THE CURTIS PLATFORM FOR CITY SIMULATION

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THE NEED FOR A CITY SIMULATION PLATFORM

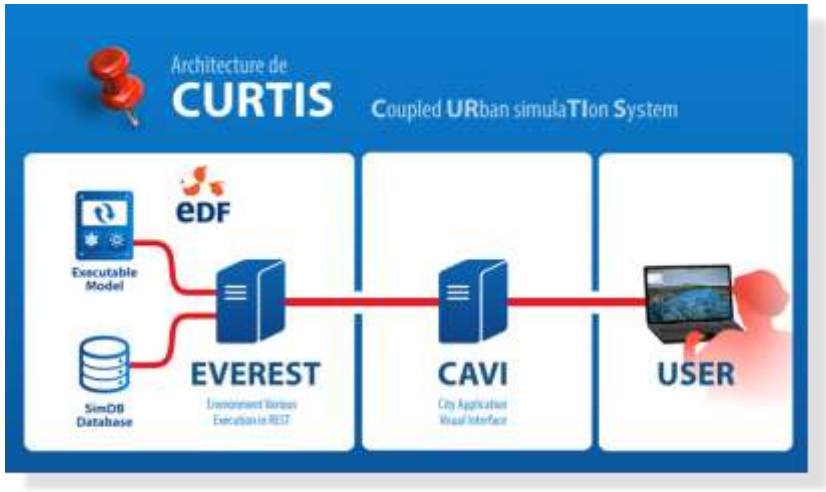
- **City development requires planification.**
  - Energy management
  - Transport management
  - …
- **Large utilities such as EDF can provide expertise based on their experience.**
  - Consulting
  - Services
- **In this context, EDF is building an urban simulation platform.**
  - Simulation codes implemented from models specified by domain experts
  - Data management (input, scenarios, simulation results)
  - A GUI is needed for this platform

A WEB BASED SOLUTION

- **End users need to access the platform ...**
  - … wherever they are …
  - … with specific IT rules about installs, OS, etc.
- **Some control need to be kept.**
  - By EDF, about its simulation codes and domain expertise.
  - By the clients, about their data.
- **The web is the best environment.**
  - No need for specific installs
  - It can be accessed from mostly anywhere.
  - Data is centralized and secured.
  - All kinds of user interface widgets (text, 2D, 3D).
  - The base of most modern Information Systems (SOA, REST)

ARCHITECTURE

- **EVEREST : A simulation platform**
  - Provides data, simulations and results management capabilities.
  - Geographic Information System services are now available too.
  - All services are exposed as REST.
- **User interface(s)**
  - WebGL based
  - Include their own presentation-oriented storage
  - 3D data exchange is based on CityGML.



WEB3DROCKS

- **A proof of concept for testing**
  - Dev < 2 weeks
    - Mostly data transform and services connection
  - X3D based
  - Connection to web services, visualisation of a 3D neighbourhood …

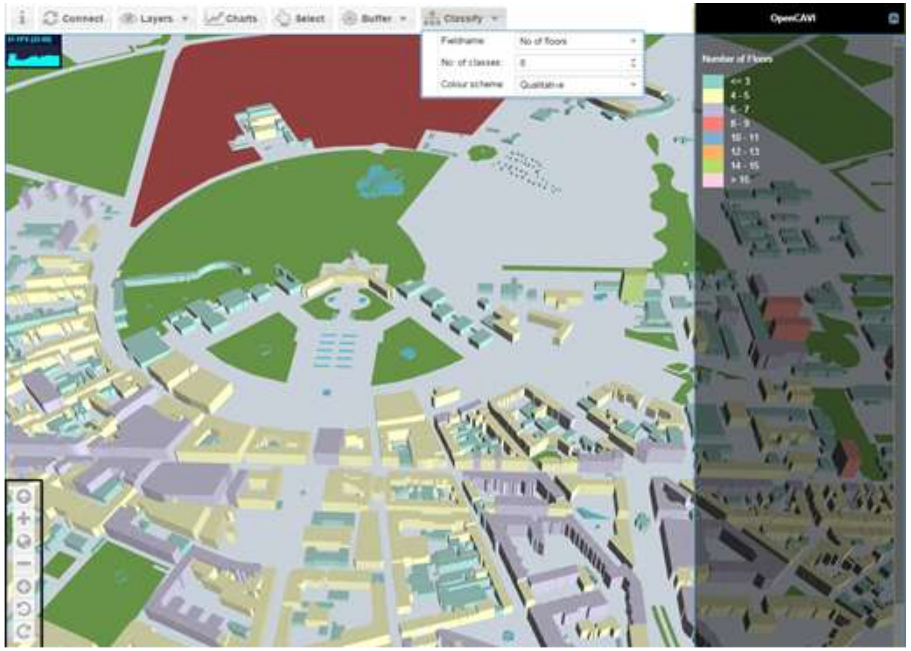
```
<html>
…
<body>
     <div>…</div>
     <div>
          <x3d …>
               <scene>
                    …
                    <inline … url=…/>
               </scene>
          </x3d>
     </div>
</body>
</html>
```

CAVI

- **A full prototype of a useful user interface**
  - Developped by a contracting company
    - Based on a fork of Three.js
  - Actually field tested
    - Services in France, users in Singapour
- **Not a full product**
  - Focus more on usage than on non-functional requirements (qualities)
  - CAVI2 development in order to go from a prototype to an industrial product

OPENCAVI

- **Internally developped user interface**
  - Developped in parallel with CAVI 2
  - Experimentation UI
    - New EVEREST functions
    - New interfaces (input or output devices)
  - Building blocks for other solutions
    - For test of other 3D engines for example
  - Maintain skills



CONSIDERED IMPROVEMENTS

- **The reason why SIGGRAPH is important to us !**
- **Seamless integration of new input/output devices**
  - 6 DoF mouses, VR headsets … technically integrated with the platform (web !)
  - User experience consistent with use cases
- **Immersive city**
  - Cars, people … simulated in real-time (possibly based on a « true » simulation)
  - Automated geotypical data (trees, textures …)
  - Realistic illumination (urban lighting)
- **Robust architecture**
  - Consistent 3D (data and GUI) requirement patterns
  - Requirements based data translation

CONCLUSION

- **Web based development of actual 3D applications is possible and can be done quickly.**
  - Different UIs can be developped for different needs.
  - Depending on the usage, data size doesn’t have to be a constraint.
    - Despite evolutions, the network still is a critical resource.
- **Architecture is as important as technology**
  - Reduce coupling : use standards!
  - Separate concerns: interchange and presentation formats may differ.
    - Using only one reduces the need for skills and the risks linked to translations.
- **Data translation (between formats) is still complex.**
  - Loss of structure or information
  - Incompatible requirements