Creating simulations for tablets using Easy Java(script) Simulations
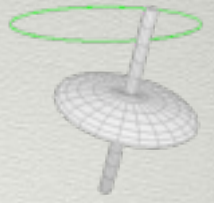
Francisco Esquembre and Félix J. García
Universidad de Murcia, Spain

18° International Conference on
MPTL
madrid   UNED

UNIVERSIDAD DE
MURCIA

Reference to one of TED talks...

Reference to one of TED talks...

Reference to one of TED talks...

www.ted.com/talks

Reference to one of TED talks...

www.ted.com/talks

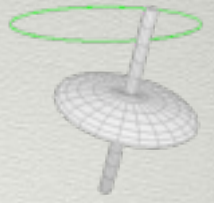TED Ideas worth spreading

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11 talks (Curated by TED)

1. Ken Robinson: How schools kill creativity — 19:24
   Show details

2. David Gallo: Underwater astonishments — 05:27
   Show details

3. Sarah Kay: If I should have a daughter ... — 18:28
   Show details

4. Hans Rosling: The best stats you've ever seen — 19:50
   Show details

5. Chimamanda Ngozi Adichie: The danger of a single story — 18:49
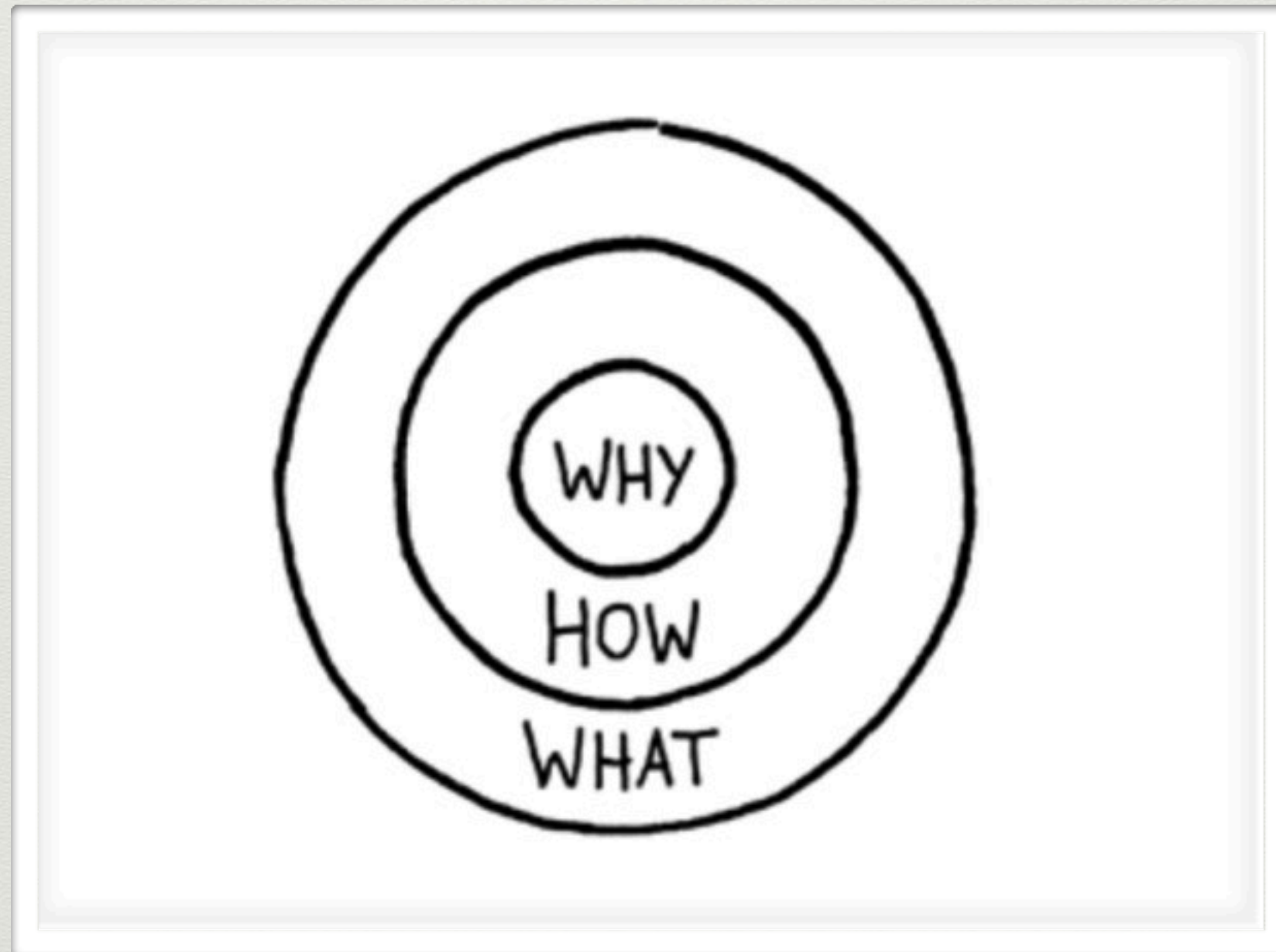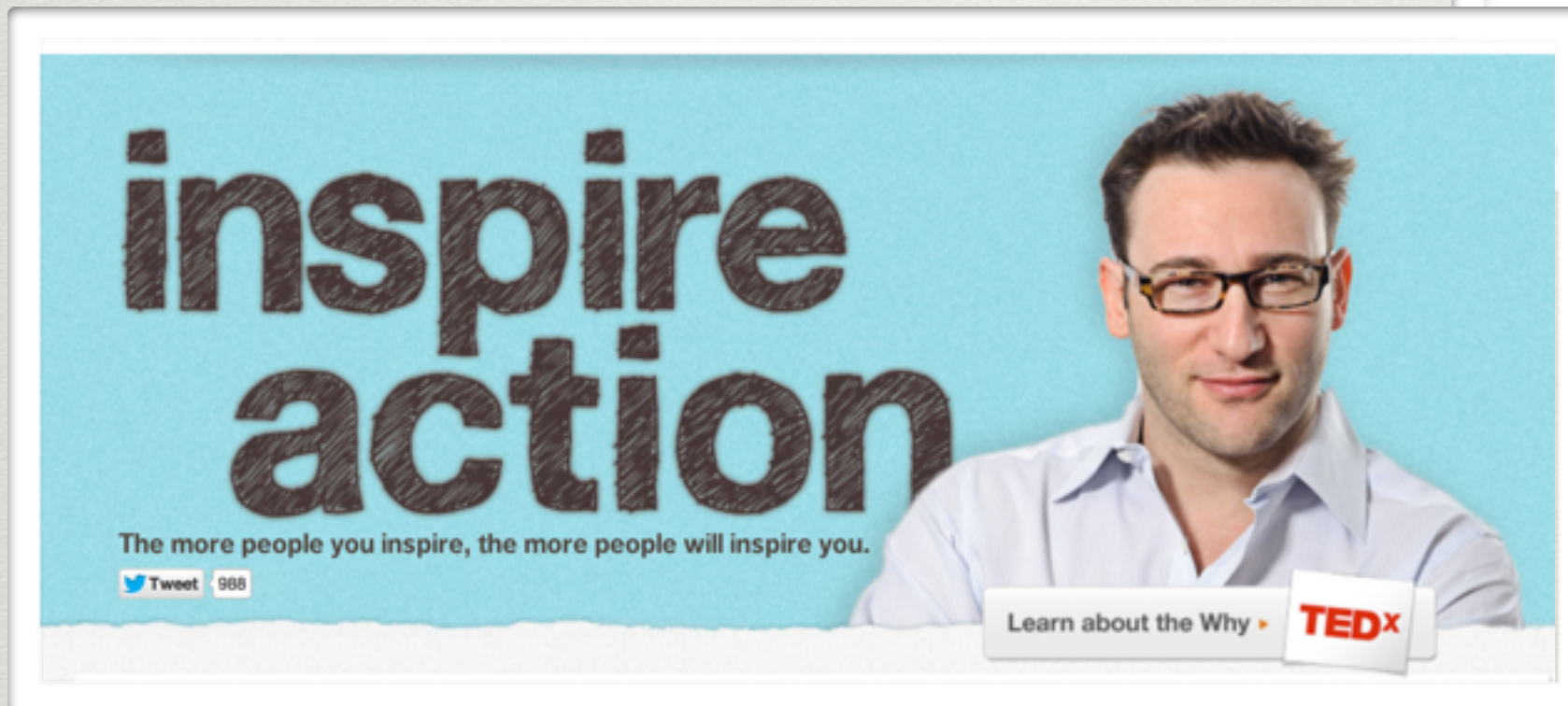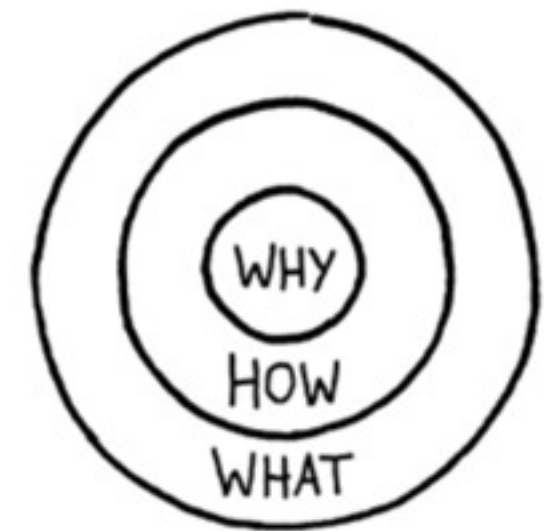   Show details

Start with "why?"
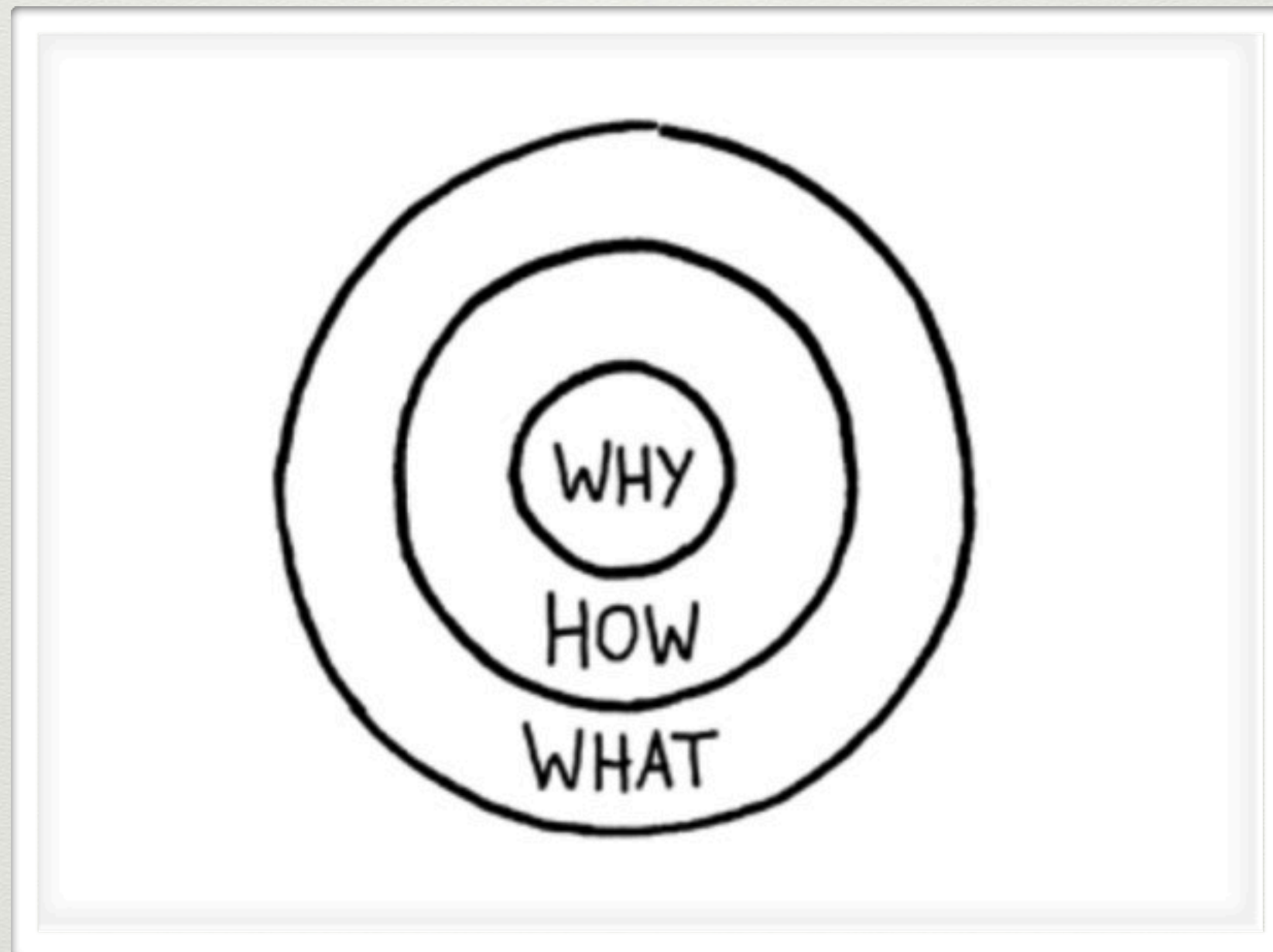
The Golden Circle

Start with "why?"

startwithwhy.com

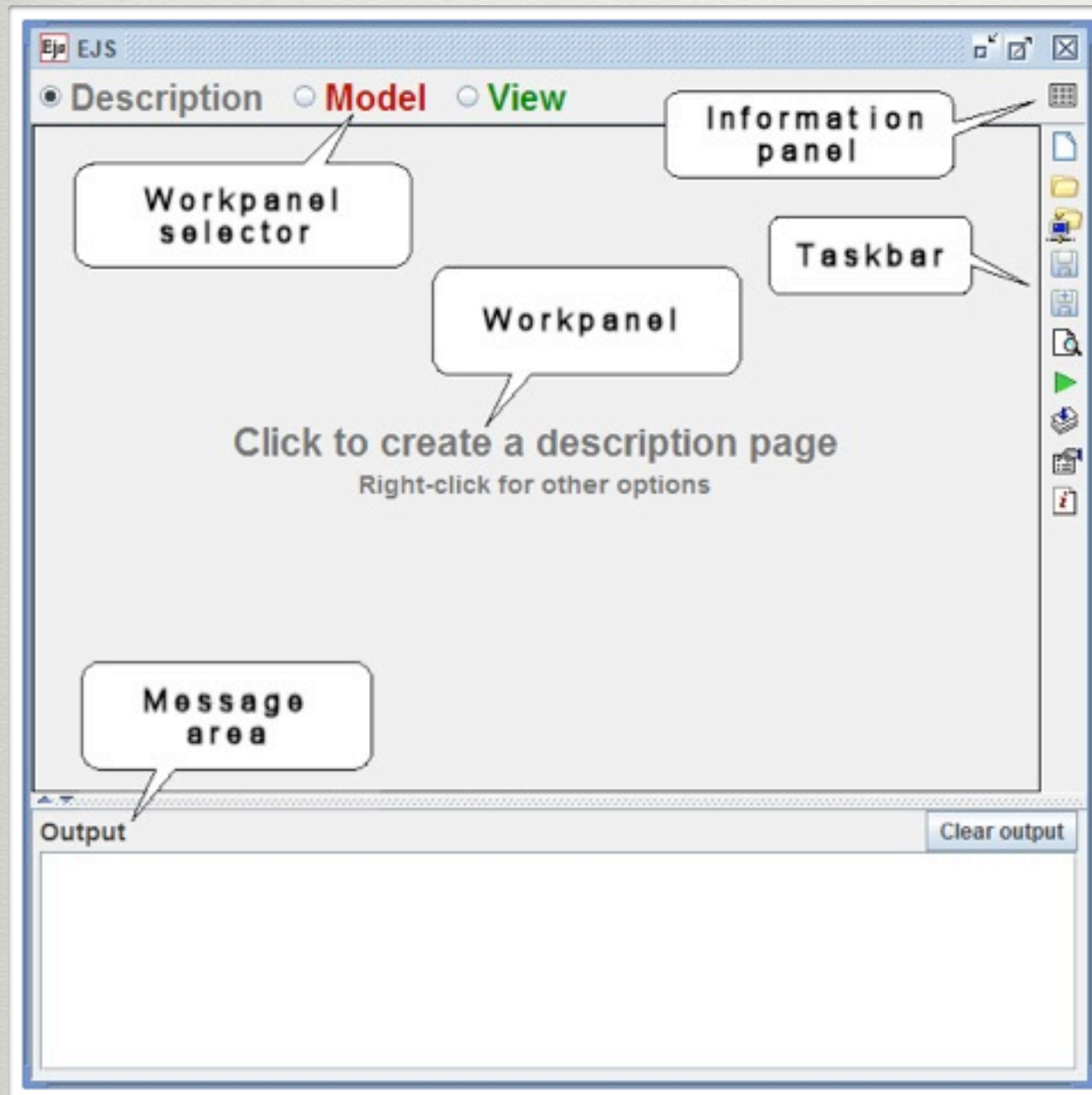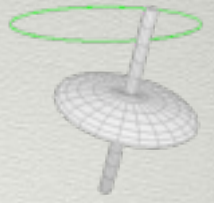# Start with "why?"

The Golden Circle

Contents of the talk

- The reason behind Easy Java Simulations

- Evolution of the idea (past, present, and future)

- Creating Java simulations with EJS 5

- Creating Javascript simulations with EJS 5

- Creating hybrid (Java+HTML) simulations with EJS 5

- Running simulations on tablets and smart phones (iBooks, ePubs and the Reader App)
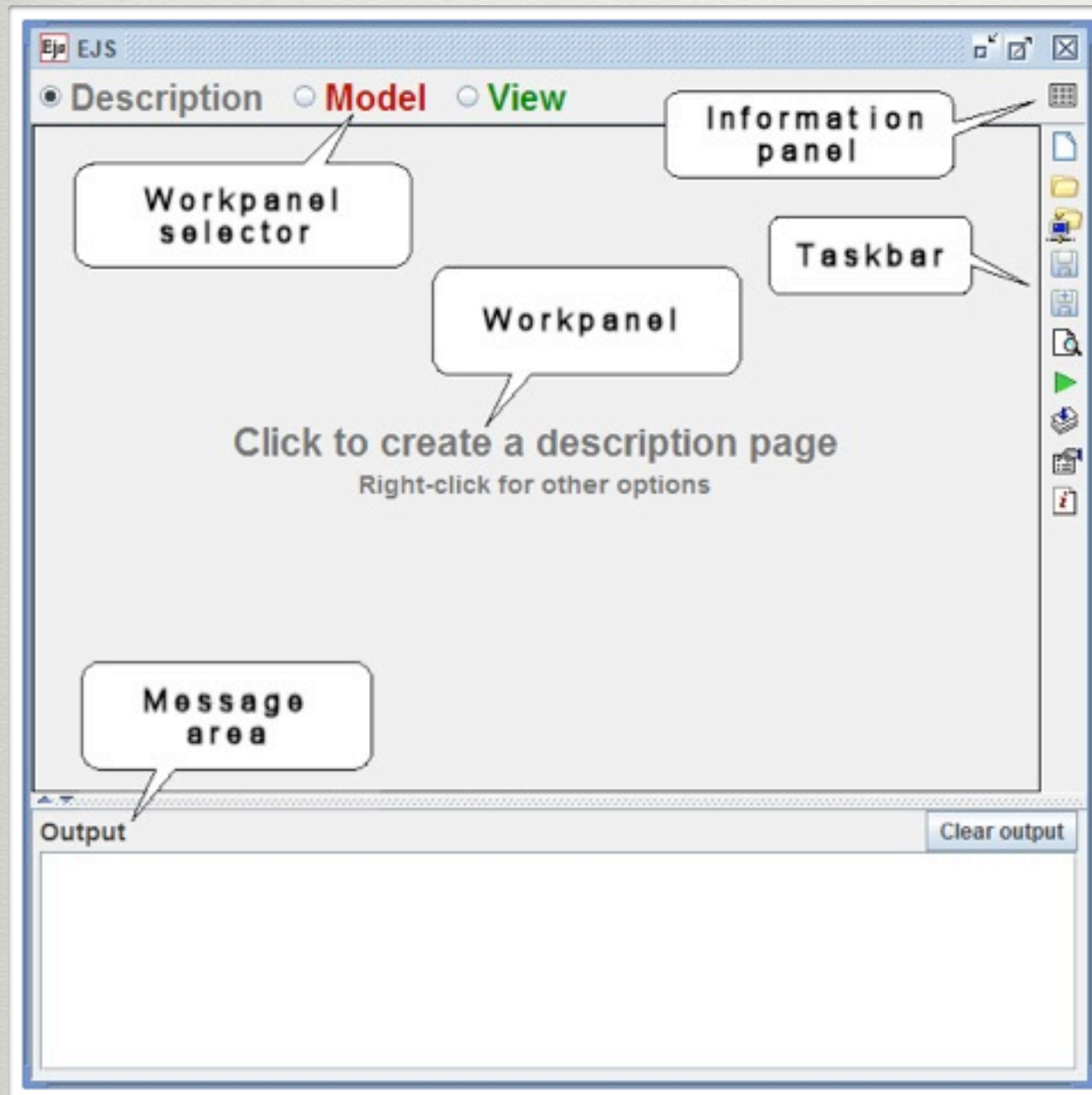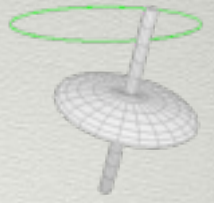
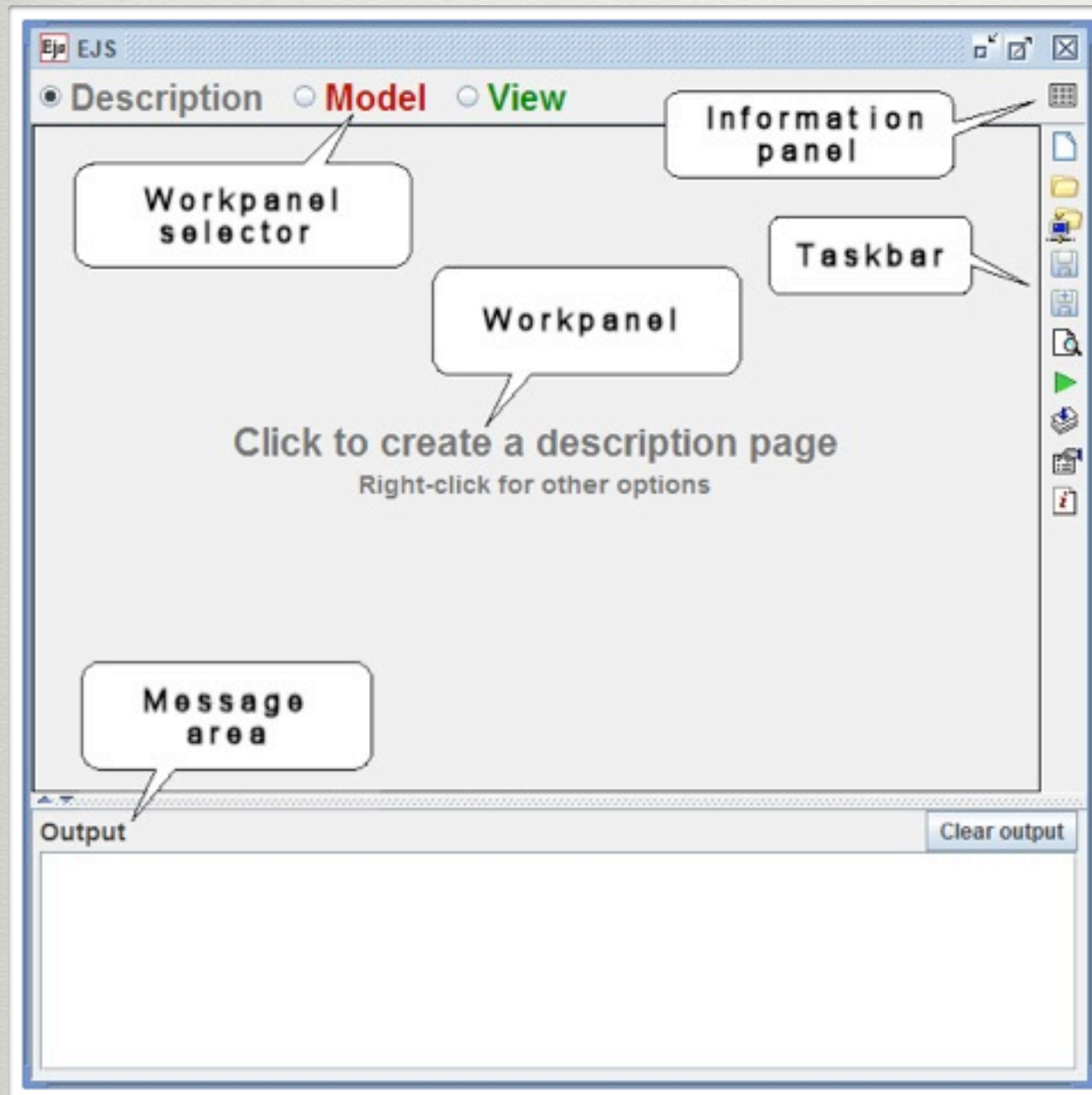- Copyright and licensing

The reason behind EJS
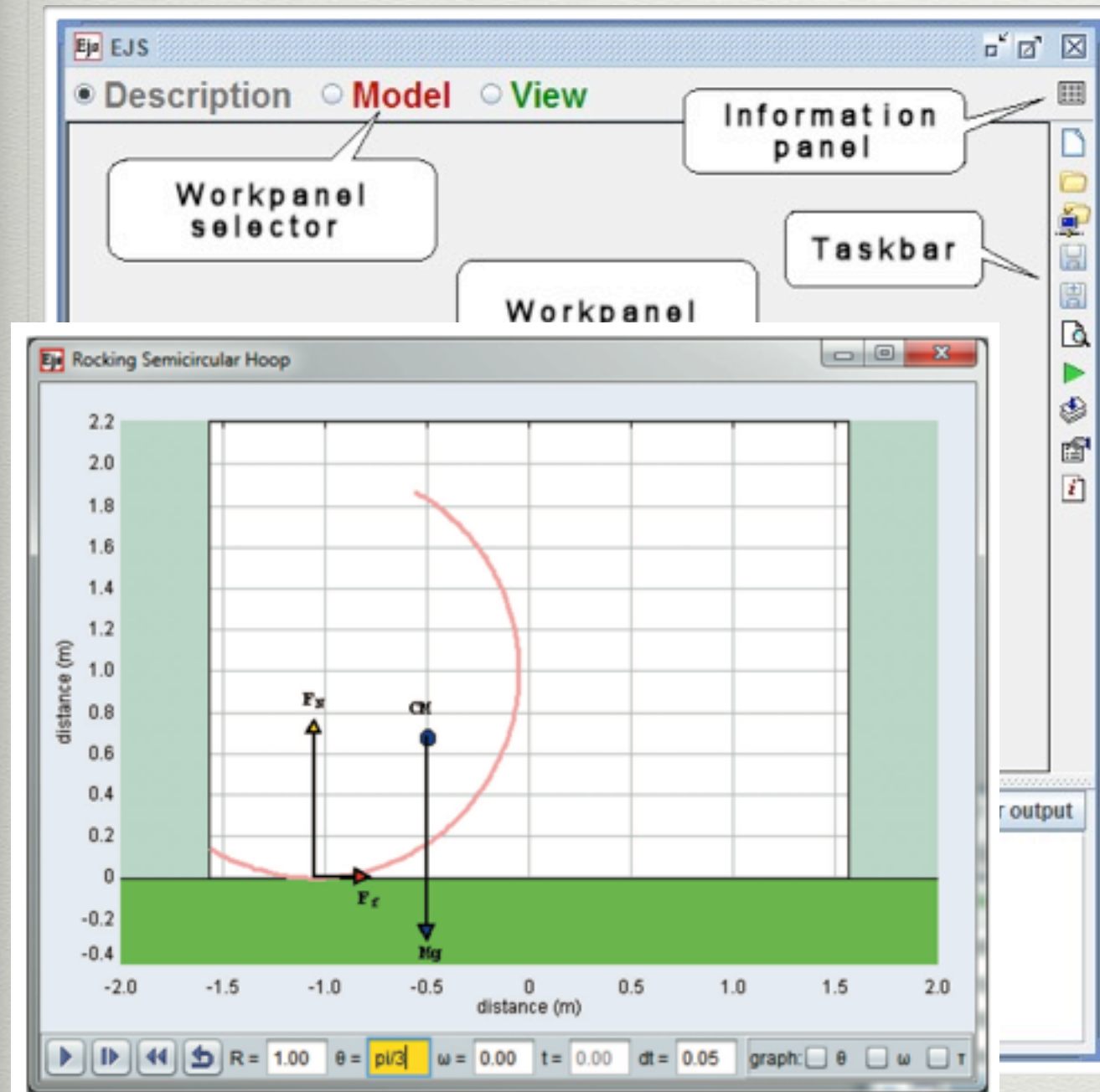
The reason behind EJS

The reason behind EJS

The reason behind EJS

The reason behind EJS

The reason behind EJS

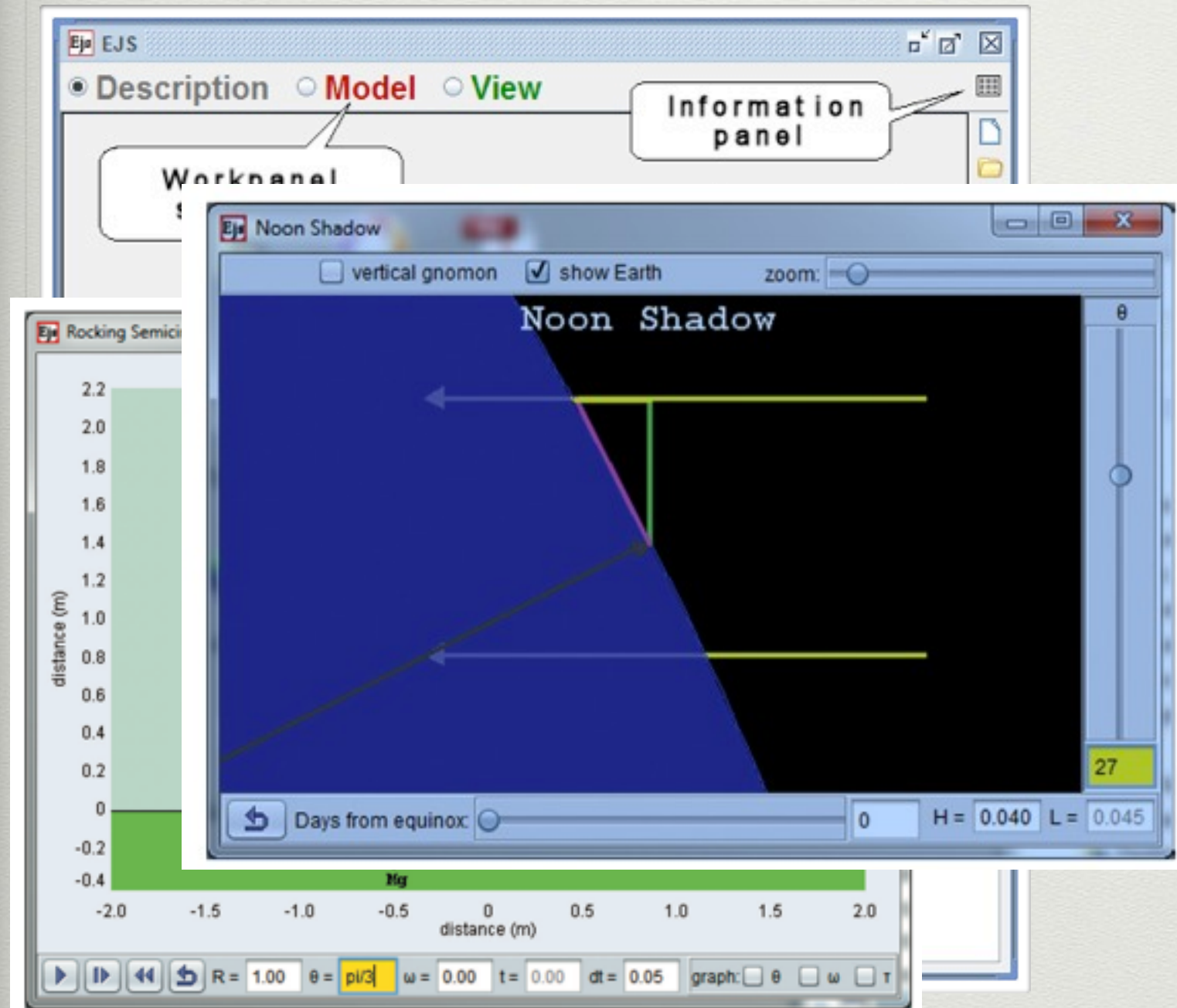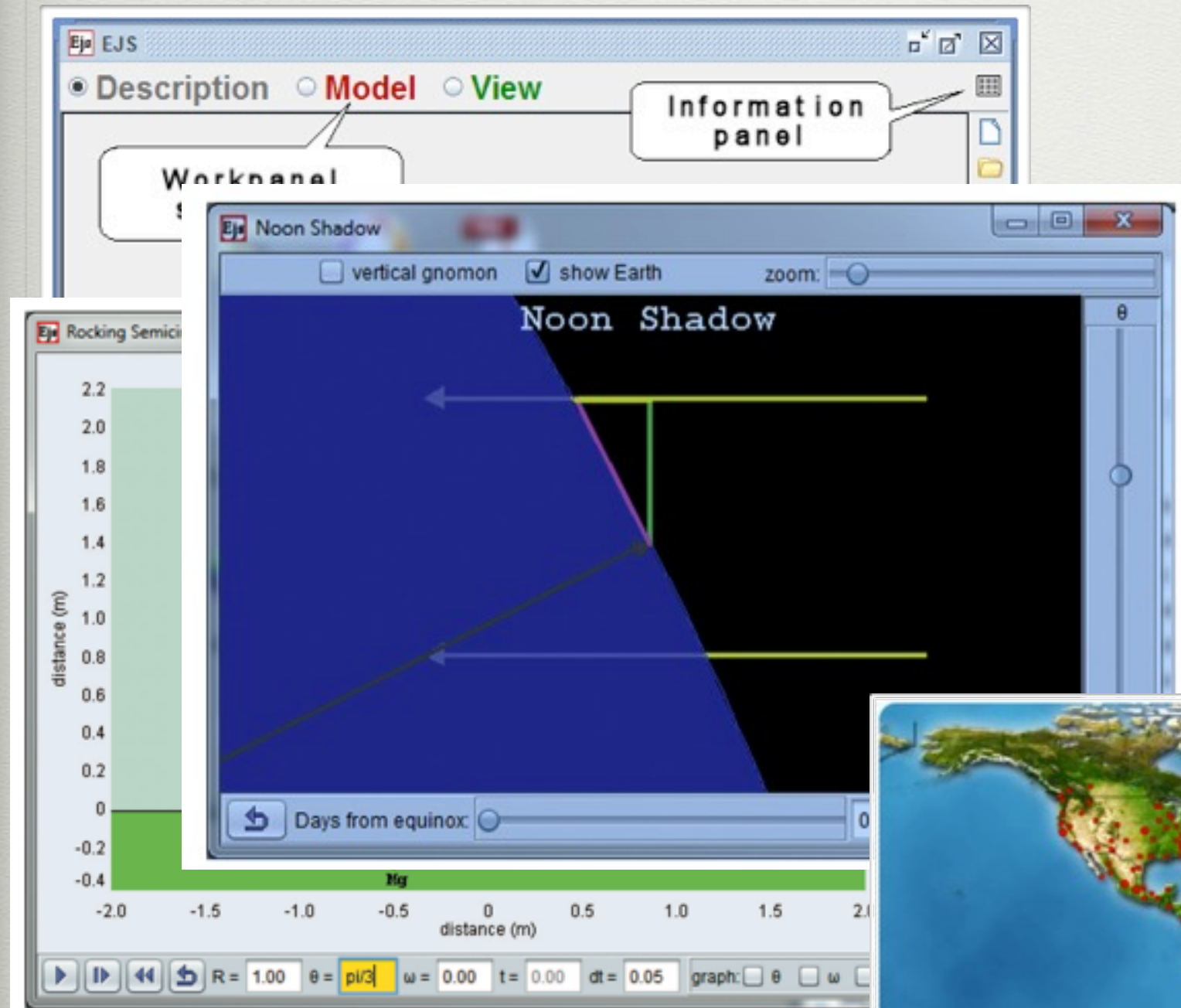# The reason behind EJS

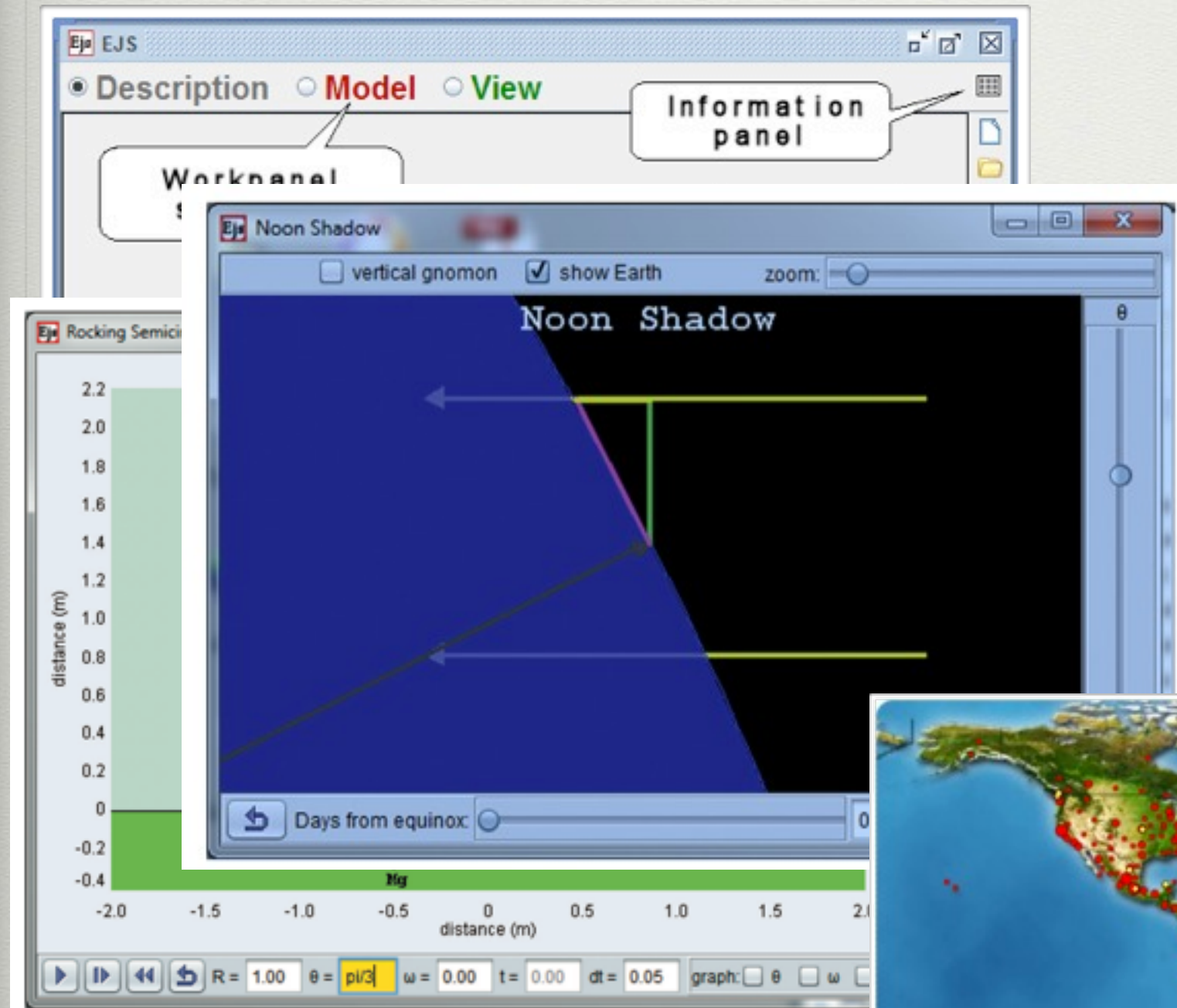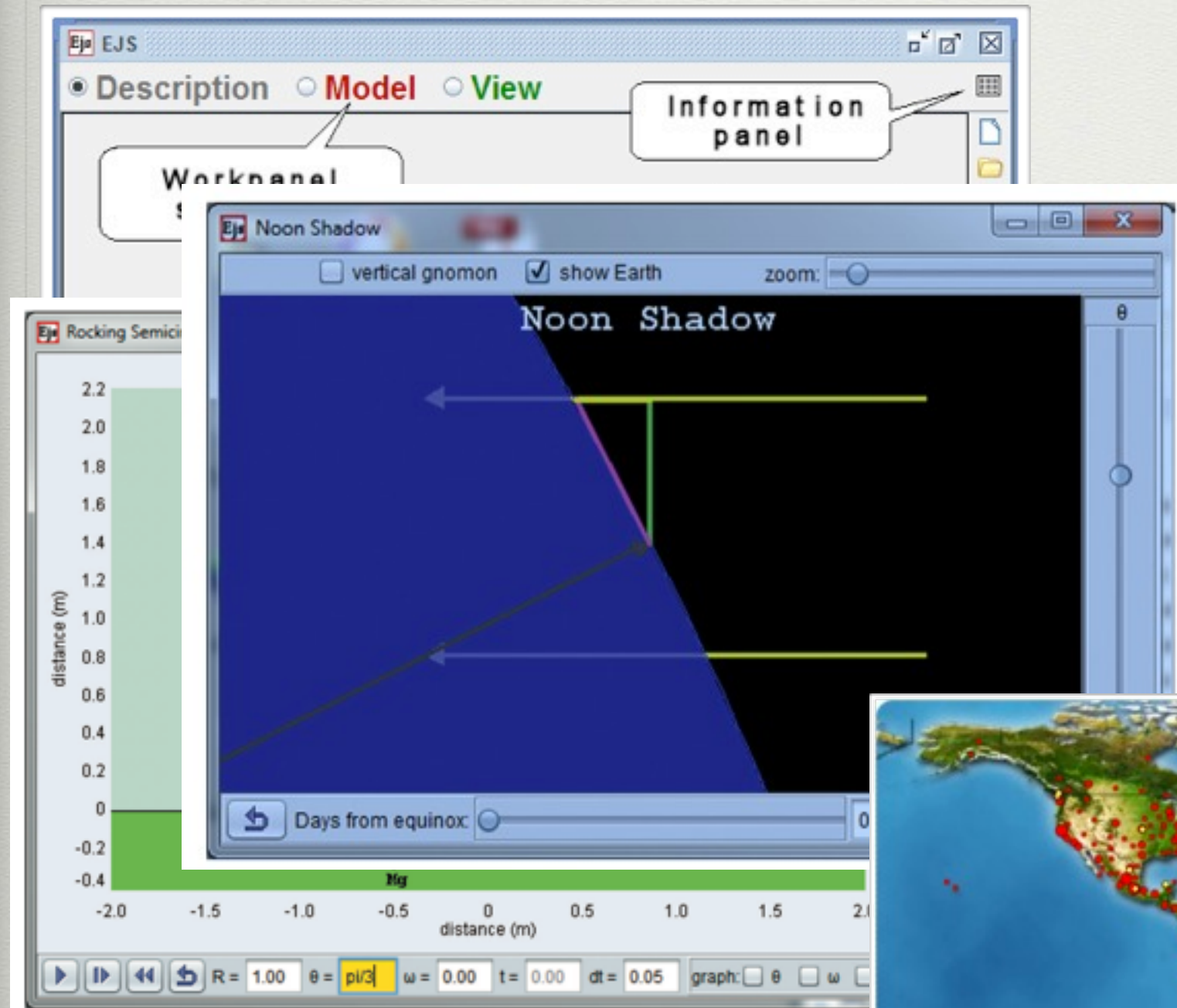# The reason behind EJS

The reason behind EJS

The reason behind EJS
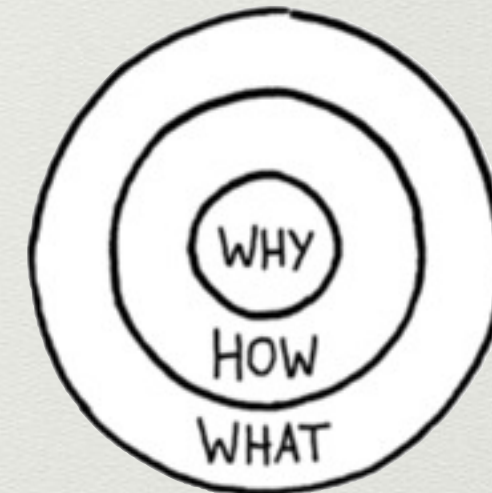
The reason behind EJS
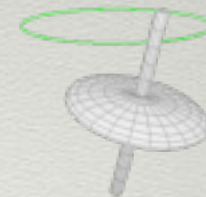
Computers can really improve education…

The reason behind EJS

Computers can really improve education...

...but only if used appropriately.

MPTL

The reason behind EJS

Computers can really improve education...

...but only if used appropriately.

EJS is agnostic...

MPTL

The reason behind EJS

Computers can really improve education...

...but only if used appropriately.

EJS is agnostic...

...but I am NOT!

The reason behind EJS

I believe in Interactive Engagement

The reason behind EJS

I believe in Interactive Engagement

Interactive Engagement (IE) is achieved by questioning students or challenging them to think or to do something that requires thought. Students interact with each other, with the instructor as a coach or guide, or with guided materials created by the instructor (on paper or computer). A key ingredient is frequent and thoughtful interaction.

(First entry in a Google search: http://serc.carleton.edu/introgeo/models/IntEng.html)

The reason behind EJS

I believe in Interactive Engagement

Interactive Engagement (IE) is achieved by questioning students or challenging them to think or to do something that requires thought. Students interact with each other, with the instructor as a coach or guide, or with guided materials created by the instructor (on paper or computer). A key ingredient is frequent and thoughtful interaction.

(First entry in a Google search: http://serc.carleton.edu/introgeo/models/IntEng.html)

I believe because I have experienced the validity of IE myself, with myself. You may call it "a vision"!

9

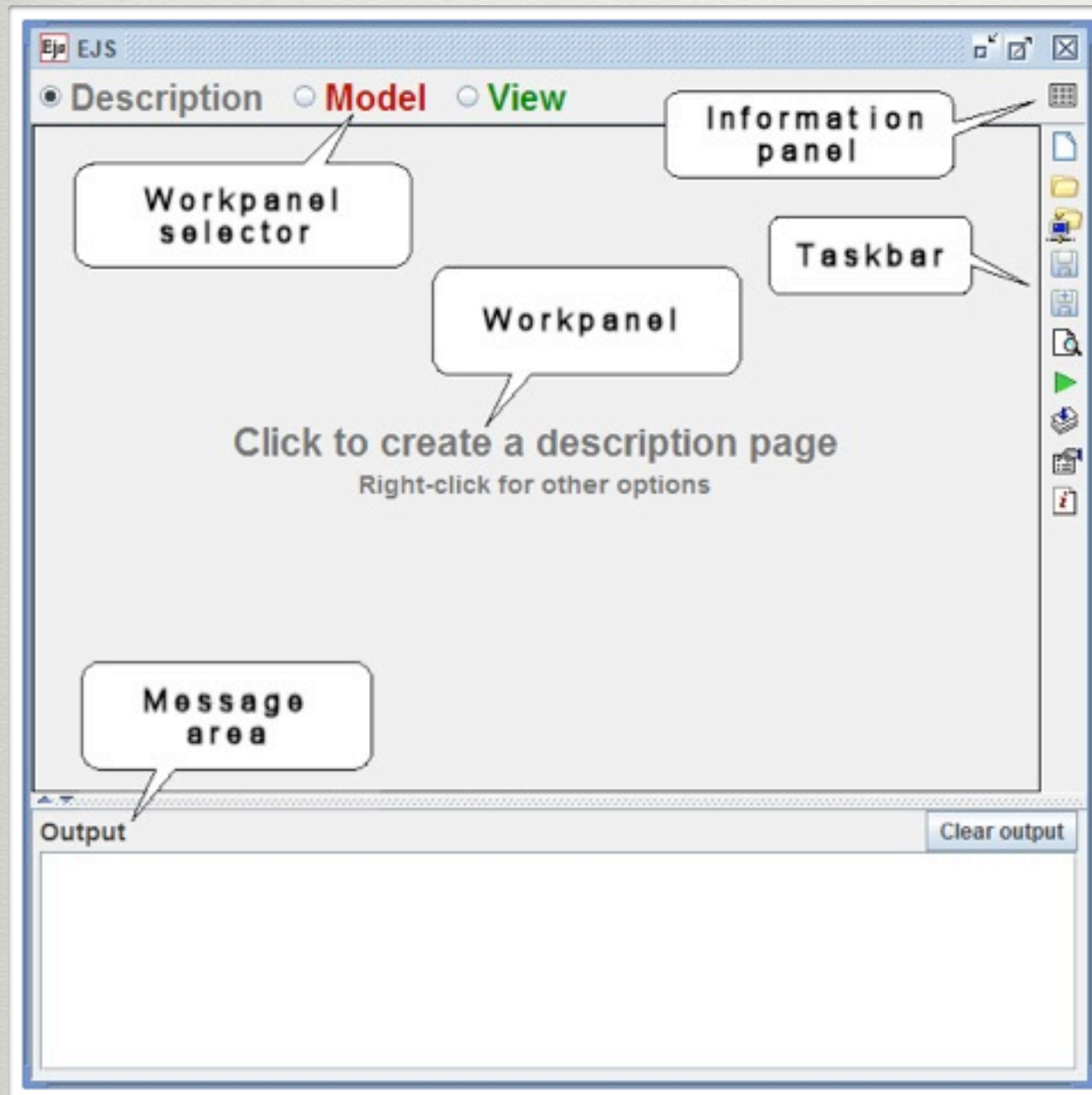# The reason behind EJS

Two scenarios:

- **Teachers can create IE activities by creating simulations.**

- **Modeling can involve students in IE activities.**

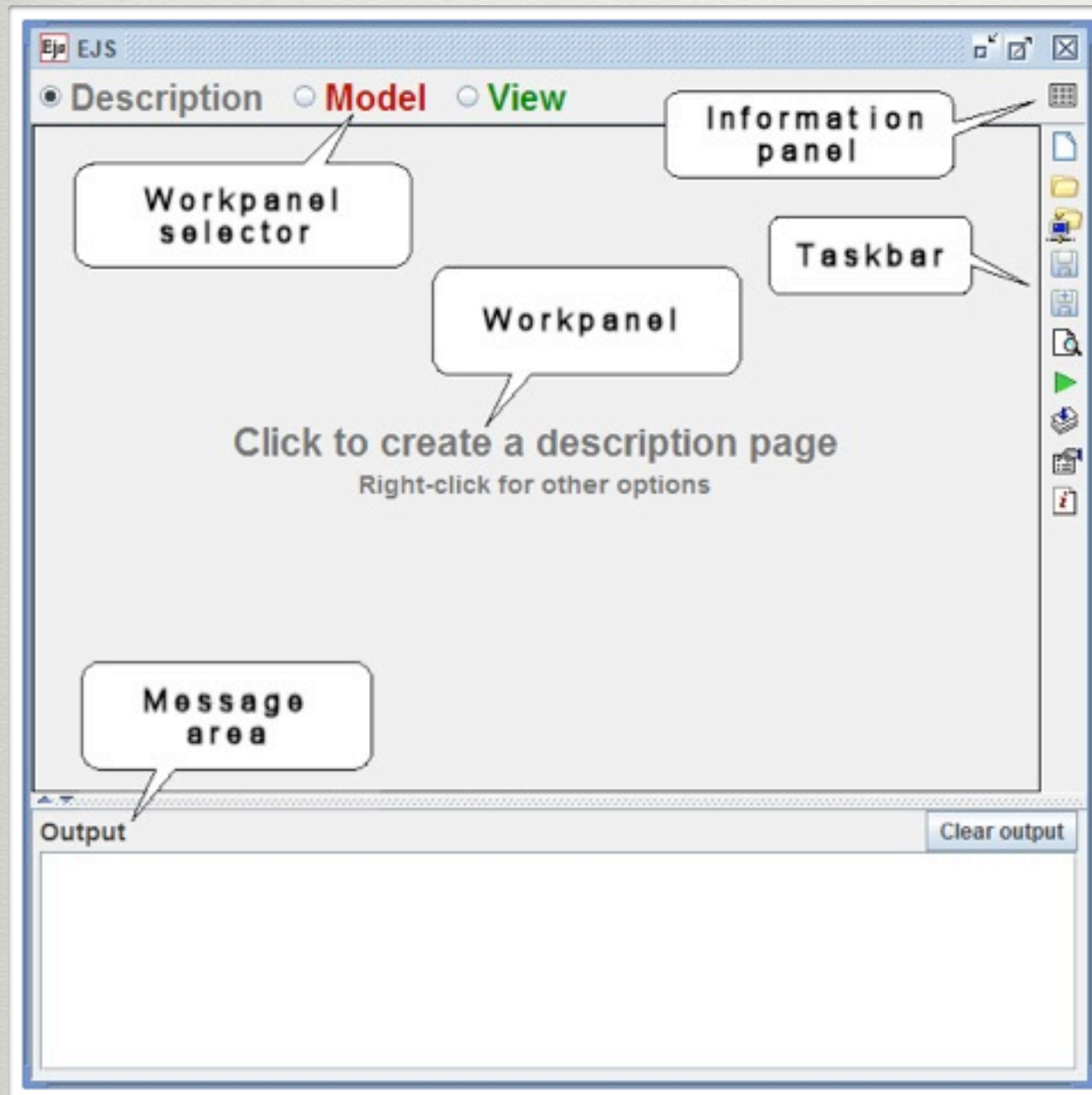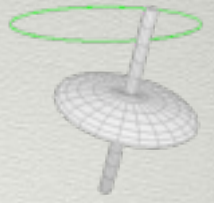Teachers need a good tool for both scenarios.
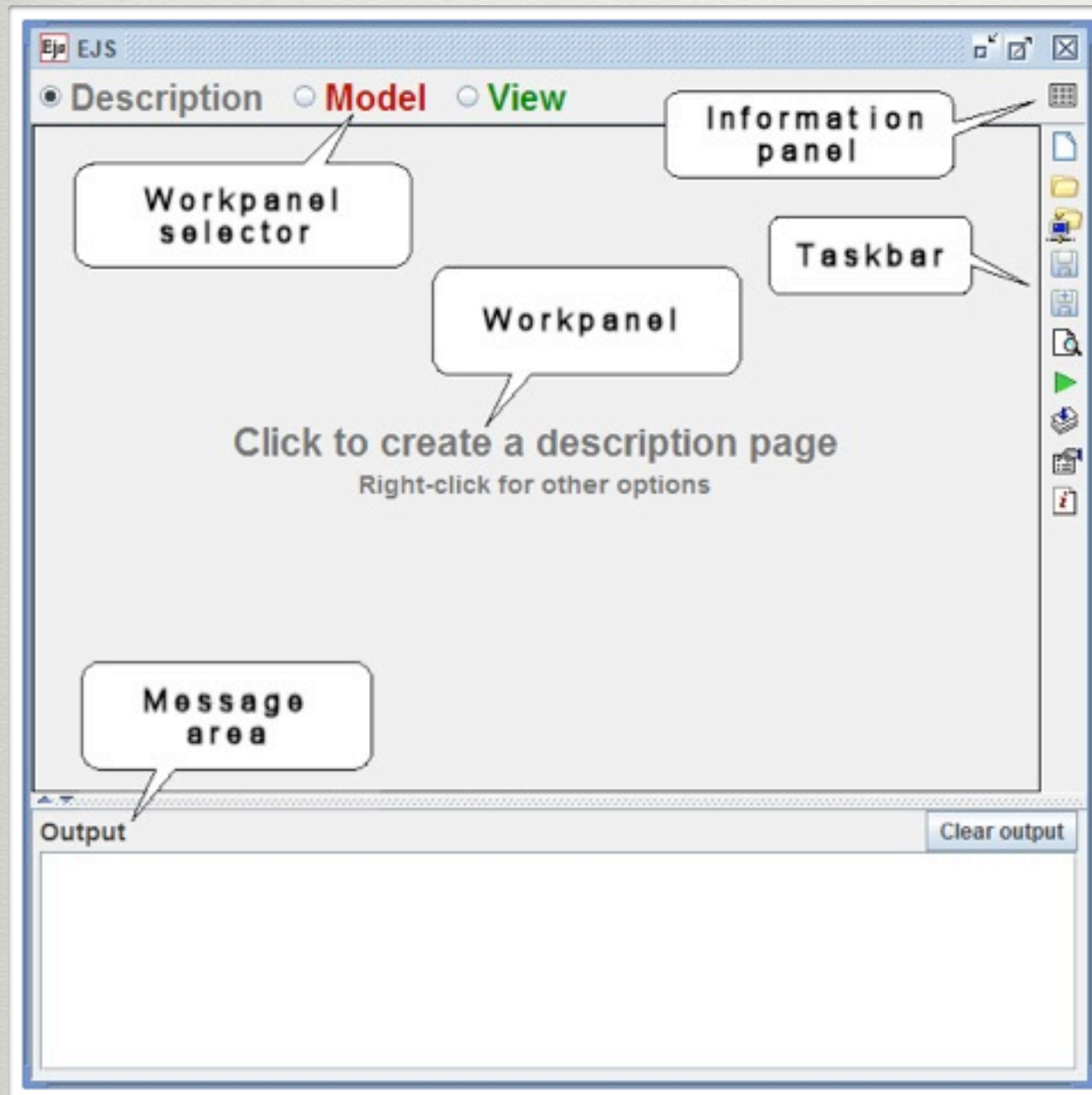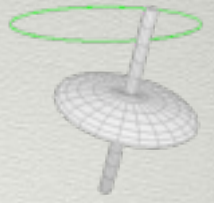
The reason behind EJS
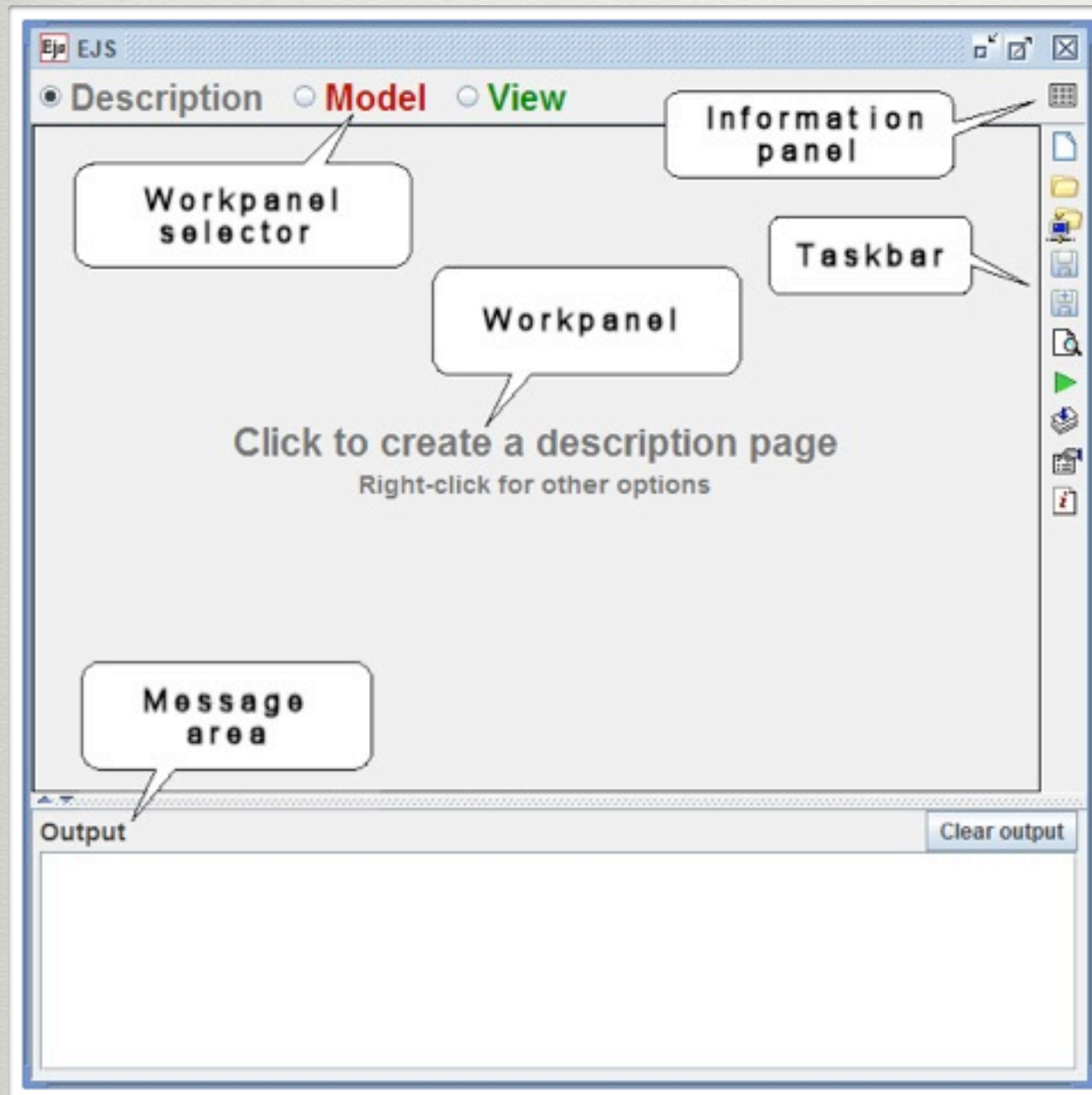
The reason behind EJS

The reason behind EJS

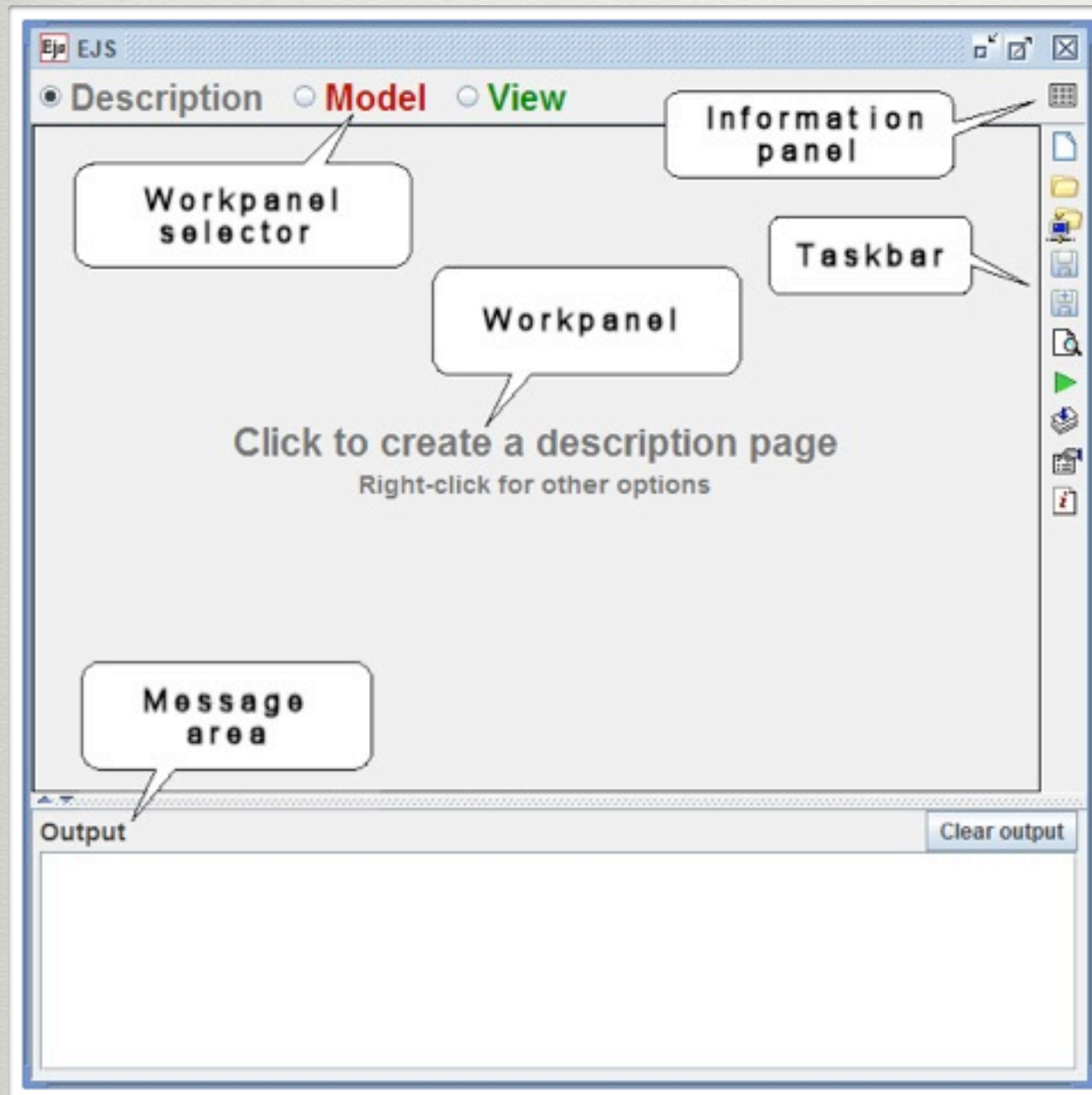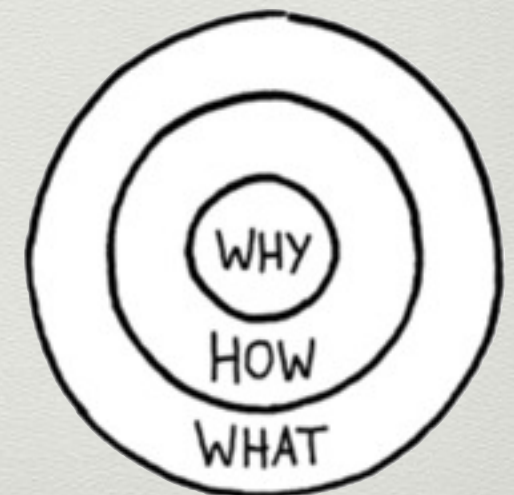# The reason behind EJS

The reason behind EJS

EJS is my small contribution to these ideas, to Science Education, to this world

The reason behind EJS

EJS is my small contribution to these ideas, to Science Education, to this world
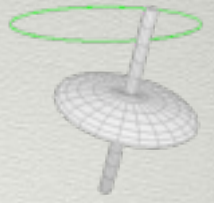
Evolution of the idea (past, present, and future)

A brief history of time...

(run separated PowerPoint file)

What should the future be?
and why?

In cooperation with Félix J. García, Univ. Murcia, Spain

What should the future be?
and why?

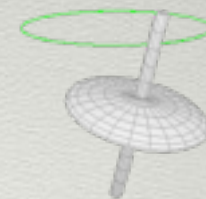In cooperation with Félix J. García, Univ. Murcia, Spain

What should the future be?
and why?

In cooperation with Félix J. García, Univ. Murcia, Spain

What should the future be?
and why?

Do I need to tell you the answer?

In cooperation with Félix J. García, Univ. Murcia, Spain
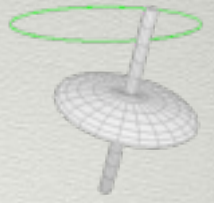
What should the future be?
and why?

Do I need to tell you the answer?

Move to the future, benefitting from the past experience

In cooperation with Félix J. García, Univ. Murcia, Spain

We are proud to introduce...

We are proud to introduce...

EJS 5 beta

We are proud to introduce...
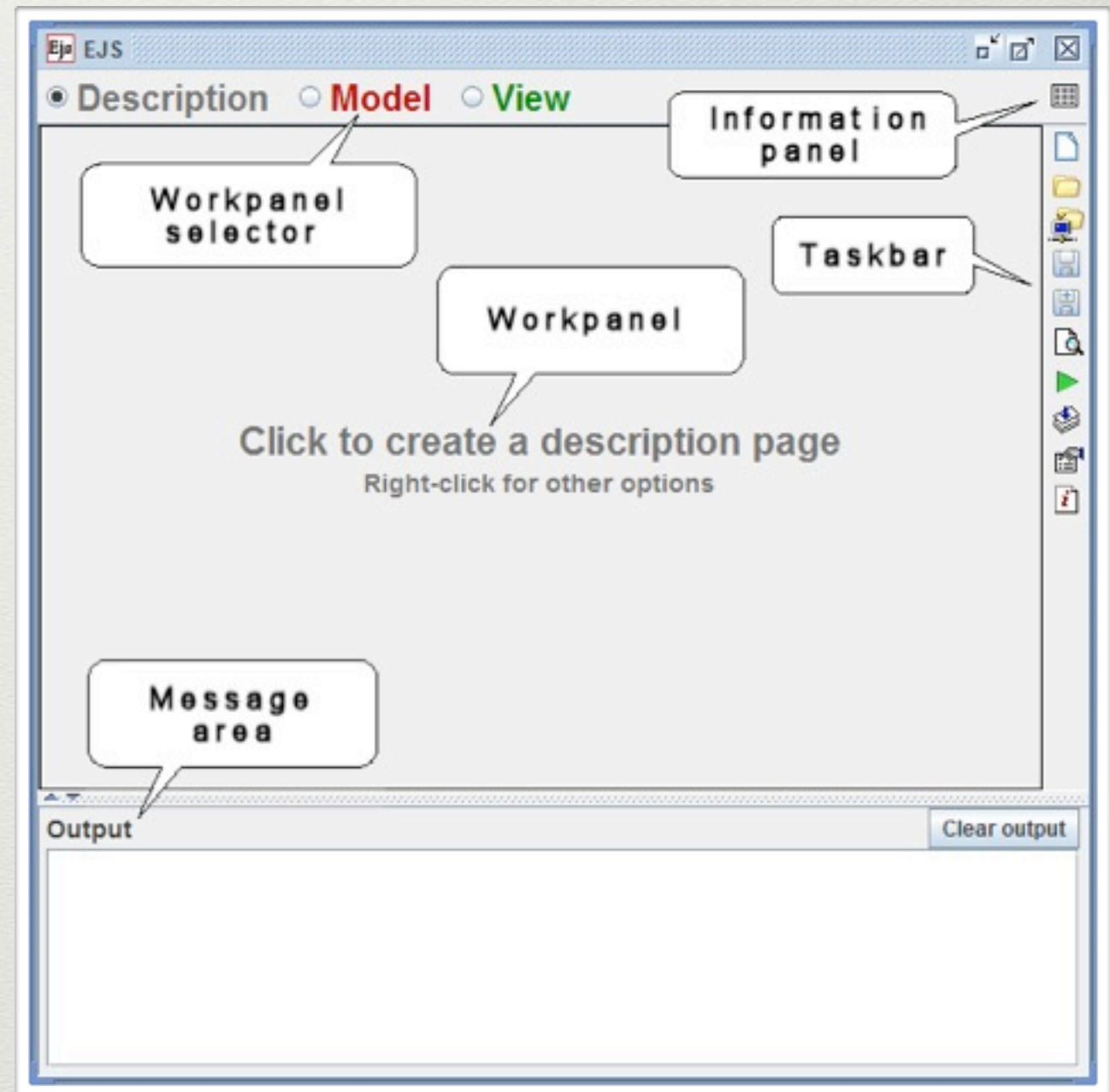
EJS 5 beta

Shipping
today!
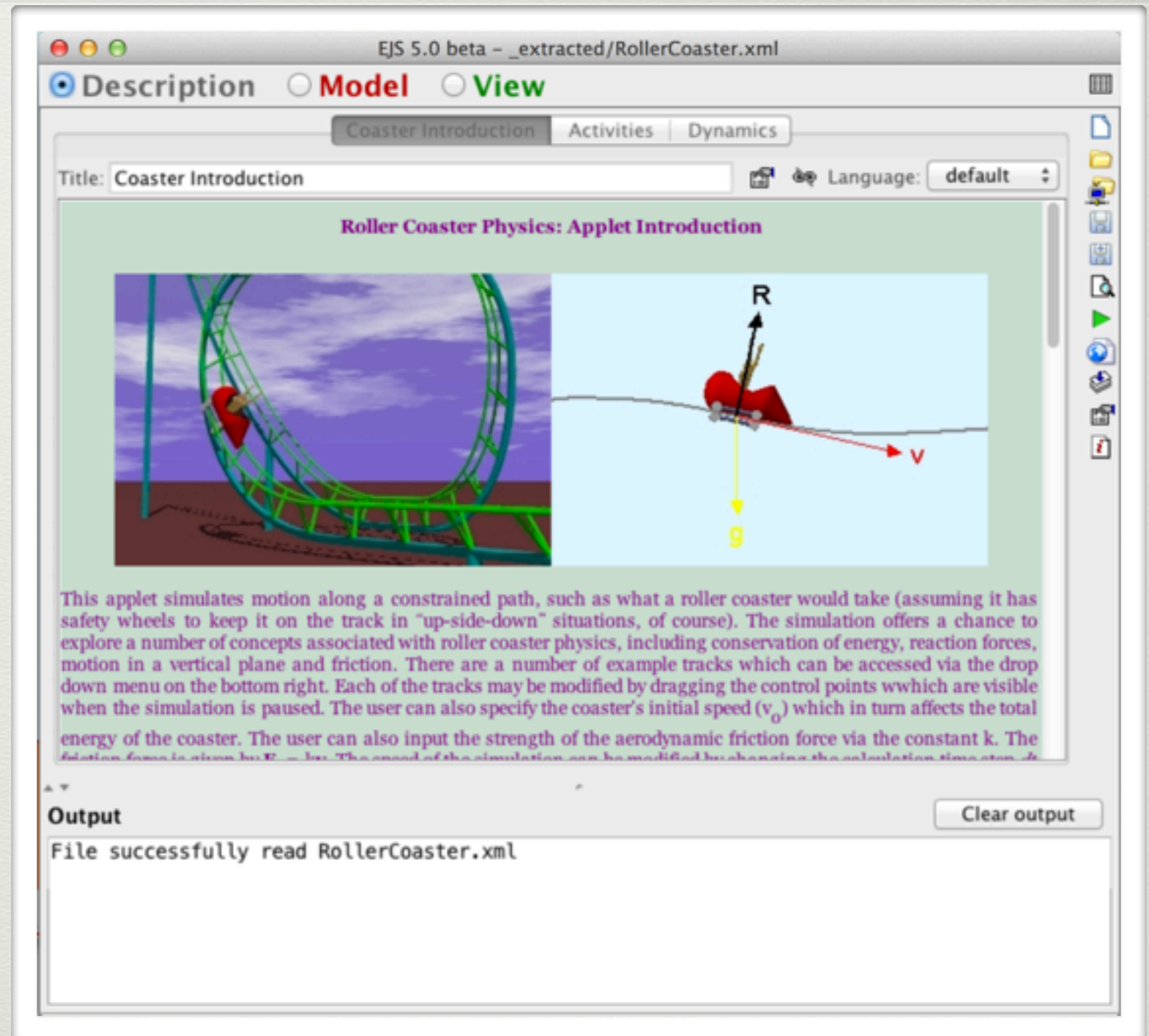
14

We are proud to introduce...

EJS 5 beta

Shipping today!

Thursday, September 12, 13

We are proud to introduce...

EJS 5 beta

Shipping today!

We are proud to introduce...

EJS 5 beta

Shipping today!
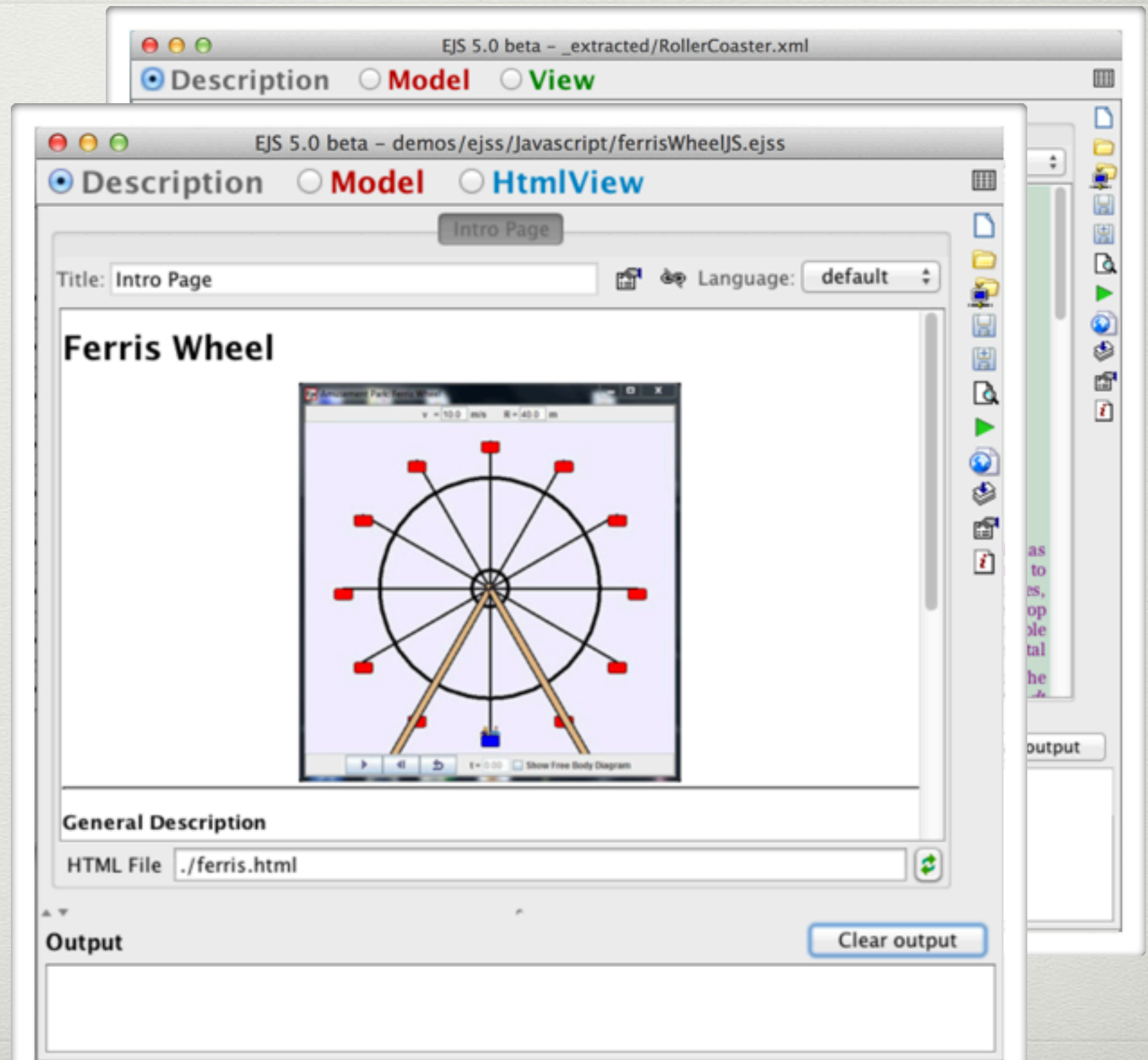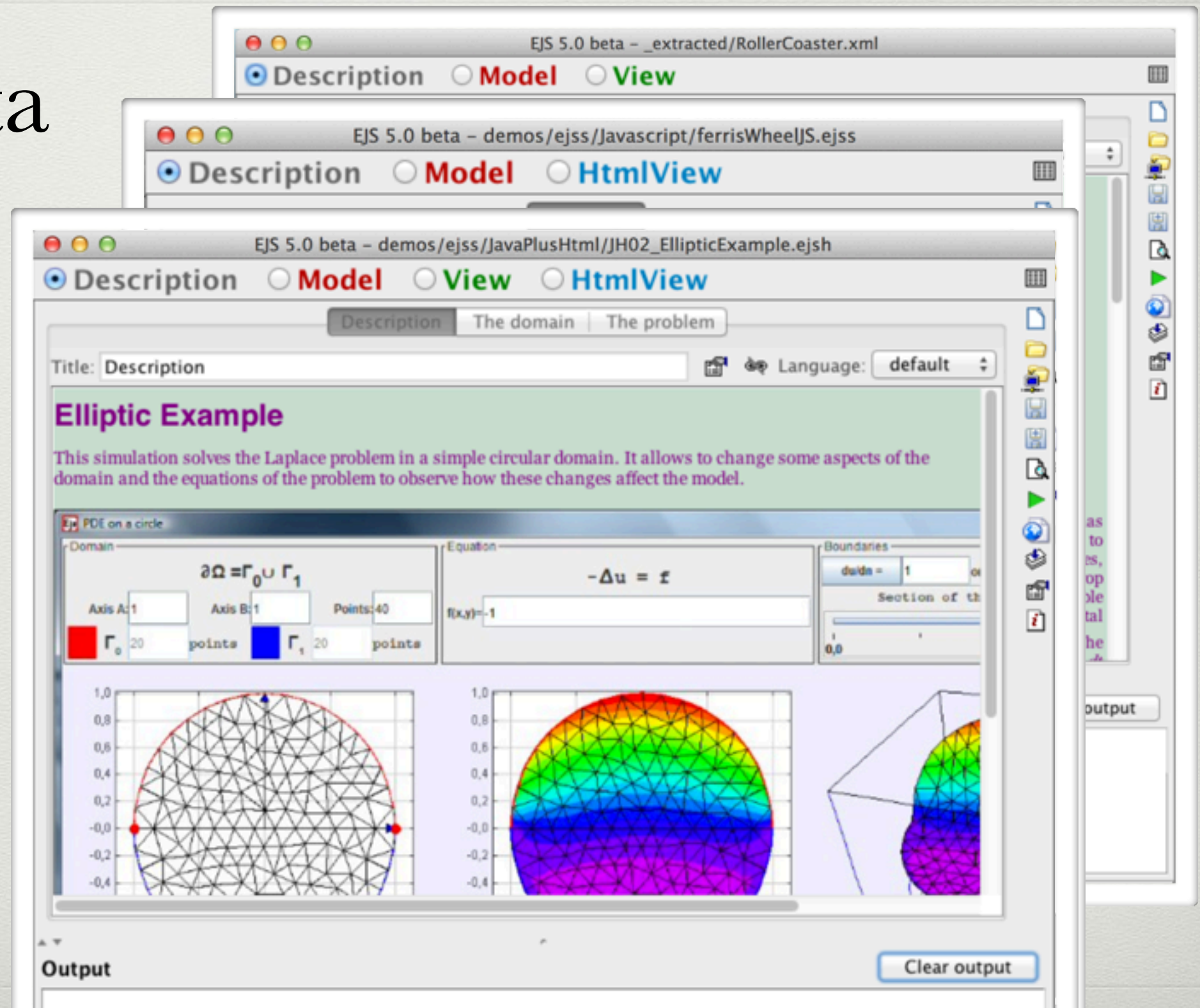
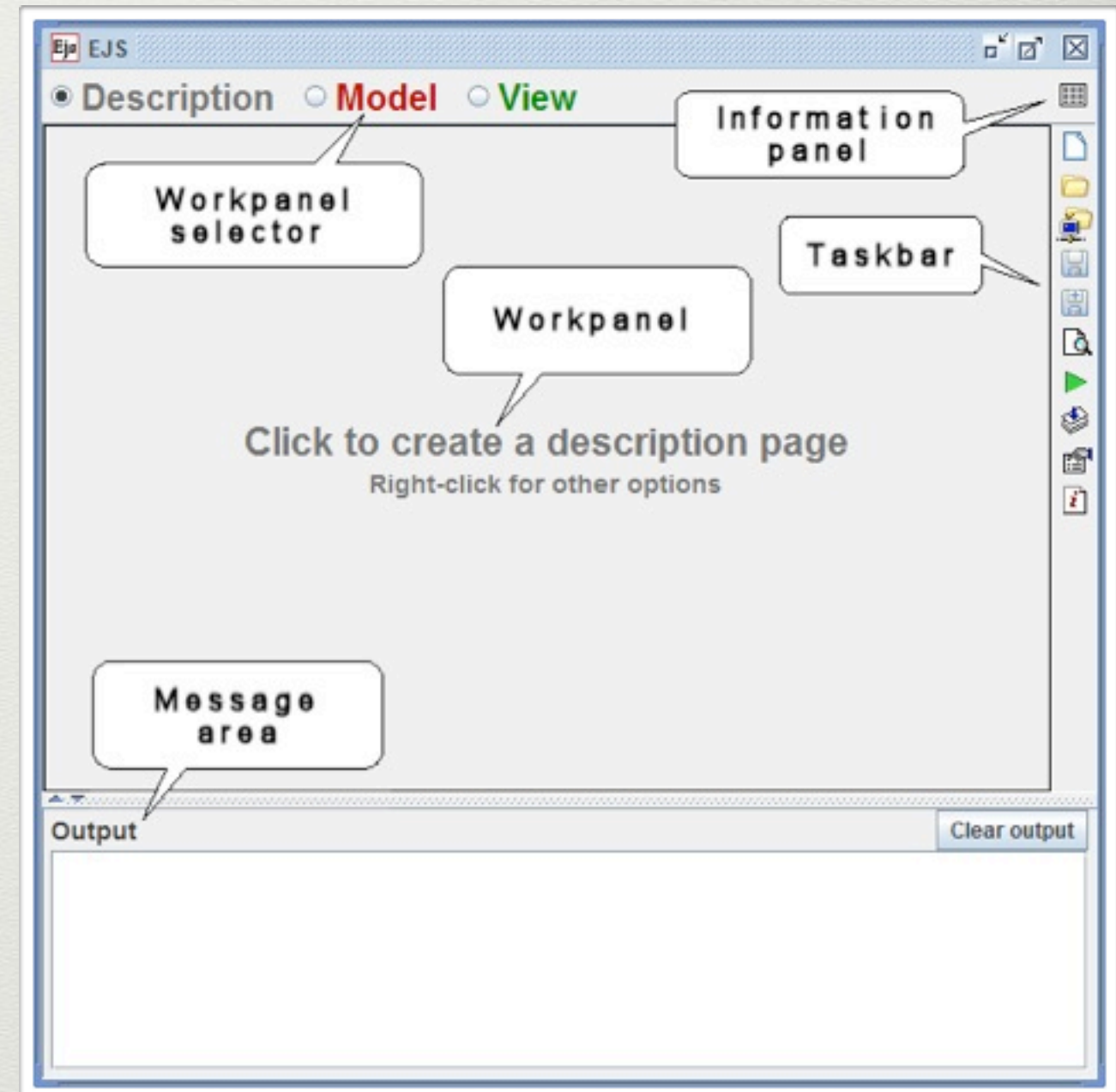# We are proud to introduce...

EJS 5 beta

Shipping today!

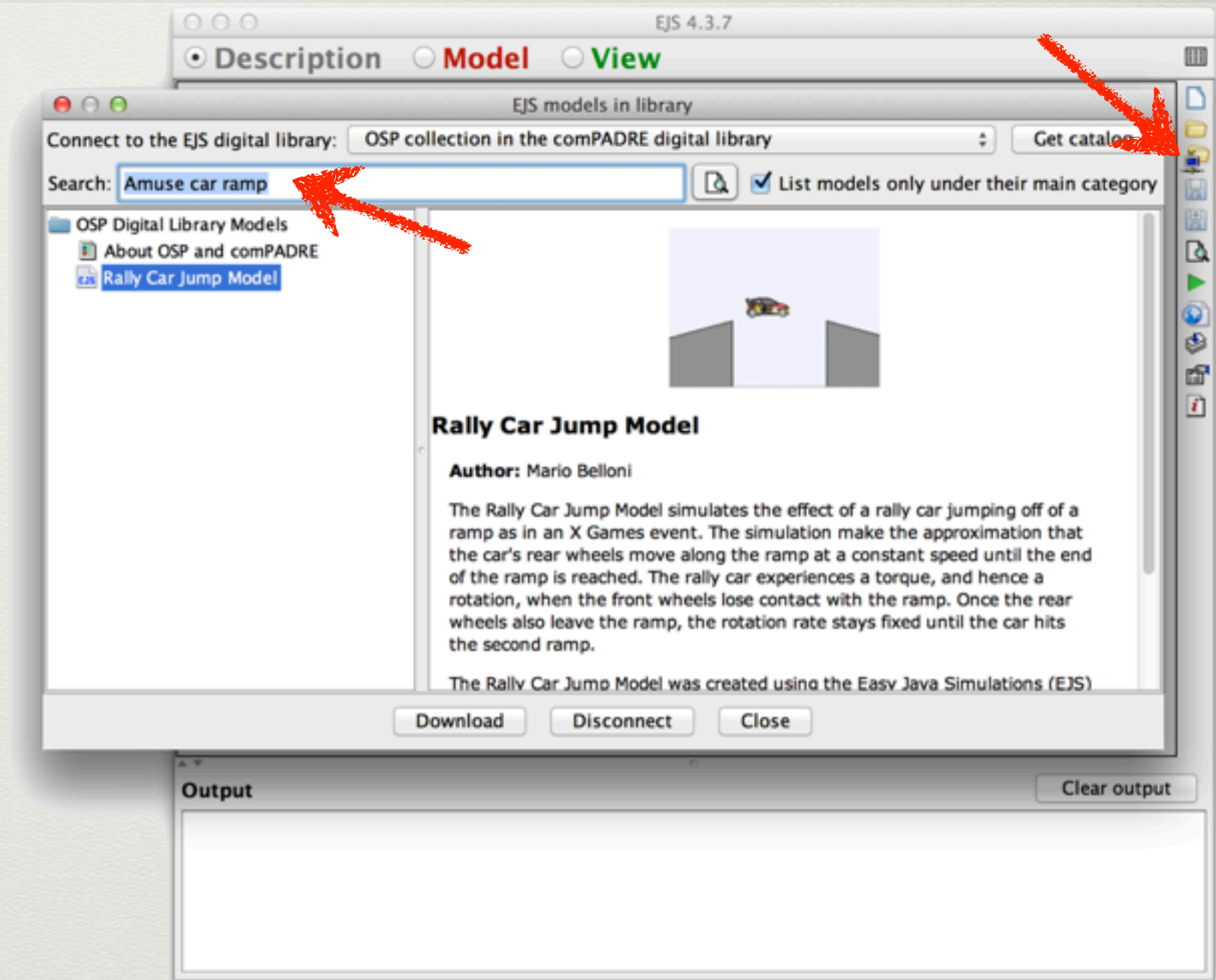# Creating Java simulations with EJS 5

Best main
features of EJS
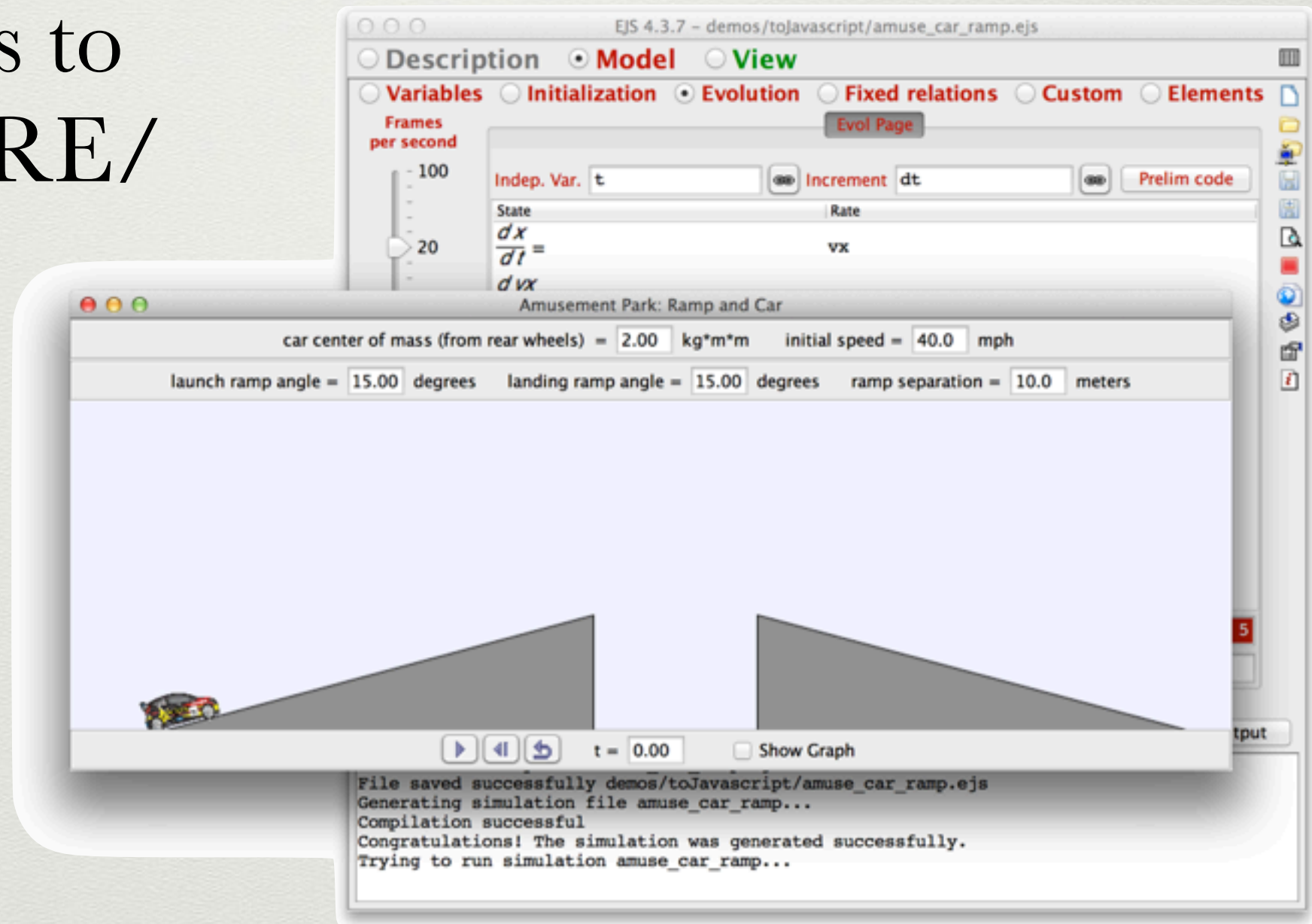
Creating Java simulations with EJS 5

1. Access to comPADRE/ OSP
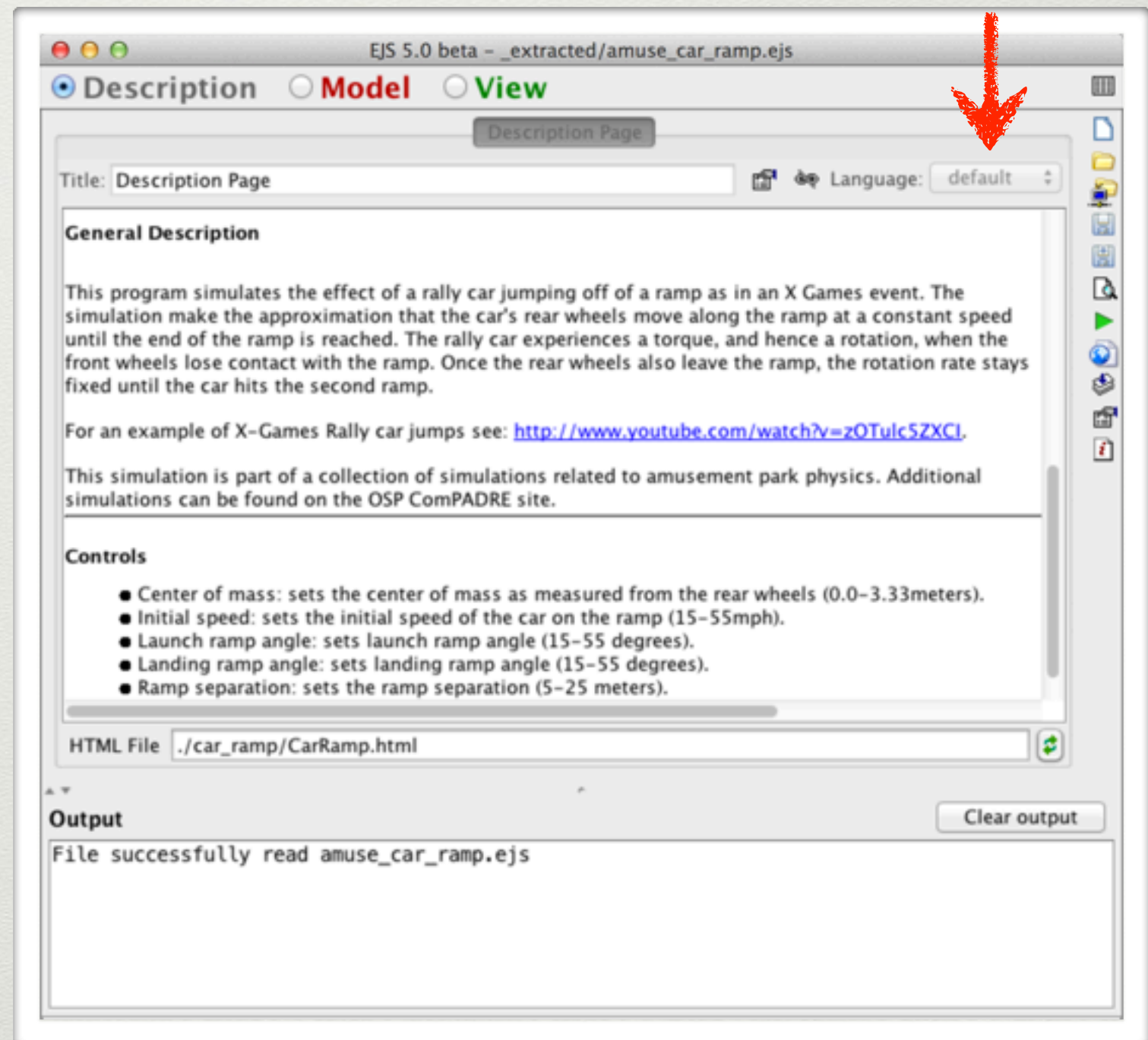
Creating Java simulations with EJS 5

1. Access to comPADRE/ OSP
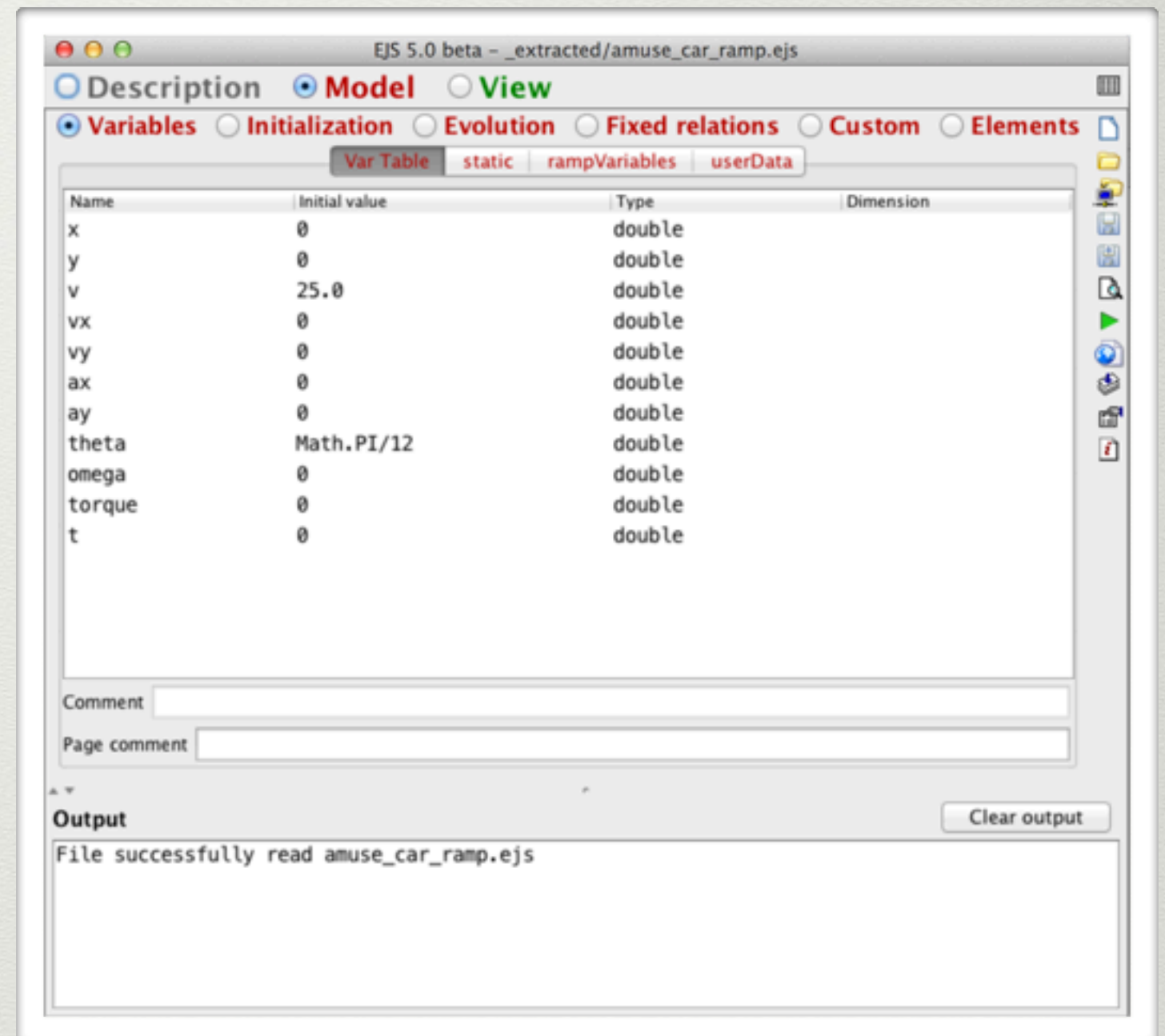
Creating Java simulations with EJS 5

2. Description included (and translation facilities)
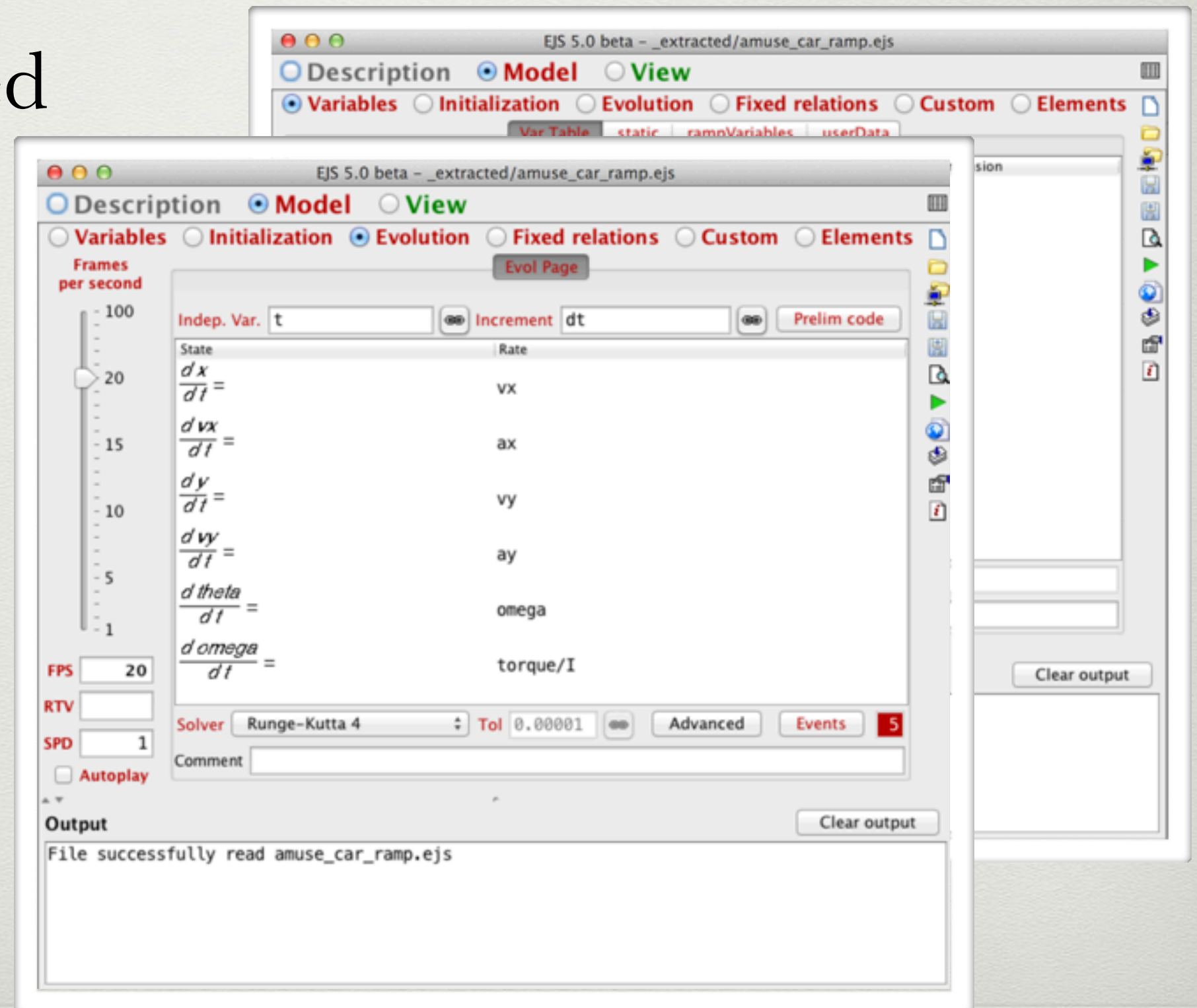
Creating Java simulations with EJS 5

3. Organized model structure

Creating Java simulations with EJS 5
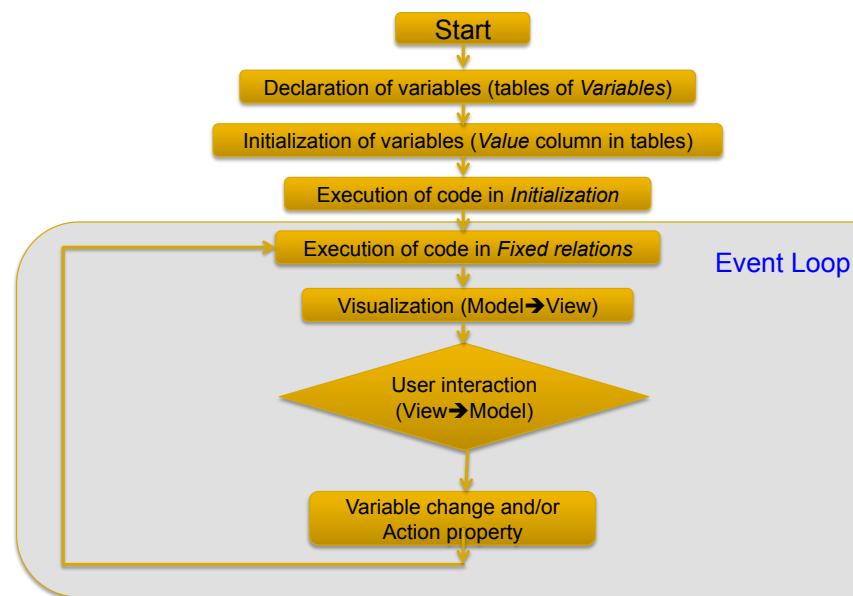
3. Organized model structure

Creating Java simulations with EJS 5

3. Organized model structure

Model without time evolution

- Start
- Declaration of variables (tables of *Variables*)
- Initialization of variables (*Value* column in tables)
- Execution of code in *Initialization*
- Execution of code in *Fixed relations*
- Visualization (Model➔View)
- User interaction (View➔Model)
- Variable change and/or Action property

Event Loop

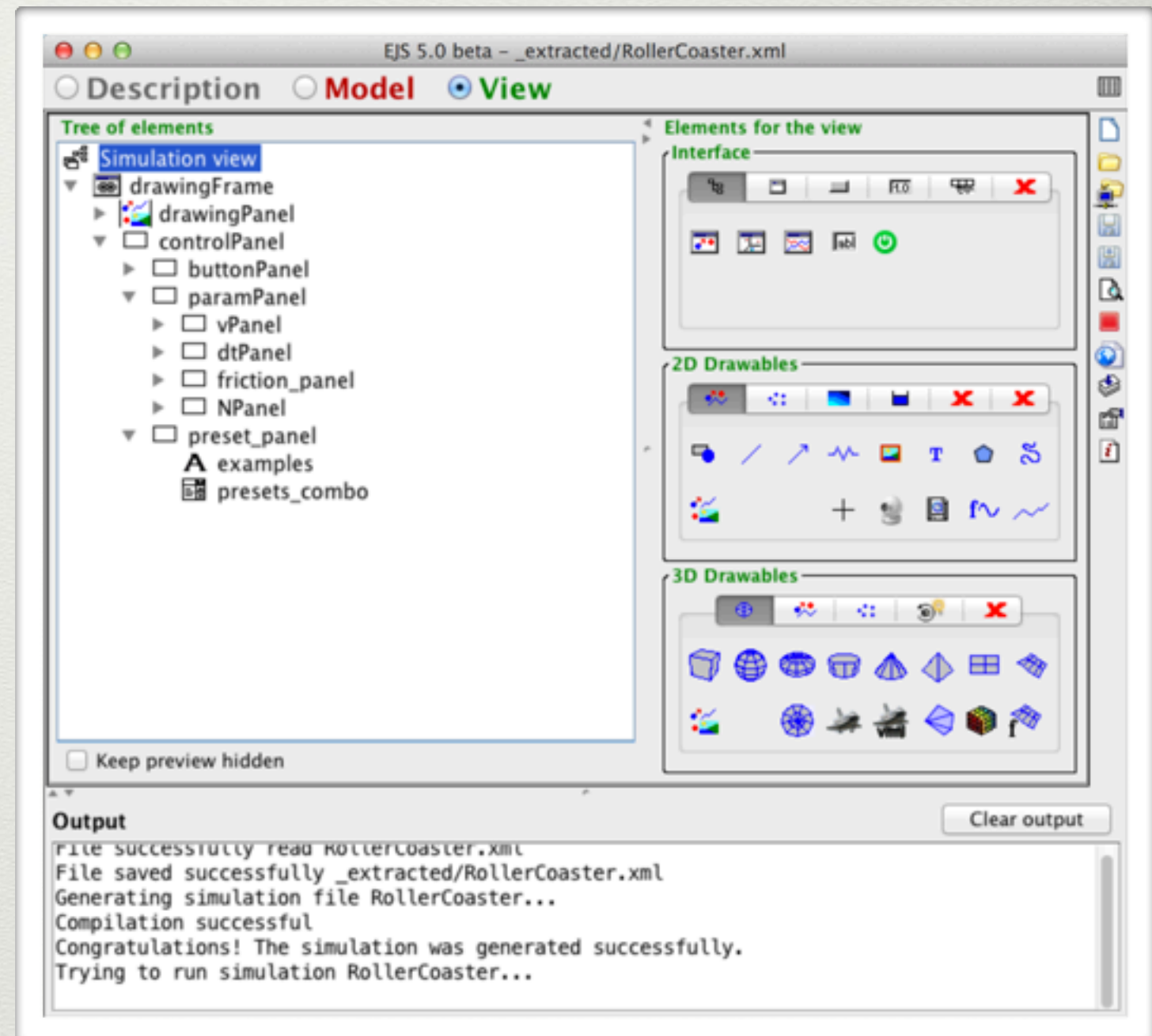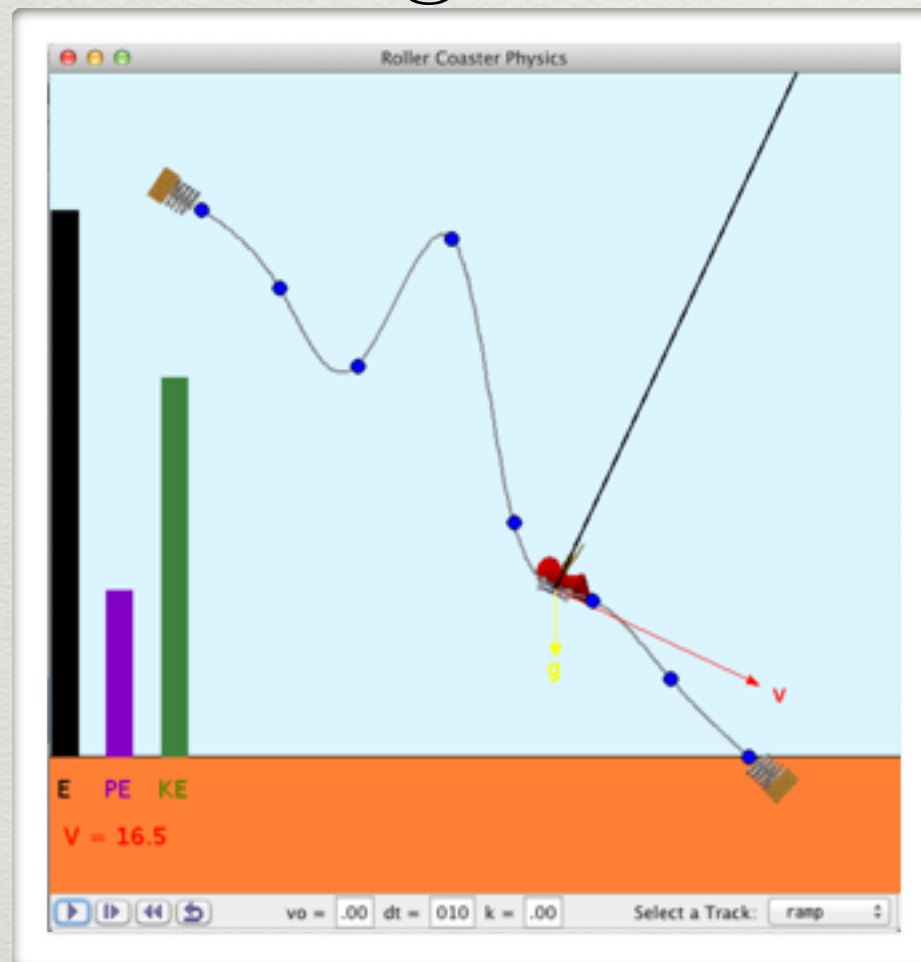EJS Program Flow   1
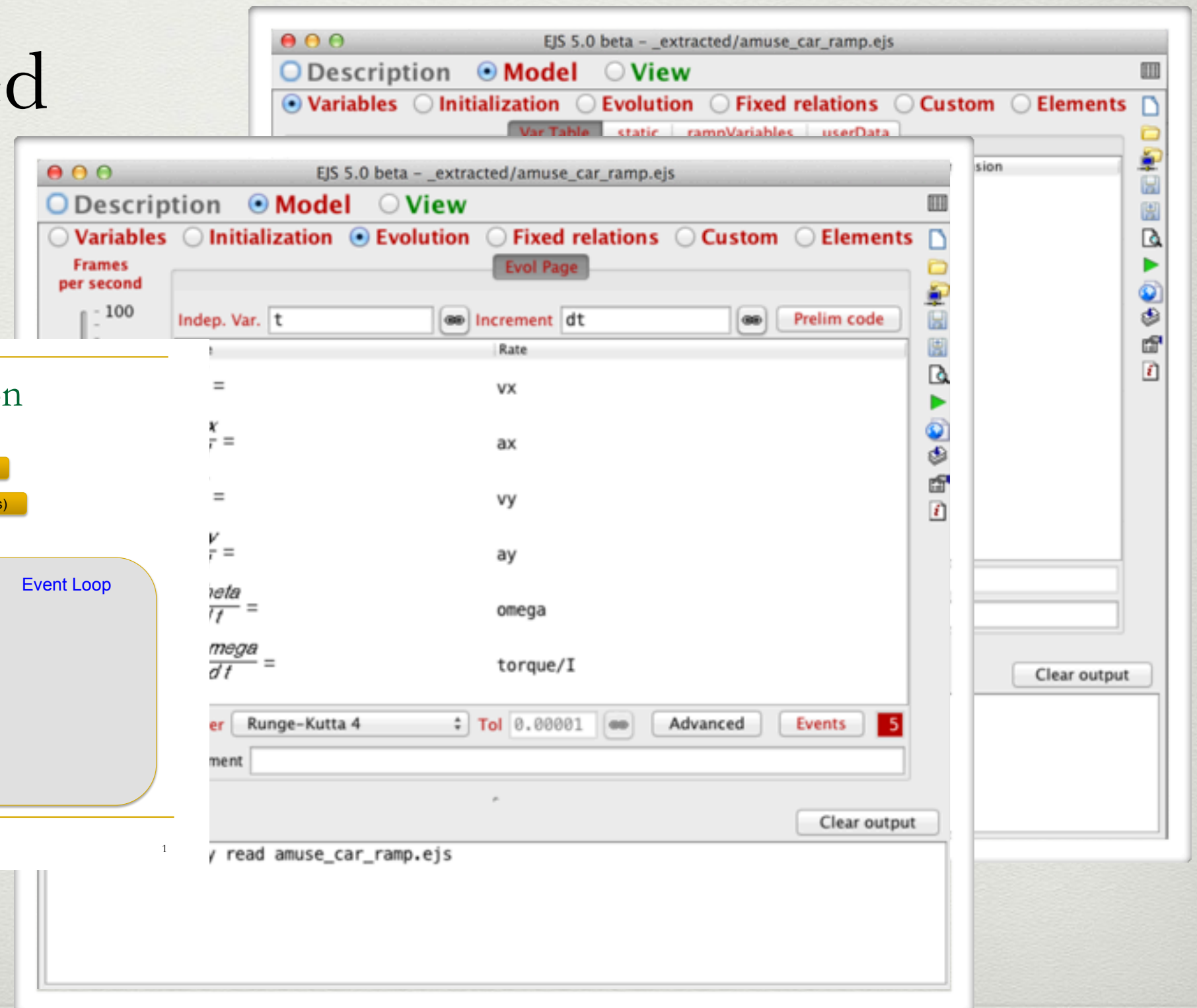
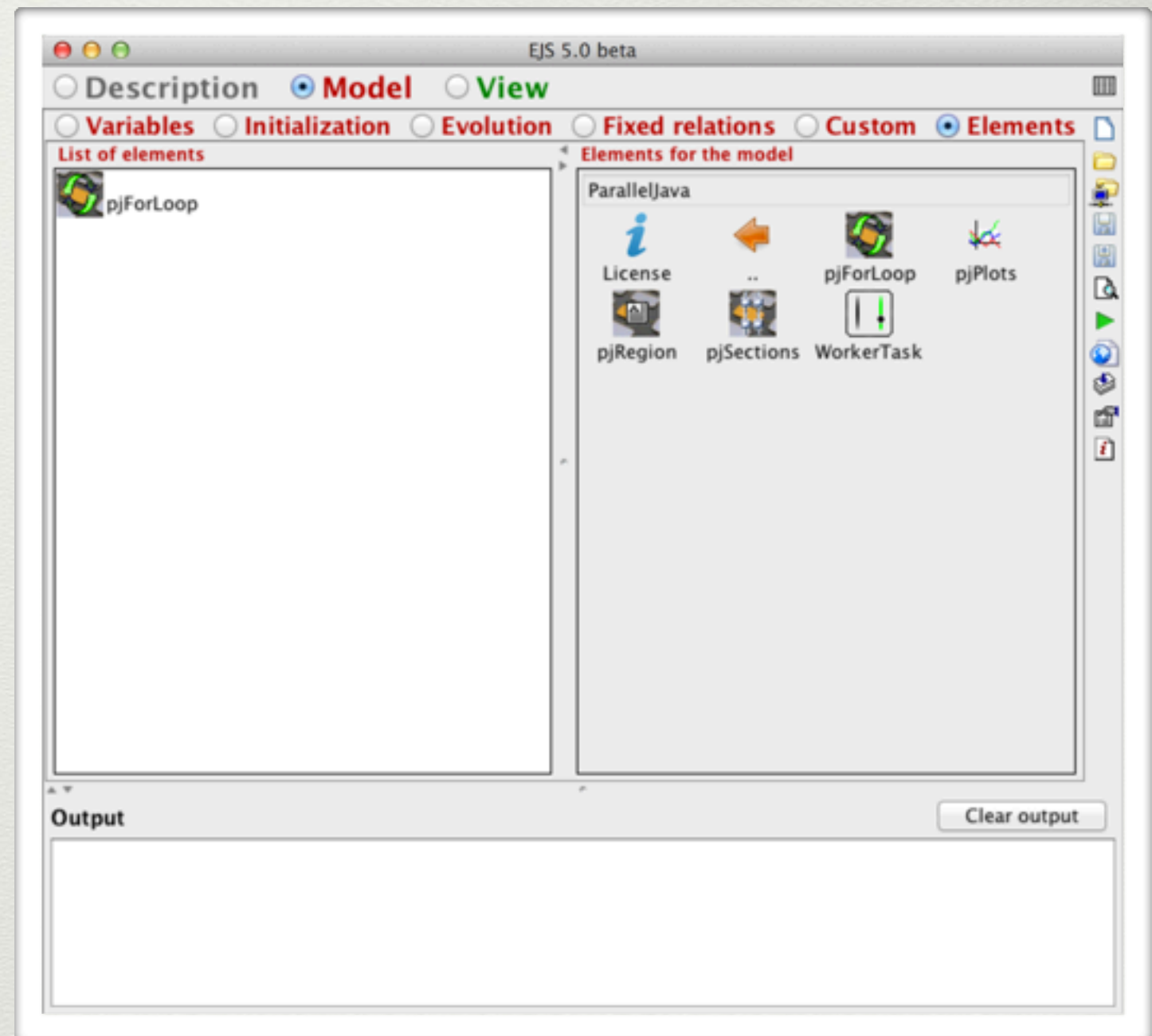# Creating Java simulations with EJS 5
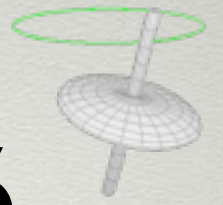
4. Professional -looking views
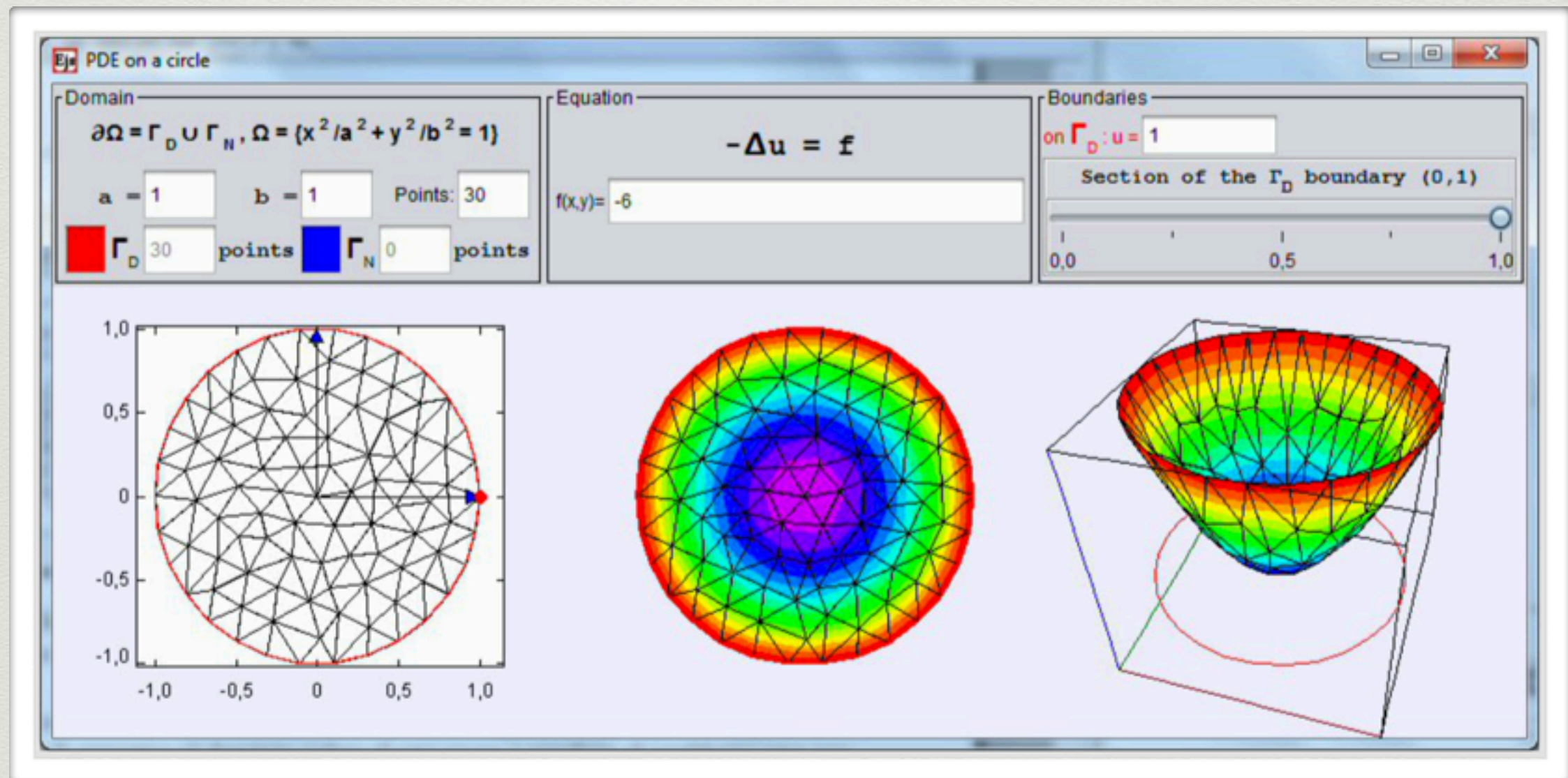
Creating Java simulations with EJS 5

5. And lots of opportunities for expansion

Creating Java simulations with EJS 5
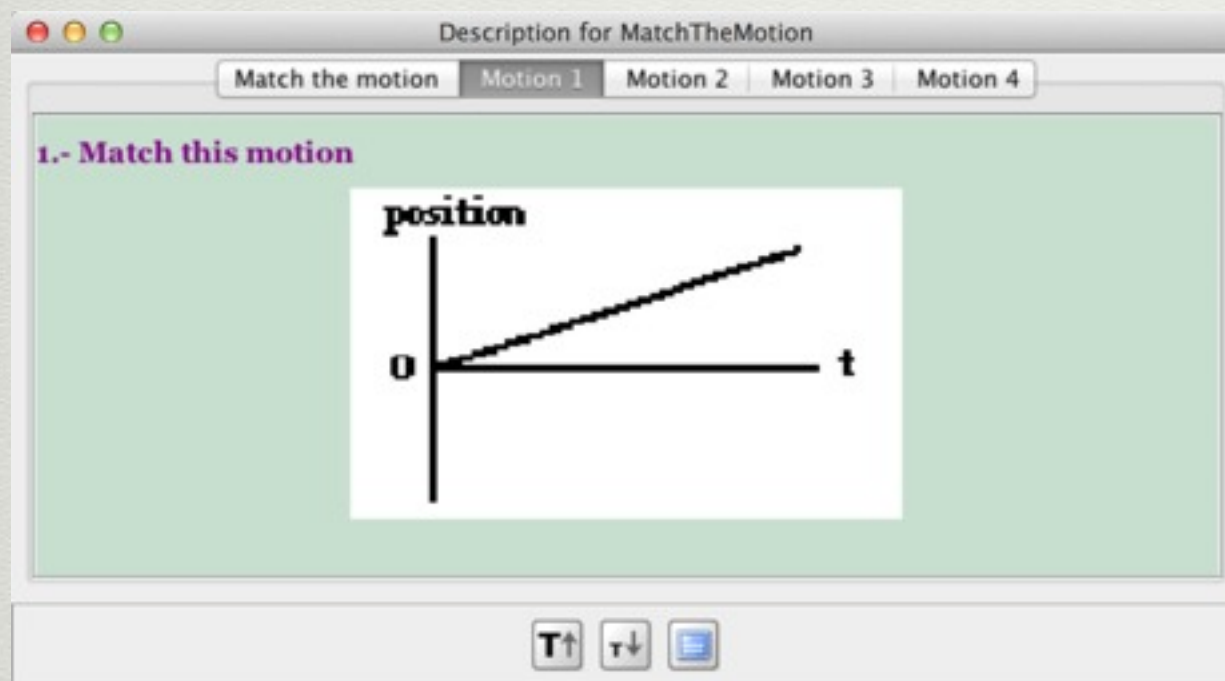
Solving PDEs

In cooperation with M José Cano and Eliseo Chacón, Univ Murcia, Spain

Creating Java simulations with EJS 5

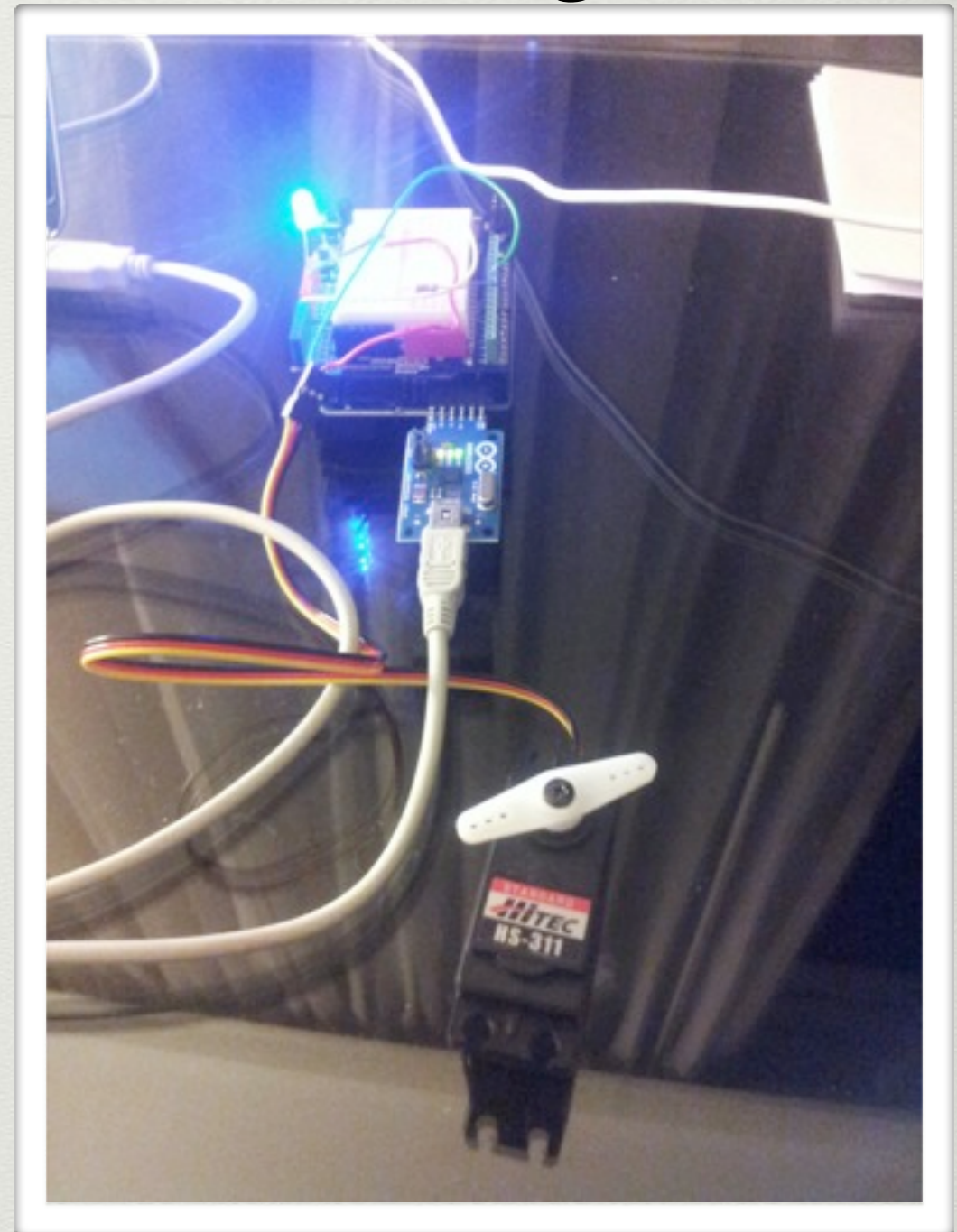Interfacing with your camera
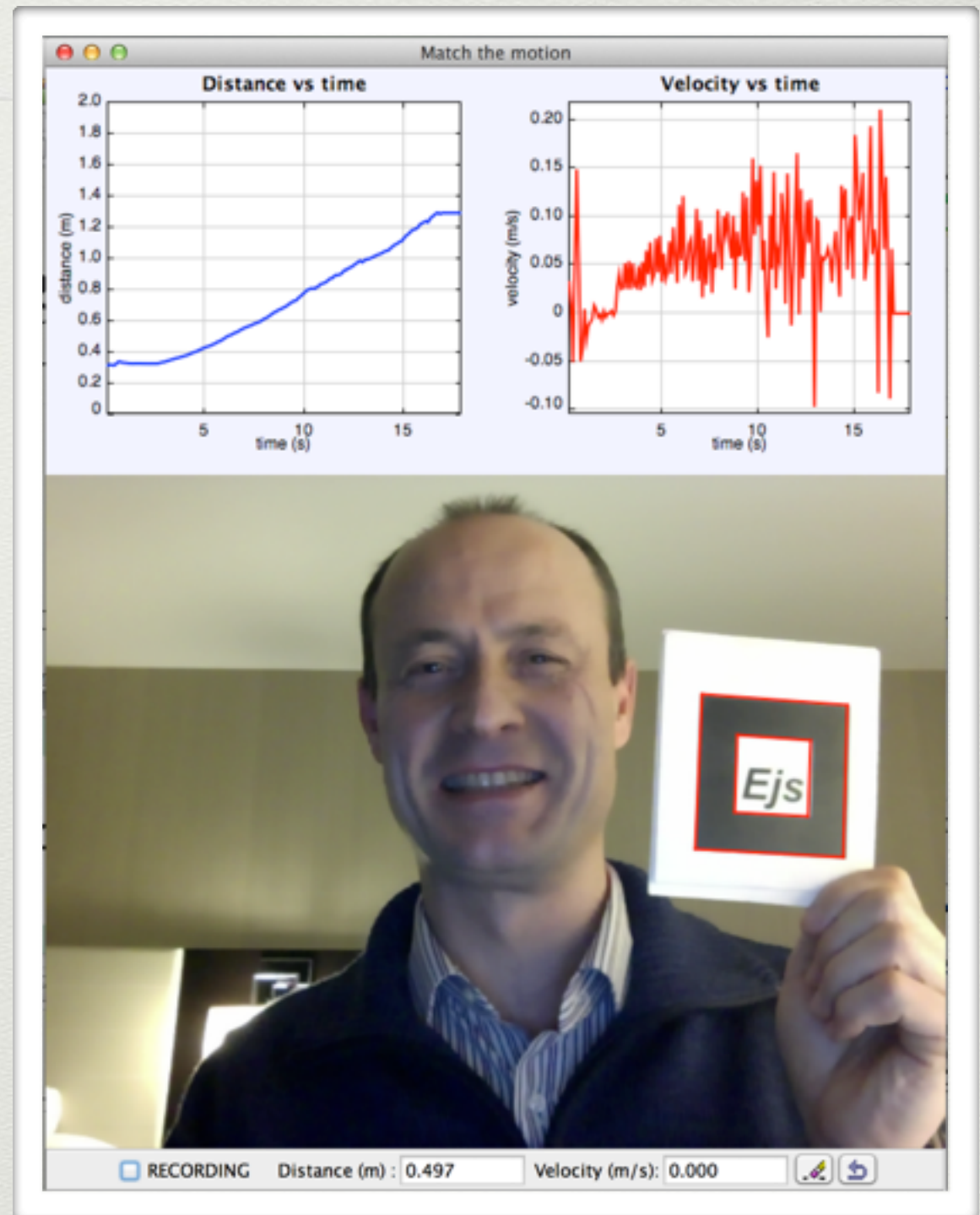
In cooperation with Andrés Mejías and Marco A. Márquez, Univ Huelva, Spain

Creating Java simulations with EJS 5

Interfacing with
Arduino

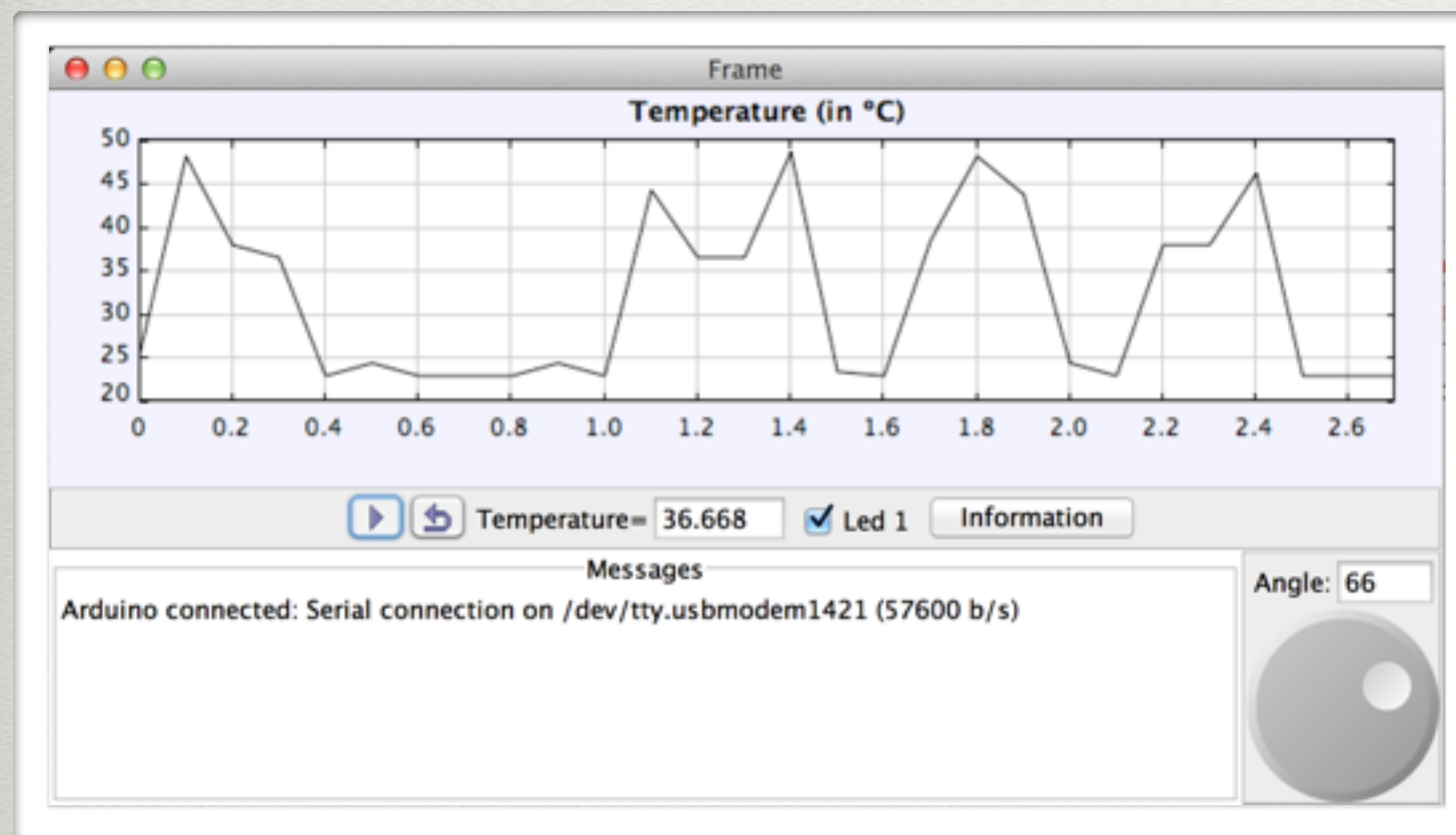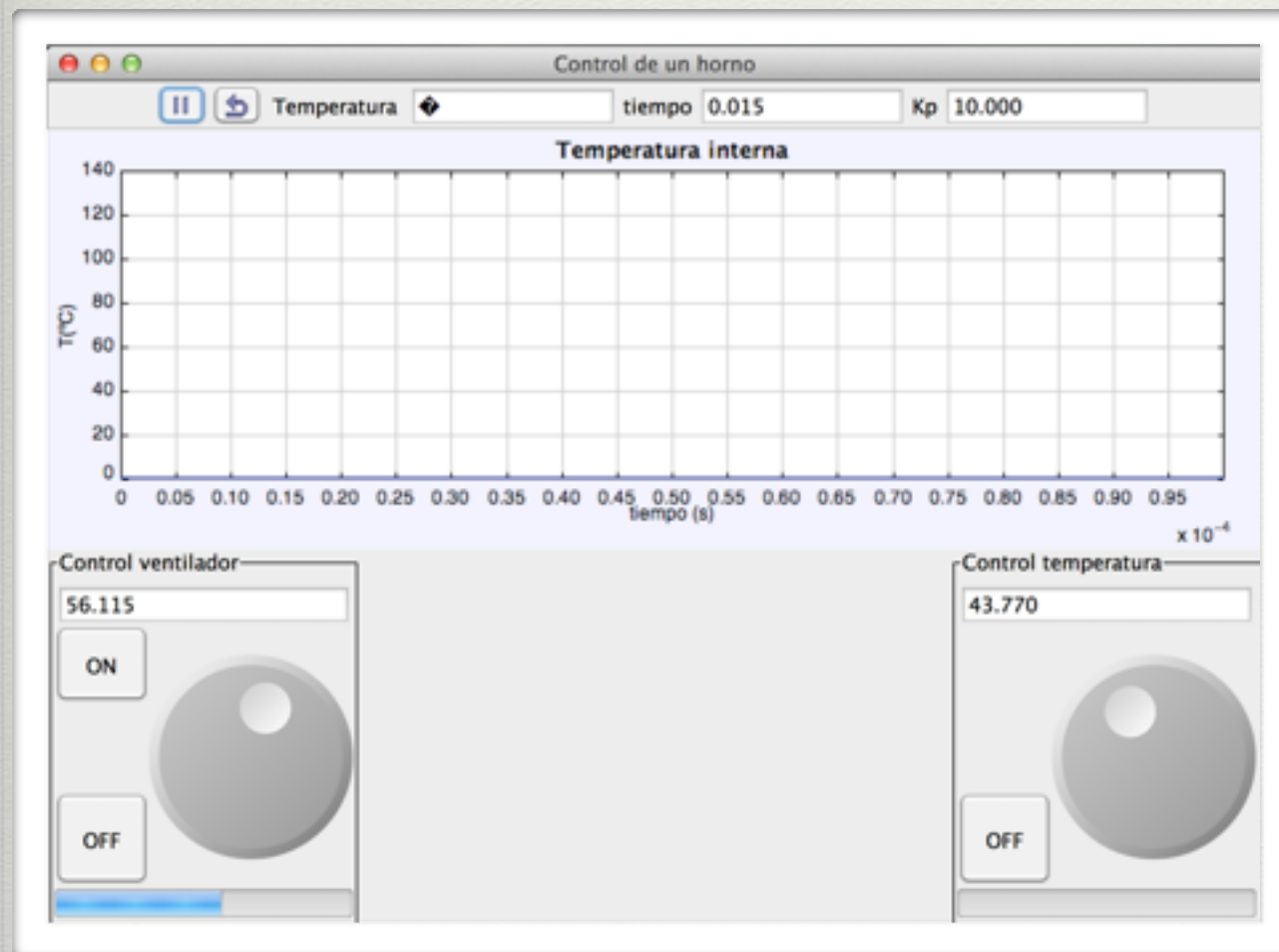In cooperation with Andrés Mejías and Marco A. Márquez, Univ Huelva, Spain

Creating Java simulations with EJS 5

Interfacing with Phidgets

In cooperation with Andrés Mejías and Marco A. Márquez, Univ Huelva, Spain

EJS grows through cooperation: Interfacing with hardware

Interfacing with industrial robots
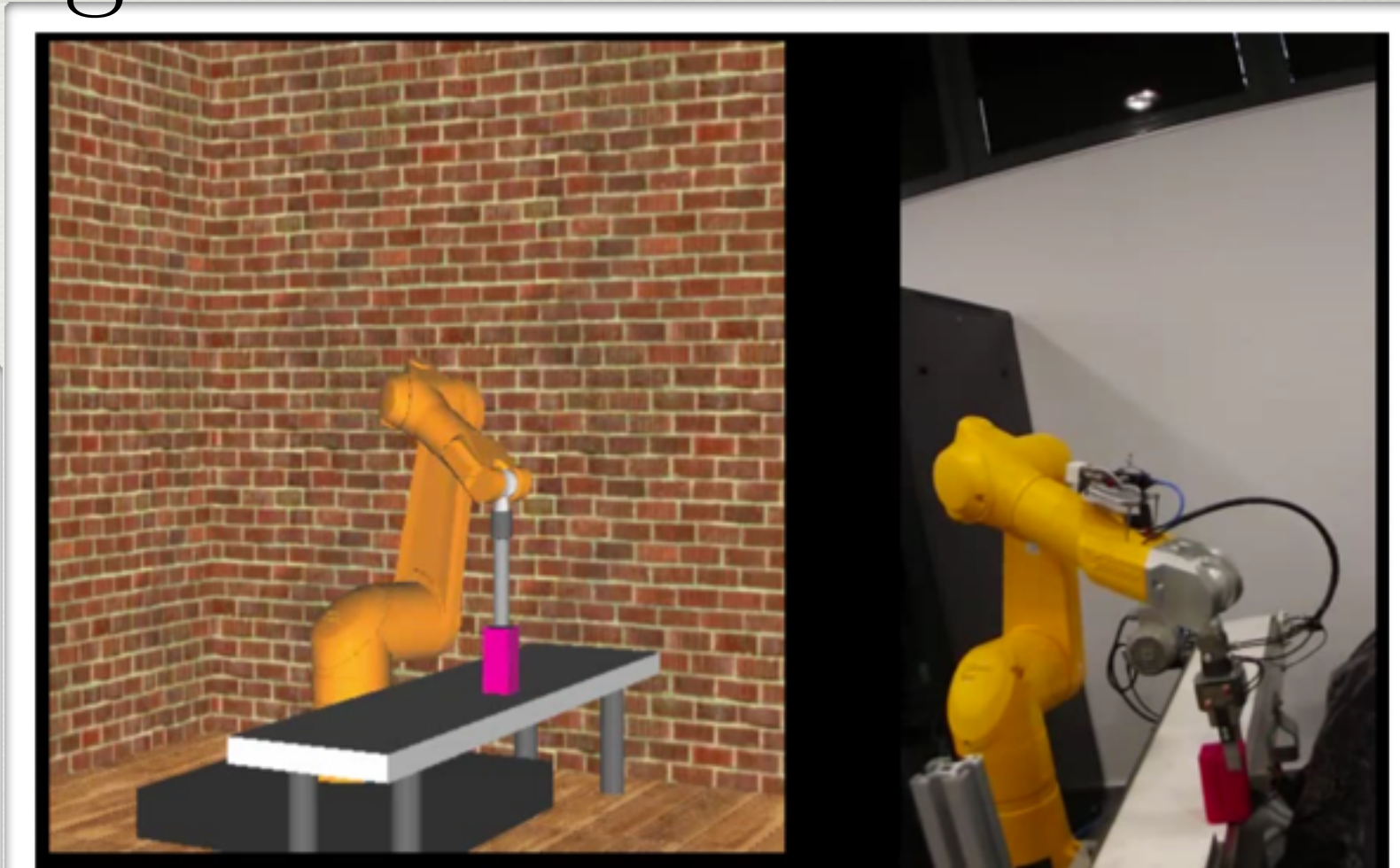
In cooperation with Almudena Ruiz and Humberto Martínez, Univ Murcia, Spain

EJS grows through cooperation: Interfacing with hardware

Interfacing with industrial robots

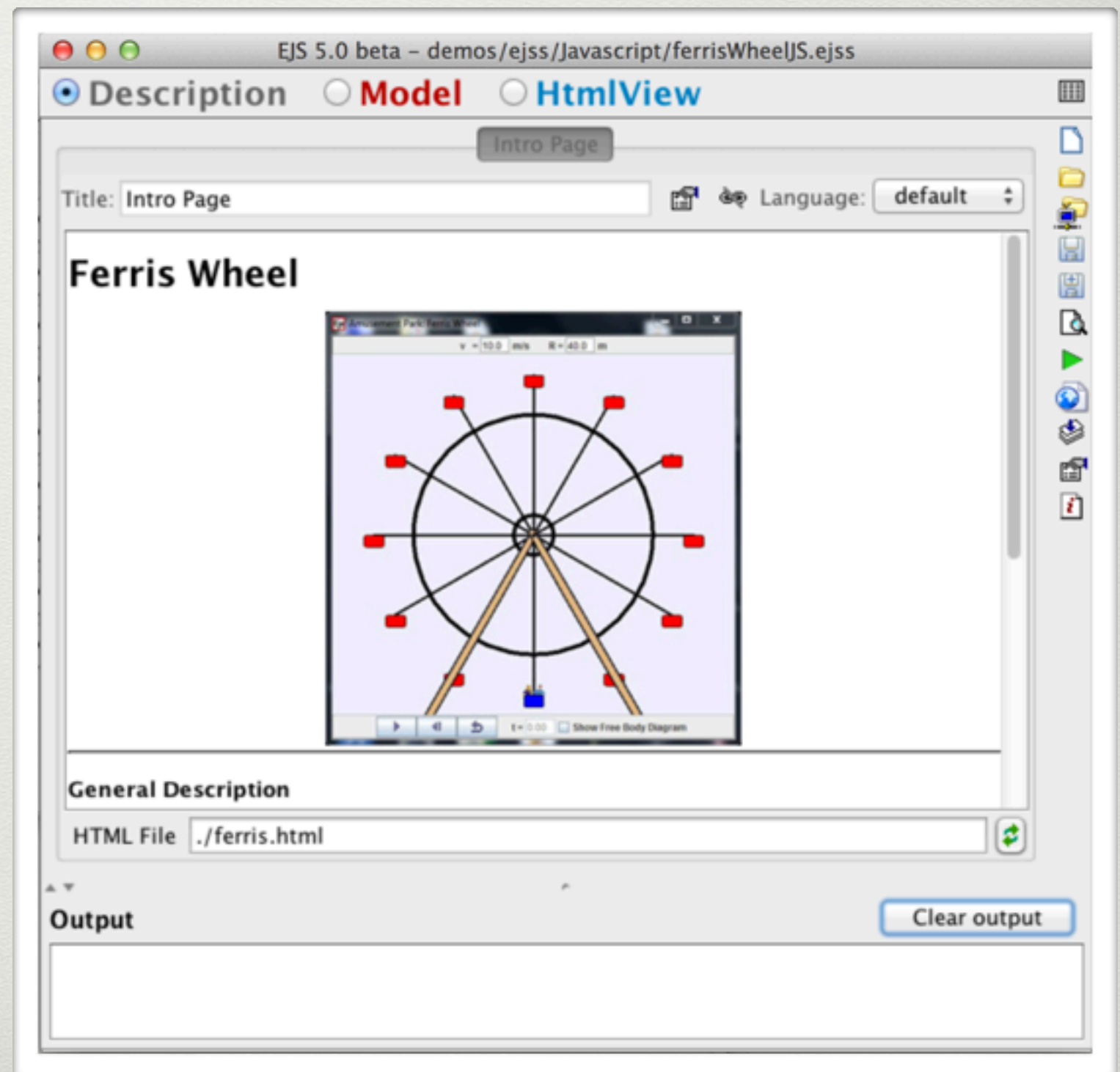How do EJS users define virtual and real laboratories in EJS?

In cooperation with Almudena Ruiz and Humberto Martínez, Univ Murcia, Spain

What to expect from EJsS?

EJS 5 beta

Run-time demo begins here!

Running simulations on tablets and smart phones (iBooks, ePubs and the Reader App)

Switch to the tablet
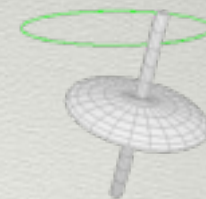
Copyright and licensing

We are trying to find a self-sustainable model

We are trying to thank comPADRE and OpenSourcePhysics

We want to make it possible for people without resources to run all EJS simulations

We want to offer those who **can** and **want** to contribute to sustain this project the possibility to do so, and give them something in return

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Copyright and licensing

- Java version absolutely free (as usual)

- Javascript versions are limited:

   + Demo license (simulations run for 3 months) FREE

   + Academic license (simulations run forever) 199 €

   + Models have a copyright and are distributed on a *Attribution-NonCommercial-NoDerivs 3.0 Unported Creative Commons license*

   + Commercial projects should contact us.

Copyright and licensing

With these **exceptions**:

- No time limit if run from comPADRE.org or opensourcephysics.org

- No time limit if run inside the Reader App

- The Reader App is free up to 5 simulations

- Costs 1.99 € for unlimited number of simulations

We are proud to introduce...

We are proud to introduce...
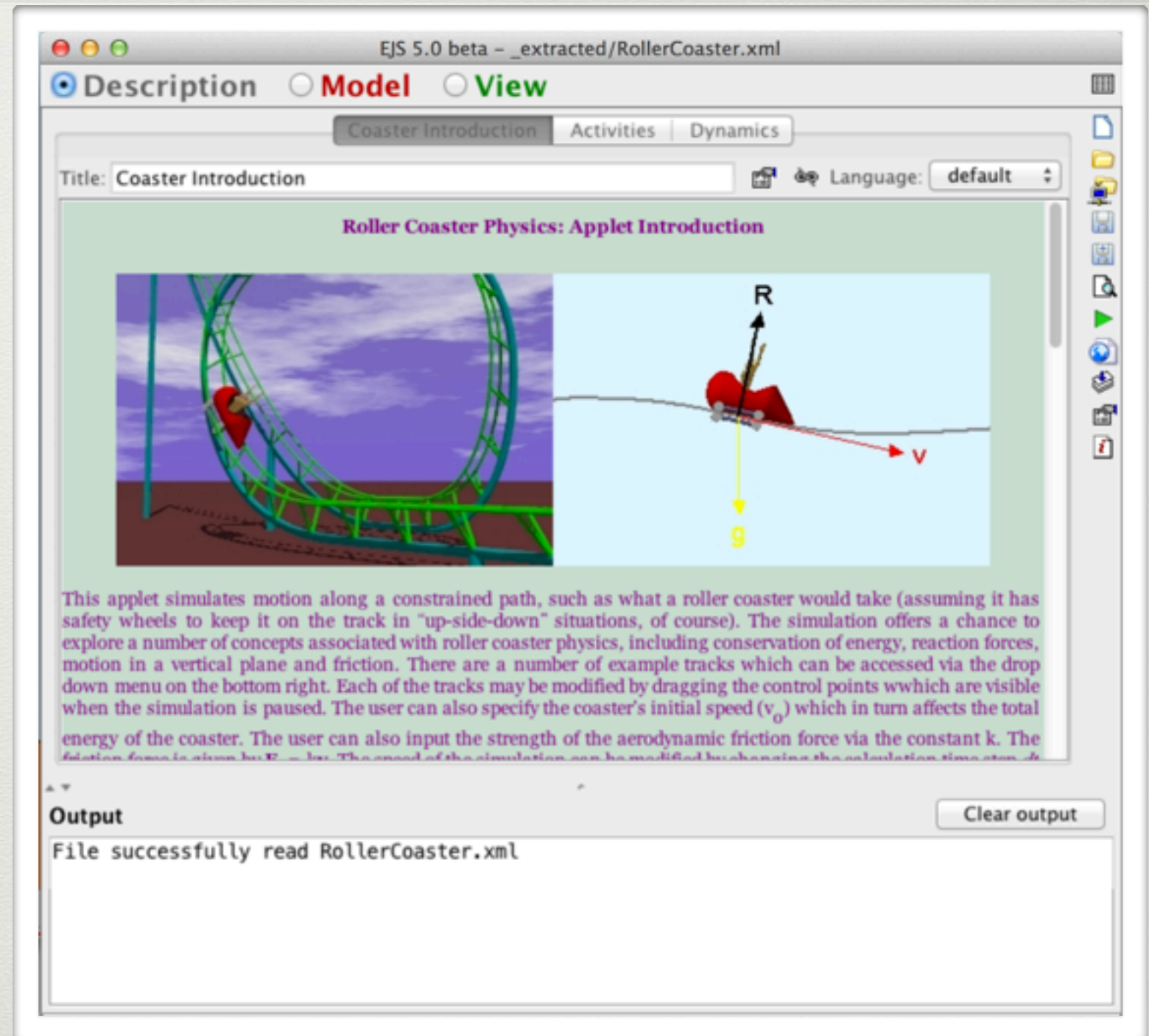
EJS 5 beta

We are proud to introduce...

EJS 5 beta

Shipping
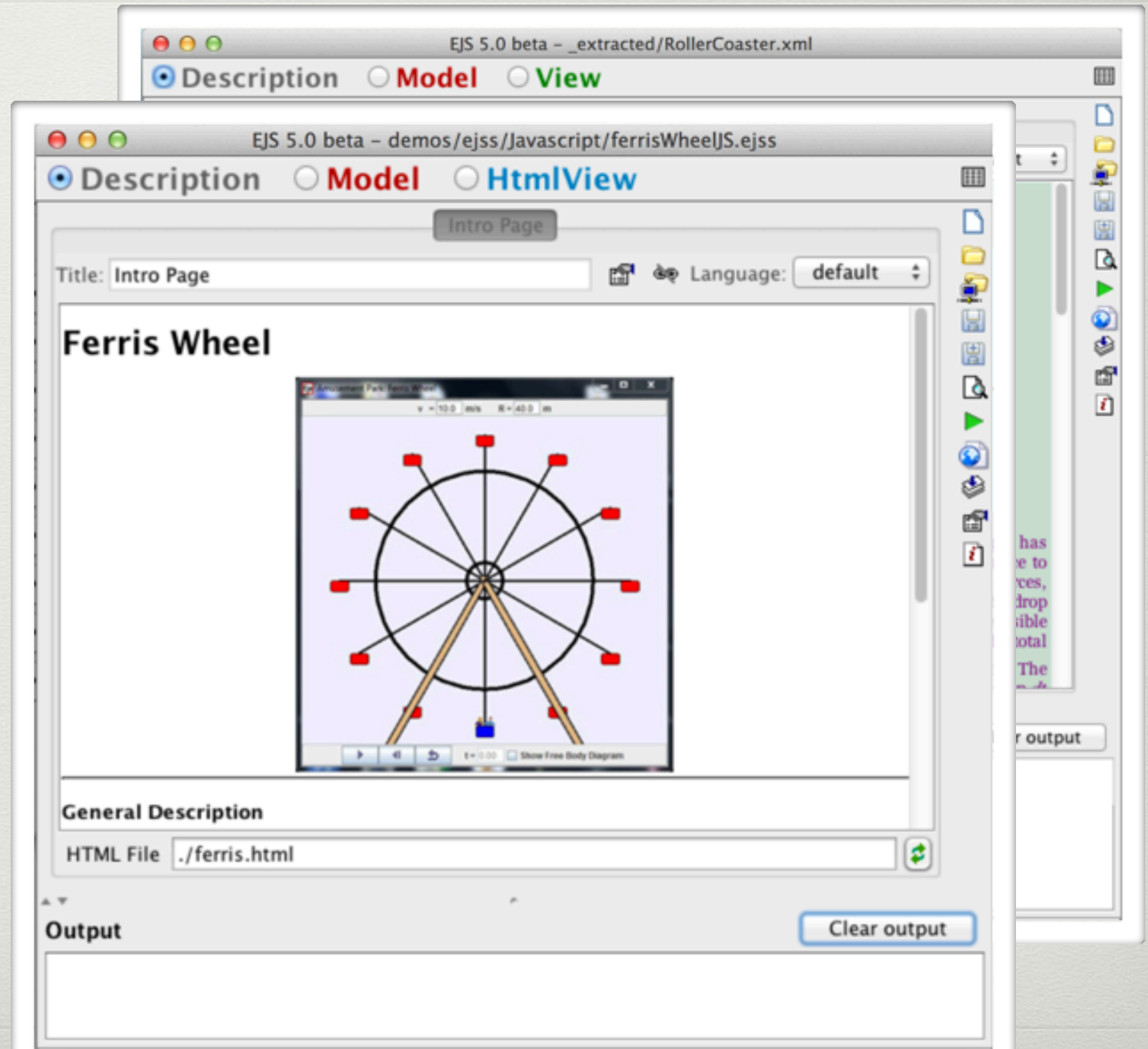 today!

We are proud to introduce...

EJS 5 beta

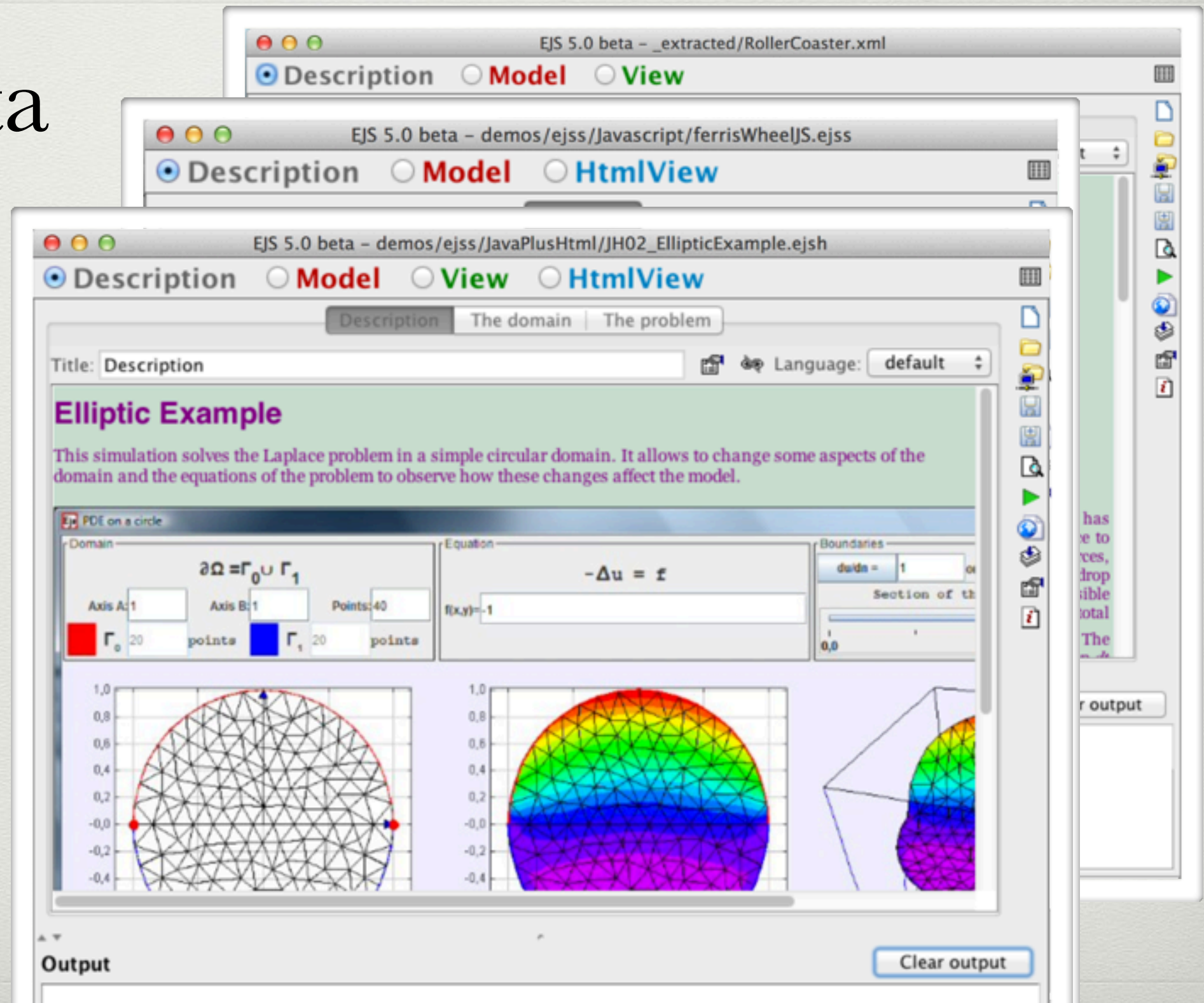### Shipping today!

We are proud to introduce...
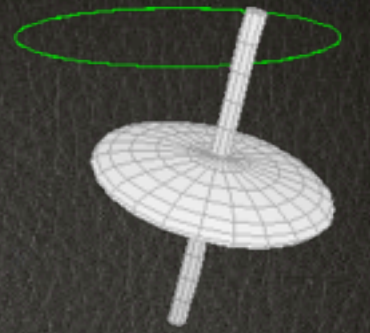
EJS 5 beta

Shipping today!

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Creating simulations for tablets suing Easy Java(script) Simulations

Francisco Esquembre and Félix J. García
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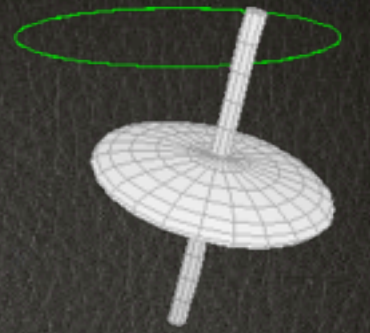
33

Thank you very much for your attention!

Creating simulations for tablets suing Easy Java(script) Simulations

Francisco Esquembre and Félix J. García

Universidad de Murcia, Spain