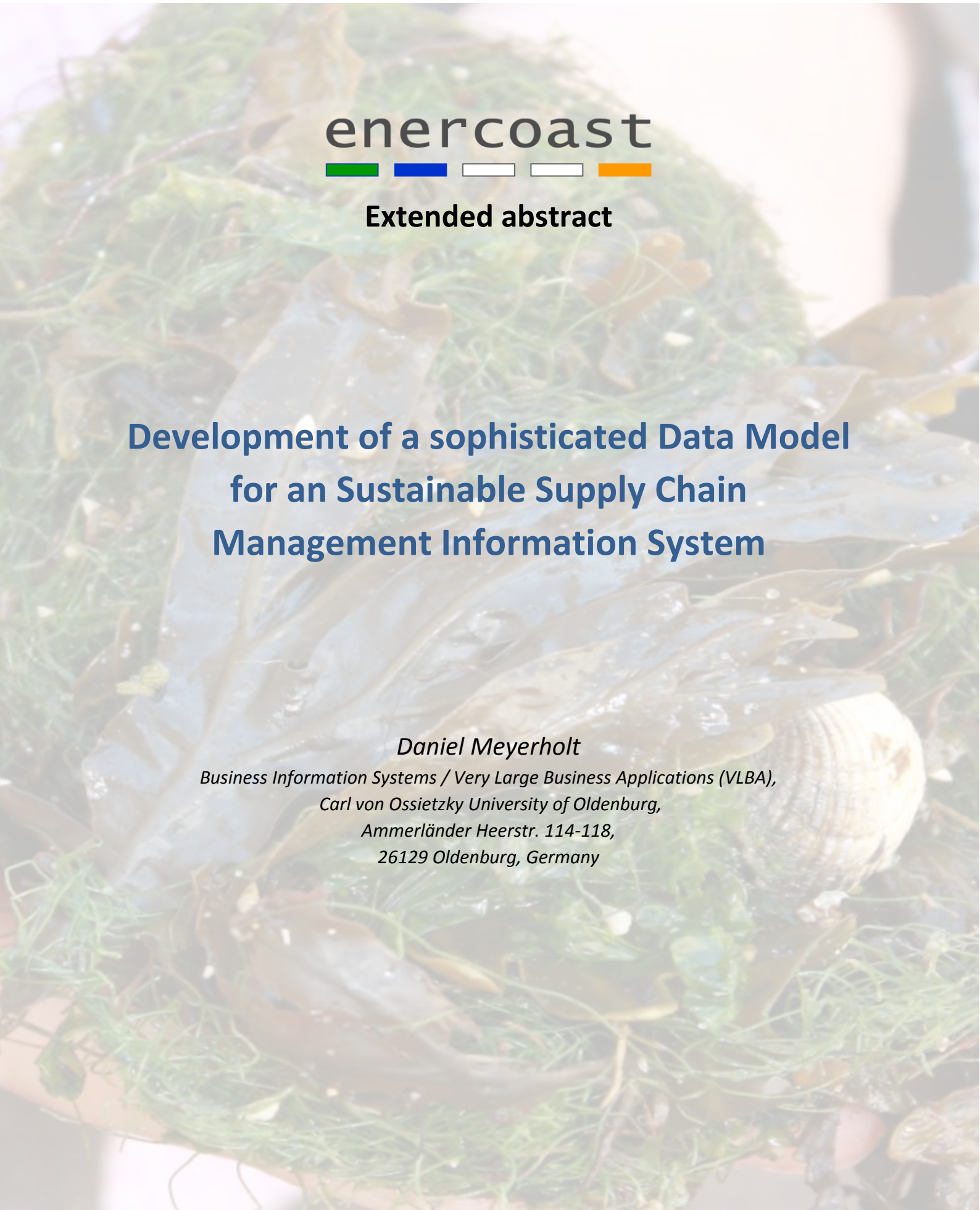

enercoast

Extended abstract

Development of a sophisticated Data Model for an Sustainable Supply Chain Management Information System

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The structured management of sustainable supply chains is becoming more and more important to bio energy project planners and related stakeholders. Following the 20-20-20 targets of the European Union (http://ec.europa.eu/clima/policies/package/index_en.htm), namely

- The 20% reduction in EU greenhouse gas emissions (GHG) compared to the levels of 1990,
- raising the share of renewable resources in the energy provision to 20% and
- a 20% improvement of the energy efficiency of the European Union

pose challenges to all member states and increase the pressure to introduce organized and well-structured approaches of creating renewable energy supply chains. Significant portions of the first two targets can handled by the means of bio mass derived energy like bio gas and other sources. The accounting of environmental performance indicators (EPIs) as well as economic key performance indicators (KPIs) are two important aspect when designing such "bio energy" supply chains. However, recent developments have shown that the inclusion of social indicators is needed as well. One prominent example is the controversy of the food versus fuel debate showing public interest in the bio energy market as well. The likelihood, that the public interest increases here can be regarded as guaranteed.

In order to provide a structured methodology and the ability to benchmark and compare different supply chain approaches, a software prototype was created by the enercoast project. This Browser-based software allows the creation of sustainable supply chains in a structured way. Furthermore additional functionalities like a decision support system and several indicator visualizations have been implemented. In Fig. 1 the software prototype's main screen is depicted.

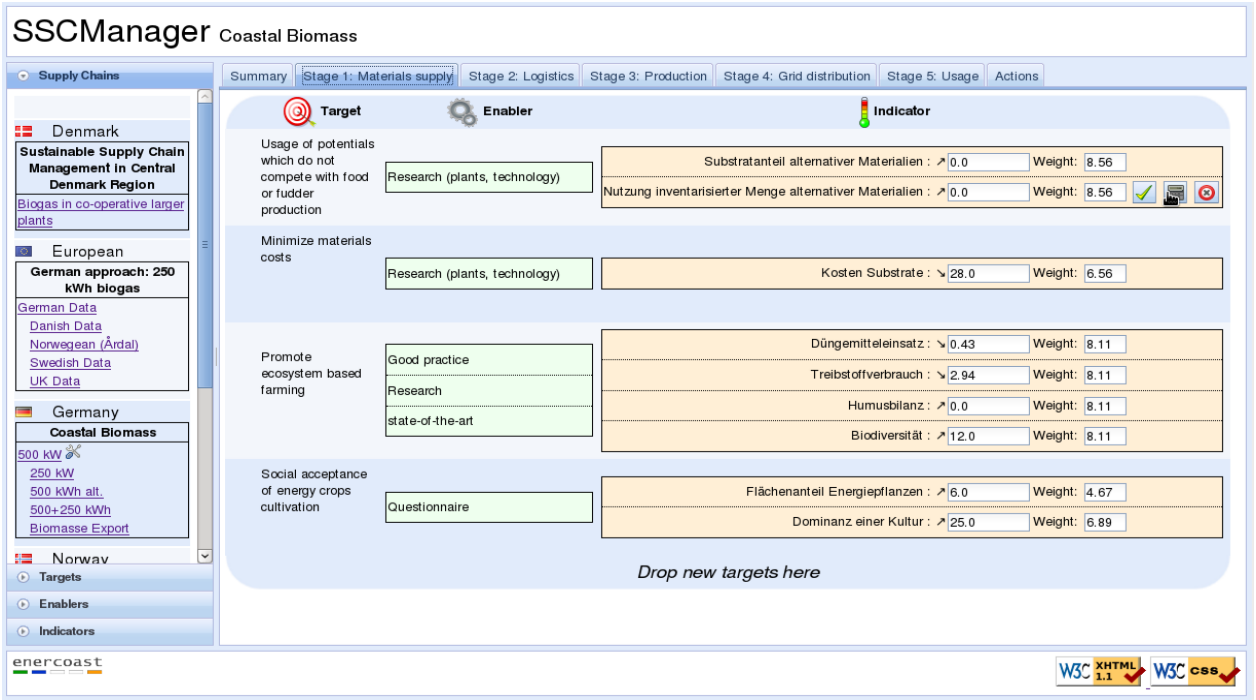

Figure 1: SSCManager main screen

The software represents the Supply Chain Methodology used in enercoast and directly maps this approach to a database model, which is shown in Fig. 2

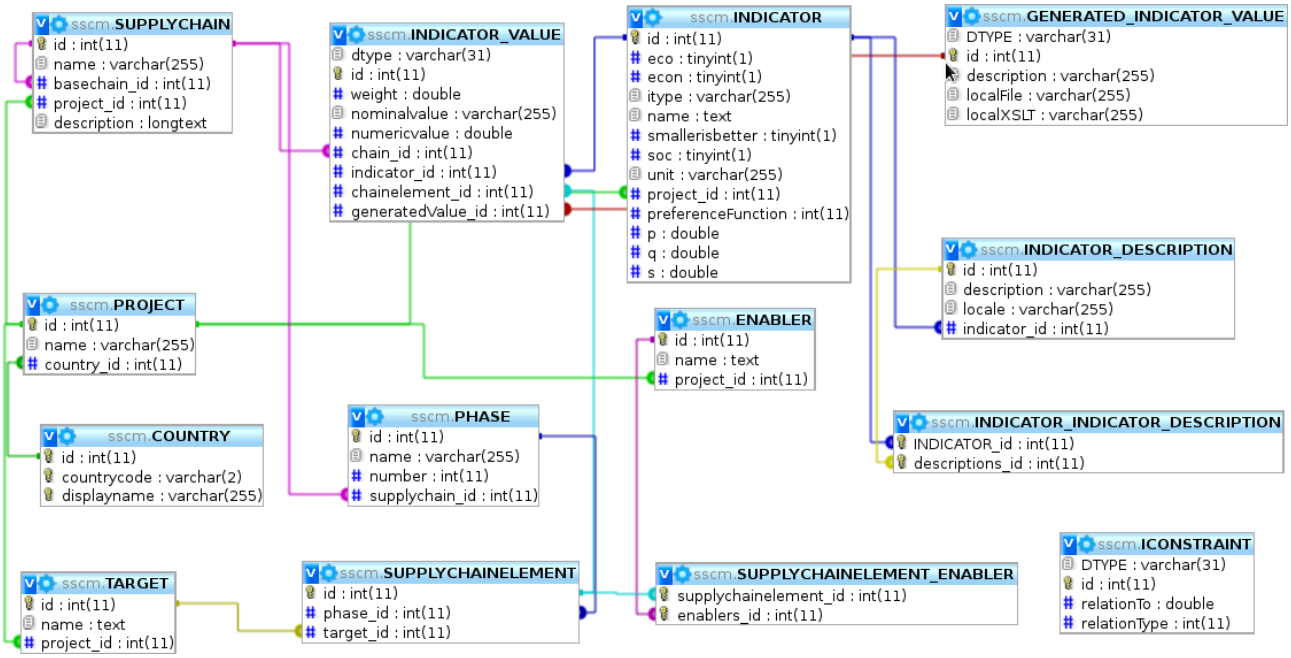

Figure 2: SSCManager data model

Several improvements can be made to different aspects of the data model.

- Currently the indicator values are based on user input. For more sophisticated supply chains these should be extended in their functionality:
    - Indicators should be derived from external data sources or databases. This allows the inclusion of data e.g. from simulation or optimization tools that may provide changing (optimized) values for specific indicators. Several technologies and approaches like Web Services or XML Files can be
    - Some indicators may be automatically generated from others and from global constants. One example here would be the CO2 emission of the transport from the materials supply to the production (“Stage 2: Logistics”). Here it would be desirable to generate that value from the distance and a specific environmental intensity factor. The best approach here would be to include a complete formula system in the software. This could be achieved by using script languages like Groovy.
- Inclusion of geographic information: Different aspects of the data model could be annotated with geographic information. This allows advanced functionalities described in a different research abstract. On the database side advanced GIS-functionalities can be provided by using the PostGIS extensions for the Postgres Database System.
- A generic supply chain workspace can be developed to aid the management of several supply chains in a whole project. Furthermore supply chain and overall benchmarking can be made possible.

- The different phases of the Supply Chains should be inter-connectable (one-to-many relationship). For example sharing of bio mass material supply would be one common use case. Another scenario would be the usage of different bio mass sources for the use in one production plant (many-to-one relationship).

By implementing some of the above measures, advanced optimization scenarios are thinkable that aid in the overall creation and management of more effective supply chains.