

IoT: the case for quantitative analysis

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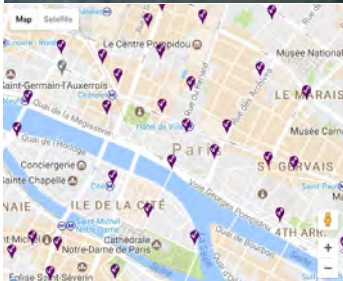
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IoT: An informatics Environment

- 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.



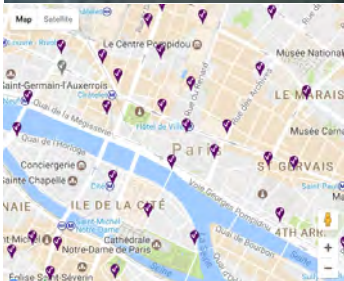
Example: Bike sharing systems



Users:

- Will there be a bike/slot when I need one?

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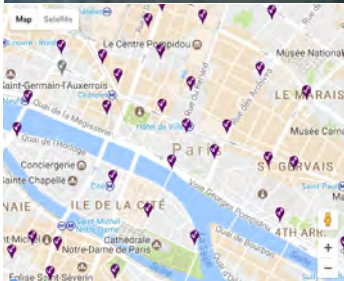
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System operators:

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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.