Proceedings of the 2012 Winter Simulation Conference
C. Laroque, J. Himmelspach, R. Pasupathy, O. Rose, and A.M. Uhrmacher, eds

INTEGRATION OF SOCIAL CRITERIA IN A SIMULATION SOFTWARE FOR A MORE SUSTAINABLE PRODUCTION

Andi H. Widok
Paul Jahr
Lars Schiemann
Volker Wohlgemuth

HTW Berlin, University of Applied Sciences
Industrial Environmental Informatics Unit
Wilhelminenhofstrasse 75A
D-12459 Berlin
Germany

ABSTRACT

Regarding that there still is a lack of simulation systems addressing sustainability as a whole, this project attempts to highlight the resulting shortcomings and show ways to make sustainability more applicable and thus measurable by focusing on the integration of social criteria in an existing Environmental Management Information System (EMIS) that combines discrete event simulation (DES) and life cycle analysis (LCA) as well as material flow analysis (MFA). This contribution will summarize the underlying concepts for the development and utilization of this module of the software tool following the integration and furthermore describe the concrete problems and approaches at the example of modeling, as well as on different levels of the software and along the process of assessing the economical, ecological and social impact of products.

1 MOTIVATION AND GOAL

A side-effect of the industrial revolution was the devaluation of the labor of a single individual. With new machines and new technologies at our disposal the individual in our economies becomes – today more than ever – replaceable. Even though in some cases high specialization requires well trained workers, the function an individual once had for a regional group is, due to the shrinking of distances in a globalised world/market, reduced. Much similar to the environmental perspective of sustainability and the load that is placed on the regeneration capacities on the earth, we can observe a similar effect of pressure on the individual. The great promise of individual possibilities in life through the liberation of the markets has changed into its opposite (Schirrmacher 2011; Pinzler 2011), its transfiguration as medium of the social, the possibility to be part of it understood as societal inclusion, while in fact it is not (Bude 2008). In that time our focus remains on the question of how to guarantee comparability between the different consequences from the economic, environmental and social perspective, to actually achieve a balance in growth where growth is the normative goal or respective reduction/equilibrium where one of these would be the goal. In the past years, especially considering the economical crisis('s) and the environmental movement of the last decades, the social part of sustainability seems still underrepresented when considering applications of technology and more precisely simulation technology in producing companies. Having developed a simulation tool for the integration of economical and environmental aspects over the last years, it is our attempt to include the social aspects, in order to make the impact of social values, such as health/well-being, fair compensation, etc. visible and comparable.

2 OUTLINE OF THE INTEGRATION OF SOCIAL CRITERIA

In order to assess social values in producing companies we defined 3 main areas different areas of interest. Referring to Figure 4, we defined:

978-1-4673-4781-5/12/$31.00 ©2012 IEEE

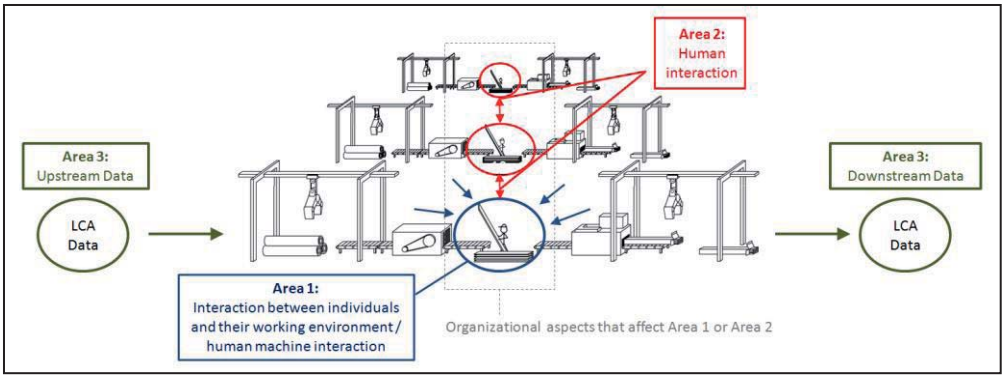

Figure 4: Areas of social impact in producing companies

Area 1 as the interaction between individuals and their immediate working environment, including factors such as health, workload, repetition, among others (numerous studies of assembly-line work for example show a clear correlation of the repetition of work and mental fitness - from broad and generally accepted studies, stochastic values can thus be deduced, which then can be applied to the simulations). This area also includes shift work, in terms of workload and the ability of the individual to predict when and how to work, or in other words organizational aspect that have an impact on the working environment of the individual,

Area 2 as the actual level of interaction between individuals in their working environment. Some organizational aspect overlap here with Area 1 and have to be taken into consideration here as well, such as the ability of co-workers to replace each other in shifts, or in other words, if there are organizational aspects in place preventing individuals self-organization, or if such behavior is encouraged,

Area 3 as all social impacts that can be deduced from the imported Life Cycle Assessment (LCA) data, that our software acquires through the EcoInvent Database (http://www.ecoinvent.ch/). It is expected that continuous research in this specific field (Social LCA (SLCA)) more and more applicable data can be deduced and imported via interfaces into the tool itself.

Apart from the classification of different areas of influence one has differentiate between various **points of effect**. There is the social impact a product is creating, referred as **Impact 1**, mainly sustained by the LCA data and ecological/social influences created during the production cycle. Furthermore there is **Impact 2**, the measurable social changes resulting from the change of a process, and **Impact 3**, social influences that are specific to a single individual.

3 CONCLUSION

Being in an early development stage we clearly have to state that it is not our intention to yet deliver a system that would actually be able to really measure social sustainability, it is rather our intention to promote the concept and make it more measurable by introducing as many measurable factors that we possibly can, we do realize however that the whole composition and interaction makes a final understanding and result a very long-term research field.

REFERENCES

Bude, H. 2008. Individualismus ohne Freiheit. Ein pragmatischer Zugang zur Herrschaft, Westend, Jg. 5, H.2, S.133-149

Pinzler, P. 2011 ―Immer mehr ist nicht genug. Vom Wachsstumswahn zum Bruttosozialglück, Pantheon Verlag, erste Auflage‖

Schirrmacher, F. 2011. ―Ich beginne zu glauben, dass die Linke Recht hat―, Frankfurter Allgemeine Sonntagszeitung vom 14.08.2011, in Pinzler 2011