# – Fidelity –
# A New Time Domain Simulation Framework
## Status Update & Demonstration

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# Project Objectives

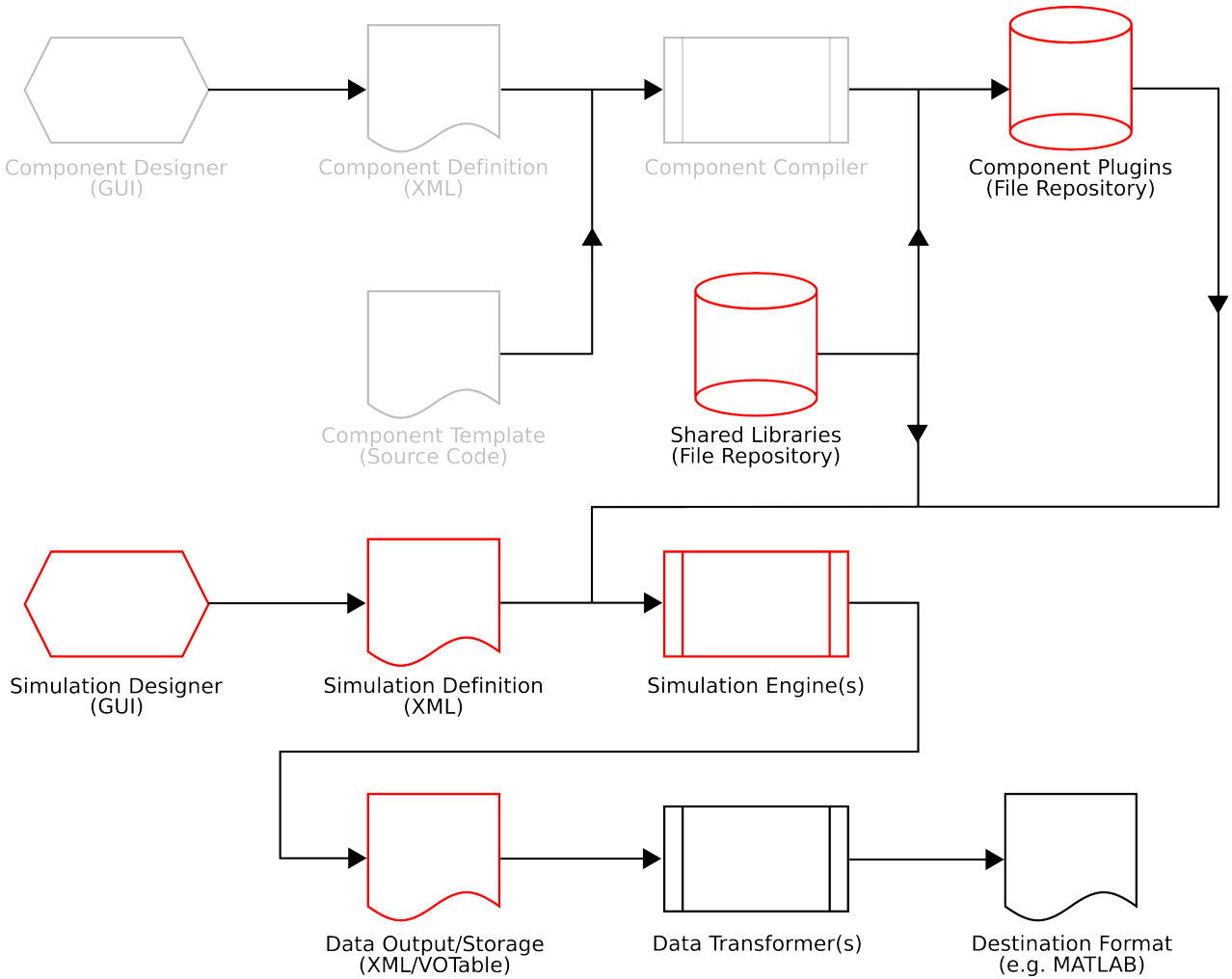

Framework for Time Domain Simulations of Advanced Laser Interferometry

- Time domain simulation for GEO600
- Framework approach (plugins & shared libraries)
- Parallel computation readiness using OpenMP
- Focus on usability (e.g. user-friendly interface)
- Based on modern open standards
- Community-driven development
- Open source license (GPL v3)

# Simulation Framework

Major elements:

- Simulation designer
- Plugin repository
- Shared libraries
- Simulation setup
- Simulation engine
- Data output/plotter



# Plugins

## Advantages

- Shared libraries (on demand)
- Extensible host application
- Independent development
- Well-defined interface / seamless integration

## Examples

- Laser, Space, Mirror, Beam Splitter
- Fabry-Perot Cavity (composite plugin)
- Photo Detector
- Signal Generators
- Data Storage / Plotter

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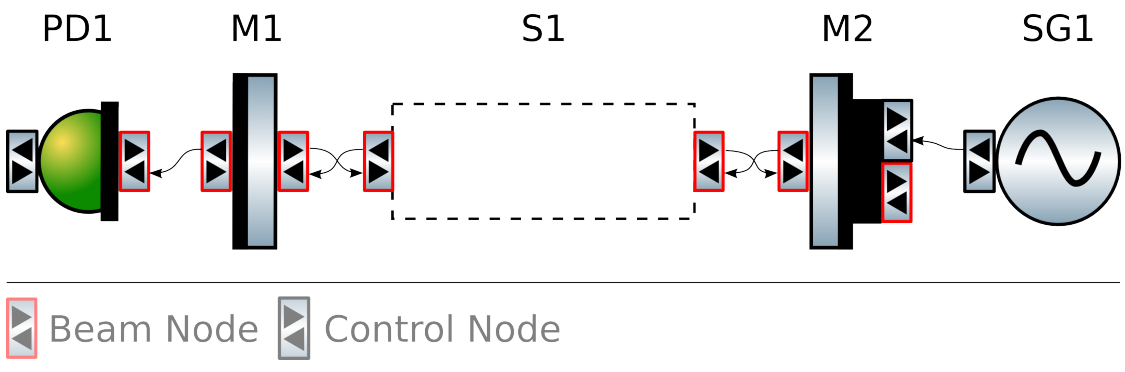
# Component Network

Any node may *register* itself as an *observer* of any other node of the same type!

Generic programming:

- Beam nodes (e.g. scalar complex double)
- Control nodes (e.g. scalar double)
- Options: (e.g. vectors, matrices)



# Current Status

## Done

- Plugin system / basic components
- Simulation description file format (XML)
- Component network & time domain engine
- Scalar field description
- VOTable output (XML/binary) and basic plot engine
- Graphical user interface (beta version)

## Pending

- Components: e.g. modulators, mechanics, electronics
- Field descriptions: sidebands, higher order modes
- Simulation engines: FFT propagation, frequency domain
- As always: code improvements

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# Demonstration

# Next Steps

- Binary releases for Linux, Mac OS X and Windows
- Establish project on suitable collaboration platform:
  - `http://origo.ethz.ch`
  - `http://gna.org`
  - `http://sourceforge.net`
- Source code release
- Code documentation release
- Preliminary development process:
  - Receive patches
  - Peer review and integrate patches
  - Accept frequent contributors as developers

# Further Reading

GEO600 Simulation Group Wiki

http://www.sr.bham.ac.uk/dokuwiki/doku.php?id=geosim:fidelity

- http://www.trolltech.com/products/qt
- http://gcc.gnu.org
- http://www.gnu.org/software/gsl
- http://www.openmp.org
- http://www.ivoa.net/Documents/latest/VOT.html
- http://qwt.sf.net
- http://www.stack.nl/~dimitri/doxygen

Any questions?

Thank you for your attention!