

# Engineering the Ambulant Multimedia Player

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SEN5 group

CWI



# Outline of the Talk

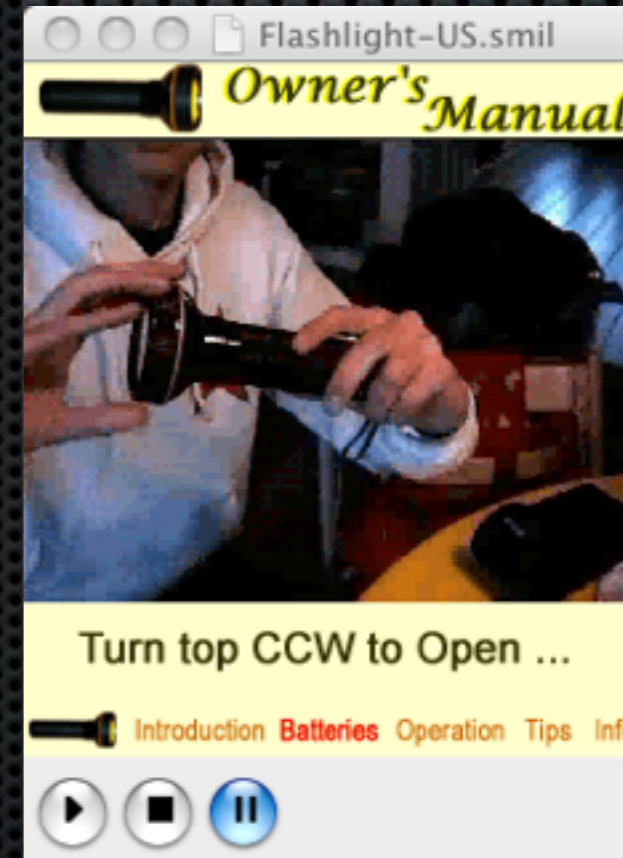


- ✦ What is Ambulant?
- ✦ Design
- ✦ Implementation
- ✦ Success stories
- ✦ Lessons learned



# What is Ambulant?

- ✦ Multimedia playback engine
- ✦ SMIL-based
- ✦ Desktop: Windows, Mac, Linux
- ✦ Browser plugin: Safari, IE, Firefox (win/linux)
- ✦ Mobile: iPad, iPhone



Initial implementation sponsored by NLNet Foundation



# Target Market

- ✦ Ourselves
  - ✦ Test SMIL standardisation
  - ✦ Platform for experimentation
- ✦ Similar groups
- ✦ Generally: scientists, experimentors and hackers



# Design Guidelines

- ✦ Use formalisms only sparingly
  - ✦ Small team
  - ✦ Highly trained staff
  - ✦ Tight cooperation
- ✦ Nothing is cast in concrete
  - ✦ Agile Development! Yeah!

Probably influenced by “The Zen of Python”



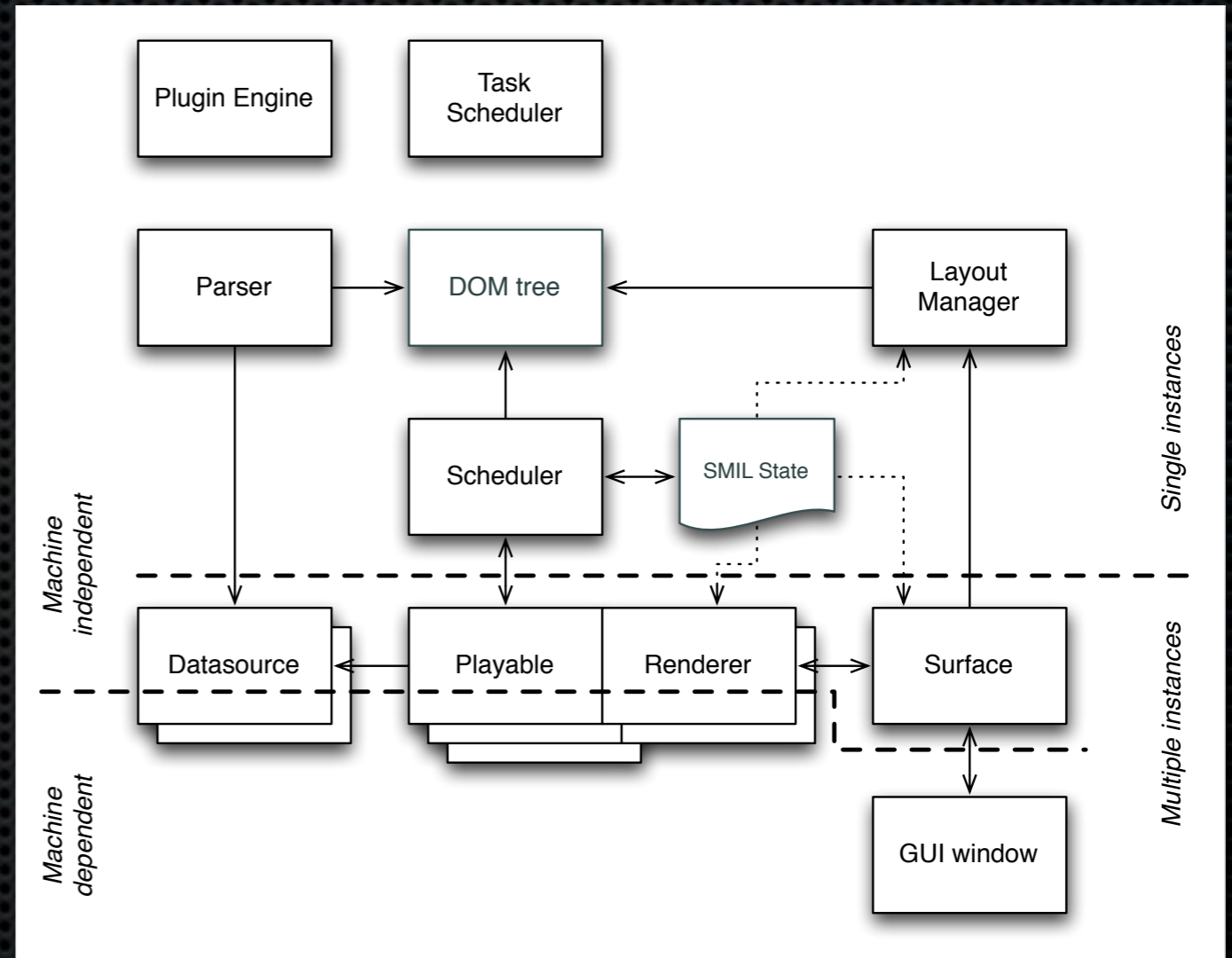
# Design Requirements

- ✦ Adaptable, extensible, embeddable
- ✦ Portable
- ✦ Platform-native GUI
  - ✦ Enables use of native media toolkits
  - ✦ Expected user experience
- ✦ Efficient
  - ✦ Handhelds, embedded systems



# Global Design

- ✦ 25 UML-ish diagrams
- ✦ 1500 lines of text
- ✦ Each component can be replaced
- ✦ Almost all have been...





# Embedding and Extending

- ✦ Clean well-defined API
- ✦ Fully available in C++, Python
  - ✦ Python bindings are two-way
  - ✦ Generated
  - ✦ Beautiful....
- ✦ Wanted: COM/OLE, Java?



# State of the Code

- ✦ Uses ffmpeg, live, expat, xerces, SDL, gettext, ....
- ✦ Linux: gtk, qt
- ✦ MacOS: Cocoa, CoreGraphics
- ✦ Windows: DirectDraw, Direct2D
- ✦ iOS: UIKit+CoreGraphics
- ✦ Dropped: Zaurus, Nokia 770, Windows Mobile
- ✦ Missing: WM7, Android, Symbian



# Meaningless Metrics

- ✦ About 100KLOC
- ✦ 60 Interfaces
- ✦ 450 Methods
- ✦ 450 Classes
- ✦ { grep, wc, interpret, refine }



# Development Environment

- ✦ Native:
  - ✦ auto\*, make
  - ✦ XCode
  - ✦ Visual Studio
- ✦ hg
- ✦ Doxygen



# Development Environment - 2

- ✦ Poor-mans code review (checkin messages)
- ✦ Nightly builds
- ✦ Test suite (finally) under development



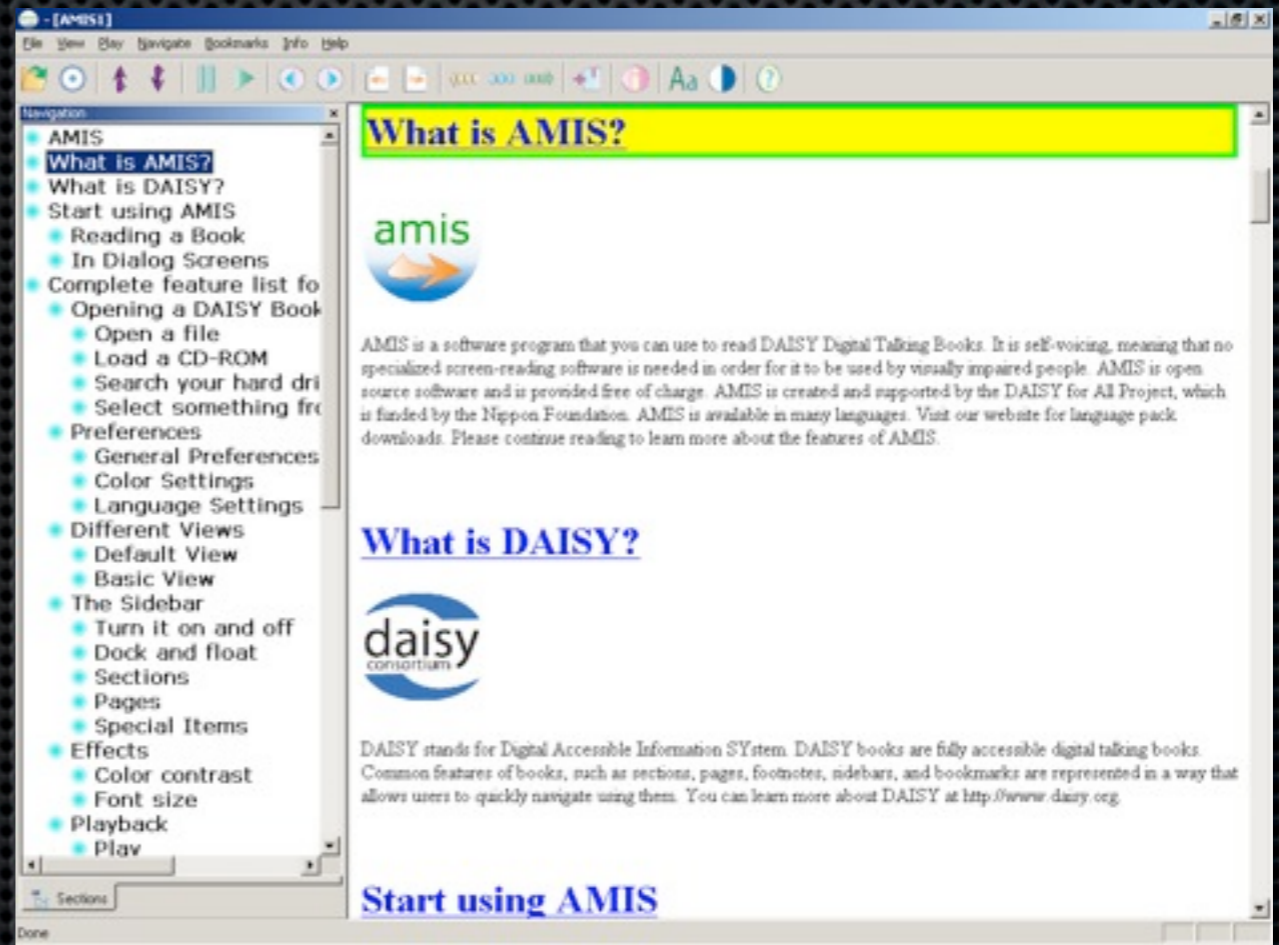
# Use Case - SMIL

- ✦ Extensively used during development of
  - ✦ SMIL 2.1
  - ✦ SMIL 3.0



# Use Case - Amis Daisy Reader

- ✦ Digital Talking Books
- ✦ Embeds Ambulant
- ✦ Screen reading
- ✦ Highlighting
- ✦ Navigation



[www.daisy.org/amis](http://www.daisy.org/amis)



# Use Case - Ambulant Annotator

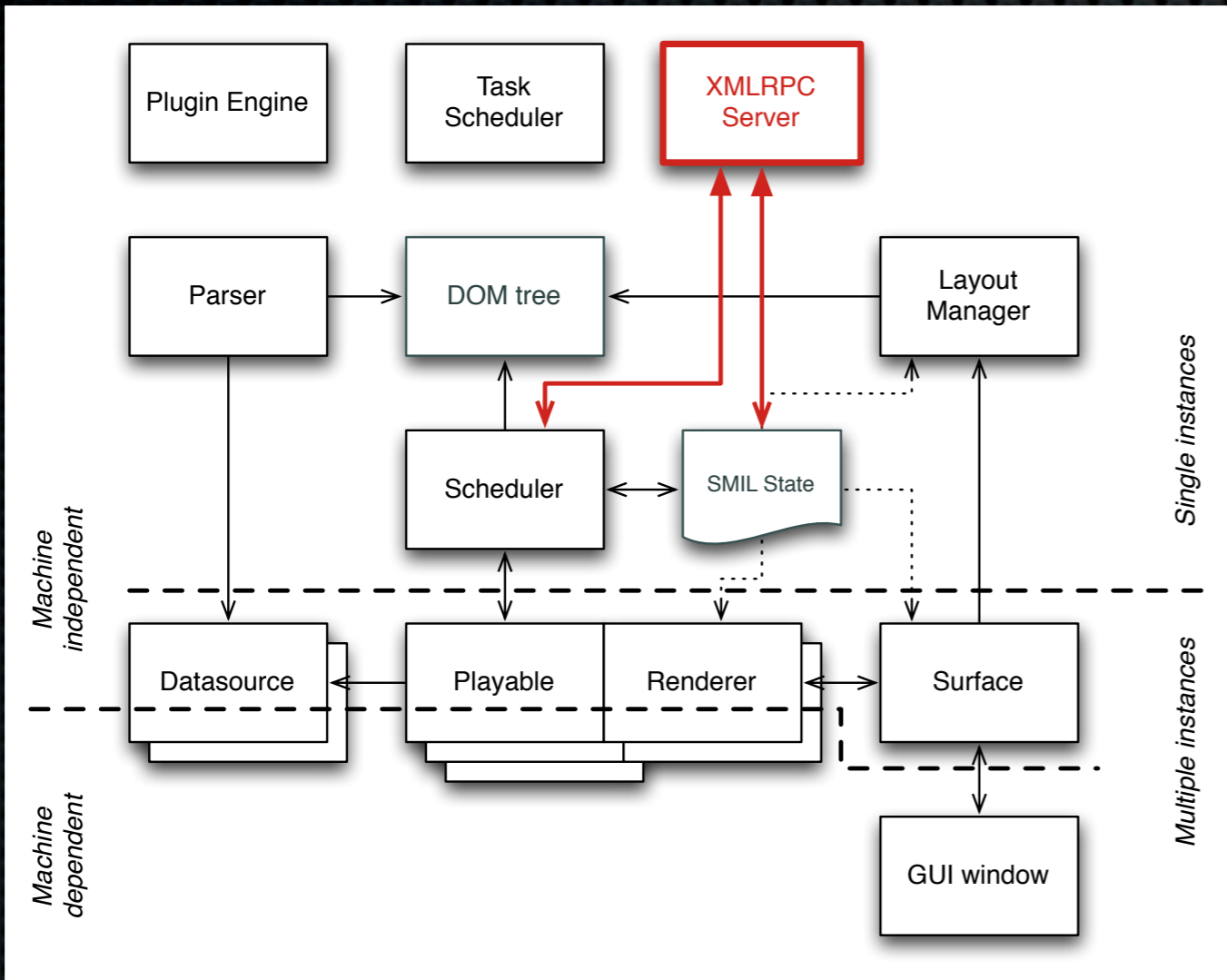
- ✦ FP6, BRICKS project
- ✦ Seminal Secondary Screen paper
- ✦ Sofa-based editing and sharing
- ✦ Python-based XMLRPC server in Ambulant
- ✦ Client UI on the handheld



Pablo Cesar, Dick C.A. Bulterman and Jack Jansen. 2008. Usages of the Secondary Screen in an Interactive Television Environment: Control, Enrich, Share, and Transfer Television Content. In LNCS VOL. 5066/2008, pp. 168-177. Springer Berlin/Heidelberg, DE. DOI= 10.1007/978-3-540-69478-6\_22



# Implementation

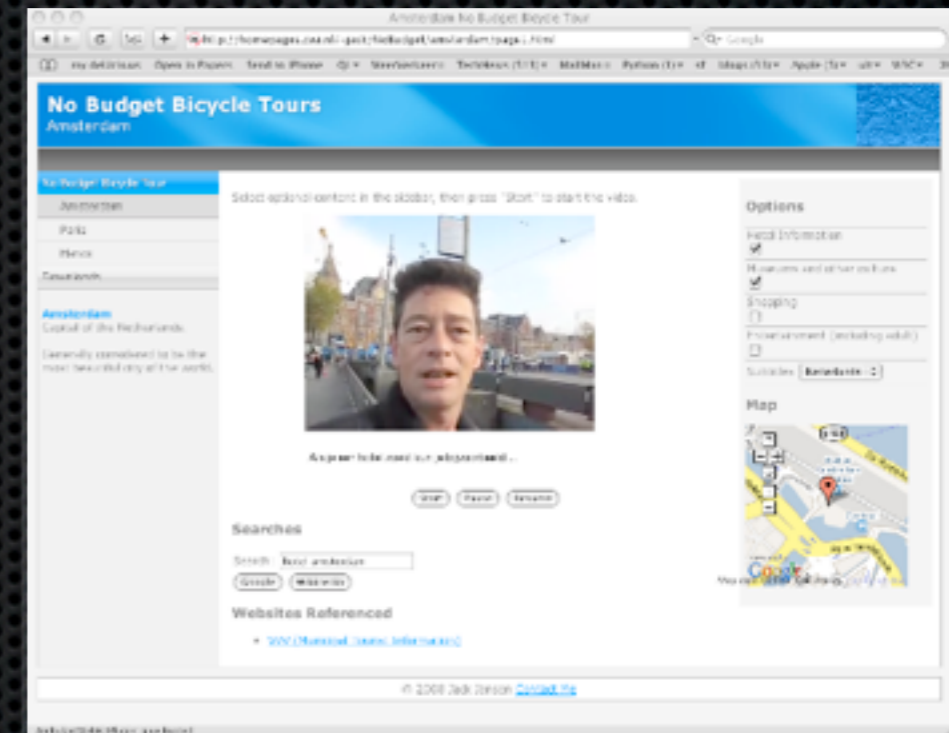


- ✦ Runs on “TV”
- ✦ Various UIs on various handhelds



# Use Case - Adaptive Time-based Web Apps

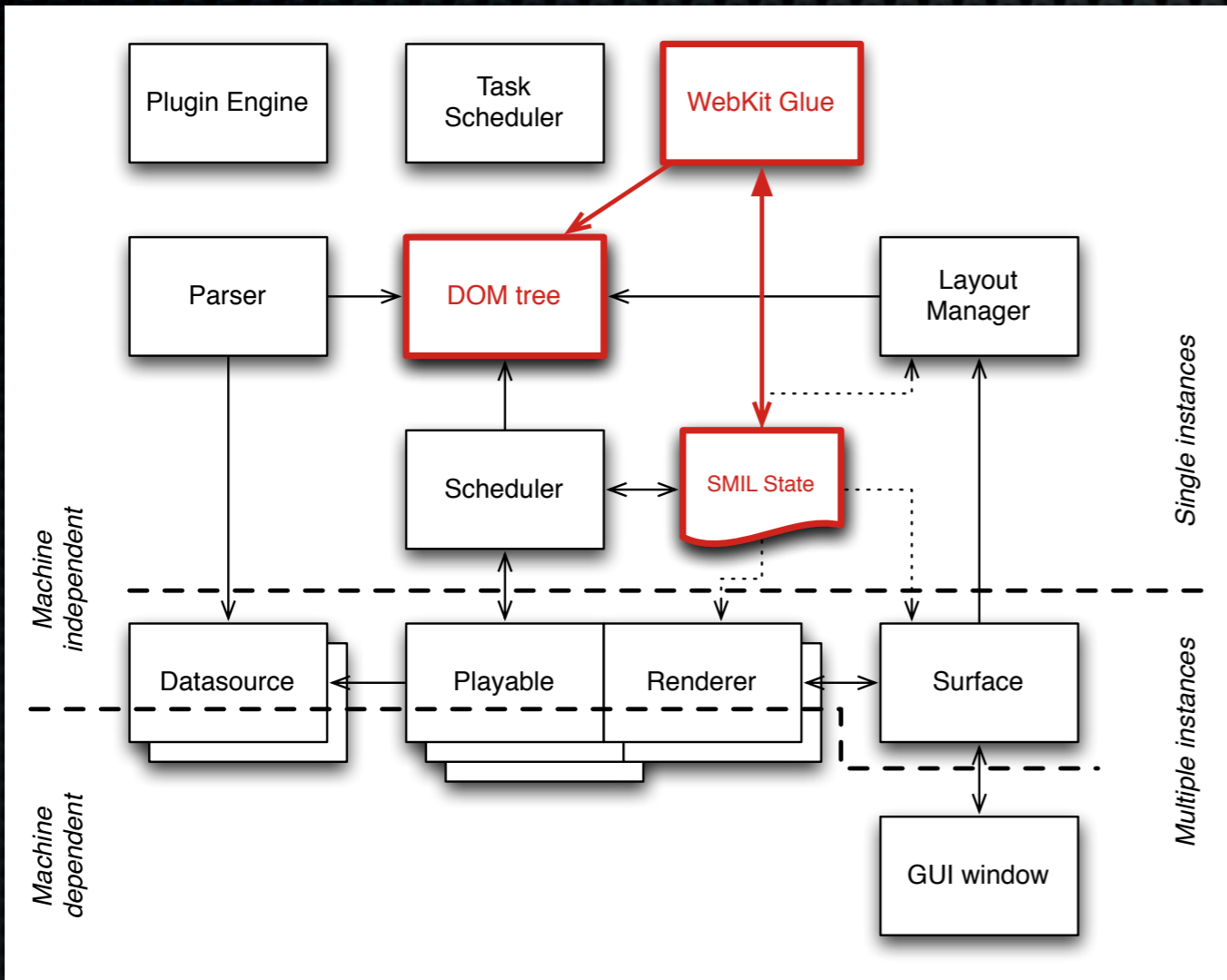
- ✦ Integrate time into web application
- ✦ Ambulant in WebKit plugin
- ✦ Uses WebKit DOM
- ✦ Glue in Python/WebKit/JavaScript



Jack Jansen and Dick C.A. Bulterman. 2008. Enabling adaptive time-based web applications with SMIL state. In Proceeding of the eighth ACM symposium on Document engineering (DocEng '08). ACM, New York, NY, USA, 18-27. DOI=10.1145/1410140.1410146



# Implementation



- ✦ Glue is Python and Javascript



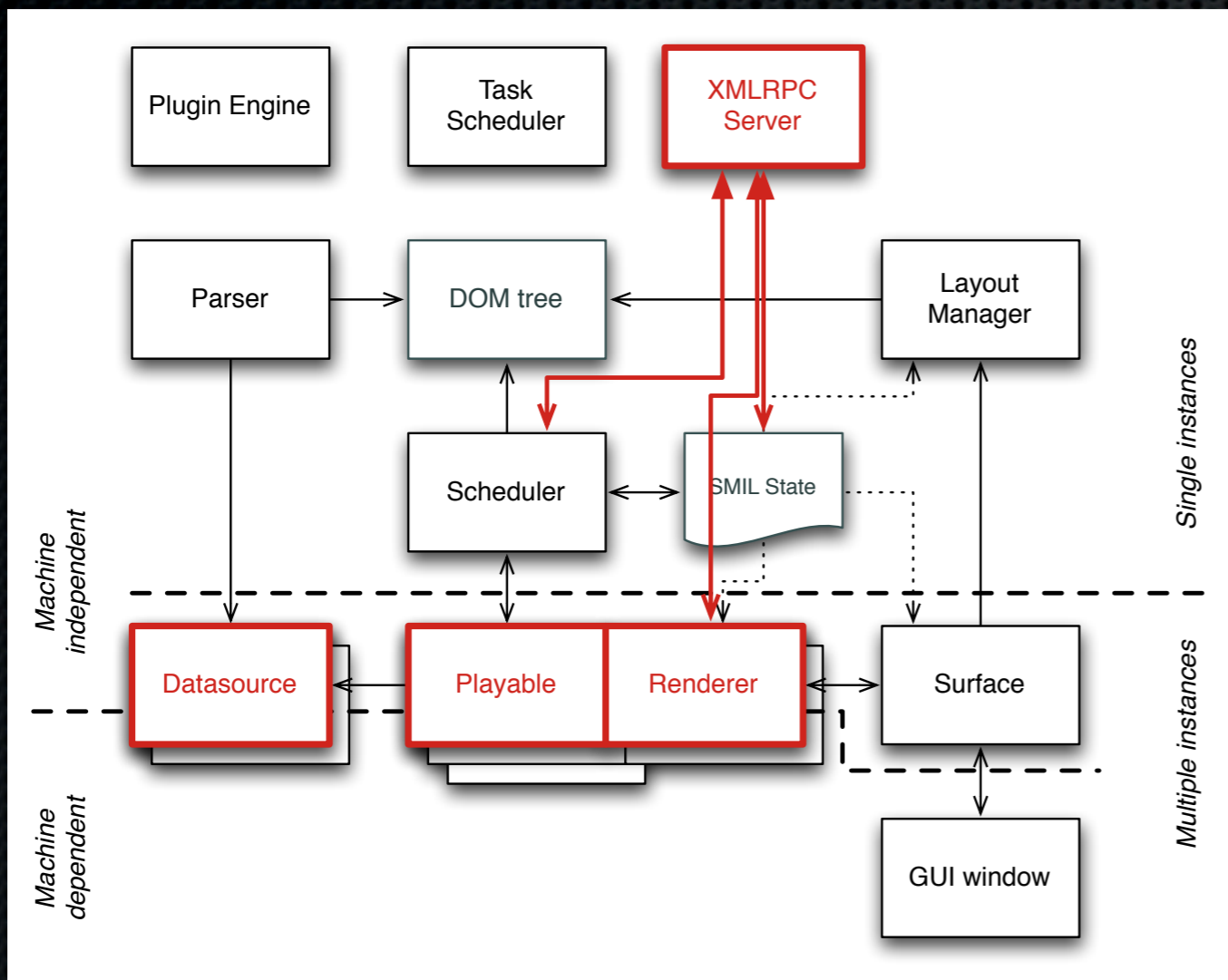
# Use Case - Ta2 VCE

- ✦ FP7 Project
- ✦ Composition-based video-conferencing
- ✦ Adds Live Video, Flash, specialised renderers
- ✦ Adds Python-based XMLRPC control

Jack Jansen, Pablo Cesar, Dick C.A. Bulterman, Tim S. Stevens, Ian C. Kegel and Jochen Issing. 2011. Enabling Composition-Based Video-Conferencing for the Home. Submitted to IEEE Trans.MM.



# Implementation



- ✦ Driven by other components
- ✦ Complexity is in SMIL



# Use Case - Axmedis



- ✦ Automatic Production of Media for Multichannel Distribution
- ✦ CWI not involved
- ✦ FP6 Project, code still available
- ✦ [http://www.axmedis.org/documenti/view\\_documenti.php?doc\\_id=3507](http://www.axmedis.org/documenti/view_documenti.php?doc_id=3507)
- ✦ [www.axmedis.org](http://www.axmedis.org)



# What we did Right

- ✦ API
  - ✦ and willingness to adapt and refactor
    - ✦ small team!
- ✦ Multi-everything to the core
- ✦ Light-weight (human) processes



# What we did Wrong

- ✦ Framework, should have been Toolbox:-(
  - ✦ Hinders re-use by others
- ✦ No “Application” object
  - ✦ Hinders embedding
- ✦ Some things left too long
  - ✦ Nightly builds
  - ✦ Automatic testing



# Closing Remarks

- ✦ Slides: <http://www.cwi.nl/~jack/presentations/ambulant-se.pdf>
- ✦ See [www.ambulantplayer.org](http://www.ambulantplayer.org) for more
- ✦ Questions, discussion, ...