some interactive storytelling systems may even not strive for entertainment experiences in a positively connoted sense; the ambition to create artistically inspiring systems is in the view of some experts not fully compatible with an entertainment theory approach that is focused on pleasant experiences only. "Facade" is an example for this:



[The authors of “Facade”] “were very much trying to capture this uncomfortable feeling of being stuck in the middle of a married or of an arguing couple” [Expert No. 17]

“It’s not just a simulation, a cold simulator, a set of intelligent agents that is nicely designed; we should see something that is artistically interesting.” [Expert No. 6].

A second reason why the interviewed experts are sceptical about a definable set of major experiential qualities in users of interactive storytelling systems is that with adding interactivity to the narrative, a high degree of individualized or personalized experience is implied. Because users are enabled to contribute actively to the progress of a story, the story that results from the interaction of a given user and a given system is not necessarily comparable to what comes out as the story if another user interacts with the same system or if the same user interacts with the same system once again.

“The story can adapt as the player or the user moves through it. So from an author’s perspective, what an author wants to know is what is the landscape, what is the space of stories, and what are the differences as the user progresses through different story parts, how would that experience be changing their emotional state” [Expert No. 14].

“Each user will go through the thing and produce a completely different tree even. So these trees will be built dynamically and in a way that might even surprise the author.” [Expert No. 18]

Moreover, some approaches to systems design in interactive storytelling are based on the assumption that there is variability in the user experience, and assessing the experience (e.g., in terms of emotional reaction or behavioural intentions) can be used as input information for the drama management software to customize the progress of the story to the unique individual state of a given user.

“You have the need to be collecting some information from the user beyond going left and right and beyond “I don’t want to steal the coin”, you need to have some means to make it really interactive in that sense. You would need a little bit more input. I think right now interactive applications are very much constrained ... not so much [by] the amount what they can do to generate a story behind it but by the range of mechanism that they have for collecting information from the user.” [Expert No. 18]

### **3.3.2 Fundamental Types of User Experience**

While most experts viewed interactive storytelling as complex, multi-layer systems that can generate a wide variety of user experiences, they mentioned some modes of experience that are likely to be important to many different systems. Interestingly, they did so mostly because the interviewer suggested such modes as examples, and not because they regarded them as common sense among system designers. Several experts mentioned the connex of curiosity, suspense, and surprise as relevant user experience, because they allow motivating the user to stay with the system and the experience.



“Surprise and suspense are in effect for us results of cognitive processes that happen when a user experiences a narrative” [Expert No. 14]

“Obviously surprise is interesting as a tool. I would see these emotions as the tools, the high level tools of the author” [Expert No. 18]

Similar to the conceptual considerations (see above), experts mentioned different objects to which curiosity, surprise, and suspense can relate in interactive storytelling, and not all of them refer to the actual narrative content, but also to the exploration of the capabilities and boundaries of the underlying technology. This suggests that novelty of the whole idea of interactive storytelling adds to the experience at least of present and near-future systems: Aside of curiosity about how the story will or may develop, users are interested and curious about what the technology can do and how it may respond to ‘silly’ user action.

[Some users] engaged at that level that the authors intended or other people were a lot more playing around the edges, trying to break the system, trying to find out where the constraints are, I guess, where the edges of the interaction are. And had fun sort of poking around, saying things that were maybe inappropriate, playing with the graphics, playing with the objects in the space, just messing around [Expert No. 17].

The labels and terminology that experts used to address the user experience of curiosity, suspense, and surprise varied considerably. Most of their mentionings of terms such as ‘narrative engagement’ and ‘immersion’ relate to users being attentive to the progress of the story and remaining unsusceptible to distractions from outside the story world.

Another fundamental principle of user experience in interactive storytelling that was found in expert statements is the perception of actually exercising an impact on the story or the story world. Experts stated the requirement to make visible to users what the consequences of their decisions, choices, and actions are. The important aspect is, according to experts, not so much a sense of achievement or self-enhancement (see 2.4.), but rather the salience of users’ own impact on the story. In media psychology, the term *effectance* has been proposed for this experiential dimension (Klimmt, Hartmann & Frey, 2007; Klimmt & Hartmann, 2006). One notion experts utilize to describe this aspect is “impact”, the other is “choice” – the choices offered to users need to be meaningful in the sense that users notice the consequences of their decision among the options of choice.

“You have the feeling that your action ... has some impact ... contrary to games where you for example have a smaller circle of cause and effect, ... in a narrative it can be that your action in fact has an effect but in the ... future” [Expert No. 7]

“I want the user to have a feeling that he is not choosing among a prewritten set of plan sheets, you want to have the feeling that it is not something that has been written but generated ... the situation is something that I have created as a user” [Expert No. 6]



### 3.3.3 System Characteristics that are Key to the User Experience

Many expert statements approached the problem of user experience from the perspective of the effects of specific design techniques on users' responses. Depending on the technological focus and guiding metaphor the experts apply to interactive storytelling (e.g., understanding interactive storytelling as a kind of world simulation versus a dialogue between author and user; focusing on agents versus focusing on language processing), various elements that interactive storytelling platforms (can) synthesize have been emphasized as (expected) drivers of the user experience. In fact, the overall vision of IRIS to create better interconnections between the various domains of technology involved in interactive storytelling is proposed as crucial determinant of the user experience.

"We cannot do away with certain basic design tools like graphics, music, dialogue, speed, interface and all of that. All of those I think are important, all of those need some attention devoted to them, and each particular effect you want to produce in the user will require a different combination of all those low level design issues. But I think what is missing in current interactive story telling is this high level of data collection and decision making that would provide the infrastructure for good decisions at this low level of design." [Expert No. 18]

In addition to such holistic perspectives, some experts also name specific system features that are likely to have a sustained impact on the user experience in interactive storytelling. Much affective user response is assumed to stem from *empathy* with digital characters or agents. Interestingly, empathy is a key element in psychological theories of suspense (Zillmann, 1996b). To design characters with a convincing personality and with a believable interaction behaviour is proposed as a desirable system quality, and experts link it implicitly or explicitly to empathic user responses.

"How coherent must the behaviour of the characters be before people recognize that they are behaving coherently; sort of motivational consistencies in characters, how important is that for interactive narrative." [Expert No. 15]

"You will find as important ingredient in either film or novels which is empathy, empathy with the characters. And that is very difficult of course in interactive experience when you are given a character that you are supposed to be and nobody asks you whether you want to be a tough hero full of scars and very quiet or whether you want to be something different." [Expert No. 18]

Interestingly, statements from different experts mirror a debate in media psychology on 'old entertainment' media about the question whether viewers (users) occupy the role of an observer (and thus merely empathize with characters) or rather identify with characters (and thus perceive themselves to be or be like the displayed character, cf. Klimmt, Hefner & Vorderer, 2009). Interactive storytelling environments seem to allow both types of experiential quality, that is empathy (see above) and identification:



“I thought was a particularly interesting case, there is ... systems that go the full-blown strong identification, trying to by virtual identification immerse the user in some strong emotional responses. So the system I am currently working on, ..., there they wanted really strong identification, because in fact they wanted to engender the same kinds of emotional responses in the user that the user would have if they would actual make these decisions [in reality].” [Expert No. 15]

Some experts addressed the issue that the interaction between user and system is in need of smooth flow, good timing, and the ability of the story environment to convey important information in a comprehensive fashion. With prior prototypes, some story elements failed to be transmitted to users accurately, and thus left users irritated or in an affective condition not intended by the authors. A robust, transparent, and quick interaction technology is not linked to a specific kind of user experience, it is rather proposed as a precondition for emotionally relevant user experiences to occur at all.

“There is a sort of naturalness element of the dialogue and whether the user is in that dialogue. It’s the sort of extent to which pace like their contribution is in the same pace as the system.” [Expert No. 4]

“One dimension that is personally quite important to me is the timing... even for commercial games including some storytelling [systems], this kind of flow in not yet reached, and in my opinion this has something to do with the timing.” [Expert No. 3].

“With [our prototype] system, where the kids could give advice to the characters, for example, to beat up another character, and the character ... did not beat up the other character, and the kids got very upset about it, and they did not understand what was going on; ... the behaviour of the characters was controlled by their emotional states, and obviously it was not clear to the users that the characters were afraid of the other character.” [Expert No. 8]

One expert framed the issue of system comprehensiveness and responsiveness in terms of avoiding user disappointment due to wrong expectations. Because interactive storytelling systems are new and high-tech applications, some users may overestimate what they can expect from the capabilities of the systems’ artificial intelligence. This expert suggested that system designers should communicate the limitations of given applications very honestly to the users in order to avoid such disappointments (which would undermine any kind of desired user experience). So before the actual experience is to begin, some practical information should be given to adjust user expectations towards a realistic assessment of how deep and broad the interactive capacities of the story (and the characters) will actually be.

“We ran into interesting problems in terms of what people expected from a conversation like that. Once you give the people the impression that it is going to be a live realistic or sort of realistic, humanistic verbal conversation than they expect to be like we have a conversation now but of course that is not technically possible yet and may never be. ... You may have to actually communicate or tone that down a bit to the point where people actually lower their expectation to how the conversation should flow. And so communicate clearly what the edges are or what they need to do in order to have agency in the system without necessarily destroying the naturalness of it” [Expert No. 17].



These and similar expert comments point to one important connection between interactive storytelling technology and user experience: *usability*. The potential capacities of interactive narratives to stimulate affective responses or reflected thinking in users depend on whether the system manages to unfold these capacities “at run time”, that is, during each interaction process with a given user. Clearly, then, usability emerges as important goal concept of system evaluation.

### 3.4 Discussion

The expert interview study served the purpose of confronting a theory-driven approach of narrowing the range of potentially relevant concepts of the user experience in interactive storytelling with the views of designers and researchers who actually have tried out ways to tell stories interactively. Findings demonstrate the usefulness of combining a top-down (theory) approach with a bottom-up (expert interviews) approach; some of the experiential qualities elaborated based on theoretical analysis (chapter 2) were mirrored by expert statements, most importantly, curiosity, suspense, and surprise, but also flow experiences. One theoretical dimension – self enhancement through achievement (chapter 2.4.) was never mentioned by experts. It is therefore considered not an important scope of system designers and should thus be dropped from the list of candidate concepts of user-centered evaluation. On the other hand, several issues were raised that rest beyond the scope of the theoretical analysis.

Most importantly, variability and flexibility of the user experience is an issue to consider. Only some – if not only few – projects in interactive storytelling strive for exactly those experiential qualities that were derived from entertainment theory. “Facade”, for instance, clearly provides an innovative kind of experience, yet it is not very pleasant, but rather “uneasy”, as expert no. 15 labelled it. There are approaches in entertainment theory to address issues of unpleasant feelings as part of media enjoyment (e.g., Oliver, 1993), but from the perspective of evaluating interactive storytelling systems with a focus on the user, the variability (and partially the non-enjoyability) of systems needs to be considered in defining an adequate dimensional approach. Clearly, there will not be a need for an evaluation instrument that can assess user responses to any kind of interactive storytelling system with five identical questions. Rather, the great diversity in systems and in user experiences within a given system needs to be reflected in a flexible kind of evaluation measurement.

Second, the expert perspectives suggest to put less emphasis on evaluation which level of (affective) user experience a given system has achieved with a given sample, but rather to examine whether relevant preconditions to foster user experiences have been met. This refers to the design features that experts found critical, such as agent believability, naturalness of dialogue, and salience of user impact onto the story. The key aspect here is clearly usability as universal concept that links the technical capacities of an interactive storytelling system to the user experience. Usability thus emerges a key target dimension of user-centered evaluation, which is of course in line with previous research on human-computer interaction (e.g., Nielsen, 1993). Because IRIS is mostly dealing with user experiences that future systems (rather than systems that are already widely used) are going to facilitate, novelty issues and (potentially too large) user expectations on what a given system should be able to do, such as very authentic character behaviour or immediacy of language processing, should play an important role in the evaluation toolkit. That means that perceived usability should be tested against prior user expectations, or alternatively, user expectations should be addressed before a system test is conducted. Ultimately, according to expert no. 17, toning down users expectations towards a given system in advance may lead to greater satisfaction and enjoyment during the actual experience.



Third, expert statements allow defining some experiential qualities that are of (almost) universal importance, regardless of technologies applied and of narrated content. The connexion of curiosity, suspense, and surprise has already been mentioned in this regard; the experts moved beyond these three facets by pointing out the importance of making the impact of users' actions and decisions transparent. The core feature of interactive storytelling, that is, responsiveness to user input, needs to be clear and visible to users in order to render the experience 'truly interactive'. In entertainment research, this issue has been addressed with the term 'effectance' (Klimmt & Hartmann, 2006), an experiential quality directly bound to advanced media interactivity.

Fourth, given the multiple complexities involved in the landscape of (conceivable) interactive storytelling systems, the scepticism that some experts expressed concerning the overall viability of a user-centered evaluation approach that fits the demands of any system or designer should be taken very seriously. While the issue of diversity and variance is familiar to social-scientific evaluation researchers, the goal perspective of benchmarking, that is, measuring reference values of user responses to an existing state-of-the-art interactive storytelling system and allow designers of future systems to apply the same measures in order to compare the user responses to their project with what had been found for the reference project, should be discussed critically. Reading the expert statements, the best strategy to deal with this problem is to accompany the envisioned measurement toolkit of standardized, self-report scales that users fill in after the interactive storytelling experience with an element of individual, case-based, that is, qualitative inquiry that allows to draw more detailed conclusions about how to improve a given system with its special content, context, and technological aspiration.



## 4. Conclusion: Dimensions for User-Centered Evaluation in Interactive Storytelling

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From the theoretical analysis – mainly the import of concepts and perspective from entertainment theory in media psychology and communication science (Bryant & Vorderer, 2006; Zillmann & Vorderer, 2000) –, and the exploration of the experts' views on what the user experience in interactive storytelling looks like or should look like, a list of requirements for the envisioned IRIS-InStET (Interactive Storytelling Evaluation Toolkit) can be derived. This includes the overall configuration of the set of measurements as well as individual concepts that should be addressed with original subscales. Specifically, the issue of flexibility and adaptability of the toolkit to individual needs of designers and systems must be addressed carefully in measurement planning.

First, it is imperative to make explicit that the function of the evaluation toolkit is **not** to cover any type of user experience that may be important to any interactive storytelling application ever to be prototyped or installed. The toolkit must necessarily represent a **selection** of especially important concepts for user-centered evaluation, and its purpose is to give the research and design community a set of tools to test and improve their projects along these key dimensions. Consequently, the toolkit will not be a universal instrument that can help designers to resolve any user-related question or topic of improvement that may emerge with given projects. Moreover, the dimensional configuration of the toolkit must not be misunderstood as suggestion for how future interactive storytelling systems should be shaped to meet the core dimensions of user experience that have been demonstrated as "gold-standard". If the dimension of curiosity is adopted for the toolkit, for instance, this does by no means imply that an interactive storytelling application needs to achieve a threshold value in users' curiosity in order to be successful or 'good'. Rather, system inventors and developers should define their intentions of what user experience their project is striving for by themselves; against these intentions, then, evaluation measures (including those from the IRIS toolkit) can test actual user experiences. In this sense, the IRIS elements derived here, which are likely to be included in the IRIS toolkit, represent experiential dimensions that many of today's and tomorrow's interactive storytelling projects will find relevant.

The preliminary structure of the IRIS-InStET is composed of three parts. They directly reflect the theoretical and expert perspectives elaborated within WP7 so far. The first part (Part A) addresses fundamental issues in user experiences that mark requirements for a satisfying user experience and specific (emotional, cognitive, aesthetic etc.) types of user experience to occur (such as usability). The second part (Part B) includes measures for those experiential qualities that are common for many present manifestations of interactive storytelling and are thus likely to mark 'mainstream' elements of the user experience also for the years to come (e.g., curiosity). The final part (Part C) is the attempt to increase the level of customization of the toolkit to individual purposes of system designers and researchers. It includes measures for certain user experiences that can be described in advance, but are likely to vary greatly between different stories and systems (such as the emotional state users are intended to enter during exposure).



## 4.1 Part A: Key preconditions to diverse user experiences

The fundamental part of the dimensional architecture of the evaluation toolkit relates to those aspects of the system that are necessary to enable meaningful experiences for users. These preconditions relate to issues of general system usability, but hold elements that are specific to interactive storytelling as well. The first part of the evaluation instrument is envisioned to include measures for the following preconditions for user experiences:

- **Usability of system:** The interactivity of interactive storytelling systems must be implemented in technical ways, such as keyboard/mouse devices or position tracking in virtual reality applications. The key question here is whether users understand their action possibilities and are capable to translate their action intentions (e.g., interaction with a character, manipulation of a virtual object) into story-relevant behavior effectively, that is, whether they succeed in doing what they want to do. For systems with more complicated input devices, usability issues are multi-dimensional. A long tradition of usability research can be exploited to define a short set of informative questions on system/interface usability (e.g., Nielsen, 1993).
- **Correspondence with system performance and own expectations:** Following the recommendations from the expert interviews, the issue of expectation-disappointment is to be addressed. Specifically, items are required that assess whether users were ready to accept the technological boundaries and limitations of the system under use, whether they had expected the technology to perform better (e.g., in terms of dialogue naturalness) or whether the system actually outperformed their expectations. Disappointment with the underlying technology would be a fundamental threat to any meaningful user experience, and surprise about what a system can do relates to novelty effects, overall enjoyment, and maybe distraction from the intended type of user experience (as people may begin to play around with advanced technology instead of driving the plot forward).
- **Presence:** The concept of Presence has been advanced mostly in the field of virtual reality (e.g., Steuer, 1992) rather than interactive storytelling (with a few exceptions, e.g., Dow et al., 2007). It has not been elaborated during the conceptual stage and was only rarely mentioned by the interviewed experts. The fact that it is included here is because some developments in the field of interactive storytelling – some of which being pursued within IRIS – indicate that Presence, both Spatial Presence in virtual environments (Wirth et al., 2007; Schubert, 2009) and Social Presence with virtual agents (Lee, 2004), is becoming an essential dimension of the intended user experience of (future) interactive storytelling. Feeling Presence implies insusceptibility to external distraction and high levels of engagement with the story world or space, which has been mentioned by several experts as important elements of the user experience. In this sense, Presence is included as one of the preconditions that must be met before meaningful modes of user experience can be entered (see also Vorderer et al., 2004). A theory-driven measurement tool for spatial Presence is already available and ready for adaptation to the context of interactive storytelling (Vorderer, Wirth, et al., 2004).
- **Character believability:** Just as many conventional narratives, interactive storytelling frequently involves characters; many of them serve as interaction partners for users. Their autonomous behavior and the social-emotional responses that they evoke are therefore important determinants of whether the overall user experience can unfold in the way designers have intended it to do. 'Artificial', 'shallow', 'dumb' or otherwise non-convincing characters are a threat to meaningful user experience. In line with entertainment theory that considers empathetic reactions to media



characters as key determinant of enjoyment (Vorderer, Klimmt & Ritterfeld, 2004), perceived character believability is thus included as one evaluation dimension among the preconditions for a complete, meaningful user experience. Research both in computer science and in media entertainment (“parasocial interaction”, “empathy”, cf. Bryant & Vorderer, 2006) can be exploited to develop a useful measure. Concerning this aspect, connections to significant other parts of the IRIS work plan can be built: Work Packages 2 (Artificial Intelligence Tools and Techniques), 4 (Hybrid Intelligent Virtual Actors) and 6 (Interaction and Dialogue) deal with believable characters and plausible, natural interactions.

- **Effectance:** Another important finding from the expert interviews is that interactive storytelling systems must make their interactivity visible to users, that is, the impact of users’ decisions and actions onto the story events must be made salient. In video games research, the term effectance has been used to describe this basic experiential quality (Klimmt & Hartmann, 2006; Klimmt et al., 2007). To the extent that users experience a ‘sufficient’ degree of effectance, experiential qualities that build on salient impact, such as curiosity (“what will happen if I do this to the character?”), are enabled. Therefore, effectance is considered an important precondition of meaningful user experiences; it is mostly connected to technical features such as processing speed and explicitness of feedback given to user inputs (Klimmt et al., 2007). From video games research, a self-report measure is available for adaptation to the present context (Klimmt et al., 2007).

## 4.2 Part B: Common and frequent experiential qualities

The second part of the envisioned instrument toolbox for evaluation refers to specified experiential qualities that are expectably typical or common design goals across many different manifestations of interactive storytelling. Their typicality stems mostly from the fact that designers will want to motivate users to begin exposure to their product (appeal) and to stay with the experience as long as it intentionally takes or is over by author decision (sustained motivation to use). This general principle of attractive system design qualifies curiosity, suspense, surprise, and flow as common user experiences for which many system designers are likely to have a need for measurement. Two more abstract experiential qualities that build on several (if not multiple) system features and user experiences – aesthetic pleasantness and enjoyment – are added here to generate a more complete account of ‘the typical user response’ to interactive storytelling.

- **Curiosity:** As outlined previously, stimulating users’ curiosity is most often a positive contribution to overall system appreciation and to sustained exposure motivation. Users can be ‘made’ curious about the plot development, about specific characters, about the capabilities of the technology and interface, and also about the consequences of their (playful versus serious) decisions concerning the interactive story. This multiplicity in possible sources and targets of curiosity must be considered when a measure is developed in the context of interactive storytelling; the psychological literature on interest and curiosity (e.g., Krapp, 1993; Loewenstein, 1994) will help to identify a set of useful items in this regard.
- **Suspense:** Mild or intense forms of suspense are common among consumers of many different types of narratives (Vorderer et al., 1996; expert no. 14). Because users of interactive storytelling systems are typically engaged, for instance, by holding some responsibility for the outcome of a conflict, psychological conditions for surprise are frequently met in such environments (Klimmt et al., 2009). With the



elaborate concept explications available in media psychology (Vorderer et al., 1996; Knoblich, 2003; Knobloch-Westerwick & Kepplinger, 2006), the conceptual basis for developing a related scale for user-centered evaluation is solid.

- **Flow:** The experience of flow (Csikszentmihalyi, 1990) has been studied widely in interactive media, and both theoretical considerations and expert views consider flow also an important element in the user experience of many interactive storytelling applications. Such applications generate flow experience with the 'right' pacing of interaction loops and with stimulating users' cognitive activity (e.g., thinking about how to resolve problems and to push the plot forward, similar to adventure video games). Flow directly builds on usability (see 4.1.), as a continuous stream of user action can only occur if users are comfortable with the devices they apply for interaction with the system. Because flow has been examined so extensively (e.g., in video games: Sherry, 2004), various options to generate a thematic scale are already available (e.g., Jackson & Eklund, 2002).
- **Aesthetic Pleasantness:** While the experts did not elaborate much on the aesthetic dimension of the user experience, several arguments justify the inclusion of the concept in the measurement toolkit. Most importantly, interactive narrative frequently cites or builds on pieces of literature with great aesthetic values (e.g., Cavazza et al., 2007). Furthermore, the confluence of computer-generated imagery, interacting characters, and dynamic plot development is likely to result in aesthetically appealing user experiences that hold artistic value (expert no. 6). While aesthetic pleasantness can have many specific sources (e.g., graphics, story elements), its assessment is considered as a summative measure of the overall aesthetic appreciation users feel towards a given system. Rowold (2008) has developed a useful self-report scale that can be adapted to the present context.
- **Enjoyment:** Aesthetic experiences are not necessarily comfortable in nature. Enjoyment – the key concept in entertainment research – clearly is focused on pleasant experiences, although negative emotions such as sadness can be entertaining on a meta-level of emotion (Oliver, 1993; Bartsch et al., 2008). The dimension of enjoyment is a summative experiential facet of positive, pleasant affective state with various manifestations (Vorderer et al., 2004). In interactive storytelling, enjoyment may be the synthesis of curiosity, surprise, and several other affective responses that occur jointly or sequentially during exposure to a system. In this sense, enjoyment is an aggregate experience whose measurement is useful in predicting the overall motivational appeal of a given interactive storytelling application; it also allows to contextualize user research on interactive storytelling with comparisons to the entertaining appeal of other media such as video games or movies (see various chapters in Bryant & Vorderer, 2006, as well as in Bryant, Roskos-Ewoldsen, & Cantor, 2003)

### 4.3 Part C: Experience Measures Adaptable to Specific Systems

The third group of measures planned for the evaluation toolkit reflects the call for flexibility and customization that is derived from expert statements. Specific manifestations of interactive storytelling can strive for very narrowly defined affective states of users (e.g., "Facade" is designed to make people feel uncomfortable or uneasy, experts no. 15; 17). In order to allow a system evaluation of such specific user responses, an approach that compares user responses to a given system with user responses to a reference system is not indicated, for this procedure is likely to fail to identify the system's performance on those dimensions its designers are working towards. Consequently, three measurement elements are envisioned that allow to fine-tune the overall content of the evaluation toolbox for



individual purposes. One of these elements addresses the affective state of the user; the second is about the adoption of the role within the story that users are assigned or (can) take over during exposure. The third element, finally, is an open question tool for detailed assessment of individual user comments.

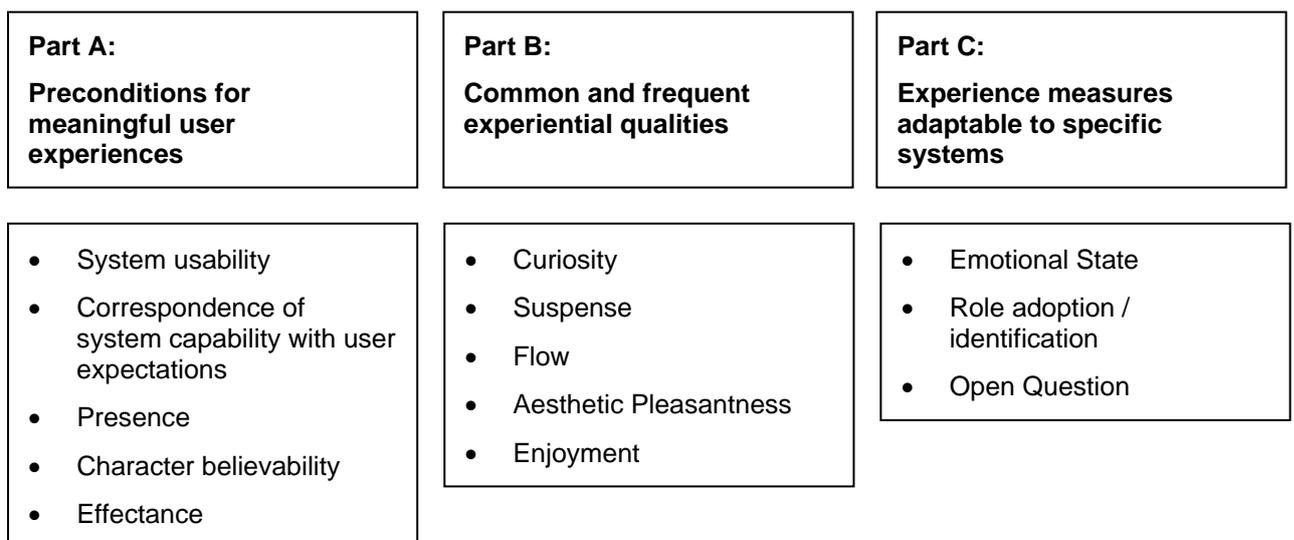
- **Emotional state:** Different narrative can evoke diverse affective responses in users. They can range from very unpleasant to very pleasant, from very calm to extremely excited. Depending on the theory of emotion applied, the range of different affects triggered by interactive narratives can be described along varying dimensions. Part C of the evaluation toolbox will thus include a broad and flexible measure of emotion that is based on a comprehensive theory of emotion and allows to a) define goal values in advance (“user of this system are intended to feel this kind of affect very strongly, another kind of affect to a smaller extent, and still another type of affect should be absent completely”) and b) to test user emotions against these goal values. A likely candidate instrument for such a purpose is the Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988). PANAS is a measure of 20 affects (10 positive and 10 negative) and allows assessing the extent to which a given user feels a specified affect (e.g., “angry” or “excited”). The scales are used widely in psychology, and much literature on dimensionality and validation is available. System authors can hence use the PANAS affects to define goal values for the intended user experience of their interactive storytelling system, and by applying the scales as part of the user-centered evaluation, data can be collected to check whether these goal values (e.g., joy = high, anger = low, guilt = very low) are met.
- **Role adoption / identification:** A second element of customization relates to the question of identification that emerged both from theory work (chapter 2.4) and some expert statements. In interactive storytelling, users typically are offered a role within the narrative setting, and it should be of great interest to designers whether users adopt this role or keep some distance (‘remain outside of the story’, cf. Oatley, 1994; expert no. 15). Customization of this measure is necessary, because the role offered to users may vary greatly. Sometimes, this role may be made explicit (the user is assigned to “be” a hero, for instance, cf. expert no. 18), at other times the role may just be conveyed implicitly to users so that merely some properties of the character that users control become salient. Based on an EU project on video game enjoyment, a conceptual approach to this issue is available (Klimmt, Hefner et al., 2009), and so is several self-report measures that can be developed further for the present context (Hefner, Klimmt & Vorderer, 2007).
- **Open question:** Following the conclusion that user-centered evaluation should be able to identify specific aspects unique to a given system, standardized measures will be complemented by a qualitative element. An open question methodology on the overall user perception and evaluation of a given system will thus be introduced as part of the final IRIS measurement toolbox. Recommendations what to ask, how to ask and how to analyse user responses will be elaborated; while no comparative approach (i.e., comparing user experiences against goal values or against data from reference systems) can be pursued with such a qualitative method, it is in many cases a useful addition to detect chances for improvement and fine-tuning of given systems. In communication science, qualitative methodology holds a long tradition that can be built on for this final element of the envisioned measurement toolbox (e.g., Lindlof & Taylor, 2002).



## 4.4 Summary and Future Outlook

Developing a social-scientific perspective on interactive storytelling is inevitably a complex endeavour. The hybrid nature of the systems that designers and researchers are striving for requires multiple theoretical backgrounds to be addressed; empirical research on end-users is in need for multidimensional approaches. The present report summarizes the conceptual preparations for such a multidimensional measurement approach (see figure 1 for an overview). Clearly, not all members of the research and development community will find the perfect match between this set of measurement dimensions and their own work. However, the list of aspects to be addressed in user-centered evaluation is to a great deal theoretically justified as targeting the core of interactive storytelling from a user perspective, and it offers the chance to come up with practically manageable measurement solutions that can also be handled by non-social scientists (an important goal of IRIS).

**Figure 1: Overview of the draft dimensional architecture of the IRIS evaluation measurement toolkit (IRIS-InStET).**



The dimensional architecture derived from the conceptual and empirical work so far includes 13 facets (see figure 1). They will be discussed with IRIS partners; subsequently, the dimensions will be translated into real self-report questions (scale development and adaptation). This preliminary set of items/measures will then be applied to pilot studies with existing interactive storytelling prototypes. As a result, more insight on the viability and usefulness of this dimensional configuration of the evaluation measurement set will be gained, and directions for further improvement will be collected. Although it is thus likely that some changes will be made to this dimensional structure of the IRIS-InStET throughout the course of the project, its definition based on theory work and expert interviews marks an important step towards the availability of a systematic, user-centered evaluation methodology in interactive storytelling.



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