Improving communication using 3D animation

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Motivations

Since ancient time the language has been seen as limited for communication

“The soul never thinks without a mental image” [Aristotle, de anima]

3D animations are now here to help communicate our ideas using an animation language

Why animation? A simple example

Mary walks away from the school

Why animation? A simple example

Mary walks away from the school

Previous work

- Animated Storytelling System via Text , *Kaoru & al, 2006 (children stories)*

- Word's Eye , *Coyne & al, 2001 (static scenes)*

- Automatic Conversion of Natural Language to 3D Animation , *Ma* , 2006 (human action centered)

The GITAN project

- Grammaire pour l'Interprétation de Texte en ANimation
- Is a 4 years project
- Has started in September 2009
- Is a collaboration between UnimaSoft and Ecole Polytechnique de Montréal.
- Has an application domain: teaching English as a second language (Chinese students).

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The GITAN project, its goals

- Uses narrative sentences to describe complex scenes
- Contains a minimum set of animations and geometries
- Generates rich scenes, but no game-like realism
- Will provide a robust set of prototypes to the funding company
- Will develop a framework for 3D objects aggregation using the linked data paradigm

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How ?

- We will use a waterfall model.
- Each module will gradually convert the text into an animation
- We are planning 4 different levels of ‘conversion’

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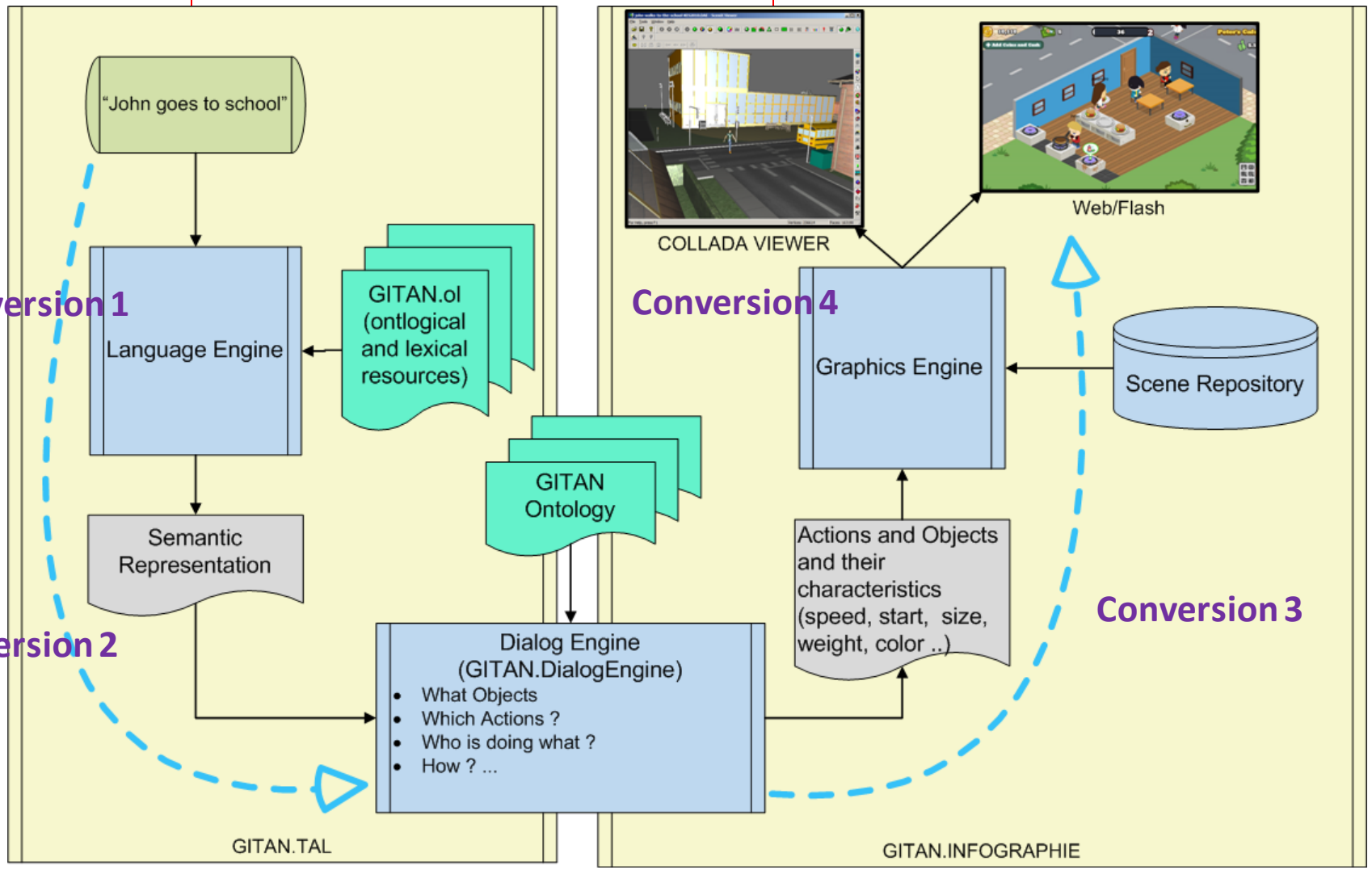
How ?

WARNING ! Things may change during the development phase



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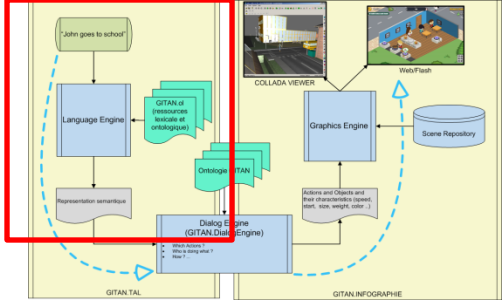
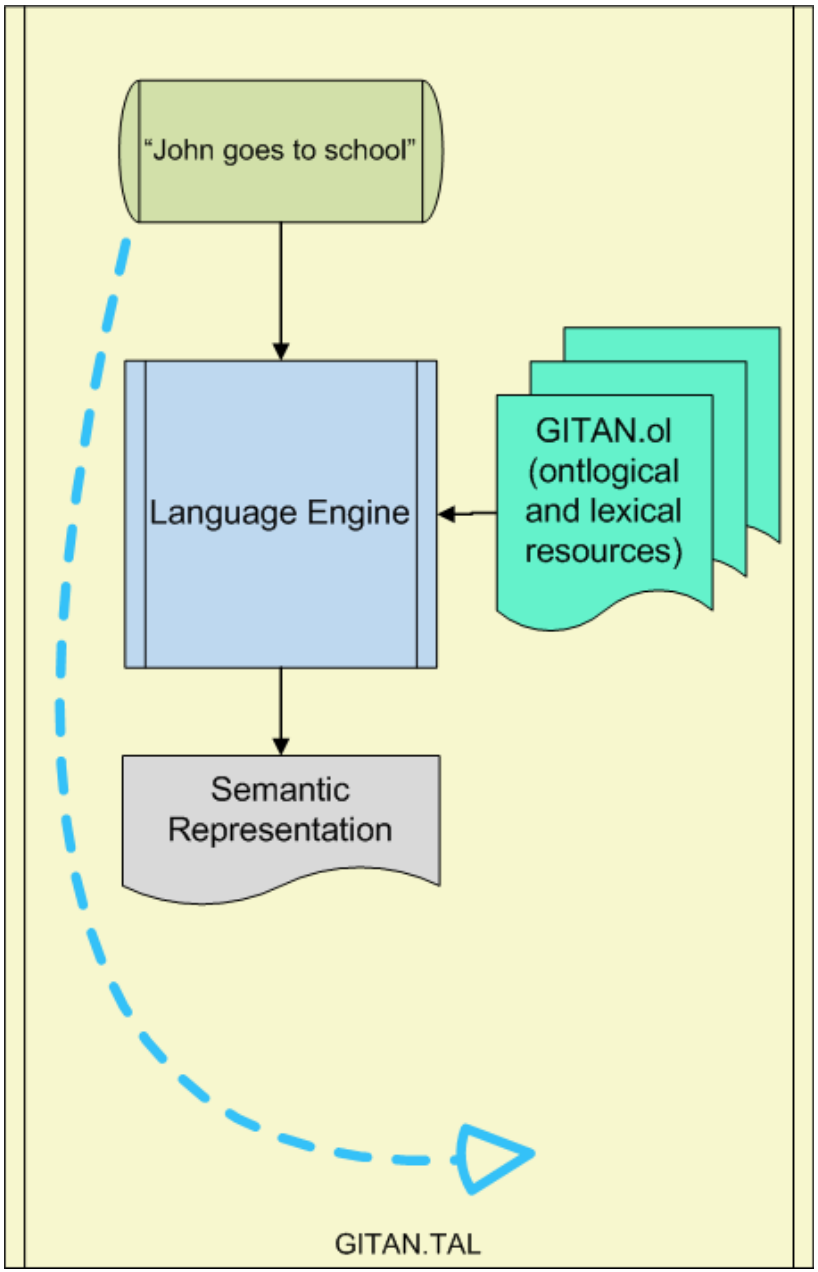
Pipelined architecture

The Language Engine





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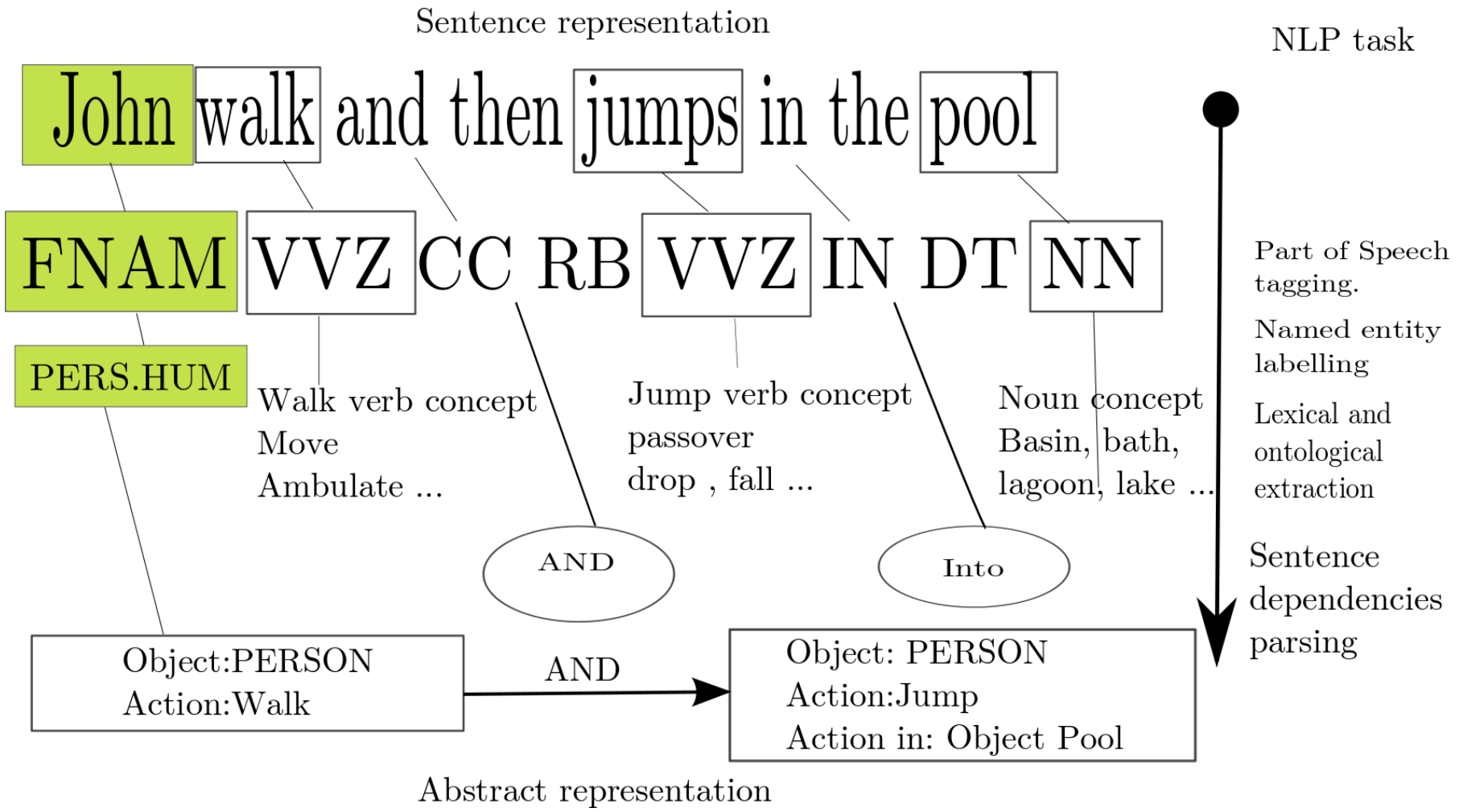
The Language Engine



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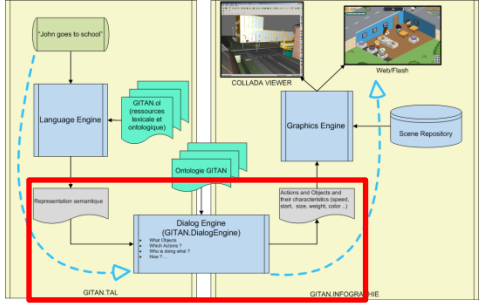
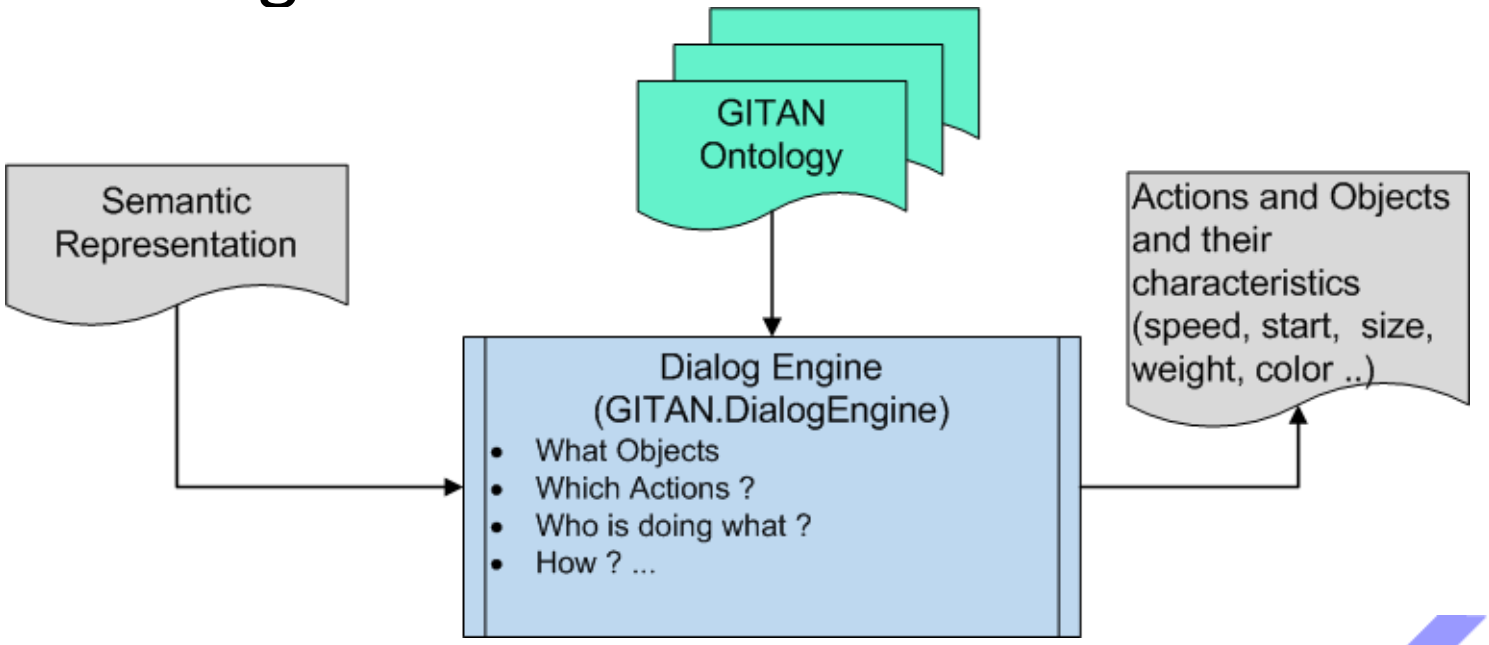
The parts of the Language Engine

The Dialog Engine



- Queries the ontologies and the concepts
- Produces an organized set of rules describing the scene



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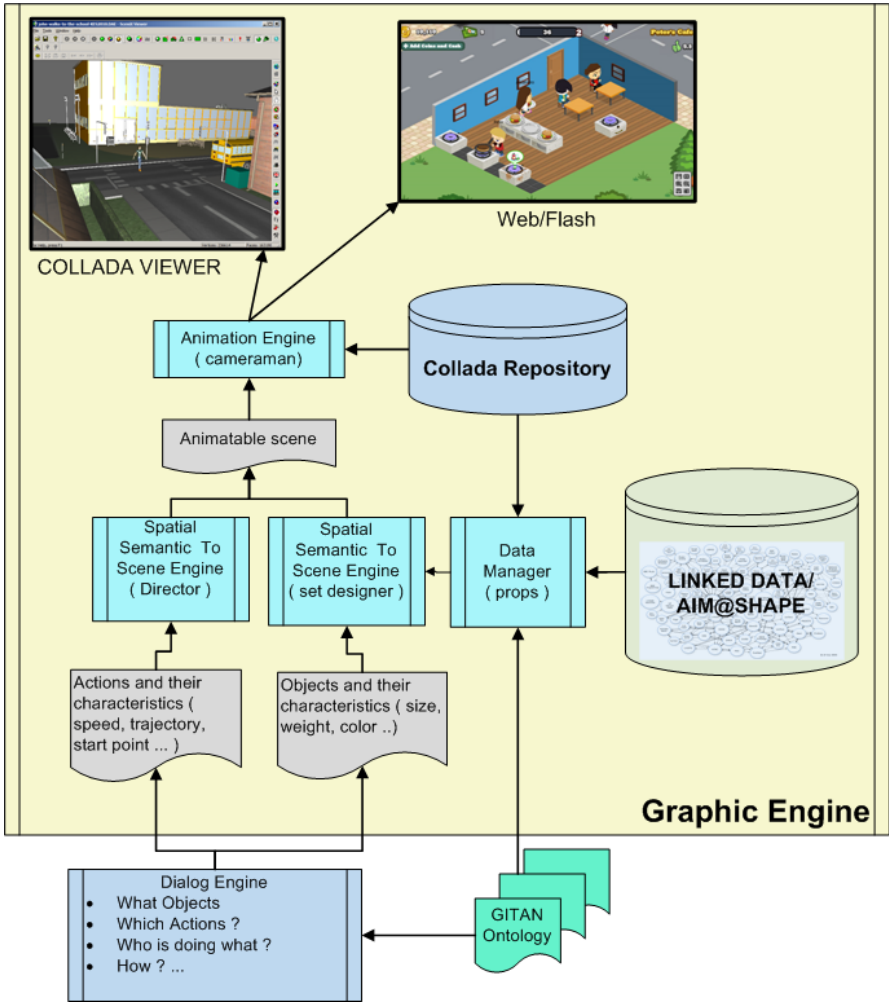
The Dialog Engine : the output text

- Is a textual description of the objects in the scene and their actions
- Makes the links between the Natural Language Processing world and the computer graphics world
- This is Work In Progress

The Graphic Engine

- Processes the results of the Dialog Engine
- Creates the animation displayed in a standard viewer
- Is made of 3 important parts



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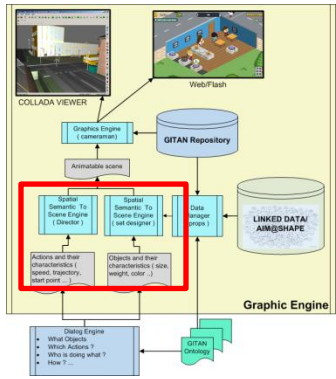
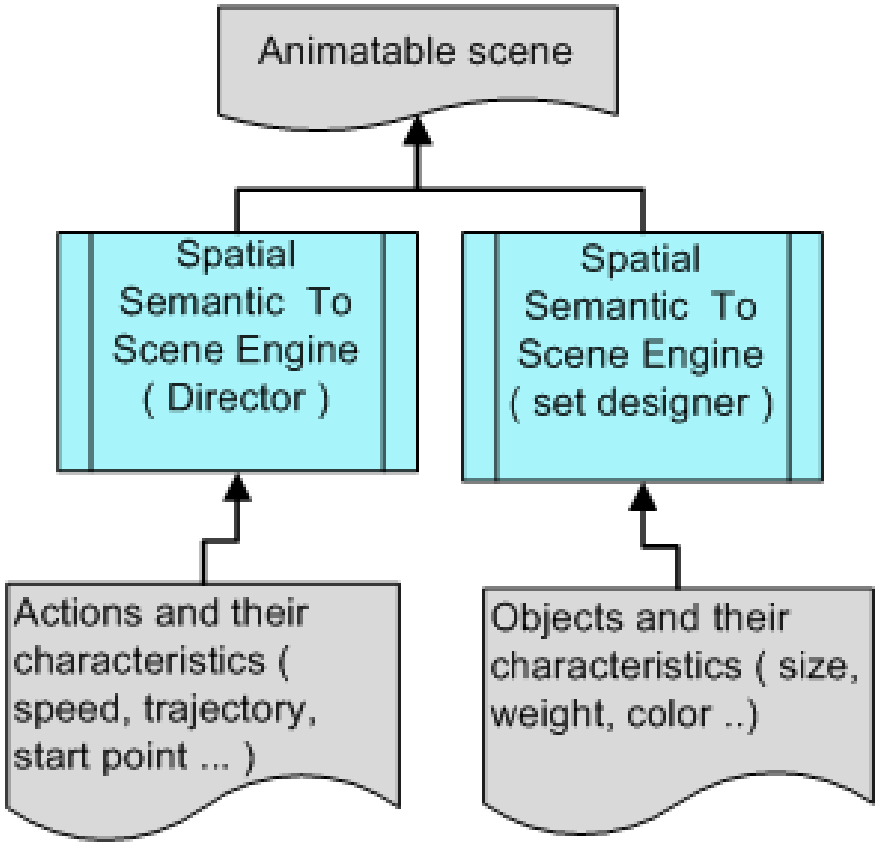
The Spatial Semantic to Scene Engine

- Inserts the proper **geometries** and resolves all collisions issues.
- Implement the **animations**
- Uses ontologies for building a proper scene description (keyframe/transition concept).

The Spatial Semantic to Scene Engine

- Director
- Set Designer





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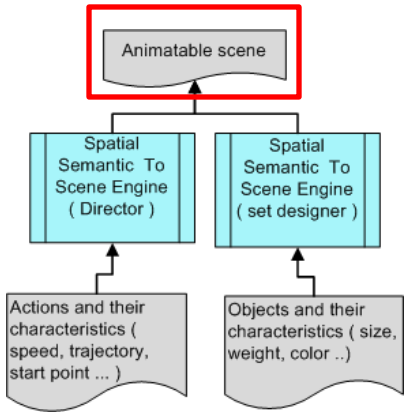
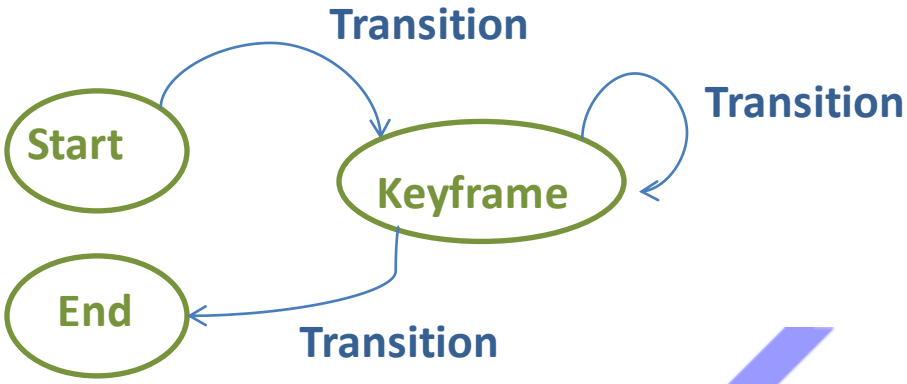
The Animatable scene



- Is the link between the Text To Scene engine and the Graphics Engine
- Defines a high level scene description
- Is Keyframe/Transition based



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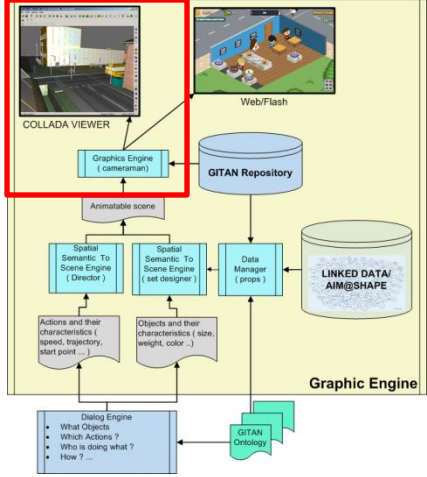
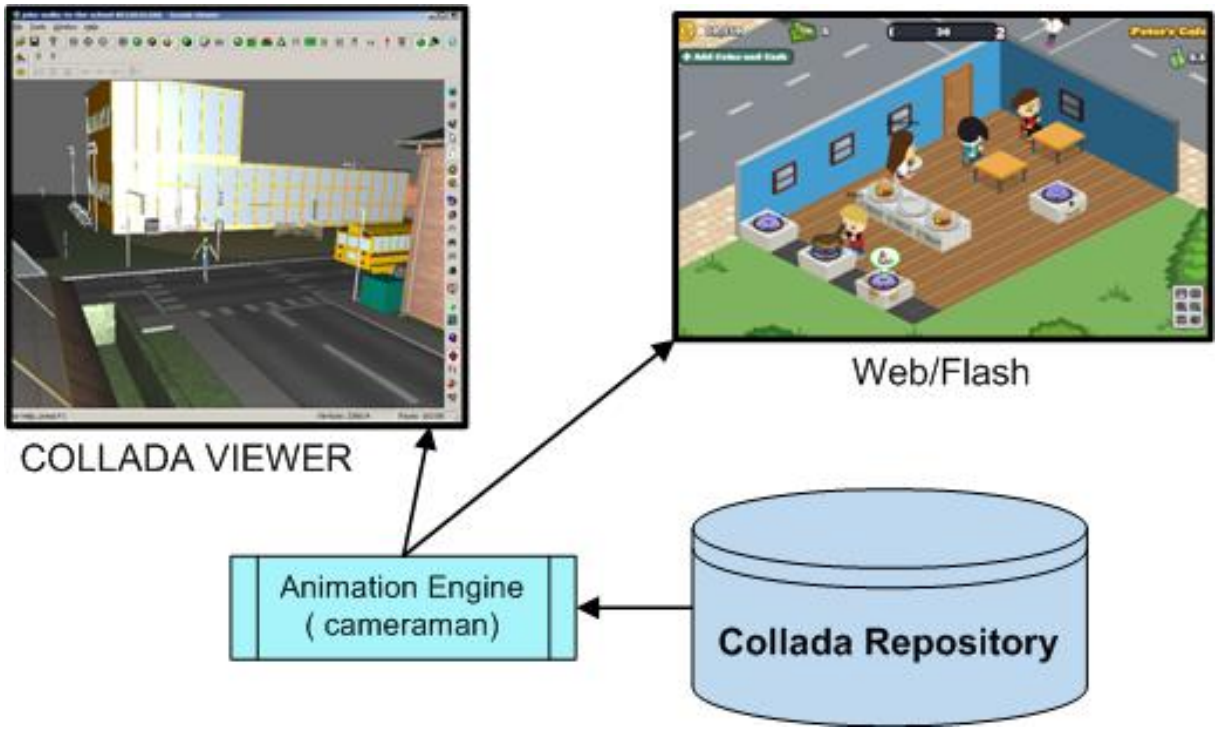
The Animation Engine



- Uses device independent scene description
- Consumes and produces a Collada file



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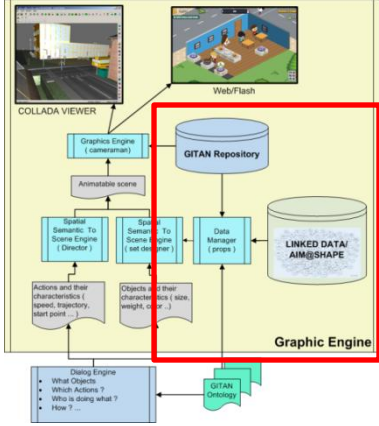
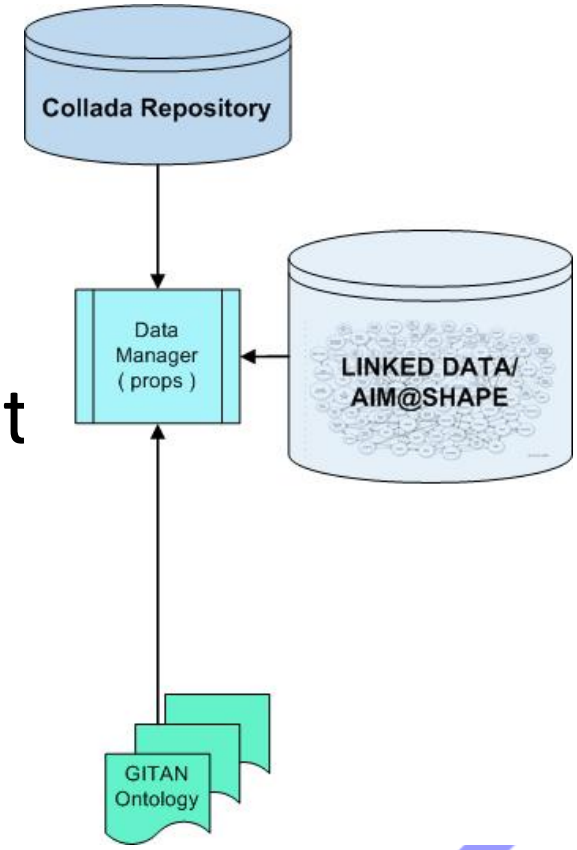
The Data manager

- Named geometries
- Categorized animations
- Minimalistic set of entries
- Connected to the web
- Using the Linked Data concept





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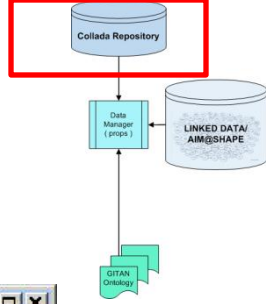
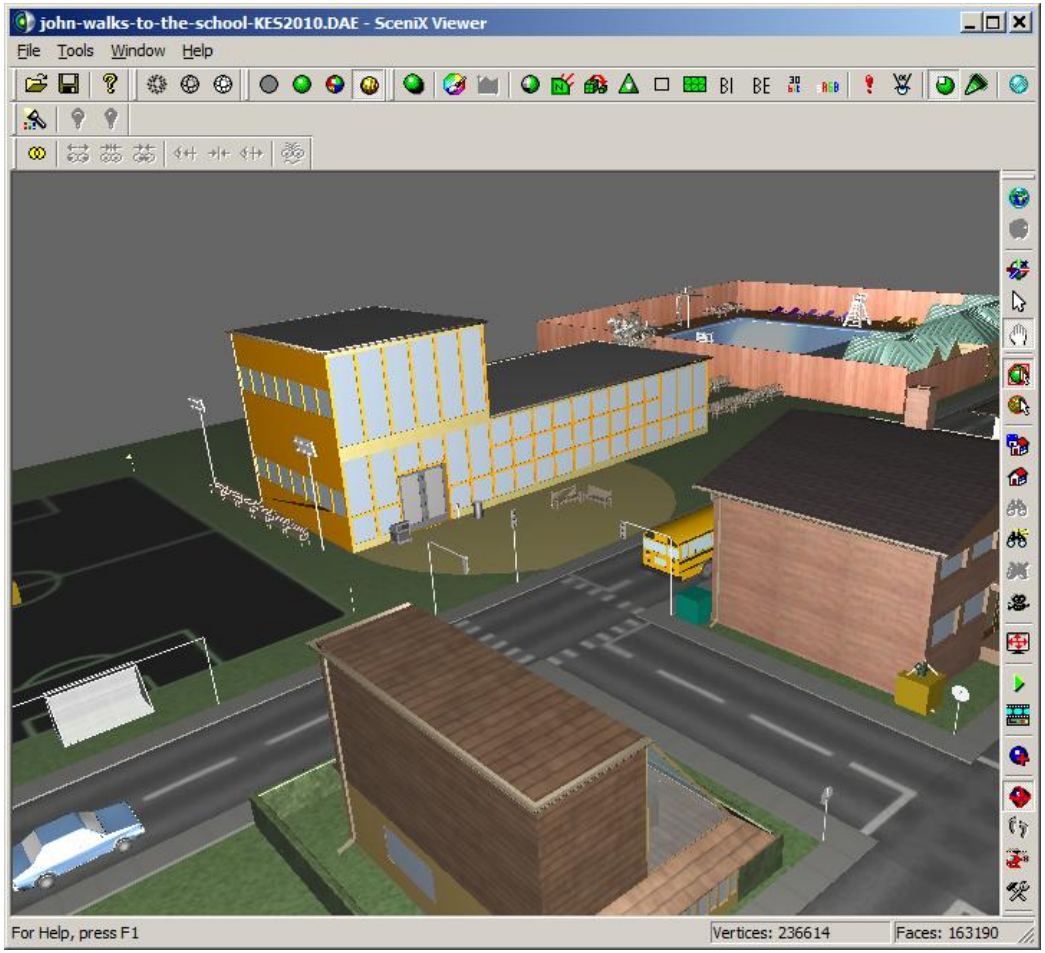
The Collada Repository



- It is a graphical standard file format
- Many software and institutions support it.



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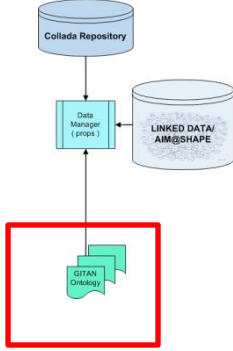
A Collada viewer

Ontologies for GITAN



- “Defines a set of representational primitives with which to model a domain of knowledge or discourse”, Gruber 2009
- Enables knowledge sharing and reuse.
- GITAN will develop its own ontology and anchor it to previous ontologies (GUM, Framenet,...)

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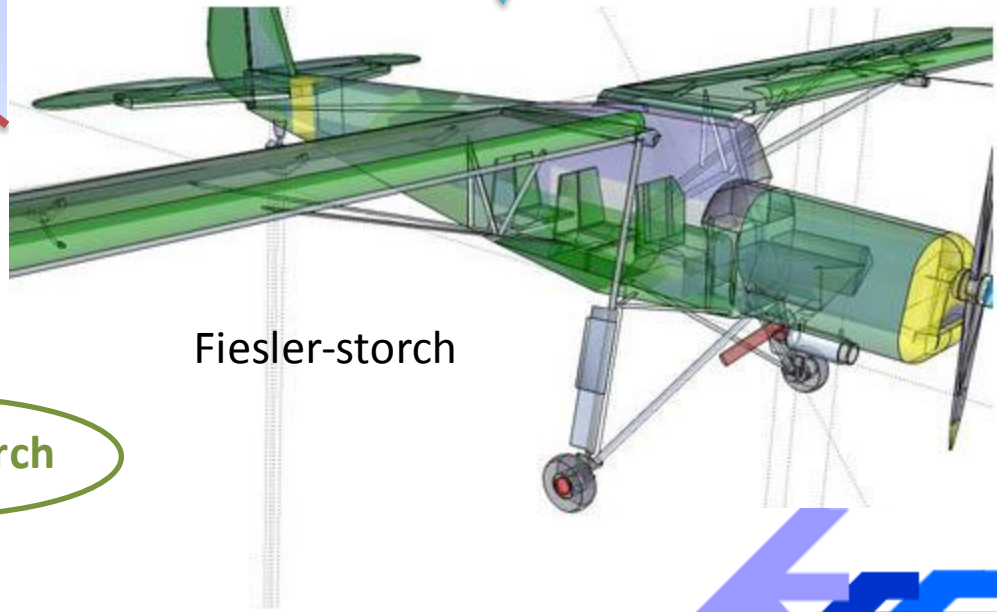
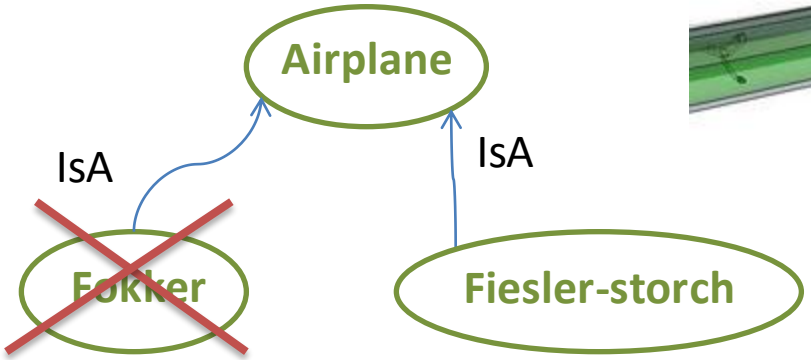
Ontologies in GITAN, an example

Fokker



Fiesler-storch



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Demo: the Animation Engine

- We wanted to make sure that we could compose various animations
- Those are the first tests using hand made animatable scene files

Future work (short term)

- Develop the Dialog Engine. This is key
- Refine the Graphics Engine
- Enrich the repository
- Streamline the production of 3D objects

Future work (long term)

- Anchor the ontology of animation to other ontologies
- Support more than action verbs
- Streamline the geometry production
- Open GITAN to the web

Conclusions

- GITAN will help alleviate the limitations of the text
- We want to provide the community with an animation ontology, which can be applied to many domains
- GITAN has very ambitious goals
- We are not there yet !

Thank YOU and :

- PROMPT (funding agency from the Quebec government)
- UnimaSoft (private company planning to integrate this research in its future releases).

Those slides (and the paper) will be made available on :
http://www.groupes.polymtl.ca/gitan/index.php/fr/publications.html

Questions ? (a ‘Gitan’ is a gipsy in English !)

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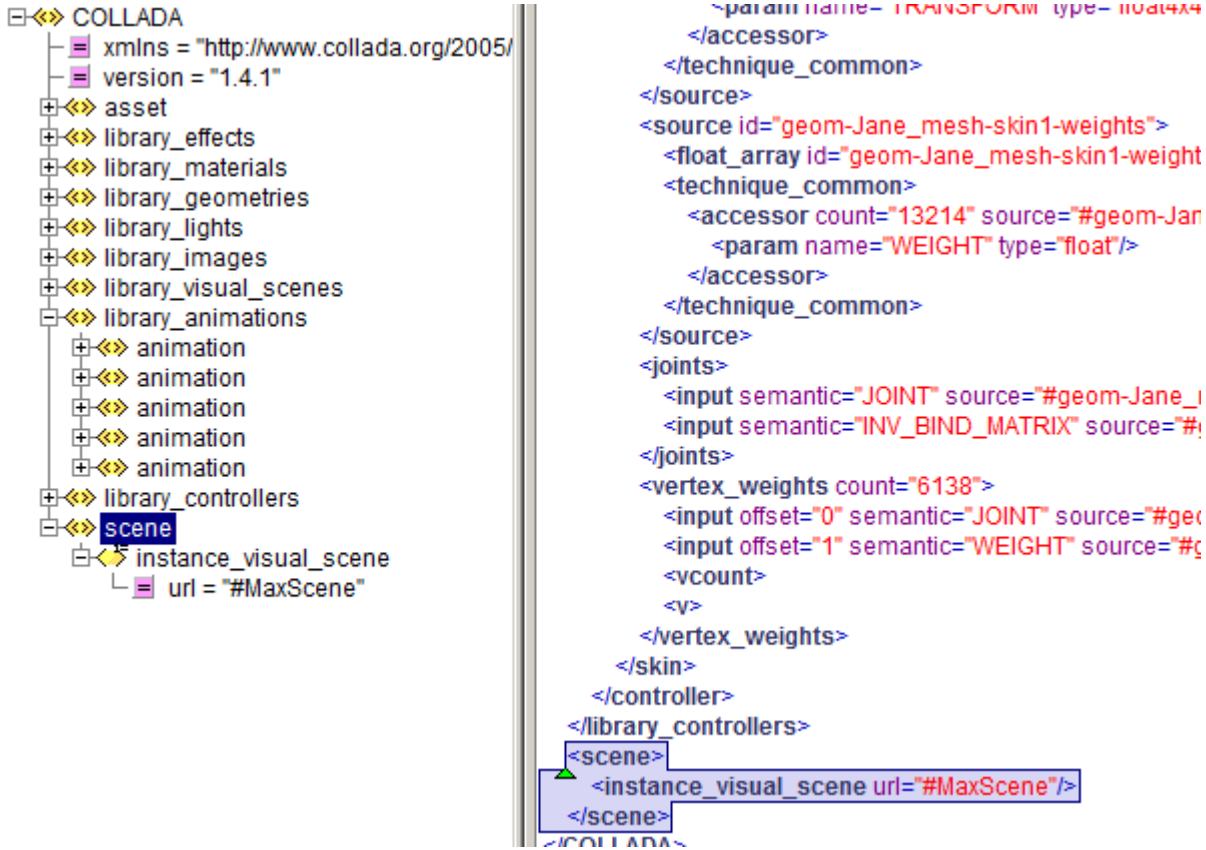
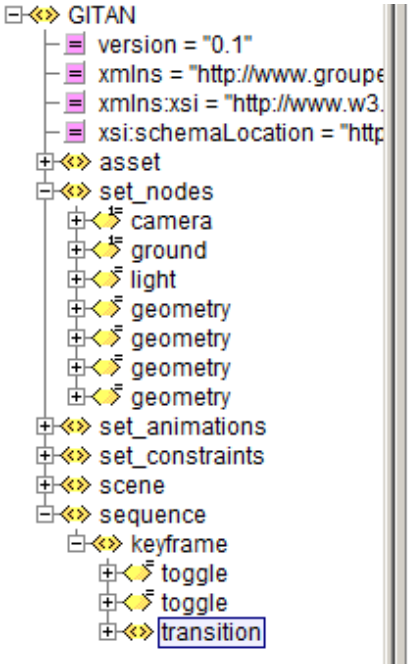
The Graphics Engine

- Parses it and build the Collada file



The Graphics Engine

- Reads in the XML file




```
    <up_axis>Y_UP</up_axis>
  </asset>
  <set_nodes>
    <!-- The lists of nodes used by the scene -->
    <camera id="cam"/>
    <ground id="ground"/>
    <light id="light" type="point"/>
    <geometry id="Point01" scale="1.0" uri="C:\svn\recherche\infographie\Ricardo\GITAN_ENGINE\GitanEngine\magasin_points.dae"/>
    <geometry id="jane" scale="1.0" uri="C:\svn\recherche\infographie\prototype\modeles\Jane\jane_boucle_de_marche.dae"/>
    <geometry id="Point02" scale="1.0" uri="C:\svn\recherche\infographie\Ricardo\GITAN_ENGINE\GitanEngine\magasin_points.dae"/>
    <geometry id="Point03" scale="1.0" uri="C:\svn\recherche\infographie\Ricardo\GITAN_ENGINE\GitanEngine\magasin_points.dae"/>
  </set_nodes>
  <set_animations>
    <!-- The lists of animations used by the sequence -->
    <!-- Assigns a predefined Collada animation to the given node. -->
    <animation id="walk-cycle" looping="true" node="jane" type="activity">
      <param name="uri">TBD</param>
    </animation>
    <!-- Characterizes the displacement of the node 1 between the 2 keyframes by giving   it a trajectory and a relative speed factor.-->
    <animation id="translate" looping="false" node="jane" type="displacement">
      <param name="trajectory">nodeAvoidance</param>
      <param name="speed">4</param>
```