Towards Tool-supported Reflection of Sustainability in Business Models

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Abstract: Sustainability has become increasingly important to business research and practice. Approaches that support fundamental changes in behaviour to act economically, ecologically and socially are required. Modelling and analysing business models can contribute to this, for example by generating new ideas as well as improving and evaluating current businesses. In this PhD Research Proposal, we report the current state and future perspectives of our research, which aims to derive design-relevant knowledge on how to reflect sustainability in business models on (1) a representation layer as well as (2) a tool-support layer.

Keywords: Sustainability, Business Modelling Language, Tool-support, Design Principles.

1 Introduction, Problem Awareness and Objectives

The rapid deterioration of the natural environment, concerns over wealth disparity and corporate social responsibility pose fundamental issues for our entire society [Br87]. In order to address these challenges, 'sustainability' has increasingly gained importance in business research and practice (e.g., [Me10, SRB13]). Approaches that support essential changes in behavior and practice (e.g., consumption or production) are required. Reflecting sustainable-oriented aspects in businesses is a challenging task, and thus, appropriate approaches and tools are needed.

Business modelling—here understood as the act of modelling the value-oriented essence of a business [Go00]—can be applied to visualize, innovate and evaluate business models [Ve14]. A business model "describes the rationale of how an organization creates, delivers, and captures value." [OP10, p. 14] For representing such models, modelling languages with graphic notations are usually used such as the 'Business Model Canvas' [OP10]. In order to contribute to sustainability, these languages should support the design of innovative businesses that, for example consider cleaner products and processes [Lu10]. However, there is a deficit of research and well-accepted guidelines of modelling languages that provide constructs for considering economic, ecological and social sustainability in an equal manner (*Gap 1*).

Moreover, to facilitate the applicability of such modelling languages, appropriate (software-)tools are required [Re12, Ve14]. Software-based tools—so-called Business Model Development Tools (BMDT)—allow to digitally represent, edit and analyse

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business models. They have enormous potential to promote certain actions (e.g., understanding, sharing and assessing) more efficiently than the 'pen & paper' versions [OPT05]. Although a number of BMDTs have been proposed in research and practice, to the best of our knowledge [Sz17], virtually no design-relevant knowledge exists concerning the functions that such tools should (*Gap 2*). Besides knowledge of BMDTs in general, there is also a lack of software features and principles for representing and evaluating business models in respect of sustainability (*Gap 3*). These lacks are problematic because they inhibit tool designers in their endeavour to (re-)design software tools and users to reflect and apply sustainable-oriented features.

In sum, the primary goal of this research project is to derive design relevant knowledge for (software) tools that allow for reflecting economic, ecological and social sustainability in an equality manner. Accordingly, this PhD proposal is guided by the following key questions that relate to the (1) representation and (2) tool-support:

- ***Q1.1****—How are current business modelling languages adopted in order to incorporate economic, ecological and social aspects? (Gap 1)*
- ***Q1.2****—What are research perspectives for business modelling languages contributing to sustainability and how can they be addressed? (Gap 1)*
- ***Q2.1****—What are functions of current software tools for business model development in general and in respect of sustainability? (Gap 2 and 3)*
- ***Q2.2****—Which functions should a software tool provide in order to support the visualization and reflection of sustainability in business models? (Gap 2 and 3)*

In order to achieve our overall goal, we aim to design artefacts that respect economic, ecological and social sustainability. According to [Ve14], Design Science Research (DSR) is an appropriate research paradigm for such issues. DSR is based on a problem-solving paradigm that aims to design purposeful artefacts like design principles [He07] that capture essential knowledge about instances of a class of artefacts, which is helpful for both technology oriented and management oriented audiences [Se17]. Following DSR [KV08], we suggest, develop and evaluate our main artefact—design principles for software tools—across several cycles (Fig. 1).

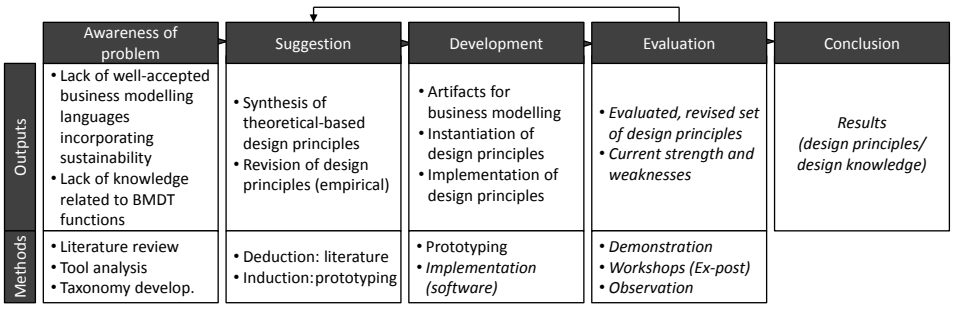

Fig. 1: Overview of the entire research design (future work = italic), according to [KV08]

2 Previous and Published Work

Our research focus on two major layers namely (1) 'representation' (e.g., modelling languages) and (2) 'tool-support' (e.g., business model development tools). Next, we outline and discuss selected results on each layer in more detail.

As a first step, on the representation layer (1), we aimed to analyse how current business modelling languages address economic, ecological and social issues (Q1.1). Based on an extensive literature review, we identified heterogeneous consideration in the state of the art studies, and thus, consolidated typical customizations of existing business model languages—mostly by adapting the Business Model Canvas [OP10]—in a typology. In total, we derived seven types that aim to respect sustainability by providing additional semantics or adjusting current semantics of such languages. Beside a lack of adequate evaluation of these notations, we suggested three perspectives in particular (Q1.2), which need further investigation: (a) domain-specific modelling (e.g., predefined elements to configure business models; patterns), (b) strategies for sustainability assessment, and (c) combination of different models or modelling languages [Sc16].

In following studies—up to now—, we researched (a) how established building-block-based modelling approaches can be adopted to standardize business models (e.g., used terms and abstraction level) as well as can serve as a configuration support (e.g., pre-defined and selectable elements; taxonomy). In order to demonstrate and evaluate our extension, we used the domain of Carsharing business models [SBK17a]. Regarding (c)—further models—, we developed a taxonomy of extensions that contribute to the representation of sustainability in business process models, and thus, can act as a detailed view on the key activities of an organisation [SBK17b].

On the tool-support layer (2), we analysed functionality that supports the design, representation and evaluation of sustainability in business models (Q2.1). To do so, we initially examined software tools and verified if and how the derived types from the literature review [Sc16] are supported. Because there are many deficits, we decided to take a broader perspective on this field and analysed functions of BMDTs in general. As a result, we lack design-relevant knowledge concerning the functions that such tools should possess. To contribute, (Q2.2) we analysed 24 BMDTs and build a taxonomy of functions, which is a necessary foundation for advanced research [Sz17].

3 Research-in-Progress and Outlook

Based on the findings, we derived an initial set of design principles (what a system should allow [Se17]). Following the DSR paradigm [He07], we run through several cycles of building and evaluating solutions—here, paper-prototyping sessions in an educational setting in particular—in order to complement the theoretical-grounded principles with empirical data. Currently, we are finalizing the implementation of the design principles in form of a software prototype. Afterwards, we plan to investigate the

applicability and usage of such a class of tools. We aim to evaluate the design principles in two stages: First, we will conduct an ex ante artificial evaluation [SB12] with master students who are knowledgeable in modelling business models. Moreover, we are targeting to apply the prototype to reflect sustainability in a real business case from an industry partner to contribute to the practical relevance. Second, we like to verify our artefact with 'real users' but have to acquire suitable participants as well as design a suitable workshop concept. Because the software tool incorporates different artefacts, whether evaluating the entire prototype or single functionality has still to be specified.

Furthermore, our findings related to the business modelling language as well as to the features that need to be provided, should be reflected against the common methodology of development business models with respect of sustainability. Accordingly, we plan to explore how and in what situations, a BMDT can be applied. For instance, is it used for analysing sustainability in existing business models or rather for constructing new ones?

4 Conclusion

Contributing to sustainability in business models is of great relevance, and we assume that providing design principles for a tool-support allows benefits for research and practice. For example, new IS theories can be derived [Gr06] (e.g., to explain how specific features affect the awareness of sustainability) and the proposed design knowledge can be applied to (re-)design new IT-artefacts such as software tools or single features. Nonetheless, different points need to addressed by future endeavor including sustainability-oriented assessment strategies, evaluation design knowledge, applicability of design knowledge and business model development methodology.

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