



PARTHENOS

Pooling Activities, Resources and Tools
for Heritage E-research Networking,
Optimization and Synergies

Sustainability and Future features for 3D web publishing solutions

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WebGL, the beginning

- ▶ API for 3D graphics in JavaScript (initial release 2011, first stable release 2013)
- ▶ Defined starting from the OpenGL | ES 2.0 specifications
- ▶ <http://webgl.org>



WebGL, first actions

- ▶ While waiting for all the browser to support WebGL, several «interfaces» were proposed:
 - ▶ Declarative: X3DOM (www.x3dom.org)
 - ▶ Imperative: ThreeJS (<https://threejs.org/>)
 - ▶ Hybrid: 3DHop (<http://3dhop.net>)

x3dom
Instant 3D the HTML way!

3DHOP
3D Heritage Online Presenter

three.js

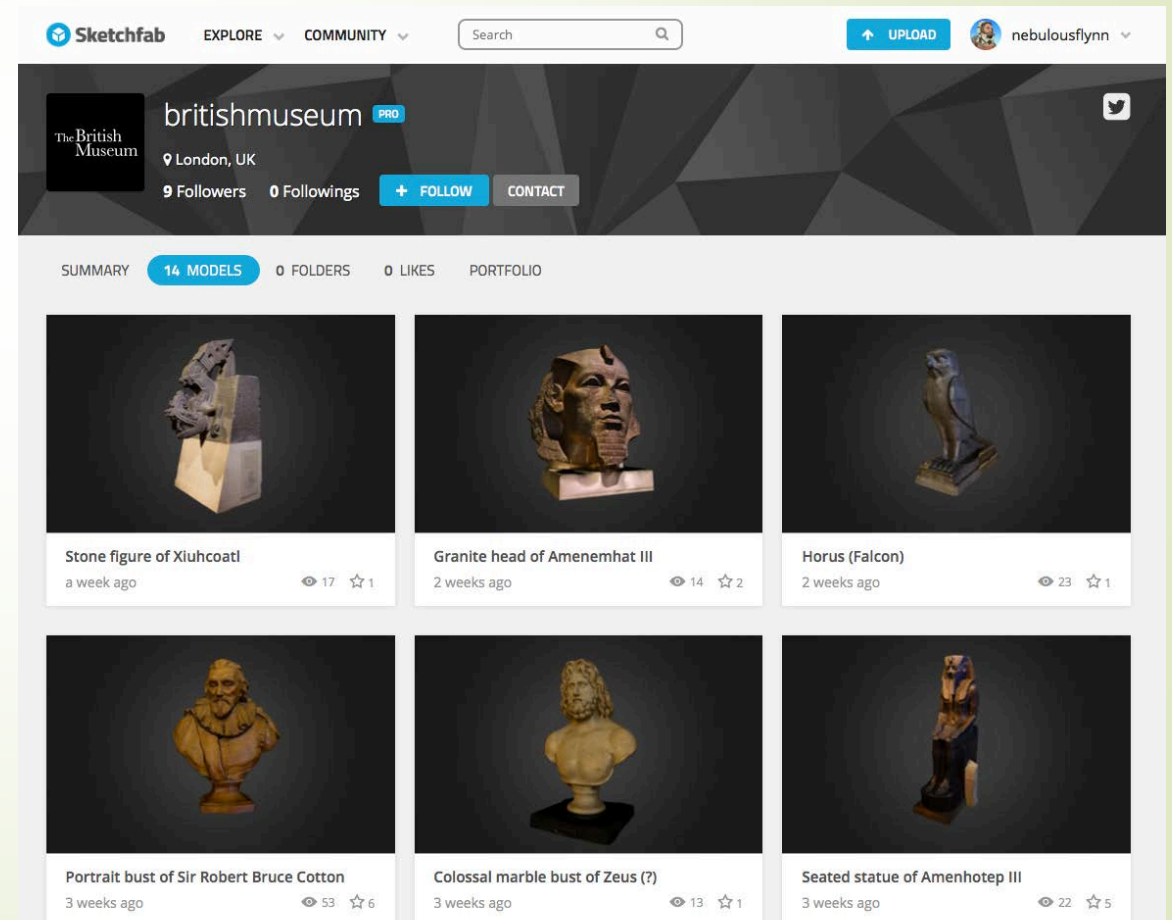
WebGL, first challenges (w.r.t. CH)

- ▶ High resolution geometry
 - ▶ Multi-resolution
 - ▶ LOD
- ▶ Variability of objects
- ▶ Quality
- ▶ Protection of data
- ▶ Need for «fully automatic» stuff



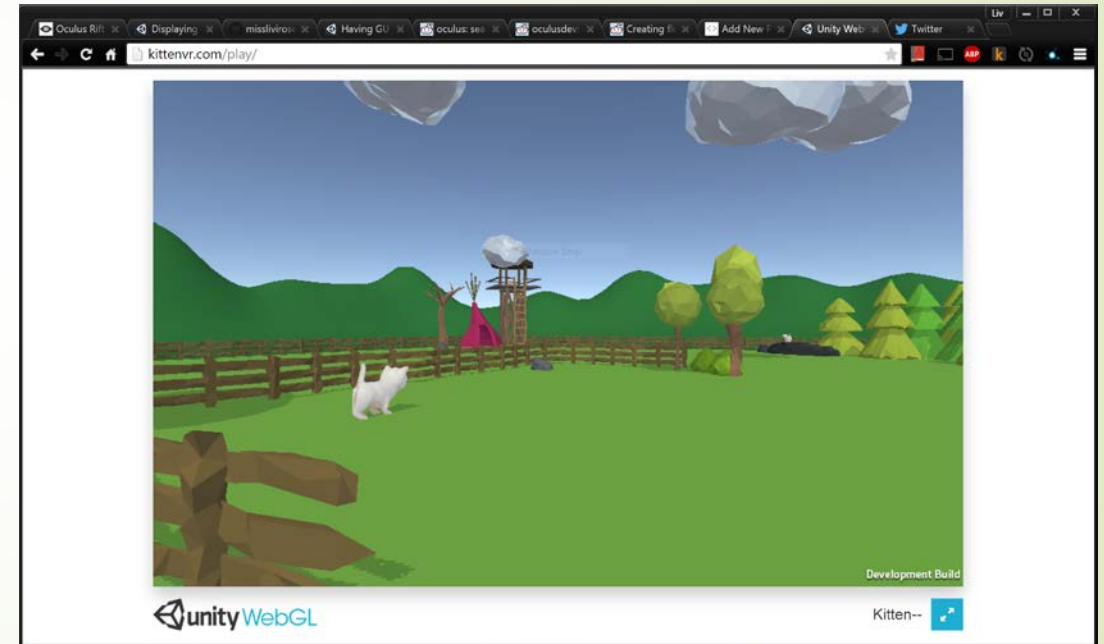
(Short) State of the art

- A «Youtube style» solution: **SketchFab**
 - Generic
 - Robust
 - «open» to CH
 - Perfect for «in-hand» objects
 - High resolution stuff (PRO)
 - Personalization (PRO)
 - Annotation (PRO)
- A non-commercial alternative
 - **Ariadne Visual Media Service**



(Short) State of the art

- A «Gamers» solution: **Unity**
 - Made for videogames style
 - Reasonably easy to use
 - «neutral» to CH
 - Can provide more complicated interaction
 - Personalization
 - Annotation
 - Issues with complexity
- A non-commercial alternative
 - X3Dom



(Short) State of the art

- A «CH-Oriented» solution: **Smithsonian X3D**
 - A CH-oriented presentation tool
 - High quality models
 - Advanced interaction
 - Annotation and storytelling
 - Personalization
 - Unclear how to create a page
 - Where is **Autodesk** going?
- A non-commercial alternative
 - **3DHop**



Requests by CH community

- ▶ WE WANT:

- 1) Fully automatic publishing
- 2) Measurements/Sections
- 3) Annotation
- 4) Collaborative environments
- 5) Comprehensive metadata/description/ontology/whatever

- ▶ For this stuff we need:

- ▶ Client-Server mechanisms, a place where to store data (1,2,3,4,5)
- ▶ Moderation/accounts (4,5)
- ▶ Define a reasonable data structure (5)
- ▶ A miracle (1)

Client-server mechanism

- ▶ If you want to add information to a 3D environment, this information has to be stored somewhere. Hence a **client-server** mechanism is needed
- ▶ When creating such an infrastructure, the initial design is highly critical:
 - ▶ Collection of requirements (what would you like to do with this data?)
 - ▶ Data format (how do I store the information, in such a way that it's flexible and extensible enough)
 - ▶ Is the system open/closed/moderated?
 - ▶ Is there any control on data quality (both 3D and annotation)
 - ▶ Are you REALLY willing to share data and knowledge?

Client-server mechanism

- ▶ Two possible approaches:
 - ▶ Full design of the architecture: the data structure is pre-defined, and the amount of possibilities of interaction is defined before.
 - ▶ The architecture must be extensible, but the requirements **MUST** be as complete as possible!
 - ▶ A Bottom-Up approach: an initial (as comprehensive as possible) architecture is created, the community uses it and provides feedback until a complete architecture is created
 - ▶ This needs several iterations and re-writings of the architecture, plus medium-term maintenance
 - ▶ And the community must use it a lot and provide feedback!!!

Web rendering has limitations

- ▶ With WebGL, only limited processing is possible
 - ▶ In particular, it may be hard to modify the geometry or some of its attributes
 - ▶ We may use server-side clusters to make the work.
- ▶ Browsers impose limitations (and do what they want)
 - ▶ No solution works forever, **continuous maintenance is needed.**
- ▶ Some actions, easy to do off-line, are much more complex on-line
 - ▶ Example: creation of area / regions over the 3D model.
- ▶ Full protection of data is NOT possible
 - ▶ But there's no «easy» way to take the data.

Web rendering in the future

- ▶ CH Domain is
 - ▶ Complex and variegated
 - ▶ Sometimes «resistant» to convergence
 - ▶ Not able to guide the market
- ▶ A possible perspective: 3D in the multimedia family
 - ▶ Commercial solutions will choose directions that may be not the right ones for CH
 - ▶ If you want your own solution, there are costs for creation but also costs for **maintenance!**
- ▶ We need to «go beyond», but are you ready for this?
 - ▶ Sharing data and knowledge (*most of CH people deny it!*)
 - ▶ Be available to discuss your current pipeline of work (and, possibly, slightly change it)
 - ▶ Be «creative» and TAKE RISKS