So what do we need to specify?

I Content

II Spatial layout

III Temporal layout

IV Linking
Multimedia object description

- media item
- duration (start time, end time)
- extent (position on screen)

Multimedia Authoring Paradigms

**Structure**
- start time
- end time
- this media item, start time calculated from structure
- end time = start + duration, or calculated from structure
- position is defined relative to window/screen

**Timeline**
- start time
- end time
- this media item, placed by author on screen
- start and end times specified on timeline

**Flowchart/script**
- display media item here
- ... erase media item
- this media item
- start time is implicit time of display command
- end time is implicit time of erase command
- position is given as part of display command
Structure-based Paradigm

![Diagram of structure-based paradigm]

MAD

<table>
<thead>
<tr>
<th>Time</th>
<th>Duration</th>
<th>Clip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00</td>
<td>5:01</td>
<td>Introduction to DGP Lab</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Several scenes of the people in the lab</td>
</tr>
<tr>
<td>0:00</td>
<td>5:01</td>
<td>Normal Shot of Us</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Movie of DGP lab people in front of Sandford Fleming Building</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Welcome to the DGP lab! Here are some of the DGP lab members.</td>
</tr>
<tr>
<td>2:01</td>
<td>16:22</td>
<td>A Little About Ourselves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Several shots of us being abnormal, while the narrator tells the viewer a little about us.</td>
</tr>
<tr>
<td>5:01</td>
<td>7:00</td>
<td>Pizzazz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Movie of DGP lab people in front of the Mod. Sci. Building doing the cone-bee</td>
</tr>
<tr>
<td></td>
<td></td>
<td>We've got a lot of pizzazz...</td>
</tr>
<tr>
<td>12:01</td>
<td>9:23</td>
<td>Friendly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Movie of DGP lab people standing at King's College Circle, feeding the pigeons on the mall.</td>
</tr>
</tbody>
</table>
**MET++**

Highest level composite object, start time A  
(contains two atomic objects and one composite)

Atomic object, start time A  
(shows x and y positions over time)

Atomic object, start time C

Composite object, start time B  
(contains two atomic objects)

Atomic object, start time B

Atomic object, start time B

---

**Mbuild**

Diagram of Mbuild components
Summary — structure based

Explicit visualization and manipulation of presentation’s structure
• structure can be viewed at different levels of detail
• structure can be used to derive (global) timing of presentation.

Synchronization constraints can be specified
• between media item and a scene, or between scenes
• need timeline to show result of constraint.

Difficult to get feel for layout over time

Links can be created among structures

Initial authoring effort is greater

Timeline-based Paradigm
**Director**

Presentation represented as set of tracks

Timing within a track is determined by position along the track

Synchronization of items across tracks determined by vertical relationships

Input, control and tempo tracks are also included

Composition is also possible

- composite placed on control track of timeline
- internal structure of composite can be inspected
- cannot create synchronization to/from within composite

Flow operations allow iteration and branching constructs

- make visualization on timeline difficult to interpret

Transitions can be specified

- associated with beginning or end of media items, also joining two
Summary — timeline

Time axis is main method of organising temporal positioning
• line with marked off intervals
• start times and durations shown explicitly, and also directly manipulable

Time axis can also be used to show values of properties over time (MET++)

Synchronization constraints can be visualized and are editable
• but not with respect to a scene

Difficult to get feel for layout over time
• but can specify point on timeline to look at layout

Links often created via scripts, and may include transition

Scene breaks not explicit, and difficult to navigate long presentation

Flowchart Paradigm

Introduction

?  

Play sound1  Place pic1
Authorware

IconAuthor

Icon-based, with flowcharts constructed from library of icons

No enforcement of programming discipline

Flowchart can be zoomed in and out
• collections of icons can be collapsed and expanded

Presentation can be previewed from a selected starting point
Eventor

Three different views of presentation
- temporal synchronizer
- spatial synchronizer
- user interaction builder

Combine timeline and flowchart (event-based) paradigms

Provide automatic aids for validating, e.g. temporal constraints

Temporal constraints can be specified among media items and composites

Paths and scaling transformations can be specified by demonstration
- less well visualized than in MET++

Summary — Flowchart

Events are specified in turn

Allows more powerful interaction commands
- for example, multiple choice questions

A number of events can be grouped
- narrative structure can be represented, but there is no guarantee

When previewing presentation, current state not necessarily known

Timing specification via “display item” and “remove item”
- simultaneous display can only be approximated
- synchronization relations cannot be specified
- unclear from script which objects are currently playing
- spatial relations are also unclear

Links are specified via commands
Script-based Paradigm

```plaintext
set win=main_win
set cursor=wait
clear win
put background "pastel.pic"
put text "heading1.txt" at 0,0
put picture "gables.pic" at 20,0
put picture "logo.pic" at 40, 10
put text "contents.txt" at 20,10
set cursor=active
```

Videobook

**Media items and hotspots specified via a script**
- include temporal and spatial information
- timing information is with respect to the beginning of a scene

**Three-dimensional display is generated**

**Scenes can be nested**
Harmony

Links are used for expressing timing between nodes

Scenario viewer displays derived structure of a scenario

Command streams

Presentation is sequence of (possibly synchronized) command streams

Each stream is an ordered collection of commands
  • each with its own execution time

There is sufficient information to play these streams forward or backwards

Authors noted that grouping was missing in their initial implementation
Summary — script

Similar to flowchart based systems, but direct access to scripts
Lack tools for viewing procedure calls in structured way
Narrative structure can be reflected in script, but need not be
Structure, spatial and timing information is in script, so visualizations can be generated

Specifying Links

Structure-based
• source component and anchor, along with context, can be specified
• destination information can also be specified
• transition information can be recorded

Timeline paradigm
• source and destination contexts restricted to points on timeline
• transition can be specified (via script)

Flowchart/script paradigms
• source anchor is hotspot with script
• script specifies source context implicitly by erasing (some) playing objects
• transition can also be specified
• destination context implicit through items which are displayed
Properties of Authoring Paradigms

**Structure-based systems**
- good for viewing, editing and navigating narrative structure
- less good for viewing timing
- layout information specified per object
- interaction restricted to specifying and following links
  — links can be fully specified

**Timeline-based systems**
- best way of visualizing timing of presentation
- not necessarily best way of editing timing
- layout specified per object per time
- links are jumps to other part of timeline

**Flowchart/script-based systems**
- narrative can be reflected in procedure structure
- timing and layout specified per object
- interaction flexibility is high

Views on a hypermedia document

**WYSIWYG doesn’t work for hypermedia — the document is too complex.**

Instead, an environment can provide different views of the document:
- temporal layout
- spatial layout
- linking
- previewing
Temporal layout (144-150)

Duration, start time (can be derived from structure)

Tempo

Applying temporal transformations

Temporal constraints

Constraints between events

Constraints from and between structures
Navigating the timeline

Standard way is scrolling — see Director, slide 11

Timeline zoomed in (4x)  Fisheye view

Spatial Layout (150-155)

Size, position of object
Position of transition
Regions
Spatial layout (2D) cannot be derived from structure
Applying spatial transformations
Spatial layout navigation
Possible ways to specify layout

w.r.t. x,y axes

w.r.t. item

function of time

regions

Spatial Layout

Position with respect to window

Position with respect to region

Position changing with time
Linking

Create links (see following slides)
- source anchor and context, transition, destination anchor and context

Find incomplete links

Check complete links

Find unlinked items

Link from element to presentation

- Source may also pause while destination is shown,
- or destination may replace the source.
Link from element to element

Link from anchor to anchor
Authoring using GRiNS

Media items
Hierarchy view
Scene information
Timeline view
Creating a synchronization arc
Layout view
Link view

Media object nodes

Node information

Node attributes
Hierarchy View

Scene information
Timeline view

Creating a synchronization arc
Layout view

![Layout view diagram]

Link View

![Link View diagram]
Further information

http://www.cwi.nl/~lynda/thesis
http://www.cwi.nl/GRINS
http://www.cwi.nl/SMIL
Proceedings of ACM Multimedia
Proceedings of Multimedia Modeling