IoT: the case for quantitative analysis

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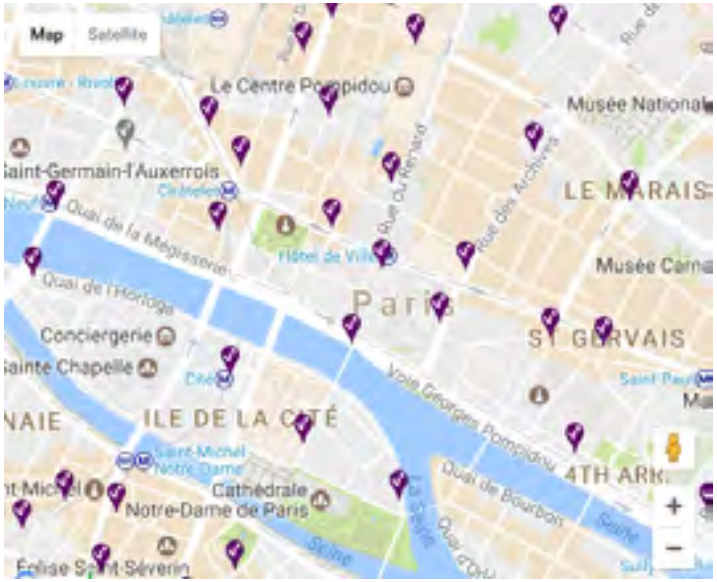
IoT: An informatics Environment

- IoT supports the construction of ubiquitous pervasive systems.
- Many of these systems will be transparent in nature, yet used to address societal goals.
- This makes it imperative that their design is thoroughly analysed before they are deployed.

Example: Bike sharing systems



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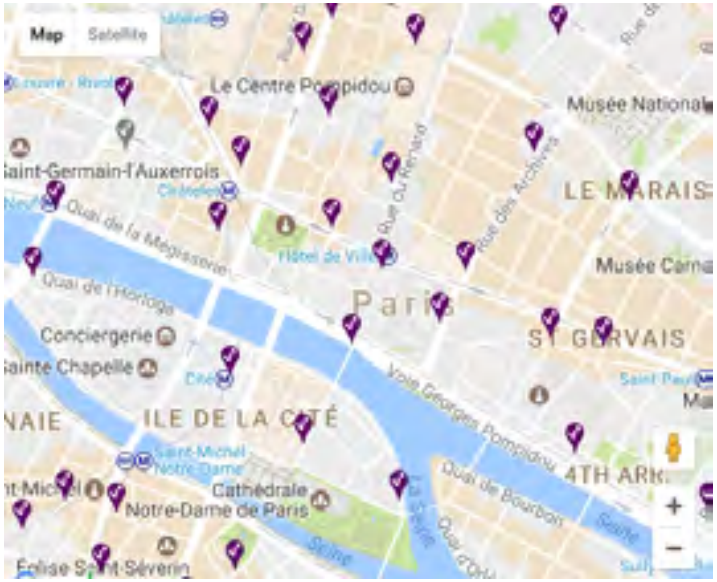

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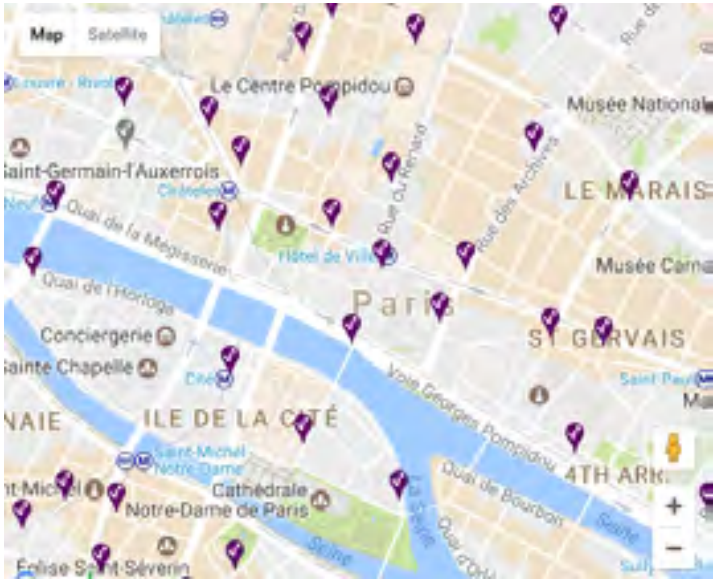

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Answering either question involves quantitative reasoning.

Quantitative reasoning for IoT systems

There are major challenges in building models of such large collective systems, some of which have been addressed in the recent QUANTICOL project (www.quanticol.eu):

- an unambiguous way of describing the behaviour of the systems we are interested in;
- a logic or requirements language which allows us to express the behaviours we wish our designed system to have;
- automatic ways to check the description against the requirements, captured in software tools;

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The scale of the systems means that sophisticated mean field approximation techniques must be used to efficiently analyse possible behaviours and explore alternative configurations.