

# Extensible Tools for Practical Experiments in IDN: The Advanced Stories Authoring and Presentation System

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**Abstract.** Research on the emerging form of interactive digital narrative (IDN) concerns both theory and practice. The approach discussed here combines a theoretical framework introduced previously with a concrete implementation in the form of the Advanced Stories Authoring and Presentation System (ASAPS), a software package that aims to foster experimentation by providing tools which are easy to use. Furthermore ASAPS differentiates itself from other authoring tools by emphasizing extensibility and collaboration with other software. Therefore, the first implementation of this tool set foregrounds a flexible, modular architecture over computational sophistication.

**Keywords:** Interactive Storytelling Tools, Authoring System, Interactive Narrative, Digital Media Narrative, Story, Plot, Protostory, Narrative Design, Narrative Vectors.

## 1 Introduction

The technical complexity of the digital medium constitutes a considerable obstacle in the way of creating a larger number of forms of interactive digital narrative (IDN). The mastery of the technical aspects alone requires highly specialized knowledge in several areas to create the visual, procedural, and participatory aspects. Amongst these requirements is working knowledge of various software tools on the computer for creating and editing graphics as well as an understanding of programming and user interface design. Even more daunting is the high level of technical expertise required to create an AI-based work in line with Mateas' and Stern's *Façade* [1].

Few potential creators command this advanced level of technical knowledge. In order to enable more experiments with IDN as an expressive form, it is important to simplify access to the procedural and participatory power of digital media. For this purpose, a number of authoring tools like *Adobe Flash* or *Processing* exist in the market today. In principle, many of these tools should enable the creation of IDN works and indeed have been used in this capacity. However, many researchers in this field have felt the need to create more specialized tools to better serve the needs of IDN practitioners. A short but by no means complete list includes *Storyspace* [2], *Agent Stories* [3], *Art-E-Fact* [4], the authoring part of the IS engine [5], *DraMachina*

[6], Adventure Author [7], Scenejo [8], Bowman/Zócalo [9], Scribe [10], Inscape [11], FearNot! authoring tool [12], Rencontre [13], and Wide Ruled [14]. Additionally, there are commercial programs like Chris Crawford's Storytron/SWAT<sup>1</sup> and freeware solutions like the Korsakow<sup>2</sup> system or Inform<sup>3</sup>.

These software packages clearly provide many valuable insights on how to implement specific authoring tasks and provide excellent solutions to authoring IDN artifacts. At the same time, many of these authoring tools are wedded to particular approaches and concepts, which influence users in their choices and potentially limit the scope of works created with it. From this perspective, existing IDN authoring tools can be broadly described as belonging to three categories: tools incorporating particular traditions, tools incorporating specific approaches, and tools designed to be more general. Some examples in the first group (incorporating particular traditions) are: Storyspace (Hyperfiction), Inform (Interactive Fiction), Rencontre (Hyperfiction), and Korsakow system (Interactive Cinema) Examples in the second group (specific approaches) include: Agent Stories (Agent-based narrative with story clips), Art-E-Fact (directed graph-based dialogue), IS engine (Character-based approach with hierarchical plans), Bowman/Zócalo (Domain Elaboration Framework incorporated with a planning system), Adventure Author (Branching dialogue trees), Scenejo (Story graphs in combination with dialogue patterns), Scribe (Front end for interactive drama in a training environment), FearNot! (Emergent narrative from the interaction of planned agent behavior), Narratoria (Branching narrative), Wide Ruled (Text-based author-goal driven story planner).

Tools in the second group represent particular underlying approaches and are therefore most clearly subject to the respective limitations. For example, Storyspace<sup>4</sup> was designed around the assumptions and goals of the Hyperfiction (HF) tradition [2] in IDN and therefore incorporates a metaphor based on nodes, offers provisions for creating hyperlinks and features a map view to navigate the resulting structure. The emphasis on nodes and links results in reduced attention paid to other areas. Storyspace offers only limited procedurality in the form of "guard fields", or hyperlinks that are initially hidden and appear after some conditions are met.

The third group (represented here by DraMachina and Inscape) exemplifies a "pragmatic" approach [15]. The collaborative European research project *Inscape* shares our integrative view on IDN, and is meant to enable the creation of many different types of IDN experiences [11]. What is missing in the Inscape project is a general definition of IDN shared by all the project partners. An mid-project overview lists seven papers on issues related to theoretical issues of IDN from very different perspectives, from suggestions to apply narrative theory [16] to a proposal for making stories by recording interactive experiences [17]. Unfortunately development on the tool seems to have stopped.<sup>5</sup>

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<sup>1</sup> Available from <http://www.storytron.com>

<sup>2</sup> Available from <http://www.korsakow.org>

<sup>3</sup> Available from <http://inform7.com/>

<sup>4</sup> <http://www.eastgate.com/storyspace/>

<sup>5</sup> At a demonstration at the ICIDS 08 conference in Erfurt, the presenter identified problems with the 3D engine in *Inscape*, and its commercial developer as a major obstacle for continued development.

While authoring tools in the first two group limit authors by incorporating only particular traditions or research of IDN, the *Inscape* project exposes a problem with an approach on the opposite side of the spectrum - when a clear distinction of IDN vs. other forms of digital expression such as digital movies is omitted, it becomes difficult to evaluate resulting artifacts as IDN works.

### 1.1 Lessons for IDN Authoring Tools

The lesson for IDN authoring tools from this discussion is fourfold. First, several traditions and many promising approaches exist within the field and it would be valuable to combine them. Secondly, authoring tools that only incorporate specific traditions or particular research approaches are limiting as a basis for IDN experiments aiming for a broad integrative perspective across the entire field. Thirdly, when IDN is taken as a term equal to “any kind of interactive experience” it is in danger to become arbitrary. Fourth, the disappearance of *Inscape* serves as a warning that sustainability should be a consideration when creating IDN authoring tools.

Consequently, an innovative approach towards an authoring tool should be able to incorporate and integrate multiple traditions and various practical approaches within IDN. At the same time, the tool should be grounded in a broad definition of interactive narrative to preserve the focus on IDN. Lastly, the new architecture should be based on the realization that at this early stage of IDN practice it is impossible to avoid certain misconceptions. Therefore, it is essential that a practical approach for IDN should make provisions for future revisions and continued development.

## 2 Advanced Stories Authoring and Presentation System (ASAPS)

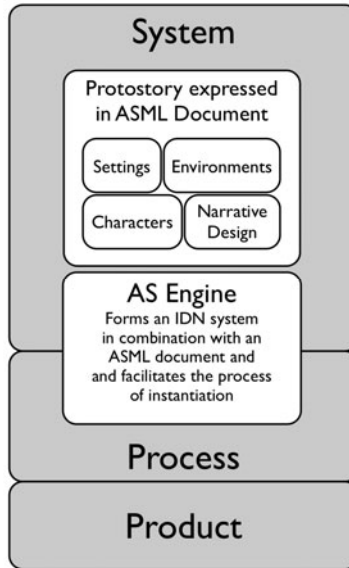
ASAPS<sup>6</sup> is a platform for IDN experiments that reflects these considerations. The World Wide Web with its robust, revision-friendly and extensible architecture provided the model for the ASAPS software architecture with a markup language (ASML), an authoring tool (ASB), and a playback engine (ASE).

The conceptual basis of ASAPS is derived from a descriptive model of stage drama with the three categories of set, character and plot, which is expanded to include four aspects - settings, environment definitions, character definitions, and narrative design. The extension to four categories is necessary to define a complete protostory [see 18]. While the legacy categories of character and plot are roughly equivalent to character definitions and narrative design, set is insufficient as a category in IDN. Some aspects of set in the participatory experience of IDN are internal (for example the definition of virtual locations, specific rules of physics or constraints in a virtual society), while other aspects of set pertain to the concrete presentation and the human-computer

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<sup>6</sup> The author programmed ASAPS and developed the ASML language. The Advanced Stories Group (ASG) at the Georgia Institute of Technology, founded by the author as part of his PhD research work was instrumental in developing the underlying concepts, and creating example narratives. Especially valuable were the many contributions by Katharine Fletcher, including user interface design for ASB. For a list of ASG contributors, refer to the ASAPS website (<http://advancedstories.net>).

interface. ASAPS reflects this distinction in the two categories of settings (for definitions related to the presentation and interface) and environment, which contains definitions for virtual environments and general rule sets. (see Figure 1).



**Fig. 1.** Overview of concepts in ASAPS

This model provides a clear separation of different aspects of the overall narrative experience – a perspective authors are familiar with from work in established media forms like film and the stage drama. This similarity lowers the threshold for practitioners wanting to experiment in IDN while allowing them to focus on the level of protostory.

The *settings* category contains definitions for the overall look and feel of an IDN experience. Additionally, settings for debugging functions are placed here that aid an author during the development of an IDN.

The descriptions in the *environment* category define spaces in which the narrative takes place including the available props. *Environment* is also the place for definitions of rule sets that shape the experience within the narrative world - for example a physics system or a system of rules pertaining to emotions or the societies the interactor is placed in. Additional rule sets would describe the progress of time, or a historic period and the associated social rules in which the IDN takes place. In the current implementation of ASAPS, environment is used for place definitions in the form of background graphics (*nodes*), and *props*, which encompasses the concept of theatrical props and effects (overlays, short animations).

The concept of *characters* encompasses active characters that an interactor commands and non-player characters (NPCs) controlled by the overall narrative. *Characters* must be able to change in the course of an IDN and react to actions. Currently, *characters* have *states* in the form of different graphical representations

and numerical variables (called *counters*). ASAPS allows an author to associate such variables with a character in order to provide a dynamic mechanism for expressing changing character traits and achievements. Additionally, these variables can be used for other aspects such as tracking overall progress. Furthermore, a character in ASAPS can have an *inventory* for items found during the course of an IDN.

The legacy notion of *plot* is superseded by *narrative design* [see 18], a flexible structure an author of an IDN creates that defines a *protostory* and contains *narrative vectors*. The contents of the categories of *environment* and *characters* supply material for the narrative design. The concrete design consists of assemblages of atomic narrative units, called *beats*, a metaphor taken from stage drama [see 1]. Combinations of beats constitute *narrative vectors*, or substructures of the overall narrative design that shape the course of an IDN.

This concept is implemented in the form of ASML (Advanced Stories Markup Language), an XML-based markup language, which describes complete IDN experiences in human-readable form. The current ASML specification consists of four top-level entities (Settings/Environment/Characters/Plot) and 14 beat functions (TitleScreen, DurScreen, IntroText, ConversationChoice, MovementChoice, PickProp, VideoBeat, SWFBeat, SetGlobal, ConditionCheck, RandomBeat, AddRemoveInventory, SetCounter and EndScreen).

### 3 Conclusion

The aim for the first iteration of ASAPS was to create a robust foundation that facilitates future revisions and enables additions by third parties. Conceptually, a flexible framework should allow experimentation and the integration of different perspectives in IDN.

Several observations demonstrate the validity of the technical approach. In the course of the development of ASAPS from 2006 to 2011, the ASML markup language has undergone many changes, including the introduction of a new top-level category (settings) and the addition of several new beat types. ASAPS was flexible enough to accommodate these changes in its different parts, which is testimony to the extensibility and robustness. Additionally, the system has been successfully used to create IDN projects, including by a class of 24 students at the Georgia Institute of Technology.

More research is needed to fully evaluate the success of the practical implementation of protostory, narrative design, and narrative vectors. In order to gain a better understanding of the advantages and shortcomings of the current implementation, a public beta test will be conducted, which should result in many more examples to analyze and allow for a more conclusive evaluation.

The long-term goal is to establish ASAPS both as a lightweight IDN authoring system of its own and as an interface and a middleware that allows access to different IDN systems. Similar to the way WWW enabled access to different media types and communication between different systems, ASAPS could serve this function in the IDN space. With an established middleware, that hope is that researchers could concentrate on specific issues - for example dialogue generation - and use exchangeable components for other aspects of IDN like the user interface.

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