

# Mechanics with Galaxy : A framework for assays and modelling automation

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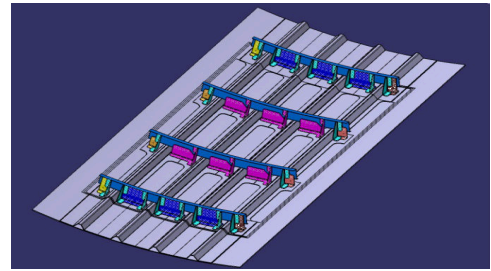

## Specifications for a system allowing experimental automation

In the context of cooperative work between industries and universities it appears that mechanical assays have to take part in a large process where rational approach implementing experimental life cycle is relevant. Experimentators are looking for sustainable infrastructure on which specific tools can be plugged in a flexible way provided by a large variability in use cases (software dedicated to data collect, constraints distribution, image processing ...) as well as operational issues (data storage, security, compute needs...).

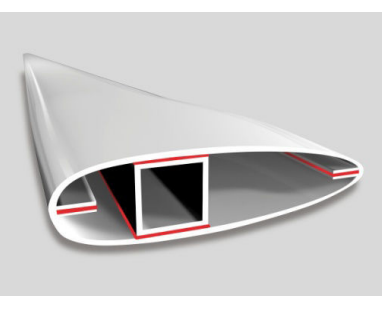

Galaxy presents flexible setups, so we launched some use cases implementations representing some needs of the mechanical approach. The relevant points in the implementation process :

- Collecting raw data provided by devices connected to specific PC
- Processing treatments connected with models and keeping trace for these analysis in order to replay them later.
- Processing queries in order to facilitate publishing.


### Needs in mechanical domain



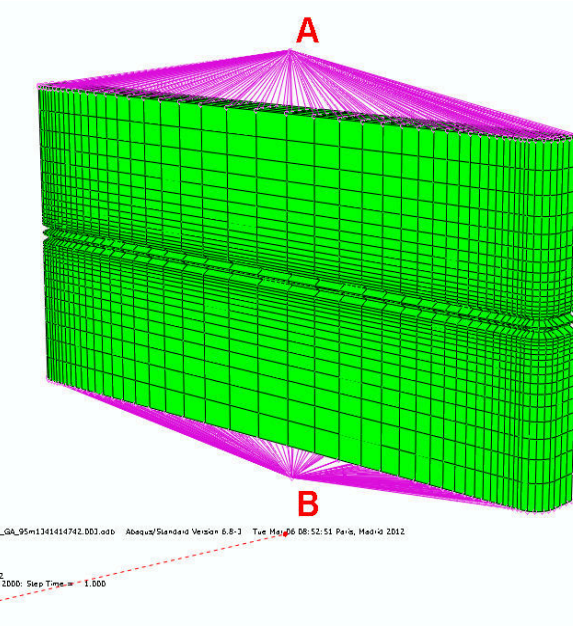

Industries deploying new technologies and processes as multi material bonded assemblies look for partners who realize assays with standard procedures in order to maintain quality as well as cost.



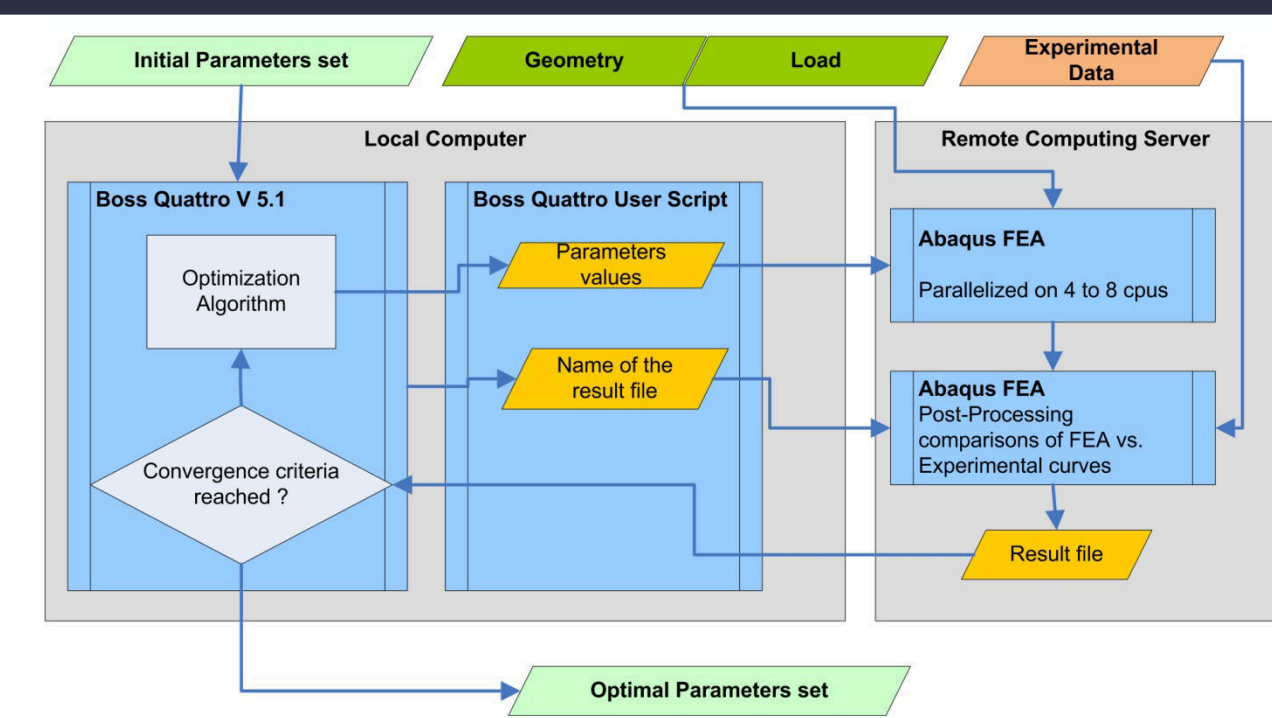
### Use cases in the data measurement and data analysis processes



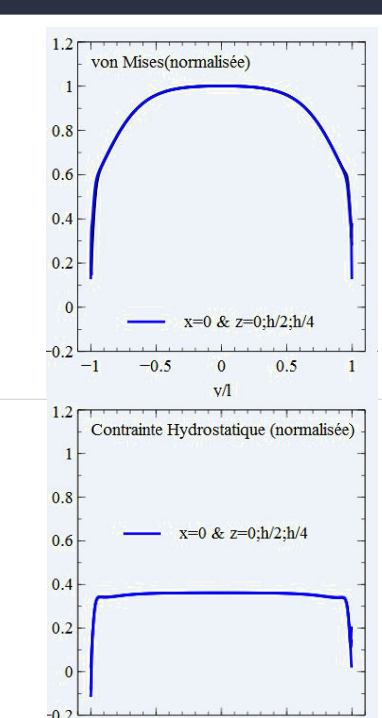
Dedicated machines break adhesive assembly samples and processes data acquisition.



Finite element models are implemented by software like castem or abaqus.



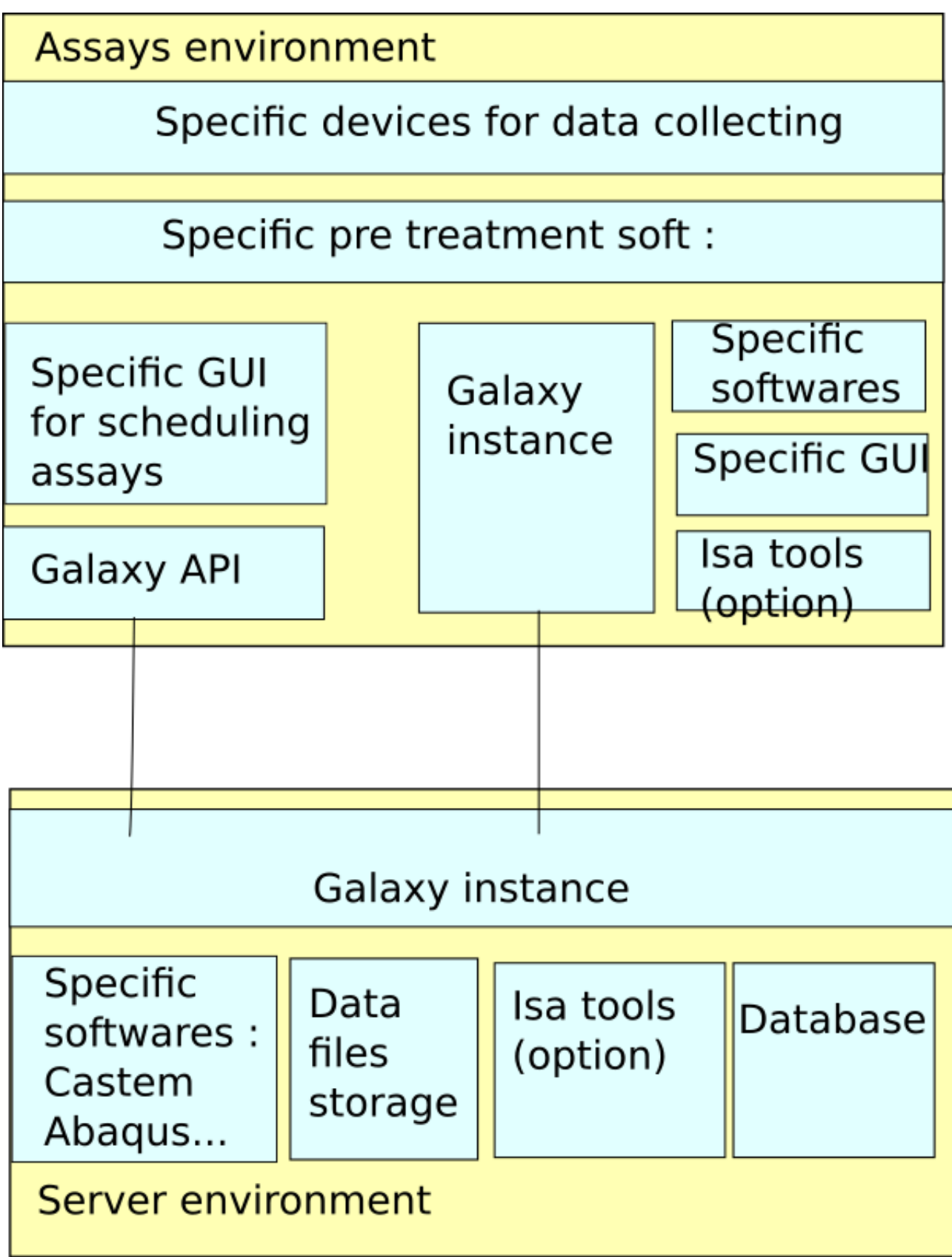
Coupling finite element models with optimization techniques permits mechanical assays cost decrease.



Model/experiment al cost curves

### Architecture for assays

The variety of assays for mechanical needs implies both standalone and web architecture.



Depending of measurement context two types of hardware PC for assays environment should occur :

- PC with limited resources implying the use of graphical interface for scheduling assays and a connection to Galaxy with API.
- PC allowing software installation where an instance of galaxy with specific tools work.

### Functionnal aspects

The actors using the system : <ul style="list-style-type: none"><li>- administrator</li><li>- local user</li><li>- project partner</li><li>- guest</li></ul>	Main entities : <ul style="list-style-type: none"><li>- project</li><li>- numerical study</li><li>- raw data</li><li>- sample</li><li>- meta data</li></ul>	Process for data collection : <ul style="list-style-type: none"><li>- acquisition in specific or isa format</li><li>- transfer on galaxy server or synchronization</li></ul>	Process for data analysing : <ul style="list-style-type: none"><li>- choosing raw data with criteria</li><li>- selecting treatment tools</li><li>- selecting optimization</li></ul>
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The implementation of simple use cases dedicated to mechanics into galaxy presents some advantages as :

- use of existing tools as file format converter, image processing ...
- capitalization and centralization of mechanical tools calling specific software
- benefit of powerful resources on which galaxy is based

The flexibility and agnosticity proved in simple mechanical context should improve virtual environment of mechanical research teams as well as in other research disciplines.

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