

# Cost-Effective Integration of MKM Semantic Services into Editing Environments

CICM 2012

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July 10, 2012

# Call for Action

$$\begin{array}{r} \text{Service} \\ + \text{Editor integration} \\ \hline \text{Better Service} \end{array}$$

# Call for Action

$$\begin{array}{r} \text{Service} \\ + \\ \text{Editor integration} \\ \hline \text{Better Service} \end{array}$$

- new users – moderate learning curve
- moderate & advanced users – increase productivity

# Java example

- Namespaces

```
import info.kwarc.sissi.doc.spreadsheet.AbstractSpreadsheetDocument
```

→ info/kwarc/sissi/doc/spreadsheet/AbstractSpreadsheetDocument.java

- Generics

```
import java.util.HashMap;  
import java.util.Map;  
import java.util.Map.Entry;
```

```
Map<Entry<Integer, String>, Integer> t =  
    new HashMap<Map.Entry<Integer,String>, Integer>();
```

# Is it just boring ...

to create better tools for MKM authors?

- handful of editors to support
  - MKM service authors  $\neq$  editor developers
  - editor plugin developers  $\neq$  MKM enthusiasts
- version upgrades (both editor and service side)
- multiple operating systems
- communication with services (Java editor with python services)
- integrate with existing extensions (e.g. extend  $\text{\LaTeX}$  mode of TeXentric)

# What are your options?

- Editor extensions
- Editor generation frameworks
- Real-Time Document Synchronization and Service Broker (ReDSyS)

# Editor extensions

Pro:

- Most editors have one
- Simple things should be simple, complex things should be possible.  
[Alan Kay]
- Direct power and control

# Editor extensions

## Pro:

- Most editors have one
- Simple things should be simple, complex things should be possible.  
[Alan Kay]
- Direct power and control

## Contra:

- write once use once
- “complex things” – need to go low level  
color text in line 2 in blue with yellow background in jEdit
  - text color - rewriting line tokens of current mode
  - background color - low level Painter object
- low level – no guaranty of stability
- write Java or go to hell

# Editor generation frameworks

Examples: xText, Proxima

Pro:

- Create editors in 30 min
  - syntax highlighting
  - autocompletion
  - validation

# Editor generation frameworks

Examples: xText, Proxima

Pro:

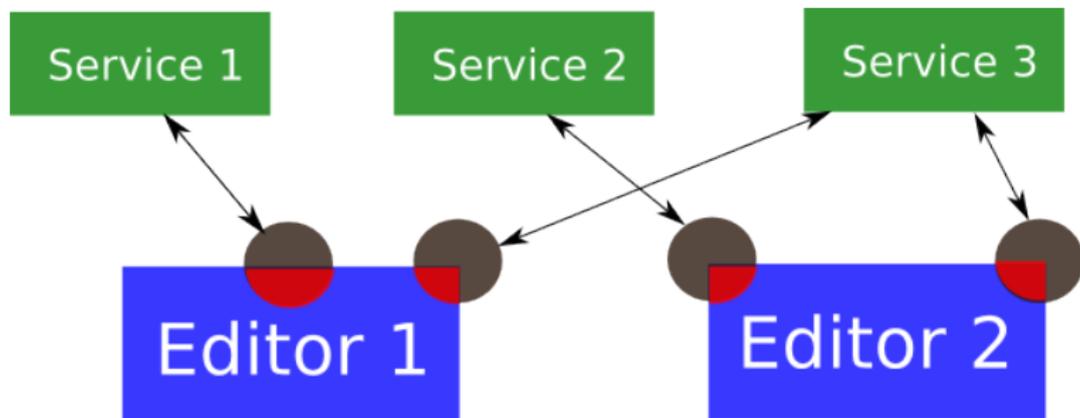
- Create editors in 30 min
  - syntax highlighting
  - autocompletion
  - validation

Contra:

- write once use once
- No CFG – no editor
- few types of customizations possible
- don't go low level

# Current state of Editor-Service integrations

Most of existing integrations are 1-to-1 integrations



- Editor dependent
- Service dependent

# Proposed Model

My sTeX Document ☆

Constantin Jucovschi ▾

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Normal text Arial 11 B I U A A ↵

1 2 3 4 5

```
\documentclass{article}
```

```
\begin{document}
```

```
The \termref{cd=physics-energy, name=grav-potential}{gravitational  
potential energy} of a system of masses $$\STRlabel{m1}{m_1}$$  
and $$\STRlabel{m2}{M_2}$$ at a distance
```



# Proposed Model

## Who has access



Private - Only the people listed below can access

[Change...](#)



Constantin Jucovschi (you) jucovschi@g...

Is owner

Add people: [Choose from contacts](#)

Mary The Highlighter

[Can edit](#) ▾

Notify people via email - [Discard message](#)

Hi Mary, I'm in trouble, please highlight my doc :)|

Send a copy to myself

Paste the item itself into the

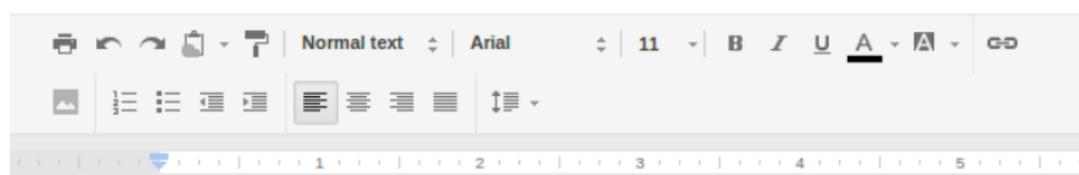


# Proposed Model

My sTeX Document ☆ Constantin Jucovschi ▾

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```
\documentclass{article}
```

```
\begin{document}
```

The `\termref{cd=physics-energy, name=grav-potential}`{gravitational potential energy} of a system of masses `\STRlabel[m1]{m_1}` and `\STRlabel[m2]{M_2}` at a distance

# Proposed Model

```
\documentclass{article}
```

```
\begin{document}
```

The `\termref{cd=physics-energy, name=grav-potential}`{gravitational potential energy} of a system of masses `\STRlabel{m1}{m_1}`

and `\STRlabel{m2}{M_2}` at a distance `\STRlabel{r}{r}` using

`\termref{cd=physics-constants, name=grav-constant}`{gravitational constant}

`\STRlabel{G}{G}` is `\STRlabel{U}{U}` |

```
\end{document}
```

```
\termref{cd=physics-constants,  
name=grav-constant}  
{gravitational constant}
```

# Proposed Model

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Comments [Share](#)

File Edit View Insert Format Tools Table Help All changes saved

Normal text Arial 11 B I U A A

`\documentclass{article}`

`\begin{document}`

The **gravitational potential energy** of a system of masses  $\$STRlabel{m1}{m_1}\$$  and  $\$STRlabel{m2}{M_2}\$$  at a distance  $\$STRlabel{r}{r}\$$  using **gravitational constant**  $\$STRlabel{G}{G}\$$  is  $\$STRlabel{U}{U}\$$

`\end{document}`



# Proposed Model

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The screenshot shows a rich text editor interface. The top bar includes a title 'My sTeX Document', a user name 'Constantin Jucovschi', and buttons for 'Comments' and 'Share'. Below this is a menu bar with 'File', 'Edit', 'View', 'Insert', 'Format', 'Tools', 'Table', and 'Help'. The main toolbar contains icons for print, undo, redo, copy, paste, text color, font family (set to 'Arial'), font size (set to '11'), bold, italic, underline, text background color, and link. Below the toolbar is a ruler with a scale from 1 to 5.

```
\documentclass{article}
```

```
\begin{document}
```

The **gravitational potential energy** of a system of masses  $\$STRlabel[m1]{m_1}\$$  and  $\$STRlabel[m2]{M_2}\$$  at a distance  $\$STRlabel[r]{r}\$$  using

$\$termref{cd=physics-constants, name=grav-constant}{gravitational constant}\$$

$\$STRlabel[G]{G}\$$  is  $\$STRlabel[U]{U}\$$

```
\end{document}
```

# Proposed Model

```
\documentclass{article}
```

```
\begin{document}
```

The **gravitational potential energy** of a system of masses  $\text{\STRlabel}[m1]{m_1}$  and  $\text{\STRlabel}[m2]{m_2}$  at a distance  $\text{\STRlabel}[r]{r}$  using **gravitational constant**  $\text{\STRlabel}[G]{G}$  is  $\text{\STRlabel}[U]{U}$

```
\begin{equation}
```

$$\text{\STRcopy}[U] = -\text{\STRcopy}[G] \frac{\text{\STRcopy}[m1] \text{\STRcopy}[m2]}{\text{\STRcopy}[r] + \text{\STRlabel}[K]{K}}$$

```
\end{equation}
```

```
\end{document}
```

$\text{\STRlabel}[m1]{m_1}$

$\text{\STRcopy}[m1]$

# Proposed Model

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Normal text Arial 11 B I U A A

1 2 3 4 5

```
\documentclass{article}
```

```
\begin{document}
```

The gravitational potential energy of a system of masses  $m_1$  and  $m_2$  at a distance  $r$  using gravitational constant  $G$  is  $U$

```
\begin{equation}
```

$$U = -G \frac{m_1 m_2}{r} + K$$

```
\end{equation}
```

```
\end{document}
```

# DEMO

# One Document, Many Experts

## Experts

- independent, self-contained entities
- provide services editors hardly support
- located anywhere in the world
- can go for 5 hours to think
- undo changes of bad experts

## Document

- edited in any environment

# Integration through the Document

- Direct Editor-Service integration breaks separation of concerns
- Ideally

Editors	Services
change document/properties menu/shortcut/toolbar integration	
show properties fire events	configure themselves interact with user

# Real-Time Document Synchronization and Service Broker

## API

- allows multiple entities to change document in real-time (broadcast)
  - insert/delete text/properties
- allows entities to exchange private messages (1-1 messages)
  - autocomplete
  - configure
- limited  $\Rightarrow$  stable API
- service/editor independent
- conventions
  - property (“bold”, true), means bold
  - event “autocomplete.stex”, means autocomplete for sTeX

# What promised / What is there / Current version

New repository: <https://github.com/jucovschi/ShareJSServices>

- RedSyS switched from Etherpad → ShareJS
- sTeX Semantic Syntax Highlighting & Term Spotting implemented in Etherpad
- Termref Hider & Transclusion
- Integrated Web Editor (AceEditor)
- jEdit integration worked with Etherpad

# Stable/Experimental

## Stable parts

- RedSyS
- JavaScript services
- Java document type (jeasysync2 library)

## Experiments/in development

- 4 services
- Java → ReDSyS connection

# How do I write a service

## Implement

- `changeset onInit(doc)`
- `changeset onChange(oldDoc, changeset, currentdoc)`
- `void onEvent(Event)`

## Changesets are programs

- skip 146 characters
- apply (“underline”, true) to next 10 characters
- delete next 4 characters

# Conclusion

- 4 ★ → 5 ★ service – editor integration
- several ways to do that ...
- document centric approach
  - pays off in the long run
  - better separation of concerns
  - distribution
  - long processing tasks
  - I do editors, you do services
- clone it on github  
<https://github.com/jucovschi/ShareJSServices>