

## **SOCIAL ASSESSMENT OF TECHNOLOGIES: THE INNOVATIVE APPROACH OF PROSUITE**

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### **ABSTRACT**

The introduction of a novel technology can have profound impacts on nature and society. Within PROSUITE, a general methodology is developed in order to assess the sustainability impacts of a novel technology, including a methodology for evaluating on the impacts on society and social well-being. The approach includes the methodology for modelling the life cycle, guidelines for the performance assessment, description and operationalization of indicators, aggregation along the life cycle, data collection and a method for dealing with data uncertainty. Social impacts include impacts on knowledge-intensive jobs, total employment, risk perception, possibility of misuse, child labour, forced labour, trust in risk information, stakeholder involvement, long-term control functions, regional income inequalities and global inequalities.

### **INTRODUCTION**

While the demand for transparency regarding the sustainability impacts of new and existing technologies increase, different stakeholders including policy makers, industries, SMEs and NGOs need a methodology and a tool to assess these impacts. Such methodology should enable these stakeholders to make decisions that take into account potential economic, social and environmental impacts of technologies, not only considering present impacts but also those based on future scenarios.

A well-accepted and robust methodology is still lacking. PROSUITE (PROspective SUstaInability Assessment of TEchnologies) aims to address this issue. This FP7 European project brings together European researchers with expertise in each of the three sustainability areas - economy, environment and society - and industry partners to develop a well grounded methodology, as well as a freeware open source tool to allow prospective sustainability life cycle assessment of technologies.

This paper presents the interim results of the working group that is dedicated to the social assessment within PROSUITE. A series of methodological issues have been addressed, including: i) which social aspects should be included in the assessment, ii) how to model and assess social indicators along the life cycle, and iii) which data sources are available and to which extent they can be used as proxies.

## METHODS

This work is based on literature review and stakeholder consultation, i.e. following a top-down and bottom-up approach. At first, experts from social sciences were consulted in group-Delphis to help identifying the indicators that should be included in the social assessment. Following these consultations, the indicators were shortlisted and then evaluated by the project team who made the final selection of social indicators. The following tasks were developed based on the final list of social indicators and additional literature review.

## RESULTS

### *Social aspects included in the assessment*

The social indicators in PROSUITE address four midpoints: ‘*safety, security and tranquillity*’, ‘*autonomy*’, ‘*participation and influence*’, and ‘*equal opportunities*’. As understood by the project team, these midpoints cover the most critical issue that can be associated with applications of technologies. These midpoints are then aggregated in PROSUITE in the endpoint ‘*social well-being*’. The social indicators are presented in Table 1.

**Table 1: Social midpoints and indicators in PROSUITE**

Midpoints	Indicators
Safety, security and tranquillity	Knowledge-intensive jobs
	Total employment
	Increased risk perception
	Possibility of misuse
Autonomy	Child labour
	Forced labour
Participation and influence	Trust in risk information
	Stakeholder involvement
	Long-term control functions
Equal opportunities	Regional income inequalities
	Global income inequalities

### *Modelling the social indicators along the life cycle*

There are two types of indicators which are then modelled in different ways:

- Extensive indicators: These indicators are process-specific and can be attributed to processes in the life cycle (e.g. total employment, and child labour). They are assessed on the process level.
- Intensive indicators: These indicators are not process-specific and can only be associated with the product as a whole (e.g. possibility of misuse by terrorists, and increased risk

perception). Therefore these indicators are analyzed on the level of life cycle stages. The PROSUITE case studies of mobile phones (Judl et al, 2012) and carbon capture follow a similar approach.

Ultimately, all life cycle stages that are relevant for the investigated product should be covered in the assessment. This may include the infrastructure that is demanded by each life cycle stage, which in turn has its own life cycle as shown in Figure 1. Relevance is determined by risk assessment and it needs to be made explicit when defining the system boundaries. Usually after applying such a risk filter, a second order of a product life cycle and the related infrastructure are not going to be included in the assessment.

#### *Assessing social indicators*

The performance assessments in PROSUITE evaluates the social performance of a technology application throughout its life cycle. It is based on the application of performance reference points (Ciroth & Franze, 2011; Fontes et al., 2012) in a Likert scale (Diekmann, 2003). International conventions and sector standards are normally considered when defining the performance reference points (PRPs). Table 2 illustrates the assessment of a given process in the life cycle based on PRPs for each indicator.

**Table 2: Performance assessment of a specific process of a technology application**

Category	Subcategory	Score
Safety, security & tranquillity	Knowledge-intensive jobs	-2
	Total employment	+2
	Risk perception	+2
	Risk of misuse	0
Autonomy	Child labour	-1
	Forced labour	-2
Participation & influence	Trust in risk information	-2
	Involvement of stakeholders in decision making process	+1
	Trust that long-term control will is safeguarded	-2
Equal opportunities	Income distribution	0
	Global equity	0

After the performance assessment, scores are attributes to all selected indicators, either on the level of processes for the extensive indicators, or on the level of life cycle stages for the extensive indicators.

#### *Data sources available and usability*

As for any other social assessment, the issue of lack of data also holds for PROSUITE. It was found that two databases can provide data to some extent for the case studies of PROSUITE: the Social Hotspots Database (SHDB, 2013) and EXIOBASE (EXIOBASE, 2013). For PROSUITE, the main advantage of EXIOBASE in comparison to the SHDB is the fact that it can support the assessment of both current and prospective scenario. Another advantage of



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EXIOBASE is that it can provide for both the economic and social assessments, ensures consistency within PROSUITE.

Moreover, five indicators are not covered by any of these two databases. As a result, these indicators can only be assessed based on literature review. Having said this, both databases can help prioritizing data collection as they can help identifying the most critical sectors and countries in the life cycle in terms of working hours or economic value.

## **DISCUSSION AND CONCLUSIONS**

As the PROSUITE project continues to develop, the following issues are to be addressed: 1) how to relate a technology application with the scenario assessment, 2) how to carry out prospective social assessment, 3) how the social indicators should be measured, 4) how the social indicators should be aggregated in midpoints and endpoint, and 5) what normalization factors can be applied.

The prospective assessment remains particularly challenging. It demands in-depth knowledge of the technology application in the current scenario and the consequences that can be expected in the future scenario. It will inevitably require the user of PROSUITE to extrapolate data and make assumptions.

There is an evident need to test the elements of the framework that have been developed and those that are going to be added. The PROSUITE case studies will play a fundamental role on this regard.

Once integrated in the PROSUITE decision support system, this module will help assessing the potential impact of a technology regarding the well-being of individuals and society as a whole.

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