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

- **A full prototype of a useful user interface**
  - Developed by a contracting company
    - Based on a fork of Three.js
  - Actually field tested
    - Services in France, users in Singapore

- **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
OPENCASI

- Internally developed user interface
  - Developed 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 developed 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