

Adaptive Digital Storytelling: A Concept for Narrative Structures and Digital Storytelling build on Basic Storytelling Principles, Adaptive Story Schemas and Structure Mapping Techniques.



by Klemens Franz and Alexander K Nischelwitzer
franz@ageless.at alexander.nischelwitzer@fh-joanneum.at

FH JOANNEUM university of applied sciences, Graz, Austria
Study Course Information Management, Digital Media Technologies

Abstract

Adaptive Digital Storytelling – a specific form of narration by using computer-based technologies – is content of this paper. The examination of the basic principles of narratives and dramatic art, in consideration of technical options, is essential for a better understanding of the concept of *Adaptive Digital Storytelling*. The idea of new technologies being responsible for a narrative evolution is coherent because a similar evolution can be found in all kinds of media – e.g. film or photography. The closer inspection of other types of narratives clearly shows the need for emancipation of *Digital Storytelling*: Most of all already existing storytelling-techniques are simply “digitised”, ignoring the core-potential: the interactivity. This paper will take an excursion through the history of digital stories and fundamental narrative knowledge. Furthermore a look at the different concepts of *Digital Storytelling* unfolds that with increasing interactivity the narrative-dramaturgic component is simultaneously decreasing. In other words: The narration is taken away by the recipient. *Adaptive Digital Storytelling* combines a new concept with concrete ways of telling a digital story. Therefore the structure of this paper will lead to a multimedia application that integrates the concept of *Adaptive Digital Storytelling* into digital biography that can be divided into different views: *Helen Keller: a digital biography* form the diploma theses of Klemens Franz [Fra03] can be adjusted through the parameters Information and Exformation to create an unique story based on the individual wishes of the recipient.

Author Keywords

Adaptive Digital Storytelling, Adaptive DST, schema mapping, structure mapping, Exformation, pre-interactivity, Monomythos, digital biography, dramatic pyramid

(1) Problem

The core-problem of many digital stories is the fact, that with an increasing level of interactivity dramatic and narrative aspects are decreasing. In the early days of text-adventures for example the narration was clearly structured. Similar to adventure books, like the famous series from Ian Livingstone, the story itself was

written in different versions and the recipient had the option to choose a direction at predefined points. So a clear and strong structure guided the recipient through the story. An interaction outside the author's imagination wasn't possible.

To be honest since these days not much has changed. The basic Digital Storytelling concepts have remained the same. Popular forms in the fields of Info-, Edu- and most of all Entertainment are using a simple narrative structure that separates the story-part from the interaction-part. Instead of an integration of the story in the area of interaction, FMV-sequences¹ erupt from nowhere to break the coherence of the interaction [Mur97]. So-called cut-scenes do use the graphic-engine of the interaction-part for an esthetical integration, but the true problem isn't solved with that trick.

Some institutions, like the "Zentrum für Graphische Datenverarbeitung" in Darmstadt, Germany, have realised this lack of coordination and timing and developed new concepts. Concepts those are truly innovative, but also on extreme high level. So that the true challenge is not the theoretical part, but the technological realisation. Braun's so called Semiotic Approach [Bra02] is deeply interesting and revolutionary. Braun realises that basic storytelling principles building on an adaptive story schema offers a new direction for Digital Storytelling.

So the question seems to be: How much interactivity is an author willing to give the recipient? But to develop new concepts of Digital Storytelling the question could also be: Where will the author give the recipient the power of interaction? A possible answer could be: During predefined points in the story. Text adventures again! The concept of *Adaptive Digital Storytelling* takes the question to a meta-level: Interaction is possible even before the story begins.

¹ FMV stands for Full Motion Video – a sequence of film-scenes that unfold the story but interrupt the interactive part of a game

(2) Basic Knowledge

The problem – or better the chance – is that digital stories have to base on fundamental knowledge concerning dramaturgy and narration.

(2.1) Dramatic Fundamentals

Beginning with Aristotles' Poetic and his idea of the catharsis as a necessary element of any good drama [Hil99]. Aristoteles already realised that a well-designed structure is a key element to reach the recipient and touch his inner feelings. Beside the Catharsis Aristoteles defined two other elemental feelings the recipient can relate to: fear and compassion. Aristoteles' dramatic structure can be found in nearly every narrative form. Especially Hollywood-films use Aristoteles' concepts to connect to the recipient.

Another well-known structure for a drama was developed by Freytag [Fre03]. The dramatic structure is visualised by a pyramid, which is divided into five major parts: Introduction – Rising – Climax – Fall – Catastrophe (Figure 1) [Lau00].

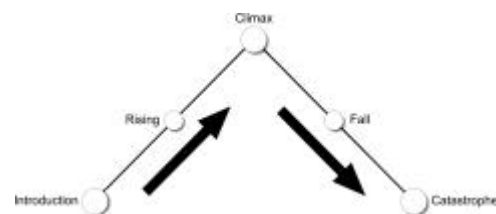


Figure 1: Freytag's dramatic pyramid

Basic concepts of storytelling are showing that a separation of What and How is essential for a clear structure and analyses [Mar02]. This separation is relevant for a classic drama as well as for an e-game. Only the types of measurement are changing. Concerning the concept of *Adaptive Digital Storytelling* the What is essential. The How on the level of presentation is secondary. Or to be more precise: The Question is not: How is What presented, but instead: What is presented How. By selecting What is presented it is also determined How it is going to be presented.

(2.2) Story-Schemas

To generate a flexible narrative structure the idea of using an universal story-concept is not new. Braun uses for his Semiotic Approach the concepts and ideas of Vladimir Propp, a Russian formalist. At the beginning of the 20th century Propp found out that all Russian fairytales are consisting of a limited amount of functions and characters.

A similar, but not limited to Russian fairytales, concept was developed by Joseph Campbell: the Monomythos [Cam99]. Contrary to Propp's 31 functions the Monomythos consists of only 17 phases. These 17 phases can be mapped on (nearly) every story – from Greek myths to African fairytales. The phases are divided into three major-phases as shown in Figure 2: Departure – Initiation – Return.



Figure 2: Campbell's Monomythos

The 17 Phases of the Mono mythos are:

- Call to adventure
- Refusal of the call
- Supernatural aid
- Crossing the first threshold
- Belly of the whale
- Road of trials
- Meeting with the goddess
- Woman as temptress
- Atonement with the father
- Apotheosis
- The ultimate boon
- The refusal of the return
- The magic flight

- Rescue from without
- Closing the threshold
- Master of the two worlds
- Freedom to live

(2.3) DST-Evolution

Based on this fundamental knowledge the analysis of concrete forms of Digital Storytelling shows that an evolution has happened especially on the technical side of the presentation. EGames are showing this evolution clearly: Beginning with simple text-adventures the structures haven't changed over the years. The graphic-adventures² transferred the storytelling concept to a visual level and took many aesthetic ideas from cinematic movies. And therefore moved the concept of Digital Storytelling toward the concept of Hollywood-film. An evolution that negated digital core-potentials. During the last years the typical graphic-adventure disappeared. Its place was taken over by action-adventure-RPG-hybrids. New e-games are hardly categorised. They are combining different game-aspects to realise an intense experience. The narrative structures are remaining nearly the same. Beside this evolution of the mainstream medium e-game some innovative concepts are showing the potentials of digital stories. Khazaeli categorises new aspects of digital dramaturgy [Kha00]:

- Interface: the room for action
- Agents and Avatars
- Room for experience: Computer

Khazaeli points out that even the usage of a non-story-oriented application, like e.g. MSEExcel, has a dramaturgic flow and concepts of Aristoteles and Freytag can be adapted. An analysis of this flow can help to optimise the usability of an application.

² The typical graphic-adventures are those from Lucas Arts (formerly known as Lucasfilm Games) like the Maniac Mansion series and Monkey Island series.

(2.4) Forms of Structures

Every story has a structure – it can be visualised as a process. Linear stories have linear processes. Non-linear stories have non-linear processes. These Geometric Design Structures offer a variation of possibilities [Sam98]:

- *Sequential*: a linear structure
- *Sequential with Cul-des-Sacs*: the main-story is linear, but there are pre-defined deadlocks
- *Branching*: in its pure form a very complex structure
- *Branching with Barriers*: barriers represented by riddles, questions or skill tests
- *Branching with Forced Paths*: feels like branching, but different paths merge later again
- *Bottlenecking*: similar to forced paths but more complex, so the recipient doesn't notice the lack of true choices
- *Exploratorium*: a pre-defined space in a linear structure in which the recipient can explore freely
- *Parallel Streaming*: parallel views of the same story through different characters
- *Worlds*: a complex combination of many exploratorium structures
- *Hypermedia*: everything is connected to everything

(3) Adaptive DST

The concept of *Adaptive Digital Storytelling* is the combination of different basics with a new starting point. A story that is mapped on a flexible story-schema can be adapted by the user before she or he “enters” the story.

(3.1) Schema Mapping

As already mentioned - the core-potential of *Digital Storytelling* is the possibility of interaction. The recipient can

interact to progress or change the story. The progression is nothing more than the usage of a barriers-structure and therefore not really innovative. The option to change and create the story interactively is rare but gives the recipient truly the feeling that she or he is in charge of the outcome of the story. The reason for this rare narrative structure lies in the problem of independence between dramatic and narrative aspects.

The idea to map a story on a specific schema is used by Braun in his *Semiotic Approach*. But Braun's concept is extremely complex. Beside that it overlooks the possibility that interaction takes place before the real story starts to adapt it to the needs of the recipient. *Adaptive Digital Storytelling* uses Campbell's 17 phases of the Monomythos. On this story-schema the story is mapped to create a concrete structure.

(3.2) Adaptive Parameters

This basic structure is manipulated by adjusting specific parameters. These adaptive parameters are standing for specific attributes of every phase. Based on the selection and adjustment of the parameters every phase is checked whether it fulfils the needs or not. After this check only some phases remain to be integrated in the story. Beside this there are so called must-phases. Phases that have to be included in the story, so the dramatic and narrative structure remains stabile. This means that the dramatic concepts of Aristoteles and Freytag are used to design the dependence between the phases of the Monomythos.

The main story is created out of these selected- and must-phases. But all non-selected phases can be still accessed. The structure how the non-selected phases can be accessed is variable - e.g. barriers or Cul-de-Sac-structures.

Adaptive parameters can and should be defined by the author. Furthermore they

should relate to the story and offer different points of view. In the multimedia-application *Helen Keller: a digital biography* two parameters can be adjusted: Information and exformation³.

These two parameters give the recipient the option to vary the story in a wide range. From a very objective and informative version to an emotionally loaded story about the life of the blind and thumb Helen Keller. Each parameter can be adjusted in 4 steps, from 0 to 3. Therefore a theoretical number of 16 different combinations are possible – the narration reacts to the wishes of the recipient and adapts the story.

(3.3) Two Levels of Interaction

The concept of *Adaptive Digital Storytelling* offers the possibility to realise interactivity on two levels. The first one is the already discusses pre-interactivity. The other one is a nearly classic one: The different phases of the story can be realised in any possible way. As a simple text-window or a complex real-time 3D Dungeon.

(3.4) The Concept

Figure 7 (see page 7) shows one possible realisation of the concept of *Adaptive Digital Storytelling*. The figure was the starting-point for *Helen Keller: a digital biography* [Fra03]: The story-schema for the structure -mapping was the Campell's Monomythos. The adaptive parameters are Information and Exformation. Therefore each phase is, after being mapped on the Monomythos, measured and rated. This subjective measurement leads to specific Information and Exformation values for each phase. The selection of the phases is based on these values. The recipient decides weather she or he wants the focus on Information or Exformation. The concrete story is then structured individually.

³ The term exformation sums up all meta-information like feelings, emotions and subjective impressions [Bir02].

(4) The Implementation

The implementation of the *Adaptive Digital Storytelling* concept follows a clear procedure – beginning with a storyboard and a structure mapping.

The multimedia application *Helen Keller: a digital biography* can be found at [http://dmt.fh-joanneum.at/~franzk/ADST/Helen Keller.htm](http://dmt.fh-joanneum.at/~franzk/ADST/Helen%20Keller.htm)

(4.1) Storyboard

As for every other multimedia application the first step was to create a storyboard. The first version was text only and used to map the story of Helen Keller's life on the story-schema of the Monomythos. A first rating concerning the Information- and Exformation-values was realised on this stage. The second version of the storyboard visualised the different phases of the digital biography and included guidelines concerning sound and interactivity. The different states of some phases were also included. The starting-screen was realised it detail, because it transports the idea behind *Adaptive Digital Storytelling*. Figure 3 shows some of the storyboard scribbles.

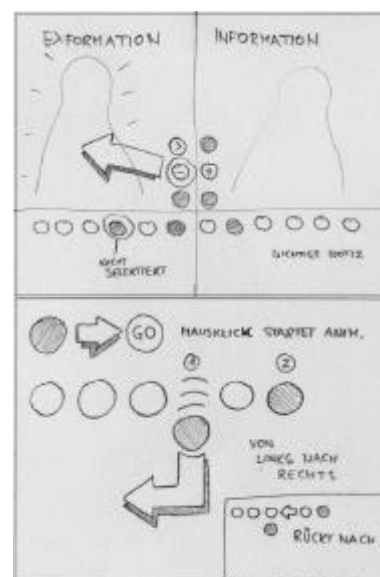


Figure 3: Storyboard scribbles for the start-screen – including the navigation matrix

(4.2) Programming the Structure

The multimedia application was created with Macromedia Director MX and its integral programming language lingo. Therefore it was necessary to create an environment for a flexible adaptive structure. The phases of the digital biography were placed in an XML-document⁴ to create a kind of database. The structure was reduced to a practical minimum. Figure 4 shows the basic XML-structure with the relevant tags.

```

<Helen_Keller>
  <Phase MUSS="j" NR="1">
    <Jahr>1880</Jahr>
    <Information>0</Information>
    <Exformation>0</Exformation>
  </Phase>
  <Phase MUSS="n" NR="2">
    <Jahr>1881</Jahr>
    <Information>3</Information>
    <Exformation>1</Exformation>
  </Phase>
  ...
</Helen_Keller>

```

Figure 4: XML-structure

After the recipient decides whether she or he wants to focus on Information or Exformation all phases are checked with lingo-commands. The selected phases are put into a List and out of this list a so-called navigation matrix is generated. This matrix contains the main story (selected phases) and all non-selected phases and can be realised with lingo by using a multidimensional list (Figure 5). Furthermore the matrix visualises the navigation structure. On the horizontal axe in the first row the main-story is placed. Vertical arranged are the non-selected phases.

```

[ [ 1, 2, 4, 5, 7, 8, 11, 13 ],
  [ 0, 3, 0, 6, 0, 9, 12, 0 ],
  [ 0, 0, 0, 0, 0, 10, 0, 0 ] ]

```

Figure 5: a possible navigation matrix

⁴ To use, parse and access a XML-document a Xtra called XMLparser is necessary.

Helen Keller: a digital biography transports this navigation matrix on a visual level. It is the base for the navigation system and shows the user during the whole application where she or he is, how she or he can unfold the story and beside that the narrative structure is visible all the time.

The start-screen (Figure 6) offers the recipient to choose how intense she or he wants the level of Information and Exformation in her or his digital biography. This is realised with a drag and drop navigation. The results – selected and non-selected phases – are shown in real-time.



Figure 6: Start-screen with navigation

(5) Conclusion

The discussed concept combines different ideas and fundamental dramatic and narrative knowledge and takes the interaction to a meta- - or better - pre-level. The goal to achieve is to create a story-base out of which the recipient selects a concrete story. Therefore one phase could be designed in many different ways. The variation should be on the level of the What and How, depending on the defined adaptive parameters. A main advantage of the concept of *Adaptive Digital Storytelling* is that it can be combined easily with others to create new forms of Digital Storytelling. *Adaptive Digital Storytelling* offers a system to guarantee a stable narrative and dramatic structure on a basic level.

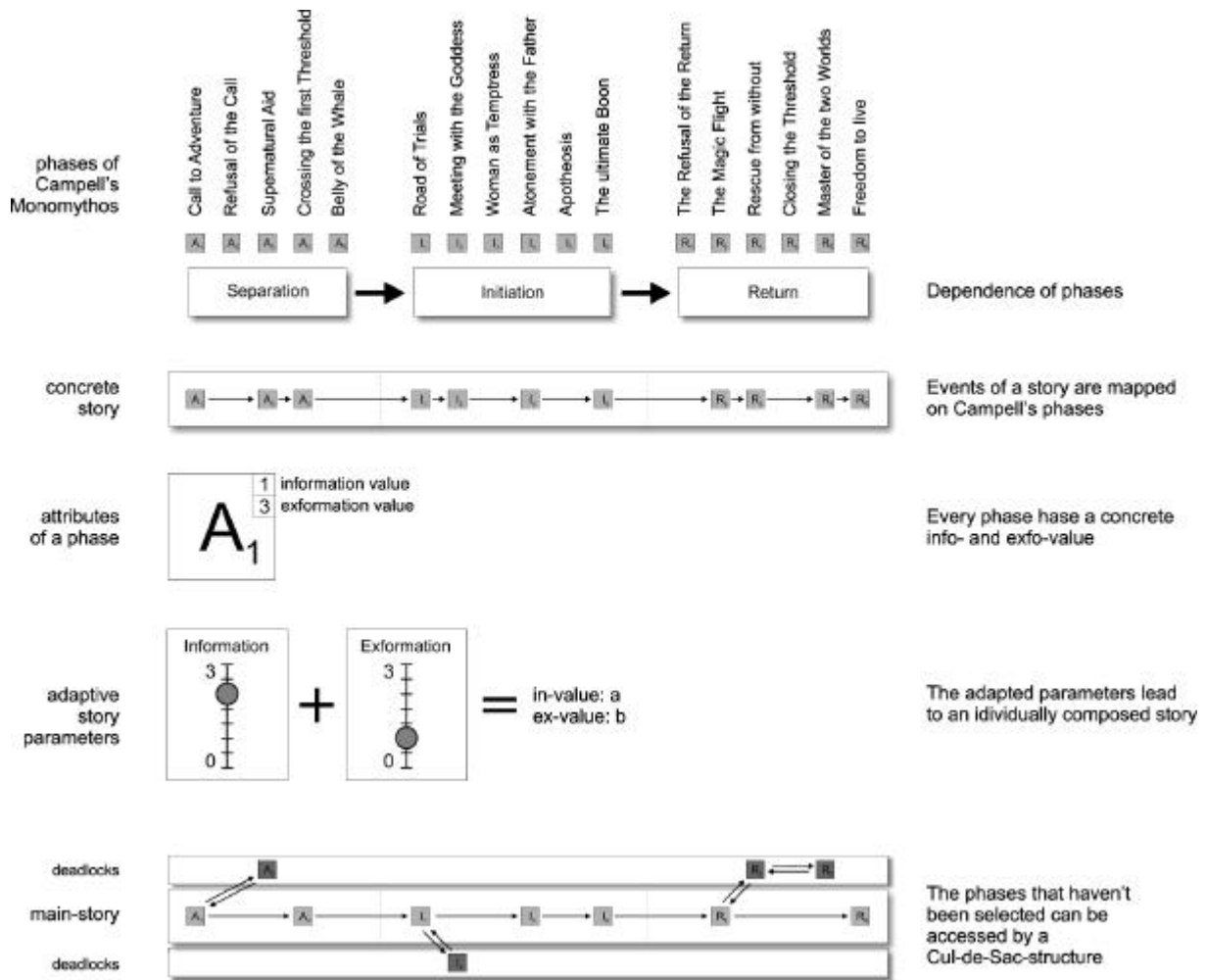


Figure 7: Concept for *Helen Keller: a digital biography*

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