

# **Standardized Individual Output Development: From a scientific print product to cross-media workflow.**

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**Abstract.** The concept of the Standardized Individual Output Development can generally be understood as an approach to the development of output using its own domain standards, or re-use of standards from other domains via analogies. Objective is a systematic, qualitative and efficient creation of individual output and an innovation-framework to systematize the support of a knowledge transfer from other domains, in the first step human resource based and supported by IT systems. Goal of the paper is on the one hand to explain the principles of the approach and the derivation of a roadmap for a technical support. On the other hand, the Standardized Individual Output Development is empirically investigated by a case study: The systematic transform of an individual (output) requirement in an individual output by students in the master program of book studies using the Standardized Individual Output Development approach.

**Keywords:** Standardized Individual Development, Cross-Media-Publishing, OLAP, Innovation, Agile Methodology

## 1 Introduction

Students in the master program of book studies with focus area “Media Economy Print & Digital” should applying the authors approach of “Standardized Individual Output Development” to transform a concrete individual requirement in a individual output. The individual requirement consisted in suggestions of how a print product focused publication workflow can be converted to a cross-media workflow. The students had no deeper knowledge of requirements engineering, process models or XML-technologies. This raises the question after a successful project implementation in the absence of project-specific capabilities.

A way to solve this problem as precondition for a successful project-implementation is the application of “Standardized Individual Output Development” [5]. The contribution enters the debate at this point. Objective of the paper is on the one hand to validate the conceptual considerations of “Standardized Individual Output Development” on a case study analysis and secondly, a contribution to the penetration and application of the approach for the Publishing Industry will be provided. Concretized: The individual requirement-blocks, (1) teaching necessary project qualifications, and (2) the based thereon successful project implementation should be systematically solved via a coupling of standardized individual outputs by applying the new approach by the author, the “Standardized Individual Output Development”.

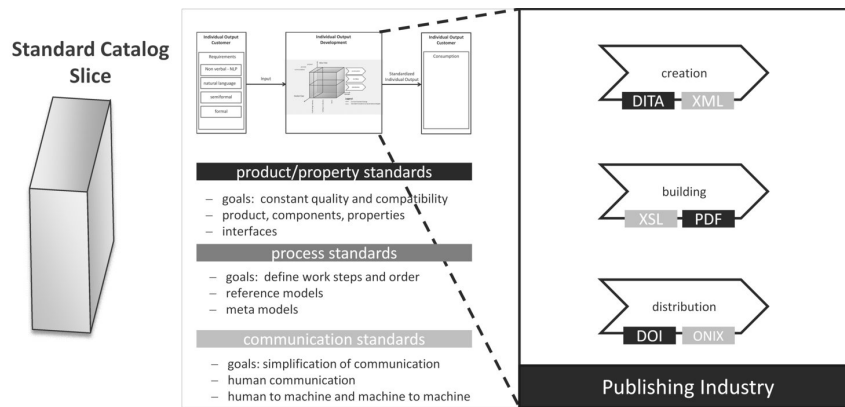
The structural design of the paper is based on the defined structure of case study investigations [18]. Accordingly, initially the own approach of the “Standardized Individual Output Development” is presented as a theoretical basis for a systematic solution finding. “Standardized Individual Output Development” forms the analytical framework for the subsequent empirical investigation on the research approach of the case study. Here is first shown how the requirement of project specific capabilities of students has been achieved through the development of the standardized individual output “Agile Teaching”. Based on this, the project implementation of the students by applying the capability of the “Standardized Individual Output Development” is described (as distinguished from capability and application of what is called function, see [17]). Conclusion of the paper forms the summary of the results. As an outlook an extension of the solution found for collaborative, online and XML-based cross-media workflow is presented, as a bundling of academic papers and components after and before academic papers, for the creation of a compilation, e.g., conference proceedings.



Based on these considerations the “Standardized Individual Output Development” describes a concrete design process in terms of a reference model for the development of customized outputs through a systematic re-use their own standards or other domains through analogies. A conceptualization of the core idea is carried out via the framework of the “Standardized Individual Development Cube (SIC)”, which is interpreted both as a synthesis of different approaches and in the subsequent step as an analytical tool.

The SIC as a synthesis embraces the connection of standards within a domain and the value chain in an output process – called the “Standard Catalog”. Regarding to the output development on the re-use of standards from other domains, the SIC includes the dimensions domain and standards – called the “Standard Innovation”. A brief introduction is following of the “Standard Catalog” and “Standard Innovation” as an interpretation of slices of a cube that is based on the OLAP (Online Analytical Processing)-Cubes operation of slicing (based on discussions by [19] to Process Cubes and regarding standards of hybrid value creation [2]).

The “Standard Catalog” as vertical slice is here interpreted as a function of standard and value chain and based on the work of Schacht/Hertel [15] and Fettke/Loos [6]. Schacht/Hertel [15] discussed the one hand, the interpretation of standards as explicit knowledge; they furthermore classifies standard categories and allocates the value chain to individual standards. The idea of domain-specific storage of standard knowledge based on the work of Fettke/Loos [6], who formulated a catalog of specific process standards called reference model. In summary, the vertical slice in SIC is called “Standard Catalog” and describes the idea to understand standards as knowledge to assign this standards to the value chain [15] and to provide (intelligent) searchable knowledgebases in a subsequent step [6] (summarized in the following depiction).

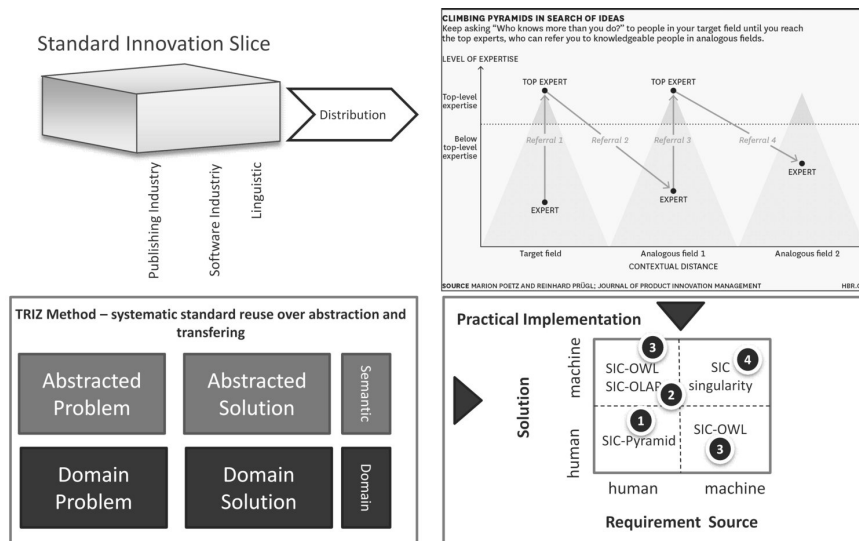


**Fig. 2.** Standard knowledge linked to Value Added Chain (based on [15])

Here the question arises, according to the development of output requirements, for which no reusable standard knowledge exists. This requirement is solved through the “Standard Innovation” slice. The Standard Innovation based on the work on the TRIZ approach [10] and the analogies on the pyramiding approach [12]. If a problem cannot be solved through existing standard knowledge from the “Standard Catalog”, it is necessary to transfer the problem to another domain. If solutions for the abstract same problem exist, it can be reused. While abstract problem-solution mappings are done by pattern search in patents in the TRIZ approach, in the pyramid approach of Poetz/Prügl [12] interviewing of experts in analog domains are used to achieve this goal. To summarize, the slice of the “Standard Innovation” forms a synthesis of the TRIZ and the Pyramid Approach. The practical implementation can be reached in following iterations (see following figure):

1. “SIC-Pyramid”: The transfer of knowledge through expert knowledge and human communication [12].
2. “SIC-OLAP”: IT-supported standard knowledge storing of various domains and human interpretation and using OLAP data cubes idea with related operations as “slicing”, “dicing”, “rolling up”, “drilling down” [19].
3. “SIC-OWL”: IT-based knowledge storage and sophisticated machine connecting of problem issues of different domains over semantic network by using the Web Ontology Language (OWL) [16].

4. “SIC-Singularity”: IT-based knowledge storage and sophisticated machine connecting of requirement and problem issues of different domains – vision of technical singularity [9].



**Fig. 3.** Theoretical building blocks of Standard Innovation: TRIZ and Climbing Pyramids

“Standard Catalog” and “Standard Innovation” form the basis of the approach of the “Standardized Individual Output Development”, be modeled as a synthesis of different theoretical and practical approaches in the SIC and form the basis for the transformation of the synthesis cubes into a concrete IT-supported analysis cube for automated “Standardized Individual Output Development” (see [4]). Specific design of “Standardized Individual Output Development” in the case of developing a user-friendly, collaborative, online and XML-based cross-media workflow at the Institute for Book Studies is the subject of the following case study.

### 3 Case Study

The application of the “Standardized Individual Output Development” using different standards to transform a concrete individual requirement to individual output of students in the master program of book studies with focus area “Media

Economy Print & Digital” is subject of the following described case study investigation.

### **3.1 Case Study investigation**

A case study analysis is concretized in definition of research subject and research questions, implementation design and subsequent execution.

Research subject of the contribution is the “Standardized Individual Output Development” in general and in particular the consideration of application the theory for development of an individual output, a “cross-media workflow for a scientific print product”. The aim is on the one hand a user-friendly content creation and on the other hand reuses once created content for different media and individual content bundling [8].

Research objectives of the contribution are on the one hand the conceptual preparation of the “Standardized Individual Output Development” and on the other hand the empirical investigation. The empirical investigation of this proposed approach is based on the research method of case study with the following design (see [18]):

- Objective: The research subject of the “Standardized Individual Output Development” should be applied in the context of the Publishing Industry and developed through discussion with the students, so there is a theory-formation and theory-verification in focus. In terms of the research interest, on the one hand the objects of analysis are described which represents a phenomenal interest, on the other hand the practical application of the “Standardized Output Individual Development” is in the focus, which represents a causal interest.
- Object Selection: A project work at the Institute for Book Studies is considered in terms of a embedded single-case study.
- Data Collection: Why and how questions are a key part of the study. For that reason the collected data are more qualitative than quantitative. In addition by participant observation the study includes interviews, group discussions and action research to ensure the quality of the collected data.
- Evaluation: The case study units, project team and project development, will first individually and the following step analyzed across. The evaluation is preceded by a short project presentation, and then the particular standard used is analyzed.

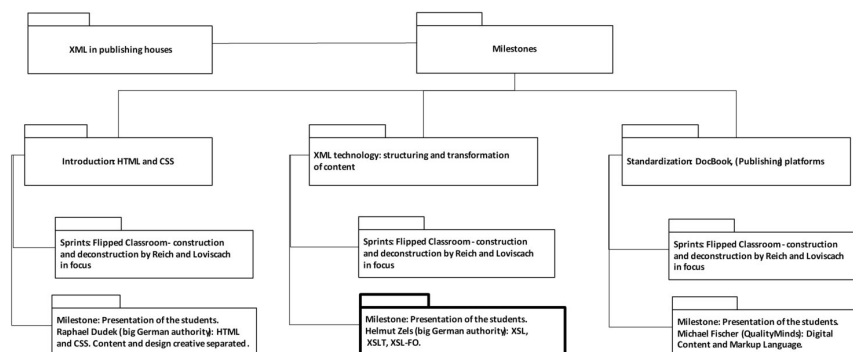
### 3.2 Agile Teaching

The project group had the task, using the example of scientific essays within the annual report of the Erlangen Institute for Book Studies to make proposals for how one can be converted a print product focused publication workflow to a cross-media workflow. For this purpose, requirements had to be raised, resulting solution variants should be derived and an appropriate technical infrastructure (standard / individual software) must be identified – the first project challenge, because the students had no deeper knowledge in requirements engineering, process modeling and XML technologies. Therefore, these foundations needed to be built. After defining the problem in interpreting the “SIC” as the standard knowledge (input), the question of problem solving arises. In interpreting the “Standardized Individual Development” concretized: “How do I reach the transition of the human resources to project staff?”

Following the approach of “Standardized Individual Development”, initially the approach of agile software development has been applied to the individual requirements of teaching. Developed individual output is called “Agile Teaching”. In a comparable Role of a ScrumMaster the lecturer reacts individual to information demands of the students among others by intensive introductions and discussions of requirement techniques and variants of solving variant systematization, e.g., morphological boxes or the template approach from the sophists. Furthermore basic knowledge in XML was built on participating of the students at a parallel seminar lecturer hold.

Within the seminar the project students were shown a fully automated publishing workflow: from reading information from a database, translation in XSL-FO, and subsequent generation of a PDF document by the practice speaker from a big German authority. The seminar structure as an instance of an “Agile Teaching” and as a composition of didactic standard blocks of construction, reconstruction and deconstruction by Reich [13] and the flipped classroom concept, which among others is used by Jörn Loviscach (see <http://www.j317h.de/>), illustrates the following figure.





**Fig. 4.** Agile teaching instance: XML for publishing houses

In addition to the basic technical understanding of XML, as a possible basis of production used in a cross-media workflow approach, the teaching focused on methods and techniques for requirements engineering, the solution variant analysis and project planning. Important statement here: It all starts with a neutral solution requirements analysis as basis for a solution variant analysis. These results serve the customers as a basis to derive the desired solution and the solution is the basis for the detailed planning for an (agile) implementation.

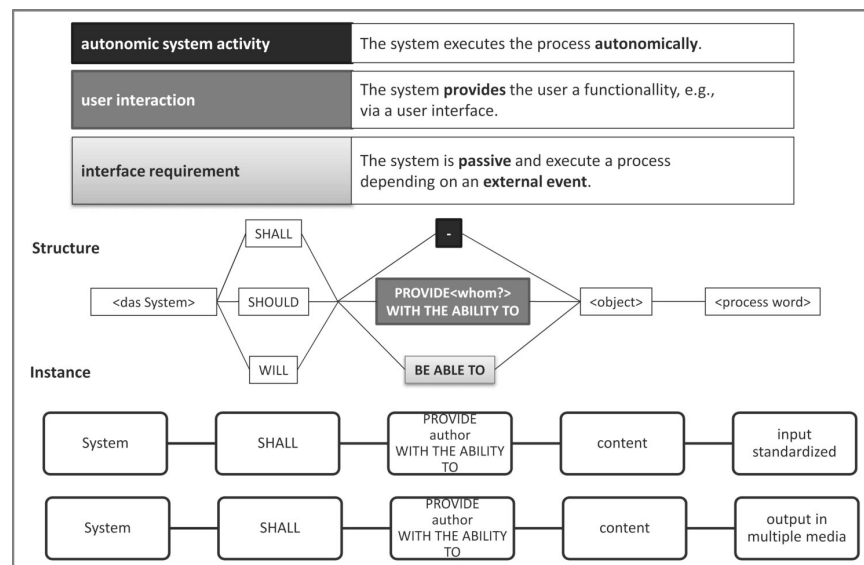
For the requirements documentation the students was taught basic knowledge in the template approach of the sophists [14]. The template approach consists of a syntactic part (the template) and a semantic part. The semantic part is based on the fundamentals of Neuro Linguistic Programming (NLP) of Bandler and Grinder [1] and heals the defects of deletion, generalization and distortion in a natural based requirements analysis by questioning techniques. The template approach can also be interpreted as a “Standardized Individualized Development” over an composition of different linguistic standard blocks among others, NLP [1] and Chomsky's Transformational Grammar [3].

In addition to the requirement analysis is a neutral search for alternative solutions an essential step to identify the best solution for the customer. Here the students were taught the basics of morphological box as creativity technique. From combination of cross-media workflow instances theoretically possible set of properties can then be combined to possible solutions. After presentation of alternative solutions and selection of a specific solution by the customer, the implementation needs to be planned. Therefore different process models were presented the students, with an emphasis was placed on agile process models with regard to the project context.

Summarized the requirement of the project-specific qualifications has been resolved over the standardized individual output “Agile Teaching” by a “Standard Innovation” of agile process models of the software industry.

### 3.3 Cross-Media Workflow

In the first step the requirements were taken systematically through the template approach. The template approach was used in the project to ensure on the one hand the completeness of the requirements on the use of rules and on the other hand, the structured requirements definition via templates. The following figure shows the structure and a concrete template instance within the project.



**Fig. 5.** Template Approach: structure and instance within the project

The next step in the project implementation was the elaboration of a solution space for the requirements of a cross-media-workflow over a morphological box. Goal was the theory-based derivation of possible solutions for cross-media publishing workflow solutions. For this, the students analyzed different production methods for a cross-media workflow, starting from Word-based systems, over wiki solutions up to CM-Systems (CMS) and derived therefrom characteristics for a morphological box. The project-specific morphological box of the project group

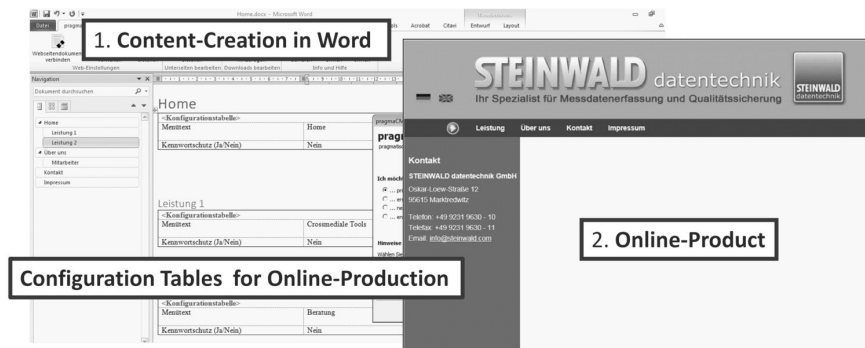
to identify the possible solutions is characterized by the following characteristics: content input, content storage, necessary installation, file formats of content transformation with the same software, usability according ISO 9241.

Using the morphological box different solution types for cross-media workflow were discussed with the customer. As an example, two solutions are shown at a glance and the final solution and implementation described in detail subsequently. The first variant of the solution in the following called “desktop” solution, includes the following characteristic values: content input (“desktop”), content storage (“desktop”), necessary installation (“yes”), file formats of the content (“docx”), transformation with the same software (“yes”), usability to ISO 9241 (“no”) (see next figure).

Requirement	Value			
content input	Desktop		Browser	
content storage	Desktop	Cloud	Database online	
necessary installation	Yes		No	
file formats of the content	Individual XML		Standardized XML (docx, docbook)	
transformation with the same software	Yes		No	
usability to EN ISO 9241	Automatic Document Structure Validation	Content Completion Support	Using individual grammars	Error-Tracking

**Fig. 6.** Solution Variant Desktop

On the one hand the familiar Word environment and all Word-based output formats such as PDF, RTF or DOCX can still be used. On the other hand, an online output is implemented via an Add In and parameterization through configuration tables within the word file. The content input (1) and bundling to the online output (2), within a solution of the company Pragmaticon in Heroldsberg, are shown in the following figure.



**Fig. 7.** Concrete Solution for Variant Desktop

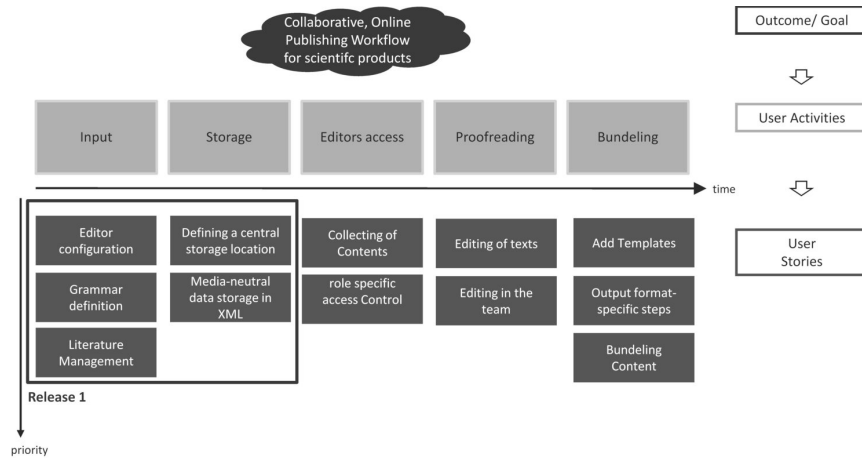
The solution represents a pragmatic cross-media approach, but does not meet the customer requirements. Emphasis was on a online-based, user-friendly and XML-based cross media solution. This solution variant was fixed after the presentation of solutions variants by the customer as implementation target and the characteristics are visualized in the next figure.

Requirement	Value			
content input	Desktop		Browser	
content storage	Desktop	Cloud	Database online	
necessary installation	Yes		No	
file formats of the content	Individual XML		Standardized XML (docx, docbook)	
transformation with the same software	Yes		No	
usability to EN ISO 9241	Automatic Document Structure Validation	Content Completion Support	Using individual grammars	Error-Tracking

**Fig. 8.** Solution Variant Cross-Media

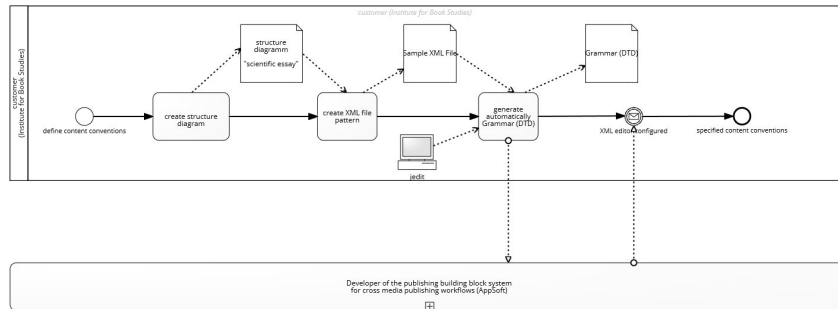
The publishing platform building blocks Xeditor and Xpublisher of the company Appsoft in Munich fullfills the requirements of the Cross-Media Variant

and were chosen for the subsequent project implementation planning. As agile planning via a simple backlog was identified as confusing, the students searched for other possibilities and found an alternative with the standard of “Story Maps”.



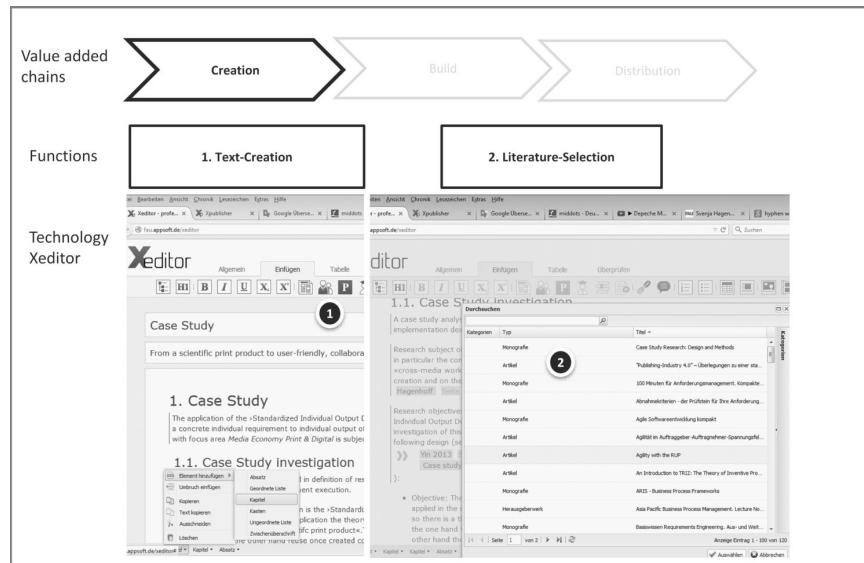
**Fig. 9.** Storymap for agile solution implementation

Finally an overview of the implementation is presented: The Xeditor was configured for scientific publishing workflow in the following activities by the students: (1) structure analyzing of scientific essays, (2) creating an XML file based on the structure, (3) automatic grammar creation using jedit, (4) deliver the grammat to appsoft.



**Fig. 10.** Grammar Creation Process

In the next step the literature function has been implemented. For this a concept was created together with the students, the lecturer and the Head of Development of Appsoft and implemented via the standard API of the Appsoft Publishing building blocks. For evaluating the whole cross-media workflow by the students a component for an automated bundling and output via XSL-FO was designed and implemented together with Appsoft in the last step (see following figure).



**Fig. 11.** Cross-Media-Synthesis: value added chain, functions and technology

In summary the “Standardized Individual Output Development” was investigated within the project. In the first step an individual output was developed with “Agile Teaching” to transform human resources to project staff. The project staff bundles their capabilities in a second step to project specific functions [17] to transfer the individual requirement of a “user-friendly, collaborative, online and XML-based cross-media workflow” successfully in a solution on the composition of different standards, such as the template approach, story map, morphological boxes and BPML for the process (knowledge) documentation and evaluate the solution by writing the project paper online and collaborative with the found solution.

## 4 Learnings and Outlook

By applying the approach of the “Standardized Individual Output Development” following was reached: (1) based on “Agile Teaching” the project-specific capabilities of the students were built, (2) the students used the approach of “Standardized Individual Output Development” to transform the individual requirement via the coupling of standards in an standardized individual output and through action research the solution was evaluated through writing the project-seminar documentation on developed solution based on the platform building blocks for content-creation (Xeditor) and crossmedia content-bundeling (Xpublisher). The outlook on current research projects of the expansion of the current solution for creating conference proceedings forms the conclusion of the contribution.

Using the “Standardized Individual Output Development” the students found in step one an online-based user-friendly approach for a collaborative creation of scientific papers. A consistent next step is on expanding the solution for the production of conference proceedings as a bundling of various articles and additional components, among others front- and back matter, cover etc. Therefore conference proceedings are currently analyzed within a project team of students to derive therefrom a conference proceedings product line with variants and invariants components. In parallel, the current solution is expanded for conference proceedings workflow and a first release was successfully implemented in the end of August.

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