proposition sujet de mémoire 2014 - 2015
MASTER Recherche 2ème année
Management, **I**nnovation, **T**echnologie
spécialité « **Génie industriel** »

Titre
A Meta Model for the Development of Customized Simulation and Analysis Platform for Semiconductor Industry (SI)

Contenu du sujet proposé:

Semiconductor Industry (SI) has emerged as one of the most fragile, highly competitive and fastest growing manufacturing domain. It is characterized by high-mix low-volume production and short product life cycles. New technologies are developed every 2-3 years to ensure competitiveness and consistent market share. The success depends on our ability to efficiently use production resources and effectively carrying out technology derivative and improvement initiatives. Therefore engineers need decision support tools to address new production line excursions as well as support modelling newly emerging systematic drifts/variations. It requires smooth transition of huge production data to information and knowledge through advanced statistical methods and AI (artificial intelligence) and ML (machine learning) based predictive models. As one model do not fit all and varies over time as a function changing system behaviour; hence, they need frequent validation and adaption initiatives.

At present, production line operations, excursions and R&D initiatives, in the SI, are controlled by different specialized software tools where statistical methods and models are fixed and cannot be adapted or validated without purchasing its new versions. The software industry in SI has emerged as one of the most important stake holders due to its competitiveness and short product life cycles. This situation is complicated in the fully automated production lines where it is highly expensive to adapt each tool for its respective method and/or models. As a result, engineers make decision with low quality information/knowledge generated by these tools. It significantly impacts efficient usage of production line resources and continuous improvement in the production technologies.

The objective of this internship is to propose a Meta model for an analysis and simulation platform where statistical methods and models are developed as pluggable reusable components. The key focus is on reducing number of analysis tools used by engineers to transform production line data into information and knowledge, and providing them with adapted and calibrated state of the art methods and models. The real advantage for the SI in this proposed simulation and analysis platform is that adaption and calibration of these methods and models can be done offline with academic collaborations to benefit from latest advances in statistical, AI and ML techniques. Furthermore, validation of these methods and models can involve end users (engineers) with actual production data, before their integration into simulation platform. The proposed approach offers the flexibility to customize user interfaces with in-house development that will steadily reduce investment on new tools and delays. The key emphasis of this propsoed simulation and analysis platform is to promote reusable component based modelling of future industrial information systems with emphasis on data/information visualization modules. Target of this internship is to develop Meta model for proposed simulation and analysis platform, based on the requirements to be collected from ST, Crolles 300mm production line. It also requires the development of a prototype for ETCH workshop to demonstrate its benefits in terms of quality of information/knowledge generated from the data, reduction in time delay and investment.

This internship offers an excellent opportunity to work in highly competent team at G-SCOP and face to face interaction with Engineers in ST, Crolles for requirements identification. It requires strong skills in information system modelling (UML), programming (Java) and preferably column store databases (e.g. NoSQL). You will get research as well as professional industrial experience of the most advance manufacturing production line.

- Quel parcours conseillez-vous : Supply Chain ou Product Devolpment ? Supply Chain
liste des cours sur le site web du master

- Pour mener à bien le stage, il est souhaitable de suivre en cours optionnels le (s) enseignement(s) suivant(s) :
  Systèmes d'infos industriels – Ass Prof. Lilia GZARA

Some Literature References:
- UML Components: A simple process for specifying component based software, Book by Addison-Wesley, 2000
- Requirements Engineering, 2nd Edition Book by Springer
- Alistair G.S., Neil A.M.M., Shailey M. and Darrel M., 1998, Supporting scenario based requirement engineering, IEEE Transactions on Software Engineering vol.2
- Roel W., 1998, A Survey of Structured and Object-Oriented Software Specification Methods and Techniques, ACM computing surveys, vol.30 no.4

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