

What research methods you currently use and which ones you might consider using in the future for your work.

Just having started the research, it is still but unclear which research methods needs to be used as of now, but being an engineer for a couple years emphasized the importance of numbers and graphics.

In engineering numbers are truth: without results there are no products, without demonstrators, prototypes and simulations there are no numbers, and/or, without ideas, theories and hypotheses there is no prototype or simulator.

It seems then logical and easier to prolong this approach and use the scientific method for the research. This method will allow the formulation of hypotheses, the extrapolation to a system and the development of demonstrators to validate/invalidate the hypotheses.

It is the method emphasized in the control area since the essence of control is to be able to predict or estimate the evolution(s) of a system (or system of systems) in order to influence its future behavior. In such context any other research method seems hard to justify.

The research would then be primarily based upon this scientific method and would allow the development of (at least one) demonstrator(s). This demonstrator would most likely be crucial in the research process because it will help to confront the theories earned and also would act as a demo platform for the company, since this is an industrial research it will most likely be its key result from the company point of view and interest.

The research will be conducted as follows: first a survey on the existing state of the art will be conducted, this is one of the contributions, indeed the research survey gathers the content of the researches done until now in the field and will allow the research to be faster and also help to have an overview of problems and open on possible solutions. Then the first demonstrator shall be created, it would act as a first output of the research process to the company and also serve as base for the research continuation. From there, we shall explore different hypotheses and apply them to the demonstrator, verify the

behavior of the system, extract the essence of the results, share it with the community and build from it. Basing the research on the demonstrator would allow the hypotheses to be easily given credit or being discredited as research output.

The demonstrator itself could be a contribution, we could share it with the community and/or join it with research papers in which case it will become a valuable addition to the research results by providing a base for research validation but also help researchers or other contributors to formulate new questions and maybe observe phenomenons that were not foreseen.

As we discussed above, the demonstrator should be central in the scientific approach of the research, nonetheless it will also play a central role in one other key research method that is considered be used in the future to complement the main research axis: case study. Being part of an industrial research gives a broad opportunity for harvesting feedback from users, developers and other type of person in relation with the object of the research. We can provide a selected panel of people with a limited/altered or full demonstrator and then observe how it is accepted, rejected and how people react to it. We also would conduct a survey and ask different parts of the industry what kind of behavior or functionalities they would like to experience. Conducting a case study could also help to resolve some uncertainties and answer questions formulated during the scientific method. The study will also help guiding the way for the research in conjunction with the demonstrator and is a such a sort of parallel input of the research.

One can see three contributions for the research: The theories and their solutions that are direct outputs of the scientific method; The case study results that would help direct the scientific research path with solutions and/or more questions; and finally the demonstrator that would serve as a research base for both research method as well as being used as an output of the research by providing an example of the solutions that emerged from the research.