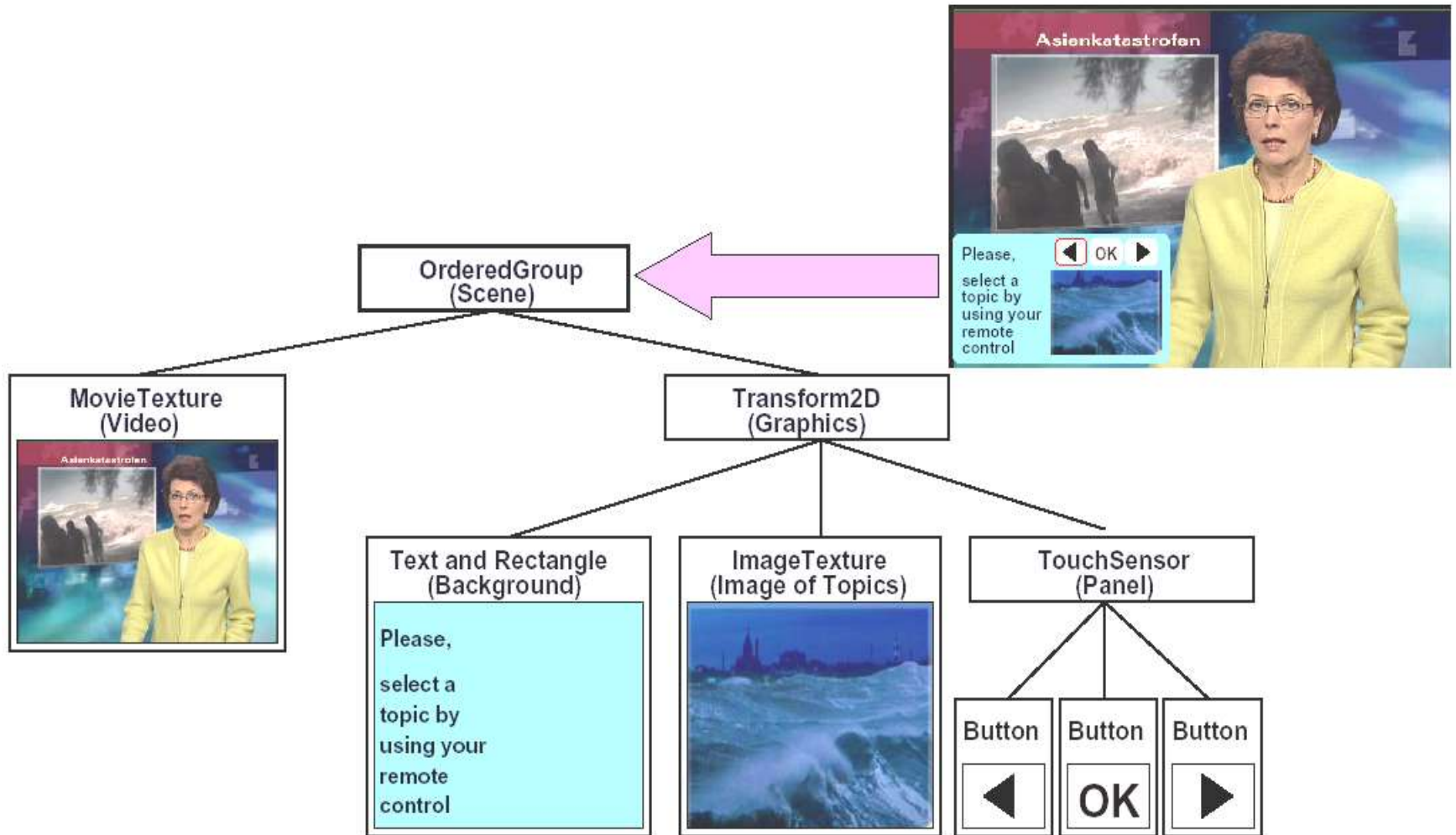# Multimedia Languages

Multimedia Languages
MPEG-4 Overview (1/2)

- Evolution:
  - MPEG traditionally targeted to audio/video codecs (MPEG-1, MPEG-2)
  - Complex toolkit capable of providing solutions for multimedia applications
- Scene:
  - Composition of different multimedia objects (2D, 3D, video) including their spatial and temporal relationships
- Entry points:
  - BInary Format for Scene (BIFS):
    - Hierarchical structure (scene graph)
    - Properties: color, size, position, and timing
    - Behavior: BIFS commands (conditional) and Animations
  - MPEG-Java: set of Java APIs
  - eXtensible MPEG-4 Texttual (XMT): XML language that describes scenes

Multimedia Languages
MPEG-4 Overview (2/2)

- Some of the Scene Nodes:
  - Top: root of the graph (e.g., Layer3D and Layer2D)
  - Grouping: containers of multimedia objects
  - Sensor: nodes capable of detecting events (e.g., Time and Touch)
  - Shape: Graphical Primitives that include two fields: Geometry (e.g., rectangle and circle) and Appearance (e.g., texture and material)
  - Face: integration of synthetic 3D human-like objects
- Interaction:
  - Sensors detect events and Route distribute them
  - Predefined behaviors: resize, relocate
  - Complex behavior: script or Java
- Widgets:
  - Can be implemented (e.g., sensor + Shape)
- Layout:
  - Local coordinates of the objects (more complex automatic layout is not permitted)

Multimedia Languages
MHEG Overview

- Content Classes
  - Multimedia objects (e.g., video or audio clips)
  - Contained in MHEG object (small data) or reference (e.g., filename, web server address)
  - Author can reference to smaller sections (e.g., track 5)
- Behavior Classes:
  - Synchronization of events and user interaction
  - User Interaction
- The action class:
  - Event triggers
  - Sequential and parallel
- The link class: establishes relationships between events and objects i.e. what actions to take on what objects in response to a particular event.
- Selection and modification classes:
  - E.g., Push button, checkbox, radio button, slider, text entry field and text lists
  - Selections, input information and trigger events.

Multimedia Languages
MHEG Example

```
(scene:InfoScene1
  <other scene attributes here>
  group-items:
   (bitmap: BgndInfo
      content-hook: #bitmapHook
      original-box-size: (320 240)
      original-position: (0  0)
      content-data: referenced-content: "InfoBngd"
   )
   (text:
      content-hook: #textHook
      original-box-size: (280 20)
      original-position: (40 50)
      content-data: included-content: "1. Lubricate..."
   )
   links:
      (link: Link1
         event-source: InfoScene1
         event-type: #UserInput
         event-data: #Left
         link-effect: action: transition-to: InfoScene2
      )
)
```

Conclusion

- Multimedia
  - Multimedia objects, visual style
  - Spatial layout, temporal dimension
  - Application logic, user interaction
- Four alternatives (from taxonomy)
  - Compiled languages (C): most efficient, less safer to distribute
  - VM languages (Java): programming language, interoperable
  - XML based languages: most interoperable, less expressive power
  - Multimedia Languages: intended for multimedia
- Number of APIs
  - C: OpenGL/Direct-X, DirectFB, SDL, linuxTV
  - Java: AWT, Swing, JMF, Java3D, Java OpenGL
  - XML: XHTML, SMIL, Timesheets, XForms, SVG, VoiceXML