



**Collaviz<sup>®</sup>**

## **Remote and Collaborative Visualization with Collaviz**

*Pierre Gérard-Marchant, Distène*



## A modern scientific issue

- Process increasingly **large volumes of data**
  - Visualize and manipulate data
  - Share data and **collaborate** with other partners
  - ...with a generic, scalable and inexpensive solution, which helps rationalizing costs:
    - Investment costs
    - Time & travel costs



## Collaviz definition

- **Collaviz is an innovative multi-domain remote collaborative platform for the simulation-based design applications.**
- Collaviz is not another post-processing engine. It is a middleware layer to expose reference/legacy tools as services.



# Consortium

- International collaborative R&D project
- 28 Partners
  - 17 financed
  - 11 non-financed





# Challenges

- **Interactive and participative collaboration**, not only “shared display” visualization
- **Full transparent access** to scalable resources
- **Mainstream technologies** for service access (network, hardware...)
- **Generic approach** applicable to the needs of diverse communities



## Global approaches (1/2)

- A simple solution to break the bottlenecks of data volume production, processing, sharing and visualization:

### **modularity**

- Services approach
- Integration of multiple pre & post processing engines (e.g. Ensign, Paraview, Cassandra)
- Compression and watermarking
- Collaboration



## Global approaches (2/2)

- A **web based approach** to bridge the gap of network and computation capabilities
  - Web architecture, thin client, HP back office
    - Scientific datasets are processed on remote servers
    - 3D processing outputs are exported as X3D scenes
    - The X3D is shared by all the clients
- Based on **open standards**:
  - API, service container layer (e.g. web services), communication layer (SOAP)
  - Data formats, for instance X3D



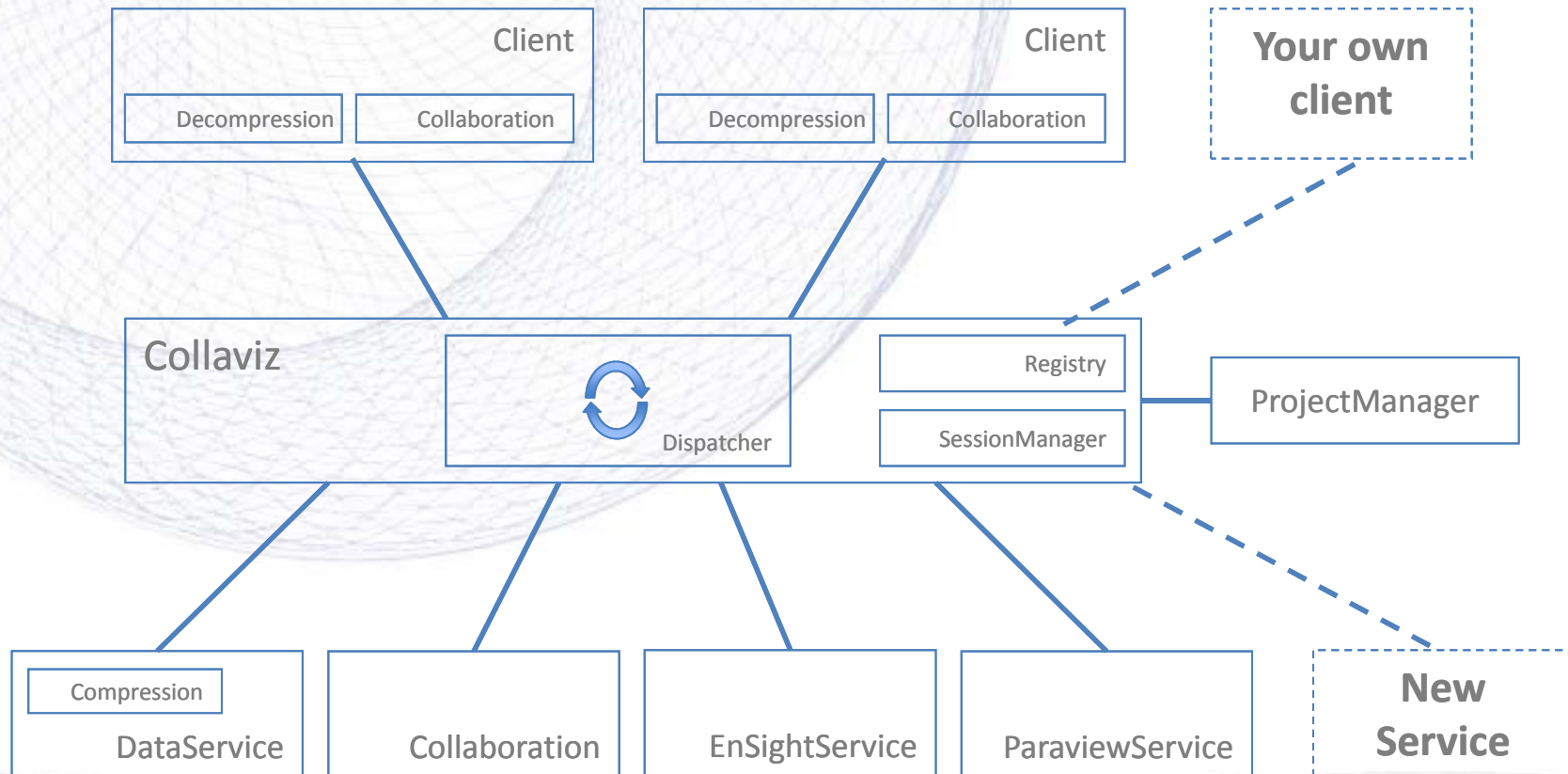
# Advantages

- Collaviz improves on existing techniques:
  - Full open pipeline to enable 3<sup>rd</sup> party services
  - Uses http/https to simplify remote access
  - Cross-platform support
  - Using existing standards
  - Synchronous & asynchronous collaboration
  - ...





# General architecture





# What it looks like...

The screenshot displays the Collaviz software interface with the following components:

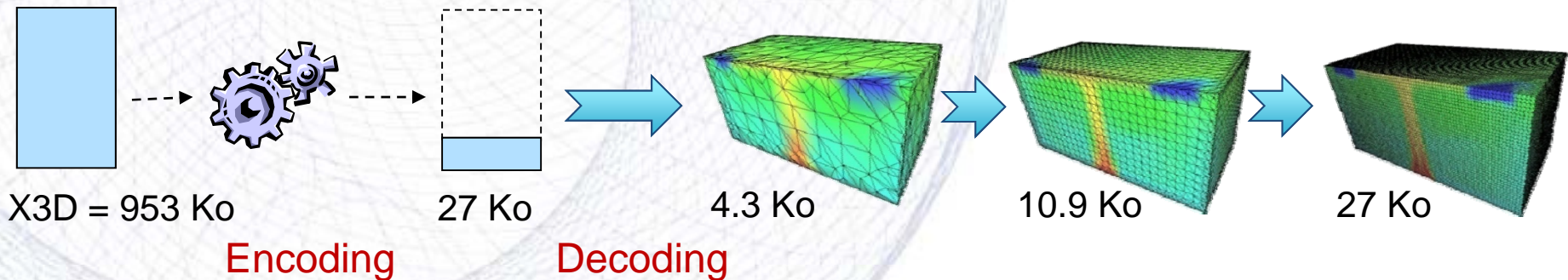
- Rendering Window:** Shows a 3D model of a hypersonic body. A legend at the bottom indicates velocity components: x (red), y (blue), z (green), velocity [x] (yellow), velocity [y] (magenta), velocity [z] (cyan), and velocity [N] (pink).
- CSV View:** A data viewer window showing the following data:

A	B	C	D
position	0	1	
x	10.0	0.0	
y	0.0	0.0	
z	0.0	0.0	
velocity [x]	nan	0.865545...	
velocity [y]	nan	-0.07252...	
velocity [z]	nan	0.095821...	
velocity [N]	nan	0.873848...	
- Tree Panel:** Shows a hierarchical view of the scene with 'root', 'New Scene', and 'New Scene'.
- Edit Panel:** Contains controls for 'Support part' (2 selected item(s)), 'Starting point' (x: 10.0, y: 0.0, z: 0.0), 'Ending point' (x: 0.0, y: 0.0, z: 0.0), 'Nb of points' (0), and 'Variable' (pressure).
- Pipeline:** A workflow diagram showing the sequence of operations from data input to final 3D views and bar graphs.



# Result example: Color Mesh Progressive compression

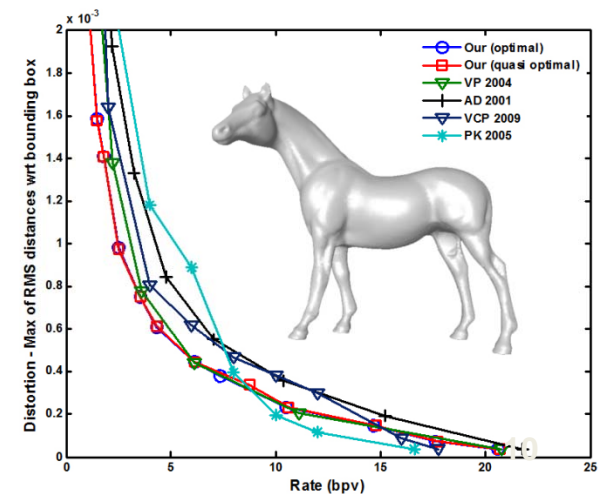
## Color-driven progressive compression



## Optimization of the visual quality of intermediate Levels of Details

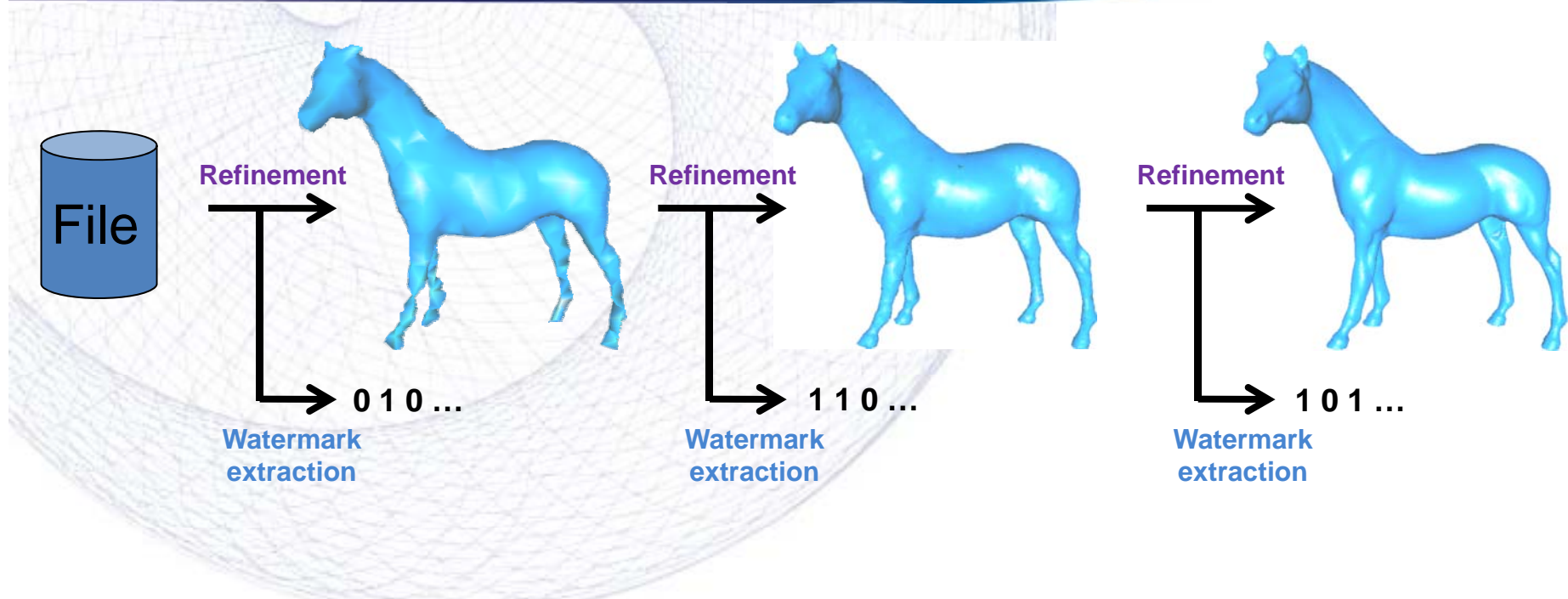
- Determination of the optimal quantization precision for geometry and color
- Introduction of a color metric to preserve important features

*Article accepted with minor revision in Visual Computer*





# Result example: Joint Compression and Watermarking



**Integration of copyright protection scheme into compression**

*Article accepted in CGI 2011 (Computer Graphics International, Vancouver) as one of 35 best papers / 220 submitted, published in Visual Computer.*



## To conclude...

- The Collaviz project started in January 2009 with a €4M funding (€2M from ANR).
- **The Collaviz framework will be Open Source released from June 2012** (packaging in progress)
- It includes **9 industrial and research use cases** (energy, chemistry, manufacturing, geosciences...)
- The extensibility of Collaviz will make it survive after the end of the project.



We are currently building  
an OPEN Community...

**So join us!**

Coordinator: [alban.schmutz@oxalya.com](mailto:alban.schmutz@oxalya.com)

Speaker: [pierregm.work@gmail.com](mailto:pierregm.work@gmail.com)