The PhD work will in particular consider the following research questions:

- **Sustaining people's participation across time.**

- **Essential elements for connecting people with their environment and communities, which may serve building upon the research background of the Inria MIMOVE team, the PhD will more specifically focus on participatory systems.**

Incentive mechanisms for participatory systems have been studied extensively in the literature. Overcoming such a challenge through the study of relevant middleware support that may be reused across participatory systems is the focus of the PhD.

Toward the above, we investigate supporting middleware infrastructures that in particular enable universal social networking so as to allow citizens to engage using their favorite online social network services. The resulting middleware is called SocialBus and is released under open source license (at https://gitlab.inria.fr/usnb/universal-social-network-bus).

**References**

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- James Holston, Cristhian Parra, Valérie Issarny. *Engineering Software Assemblies for Participatory Democracy: The Participatory Budgeting Use Case*. International Conference on Software Engineering (ICSE), Software Engineering in Society (SEIS) Track, 2016. [https://hal.inria.fr/hal-01261012](https://hal.inria.fr/hal-01261012).
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- Rafael Angarita, Nikolaos Georgantas, Cristhian Parra, James Holston, Valérie Issarny. *Leveraging the Service Bus Paradigm for Computer-mediated Social Communication Interoperability*. International Conference on Software Engineering (ICSE), Software Engineering in Society (SEIS) Track, 2017. [https://hal.inria.fr/hal-01485213](https://hal.inria.fr/hal-01485213).
- Rafael Angarita, Nikolaos Georgantas, Valérie Issarny. *USNB: Enabling Universal Online Social Interactions*. IEEE International Conference on Collaboration and Internet Computing, 2017. Best paper award [https://hal.inria.fr/hal-01591757](https://hal.inria.fr/hal-01591757).

**Principales activités**

Incentive mechanisms for participatory systems have been studied extensively in the literature. Building upon the research background of the Inria MIMOVE team, the PhD will more specifically focus on the study of solutions that leverage mobile networking and the IoT. Indeed, these are two essential elements for connecting people with their environment and communities, which may serve sustaining people’s participation across time.

The PhD work will in particular consider the following research questions:

- **How to leverage the IoT for participatory systems:** The objective here is to enrich the
exchange among citizens through the provision of relevant observations from the physical environment. Things may further extend to “social things” (e.g., social bots) that autonomously communicate with the engaged citizens so as to foster interaction among them, while preserving their respective privacy.

- **How to support the continuous engagement of nomadic users**: Despite the increased capacity of smartphones, connectivity and relative resource constraints, esp. wrt energy, remain the norm. It is thus essential to customize protocols for the mobile case so that citizens are able to engage any-time, any-where, when that is the most relevant with respect to the purpose of the given participatory system.

To address the above questions, the PhD work will decompose into:

- State of the art survey of participatory systems and their applications, with a special focus on systems oriented toward participatory democracy, to become familiar of the overall topic of participatory systems and select a specific use case for experimental validation.
- Design of incentive mechanisms and supporting middleware protocols for participatory systems that leverage observations from both “physical” and “social” things, while preserving the required security and privacy properties.
- Customization of the proposed mechanisms for the mobile context.
- Prototype implementation of the above solutions as part of the SocialBus middleware.
- Evaluation of the proposed solutions.

**Compétences**

Technical skills and level required: Master degree in Computer Science or Computer Engineering is required. Programming skills.

Languages: Fluency in English is required; it is not necessary to speak French.

Relational skills: Team spirit is essential.

Other valued appreciated: Autonomy.

**Avantages sociaux**

- Subsidised catering service
- Partially-reimbursed public transport

**Rémunération**

Gross Salary per month: 1 982 € the first 2 years and 2 085 € the last year