PhD Proposal 2017

School: ECNantes	
Laboratory: IRCCyN	**Web site: http://www.irccyn.ec-nantes.fr/**
Team: IS3P	**Head of the team: A. Bernard**
Supervisor: Catherine da Cunha **Raphael Chenouard**	**Email: Catherine.da-cunha@irccyn.ec-nantes.fr** **Raphael.chenouard@irccyn.ec-nantes.fr**
Collaboration with other partner during this PhD:	
In France:	**In China:**

Title: Simulation of public value network for decision support
Scientific field: *Industrial Engineering*
Key words: discrete event simulation; value network; optimization

<u>**Details for the subject:**</u>
Background, Context:

The economic crisis and the budgetary rigor that followed had many consequences. In Europe it drove the States to diminish their expenses and reduce the number of public servants. Yet one of the levers to boost the economic recovery was to inject public money in sectors that would allow the most pay back in terms of innovation, employment, and public value. Both objectives can be obtained when externalizing previous state realized mission to private tiers.

In France the public budget that is re-injected in the private economy to maintain public value mission represents 10% of global GDP [1]. Furthermore the lever effect is then of 1 to 5 (depending on the sector) [2]. The main challenge is then to use this great opportunity to overcome the economic crisis by optimizing the public-private relationships. The resulting network of actors forms a extended administration that can relies on the advance made on the extended enterprise domain.

Previous works enabled to define a methodology to identify the processes performance levers and link them to simulation elements ([4], figure 1) and also to define link between modeling and simulation meta-models.
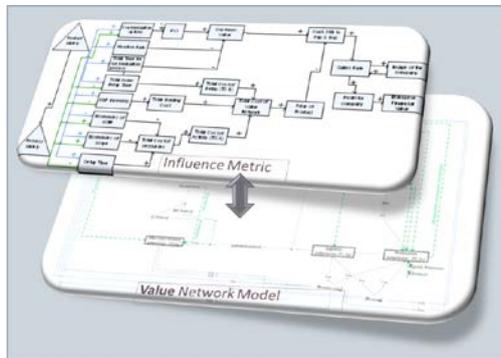

Figure 1 Elicitation of the links between process levers and value model [6]
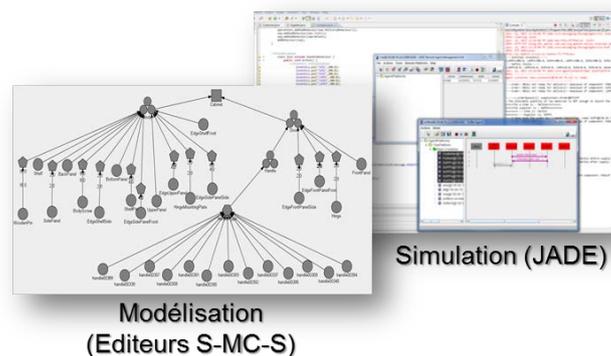

Figure 2 Automated links between modeling and simulation [5]

Some first results on public value network simulation were presented to the APMS conference in 2015 [3].

Research subject, work plan:

The main objective of this research work is to define the modeling basis that will support simulation relating to public value network. After a review of existing simulation

environments, required elements identified in the modeling basis should also be implemented to simulate academic and real-world cases. This library should manage stochastic data to allow realistic scenarios.

One important part of the decision support activity is to deal with alternative scenarios and uncertain data, to improve them and choose among them. Each alternative will be evaluated through several criteria. Multi-criteria decision methodology and tools could be used.

Work plan:
- state of the art (modeling and simulation, value network)
- definition of metamodel for public value network simulation
- implementation of metamodel within a simulation library
- application of at least one real case

The student will have to develop a simulation tool and must therefore be able to (or at least willing to) code for example using python.

References:

[1] Chambres de Commerce et d'Industrie: Livre vert sur la modernisation de la politique de l'Union européenne en matière de marchés publics (2011).

[2] Assemblée des communautés de France: Assises de l'investissement : propositions pour un investissement public levier de croissance (2014).

[3] Y. Bouallouche, C. da Cunha, R. Chenouard & A.Bernard, "Extended Administration: Public-Private Management," in *Advances in Production Management Systems: Innovative Production Management Towards Sustainable Growth*, pp. 20-26, Tokyo, Japan, September, 2015.

[4] J. Daaboul, P. Castagna, C. da Cunha & A. Bernard, "Value network modelling and simulation for strategic analysis: A discrete event simulation approach," *International Journal of Production Research*, vol. 52, no. 17, pp. 5002-5020, 2014.

[5] K. Medini, C. da Cunha, R. Chenouard & A. Bernard, "Enterprise modelling for performance measurement – gearing variety towards sustainability ," in *Conférence Internationale de Modélisation, Optimisation et SIMulation - MOSIM*, Nancy, France, November, 2014.

[6]Daaboul, J., da Cunha, C., Bernard, A., Laroche, F., 2011. Design for Mass Customization: Product variety vs. Process variety. CIRP Annals - Manufacturing Technology 60, 169–174. doi:10.1016/j.cirp.2011.03.093