

# PROJECTE DE DOCTORAT INDUSTRIAL EXPEDIENT 2016 DI 032

## DADES DE L'EMPRESA I DE L'ENTORN ACADÈMIC

**Títol del projecte**

Software verification and formalization of mathematics; The semantics road.

**Empresa**

Formal Vindications S.L.

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## BREU DESCRIPCIÓ DEL PROJECTE DE RECERCA

Formal Vindications S.L. is a company that does formal verification of technical specifications and of software.

For example, to be a medical doctor you need to be inscribed at the General Practitioner Register, to work as a lawyer a similar registration is needed, but to call yourself a programmer, no requirements are needed. It is in this context that lately one observes an increasing need to verify that software actually does what it claims that it does. Particularly for critical software involved in, for example aviation or traffic it is clear that no errors are allowed to occur. The same applies to critical technical software on the basis of which fines are computed.

Here, formal logic offers a helping hand. With modern techniques, formal specifications can be formulated in an unambiguous fashion that allows standardized verification certificates for the corresponding software. This is the core activity of the company.

The industrial component of the PhD revolves around the development and verification of legal software in Coq. This work will be complemented with the formalization of parts of logic/mathematics. Since the group where this project will be embedded works on ordinal analysis via modal logic and reflection principles, we expect collaboration with the main group to arise, but we are open to alternative proposals. As to tell the two PhD



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positions apart, we tentatively call them “The Syntax Road” and “the Semantics Road” respectively since one part of the formalization of our mathematics projects involves modal calculi whereas another part will emphasize on relational (Kripke) semantics.