

# AUTHORING FOR THE INTERACTIVE CONTENT GENERATION

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## ABSTRACT

Interactivity is a key feature of new internet, IPTV and mobile video services, especially for those targeting the 16 –34 demographic. But, creating interactive content poses challenges for authors and production teams. This paper describes work-in-progress for an IT-based solution.

INSCAPE is a suite of authoring tools enabling creators without coding skills to build interactive stories. The application is an integrated environment in which content can be authored from concept to completion, creating interactive options that can be timed, tested and modified. Authors build environments, create and direct characters, add dialogue, music and sound effects. Plug-ins let them build 3D sets, create virtual people, objects, and capture motion. Workflow is designed to optimise creative teamwork. Once completed, linear story assets replace story-planner place-holders, and the final result is exported to a wide range of industry distribution standards.

This paper looks at the growing demand for interactive content and describes the way INSCAPE tools, editors and file structures have been developed to meet the needs of today's market.

## INTRODUCTION

Amid a dizzying richness of new services, delivery systems and devices, it is clear that a new pattern is emerging in the way consumers engage with media. A key feature is interactivity. Viewers are developing activity patterns that make them more like *users* who, in the old definition, sit forward not back. In a world where leisure time is short and concentration spans shorter, the linear story is developing an exciting sister art. Interactive media now features on computers, TVs and mobiles, appealing particularly, though not exclusively, to younger generations, brought up on computer games. Many people are used to browsing and this pattern has spread to the consumption of linear entertainment itself. Sites like YouTube or MetaCafe offer a variety of short video extracts, and encourage a grazing pattern where the viewer moves from clip to clip. This new paradigm of engagement has enormous consequences for technology developers, content creators and business models.

## INTERACTIVE CONTENT

In 1953 CBS' *Winky Dinky and You* encouraged audiences to interact with characters by putting acetate sheets on the screen and drawing on them. More than 2 million acetate kits were sold before being stopped for safety reasons. More than half a century later interactivity is a key feature of the games industry and increasingly important on the internet, mobile and television, where content is moving beyond voting to new, dynamic experiences, offering a wealth of enhanced storylines, activities and complementary information.

Early red-button technology is now giving way to a powerful kind of interactivity, more akin to the experience of games-playing on a computer or console. People of all ages spend increasing time online. Telcos are launching IPTV services with powerful interactive capabilities and European revenues predicted to rise from €1.74m in 2007 to \$8.51m in 2010.

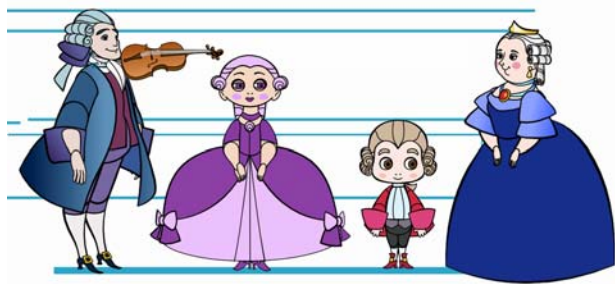


Fig 1 - Mozart Interactive Characters

A recent report for the European Commission found that interactive content comes in many flavours and includes (1) traditional programming delivered in interactive form, (2) on new digital platforms, (3) through interactive searches, as well as (4) new content that is inherently interactive. The report suggests how services will evolve with new forms of enhanced content, new business and distribution models, new platforms and new usage patterns. Just how interactive these patterns may be can be seen from the comScore Media Metrix' chart below.

July 2006 – Total UK locations	Average Usage Days per Visitor	Average Minutes per Visitor	Average Pages per Visitor
Average of select UGC sites	4.2	79.9	217
Wikipedia Sites	2	10.1	13
MySpace.com	5.4	122.7	333
Piczo.com	4.8	60.9	238
YouTube.com	2.9	60.9	70
Betco.com	5.6	145	428
Average on-UGC sites among top 50	3.5	33.2	52

Table 1 – User Engagement with UGC Content

However, interactivity is no longer just a case of users moving restlessly from page to page. We are now seeing the development of intelligent content within linear story elements themselves, in which essence is labelled with metadata, and story elements are able to combine in new forms, both at machine and user level. This offers both a more personalised (reacting to previous decisions) and dynamic (games-like) experience. Content of this kind is becoming a feature not only of the internet, but also of IPTV, mobile, education, training and cultural services. Advertisers can now imbed hotspots into linear streams, so that, for example, a click on James Bond's sunglasses takes you to the manufacturer's site. There is now a clear incentive for broadcasters, aggregators and service suppliers to provide interactive services. The problem is how to author them. Although operators would like to offer interactive stories with the excitement and immersion of computer games, the impediment is the level of technical expertise, time and cost required to do the job. Additional difficulties are workflow requirements running counter to traditional ways of making television or film content. However, the first problem is at the point of creation itself.

## THE CREATIVE CHALLENGE

Creating an interactive story requires an unusual kind of imagination. The author needs to construct a compelling narrative, with points of departure where users can exercise choice. Those points can lead into further narratives, further interactive choices, and reach out into unpredictable realms determined by previous user decisions, including what is available on the internet or artificial intelligence. However, all roads must be capable of returning coherently to the original narrative thread. The technical challenge is enormous. Picture and sound transitions need to be seamless, as well as *intelligent* timing to fine-tune the experience to user need. But the main onus is on the creator who has to mastermind a multi-faceted experience and also keep control of a free-flowing experience that is more like a speaker's dialogue with an infinitely large audience. No piece of paper or word-processing page is capable of keeping track of the routes and loops of the evolving matrix.

## A TECHNOLOGY BASED SOLUTION

Four years ago, it became clear to a group of European companies and academics, that the authoring of interactive stories posed strategic problems for their work and they determined that a solution could be found. The result is a collaborative European Information Society Technologies (IST) project called INSCAPE, aiming to create a software suite designed to help professionals (as well as so-called pro-sumers) build interactive stories without direct coding. Its underlying philosophy is to avoid the complexity of existing professional software and encourage creators to work intuitively. Early steps in bringing interactivity to the TV experience had encountered a number of problems. Red-button technology was slow and clunky, and at the creative end, the need for outside teams to build the interactive element meant trying to merge TV and software workflows. Most frustratingly, creators themselves were not in charge of interactivity. Last-minute editorial decision making proved difficult to implement where coding changes were necessary. The dream was for tools that would let creators themselves build exciting and flexible interactive experiences at the computer in the same way as with non-linear editing.

## THE INSCAPE APPROACH

End-users in the consortium came from the worlds of television, animation, training, live performance and edutainment (museums and theme parks). Their work encompassed delivery to television, fixed terminals, simulators and mobiles. The first stage was to research needs, define and compare workflows, and establish a vision of the kind of content they wanted to create. Software creation is a precise and demanding business, and however



Fig 2 – Graphical User Interface

visionary the ideal, needs ultimately have to be expressed in terms of a list of technical features that are achievable. At the same time, industrial and academic partners undertook research into state of the art technology, and the structures of story-telling itself. It was important not to reinvent the wheel, to be aware of the strengths and weaknesses of existing software, to define what would be core and what plug-in, and achieve a high degree of usability. The result was a precise description of work to be done in creating a suite of software to meet needs across the board, fit into existing workflows and appeal to the

typical creator who works in media. INSCAPE consists of a set of 2D and 3D authoring tools with a system of interlinked editors and plug-ins, united by a single mark-up language, communicating with an asset library through an XML-based file structure. The emphasis is on unity. INSCAPE is a suite of tools, and the aim is for the creator to have everything to hand in a single working environment. INSCAPE's working project was an animation about young Mozart where users can choose between different characters telling the story, explore the historical and musical background, play virtual instruments and hear a range of music.

## THE INSCAPE SUITE

The first stage is the creation of the story itself. This might be the work of a single person, or a team of writers, designers and technical experts in which collaboration is essential. Traditional tools here are the initial script, the shooting script and the old fashioned, hand-drawn storyboard. INSCAPE recognised that it had to build on well-established ways of working, improving functionality, speed, cost and convenience. An important requirement was that the entire team should have access throughout the creative process to a single master document which is always up to date. So, in INSCAPE work is created within an Integrated Storytelling Environment (ISE).

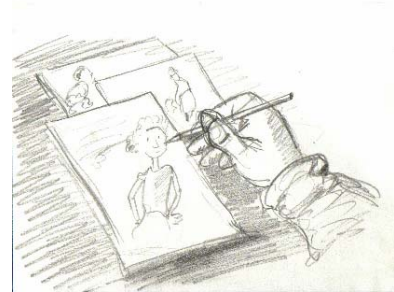


Fig 3 - traditional storyboard

## Planning the Story

The starting point for creating an INSCAPE story is a text editing environment similar to a basic word processor, with specific features that lets the author add supporting information

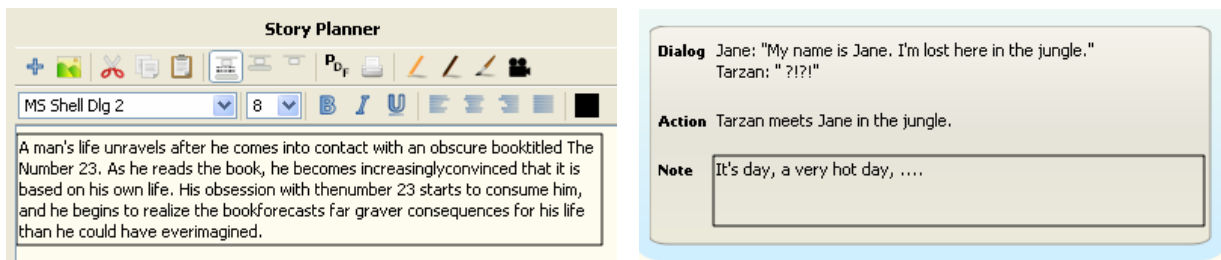


Fig 4 - INSCAPE Story Planner

(images, dialogues, sketches). Ultimately, the story will be presented as individual units (*slices*) which together comprise a kind of storyboard. As always, the process begins with the author typing in the script, or cut-and-pasting it from an existing document. The aim here is that authors used to working with words will feel at home. For a more visually-minded creator, the opportunity is at hand to add images, or even build, the story through hand-drawn pictures. A mouse click brings up a new slice, while another click makes it active and the author can start to put in additional details. The single creator can include

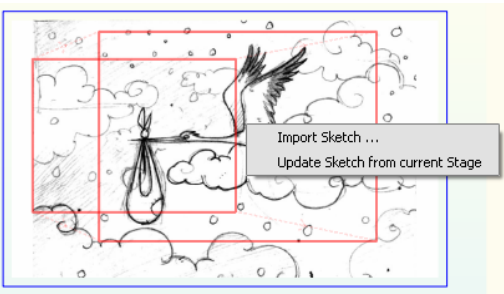


Fig 5- annotated sketch

notes or shooting information at this stage, or they can be added subsequently by a director or designer. If the work is a team effort, individuals can add their contributions, edit and modify what is already there according to the permissions. Existing categories (Dialogue, Action, Notes) can be changed to suit the needs of individual teams. Equally, parts of the contribution can be locked. Another click brings up space for an image, particularly useful if the author has a specific setting in mind or is referring to something which is hard to describe, an existing picture or the thumbnail of a piece of video. The aim is to give authors the freedom to express themselves completely in a single document that can be shared with others. Experience shows that the structuring effect of this kind of process can be very helpful in conceptualising the required blocks for building interactive experiences. The resulting *slices* can be exported electronically or printed out as a conventional storyboard.

### Creating the interactive plan

Next, the author builds a plan of the intended narrative, opening boxes which are placeholders for visual and audio assets, and linking them with the required interactive transitions. The concept here is that each story element is a stage with detailed situations added within them. A stage (a) is opened with a single mouse-click. A situation added (b) by clicking the add situation button. Another box is then created for the next story element and a transition, Bezier, orthogonal or straight, (c) generated between them by drawing a line from one of the handles.

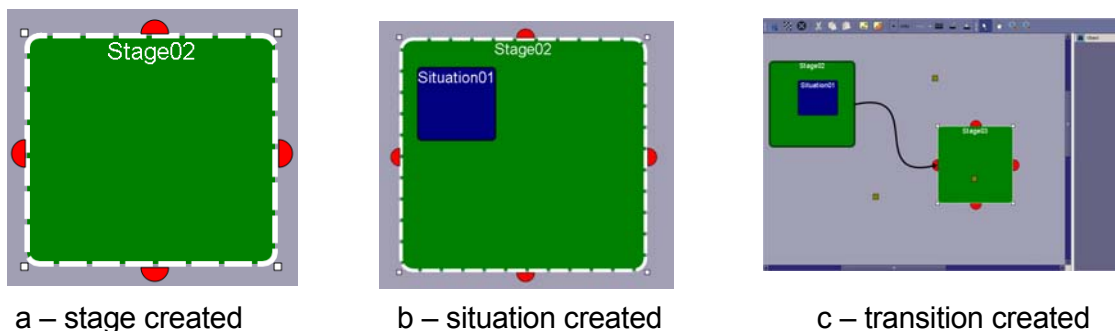


Fig 6 – Story Editor

The result is a schematic representation of the interactive story, which can be easily modified, by removing or adding new elements, or finding new links. The boxes are essentially placeholders, so that assets or essence (video, 2D or 3D) once created can be dragged and dropped in. Once complete, the whole interactive story can be played to test how it works, and refinements or changes made. The plan can be expanded to see the whole story matrix, or zoomed into a specific area for detailed work. From a semantic point of view, the Story Editor has to handle both the INSCAPE common data model which is optimised for the run-time environment of the INSCAPE framework, and the INSCAPE Markup Language which is an Extensible Markup Language (XML) based descriptive story format used as an interoperability format.

### Creating Assets

The next stage is to create the visual and audio elements of the story. These might be acquired from video cameras, or built as 2D animations or 3D worlds. There are existing toolkits to build these kinds of assets but many are complicated to use and do not cater for

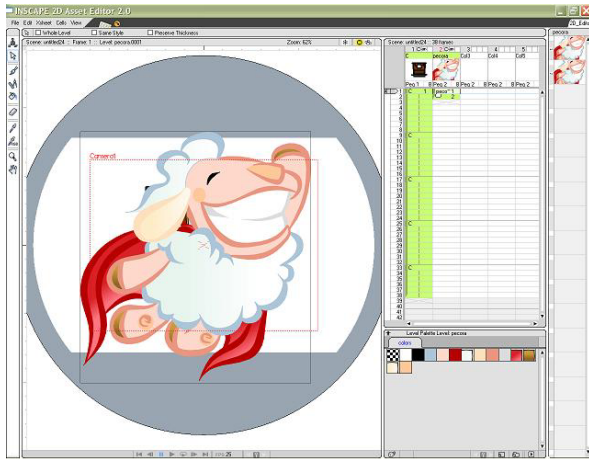


Fig 7– 2D Animation Asset Editor

Each node defines a sequence (or a single) frame needed to perform an action (walk left, jump, speak etc). So a node referring to Mozart walking about his parents' apartment might contain a range of frames (say 13-17 for sitting down, or reversed, 17-13, for getting up). If a precise impression of speech is needed, a lip-synch node stores a table containing the relationship between phonemes and frames. Nodes can contain a range of attributes for movement, or, to trigger some event, such as a sound or another asset to be played.

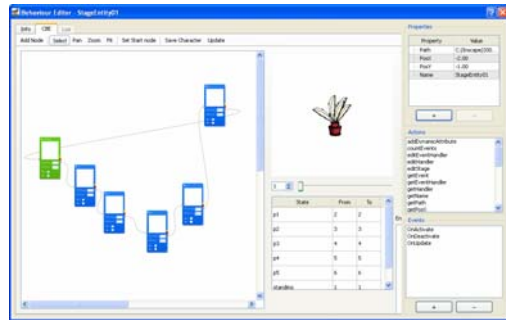


Fig 8 - INSCAPE dialogue box

### Working in 3D

A similar approach is taken for 3D authoring. Authors can create virtual characters, skin, pose and direct them, create hotspots for them to interact with their environment, then build the story, importing 3D objects and characters, setting up camera views and navigation. In INSCAPE, motion is captured using consumer cameras instead of the usual costly set-up. Additional tools include plug-ins to enable users to create environments from a series of still images, and modify elements, turning them into apparent 3D worlds where characters can walk behind objects and through doors.

### Making sound work

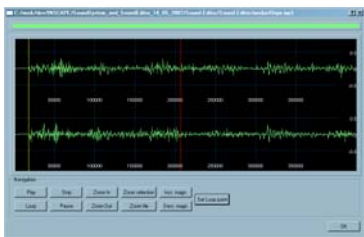


Fig 9 – sound system

interactive authoring INSCAPE decided to develop authoring tools specifically for interactive storytelling, including specialist tools for 2D, 3D and audio. The 2D animation tool lets creators build characters, props, backgrounds and overlays using both vector and raster (colour-mapped) animations in a variety of ways, *in-betweening* scanned drawings to create movement, with a full range of paint and colour tools, as well as lighting effects. Characters can be made interactive by constructing a state graph containing all the animations and possible transitions between them, and consisting of nodes and transitions.

Effective handling of audio is one of the greatest challenges in interactive storytelling. The INSCAPE sound system works with MIDI to enable sounds to be manipulated and played back through user systems. Authors can import music and dialogue, view waveforms, set edit points, create looped tracks, effects, and adaptive blanks, configure playback for stereo or surround, and create event trees.

## Handling the Assets

Once created, all assets are accessed and manipulated through the Browser which acts as a sophisticated repository for the needed elements adding metadata to make it easier to search and retrieve them, and managing the elements of the current story under construction. The OWL ontology language is used to facilitate searches using a Pellet reasoner, servlets modules and an Extensible Markup Language (XML) parser. Underpinning all these editors is the Inscape Markup Language (ICML) itself whose specification is laid down in an XML-schema document, defining elements and parameters, as well as their cardinality and order of appearance. XML is widely used by IT professionals, and being text-based has the advantage of being readable by humans as well as machines. Each ICML document is separated into top-level nodes, distinguishing different levels of narrative structure and building primitives. (1) ICML Content Elements lists logical content elements. The mapping to their physical source (e.g. image URL) is done by the database interface in the INSCAPE tool so as to separate implementation detail from story logic, and keep similar resources in a single listing for easier maintenance. (2) ICML Player contains all activities to be performed by subsequent rendering components. (3) ICML Story encodes the *state model* of the story, including scenes and all possible transitions between scenes. (4) ICML Wiring contains mapping and abstraction of physical input devices to logical input channels used to enable interactive behaviour within the ICML Player separating implementation details from story logic. A Story Pacing plug-in permits timing adaptations to fit the needs of individual users.

## Interface

Story planning, building, asset creation, viewing and export are all controlled through one Graphical User Interface (GUI). With so many tools to hand, the aim is to produce a clear working environment where users can configure the screen(s) to their personal needs, connect a wide range of viewing devices, and export in the standards required for distribution by television, online or mobile.

## BUSINESS ENVIRONMENT

It is a truism to say that the media delivery business is in a state of flux. New Telco entrants are using IPTV to compete with broadcast, and there are User Generated Content sites with a multiplicity of short videos, and streaming newcomers like Joost.

Rank (vs top UK properties)	Total UK – Home and Work locations	Rank (vs top UK properties)	Visitors (000)	Visitors (000)	Change (%)
2005	YoY Comparison (July)	2006	2005	2006	
78	Wikipedia sites	16	1,852	6,545	253
89	MySpace.com	27	913	5,173	467
91	Piczo.com	43	820	4,049	393
N/A	YouTube.com	47	N/A	3,918	N/A
90	Bebo.com	48	912	3,902	328

Table 2 - UK UGC Internet Use (Comscore Media Metrix).

The last two years showed enormous growth in newcomers entering the market, and at the same time, advertising has shown considerable interest in these new services because of their precise targeting of consumers, and the perceived ability to build a lasting relationship. Figures for online advertising revenues (source PWC/IAB) look extremely promising. Broadcast commercial television has taken much of the pain from online gains, and is looking hard at ways of gaining back revenues with programmes and services that make it competitive.

€m	2003	2004	2005	2006	2007	2008
Western Europe total	1,779	2,893	4,283	5,281	7,297	8,768
USA	5,712	7,567	9,859	12,223	14,542	16,743

Table 3 - Online advertising revenues

More impressive still are projections for growth. TV Programmes (VOD and advertising) are estimated to grow from €4.5 million in 2005 to €689m in 2010 with Games (online and mobile) growing from €699m to €2,302m (Screen Digest, Goldmedia, Rightscom).

## CONCLUSIONS

Interactivity is a key element in a rapidly growing market, reflecting what some observers see as a changing paradigm in the consumption of media. From now to 2010 the European digital content industry is estimated to grow at some 36% a year to be worth €8.3billion (€200 million for TV programmes and €477 million for online TV advertising). During that period, content will have evolved in unpredictable ways. There are many theories to explain what is happening. John Henry Clippinger argues that digital technology creates the *Crowd of One* in which we only become ourselves through interaction with others. The growth of special interest and User Generated Content (UGC) sites, together with professional demand for compelling content, underlines the need for effective authoring systems, and promises well for the INSCAPE toolset which offers a reasonably priced way of generating interactive content fast and cheaply. Demand for interactive content is likely to grow especially for content for online delivery and budgetary pressures will inevitably push towards smaller production teams. In the end, INSCAPE's challenge is to deliver tools that will stimulate and support creators in building compelling interactive narratives to engage audiences and deliver satisfaction.

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