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Supervisor Expression of Interest MSCA-IF Marie Sklodowska Curie Action-Individual Fellowship

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Department Name: Research topic: (https://www.polimi.it/en/scientific-research/research-structures/departments/)	Dipartimento di Elettronica, Informazione e Bioingegneria PE6_3 Software engineering, operating systems, computer languages
MSCA-IF Research Area Panels	<input type="checkbox"/> CHE_Chemistry <input type="checkbox"/> ECO_Economic Sciences <input checked="" type="checkbox"/> ENG_Information Science and Engineering <input type="checkbox"/> ENV_Environmental and Geosciences <input type="checkbox"/> LIF_Life Sciences <input type="checkbox"/> MAT_Mathematics <input type="checkbox"/> PHY_Physics <input type="checkbox"/> SOC_Social Sciences and Humanities
Politecnico di Milano Areas:	<input type="checkbox"/> Cultural Heritage <input checked="" type="checkbox"/> Smart Cities <input type="checkbox"/> Territorial Fragilities <input type="checkbox"/> Health <input type="checkbox"/> Industry 4.0
Brief description of the Department and Research Group (including URL if applicable):	The DEEP-SE (DEpendable Evolvable Pervasive Software Engineering) group conducts research on techniques, tools, and frameworks for the development of complex software systems. It encompasses a variety of aspects of such systems, ranging from modeling and analysis issues to issues related to their implementation and runtime management and optimization. The applications that are the focus of this research can be characterized, in varying degrees and flavors, as distributed, pervasive, adaptive, reconfigurable, dynamic, mobile and critical. Formal languages and techniques for the modeling and verification of the target applications play a central role in the research activity of the group. Most of the research activities eventually lead to software prototypes and experimentation. URL: http://deepse.dei.polimi.it



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Brief project description:
(max 1 page)

MobleSE: Software Engineering for a World of Mobile Applications

Mobile applications have changed the way we live and important activities, like payments and reservations, can now be done through mobile devices. A mobile application is not only a piece of *conventional* software that runs a new device (for example an Android application is not only a Java program), but there are some peculiar characteristics that must be addressed properly. The creation of quality, complex mobile applications requires new methods and solutions in all the following areas (at least).

Since Android and iOS are incompatible, and every application must be developed twice, the community needs efficient, usable, and complete cross-platform solutions. The need is not only related to the implementation of the final application, but also to its test and maintenance. This is why, a model-based solution that starts from shared models and produces native applications, instead of exploiting web technologies or cross-compilation techniques, could provide better results. Obtained models could also be used to derive comprehensive test cases and to govern the maintenance and evolution of the application.

Even if one only addressed one operating system, and Android could be a more easily available solution, there are other aspects. Conceptually the same application is executed on very diverse devices. For example, nowadays there are thousands of different Android devices, and the application must always execute correctly on each of them, no matter of the screen size, its resolution, the version of the operating system, and the sensors and cameras onboard. This calls for new design methodologies, which support the synthesis of application families into a single design, but it also calls for dedicated testing solutions that aims to both cover the different characteristics and prioritize test cases given the devices of interest.

It is also true that mobile devices are equipped with a great variety of sensors and cameras, and mobile applications use and exploit the data they acquire. Again, the rich context must be conceived, designed, implemented, and tested consequently. For example, while nowadays thinking of a geo-localized application is quite simple, its realization is still often problematic and better, special-purpose abstractions, libraries, and tools would ease the task and allow for more quality solutions.

Finally, these applications are now available for very diverse devices (from watches to phone and tablets, from televisions to cars). They can run on this devices in isolation, but they can also be distributed on a group of nearby devices or some activities be moved from one device to another while in execution. This is the idea of liquid computing applied to mobile devices, and again appropriate middleware infrastructures, abstractions and APIs, and tools would help stand-



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	<p>ardize and ease the conception of these distributed, liquid applications.</p> <p>These are only some examples of what software engineering for mobile devices/applications should be about, but more, additional dimensions can easily be identified. The candidate is not supposed to address all these aspects, but s/he should frame the problem and then tailor the actual research on her/his skills and expertise.</p>
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