

# The Need for Standardization of Context Metadata for e-Learning Environments

Thomas Richter

e-Learning Research Center, Korean German Institute of Technology, KGIT, Seoul – South Korea  
Information Systems for Production and Operations Management, University of Duisburg-Essen, Germany  
richter@kgit.re.kr

Prof. Dr. Jan M. Pawlowski

University of Jyväskylä, Finland  
e-Learning Research Center, Korean German Institute of Technology, KGIT, Seoul – South Korea  
jan.pawlowski@titu.jyu.fi

**Abstract:** This paper addresses the urgent need for international standardization of Context Metadata for e-Learning environments. In particular, E-Learning when distributed over the Internet, can synchronously and asynchronously reach a huge number of learners but also has to deal with a variety of different cultures and societies and the related complications. A lot of the differences strongly demand adaptation processes in which especially the contents are being modified to fit the needs in the targeted contexts. In our approach solving this task, we determined a list of around 160 significant possible differences and defined those as context metadata. In this paper, we show the results of our research regarding to the determination of context related influence factors as well as approaches to deal with them and present a first specification of the representing context-metadata.

## Introduction:

We have researched about the context of e-Learning situations and environments. We developed possible learning and distribution scenarios and analyzed differences between countries and cultures which may affect the learning situations as influence factors. Those influence factors, in a lot of cases, do not play a significant role in the local face to face education. They indeed play a significant role when it comes to determine changing needs which occur when contents are being adapted from one context to another.

In this paper, we first of all recapitulate our research progress by demonstrating the environment as well as our resulting metadata approach. We present the methods and procedures which we already have predefined and which shall prepare the way for an automated changing needs determination. Before, we briefly introduce the recent state of the art in standardization and show why an additional standard is needed for e-learning context metadata. After the conclusion, in the appendix, we concretely present the full list of differences, as we have determined them and defined as context metadata.

## The e-Learning Scenario

Analogous to the definition of the 'SCHWEIZERISCHE KONFERENZ der REKTORINNEN und REKTOREN der PÄDAGOGISCHEN HOCHSCHULEN' [SKPH07] we understand '*e-Learning*' as every kind of electronically supported learning. As '*e-Learning environment*', we understand all factors belonging to the e-Learning situation, those which are manipulable by the system (for example, the LMS, the content, the learning design) or its defined preconditions but also those which are naturally given and therefore need to be adapted (for example, the technical infrastructure of the country, the client's culture, the geographical environment, the legal system). With the term '*e-Learning situation*', we conclude all aspects which are part of (and manipulable by) the teaching and learning process.

Besides the common learning scenarios, as they are known from the face to face teaching, e-Learning provides the opportunity to teach (learn) at '*any time*' and '*any place*' [NASB01], as long as the technological preconditions, as for example the needed hardware for proceeding, are fulfilled. In opposite to this, learning in the face to face teaching is designed in a way that a clearly defined group of students (in the following, because more general, 'learners') within a certain region is addressed. This different scenario confronts us with conditions which we, until now, did not need to care about: Providing learning materials to learners who are divided over the whole globe, not only forces us to take their time-zones into consideration (for synchronous live teaching), but also the different rights-systems, technological infrastructures, political systems, languages and last but not least, the learner's cultures, knowledge and expectations. Additionally, the content production can be very different to the face to face learning situation: In the face to face learning situation, usually a teacher or professor stands in

front of a defined class and directly teaches contents which he designed according to the local curricula. In the e-Learning situation, instead of the physical class room, there is a virtual classroom, mostly represented by a Learning Management System (LMS) which provides all needed functions for the learner as using and managing the content. Additionally, an e-Learning course can consist of various course elements which may be written by more than a single author and the design of the course not necessarily has been developed together with the text which the author(s) wrote. All those steps within the production cycle in theory could be managed and realized in different parts of the world and therefore contain influences of very different cultures and societies. A course in such a scenario which has been designed by an Asian course-designer (a lot of colors, very interactive ...), is running in an American LMS and which has modularly been written on the basis of European teaching approaches and learning strategies may in its origin form, not fit the needs of learners in North-Africa, even if translated into the corresponding languages. Obviously, in both scenarios, the distributed production and the distributed learning scenario, there are parameters which must be taken into consideration and which cannot be manipulated by the course or its constructed environment (LMS, preconditions ...). At least, by requiring a comparable (to the originated course) workload at the side of the learners, the aim must be a comparable learning quality for all learners so that for example in the end the same certificates can be assigned.

## Learning Technology Standards

Standards concerning learning technologies are subject of controversial discussions since a longer time. The benefits which can be described with the keywords cost-reduction, secure investments and new market potentials, are faced with the fear of losing opportunities to creatively develop and produce learning contents. Finally, related standards have improved the flexibility while ensuring the compatibility of the final products with old and future products. The defined learning standards primarily focus on the interoperability of components as they are used within learning situations, for example, LMSs, authoring tools, and learning resources and services.

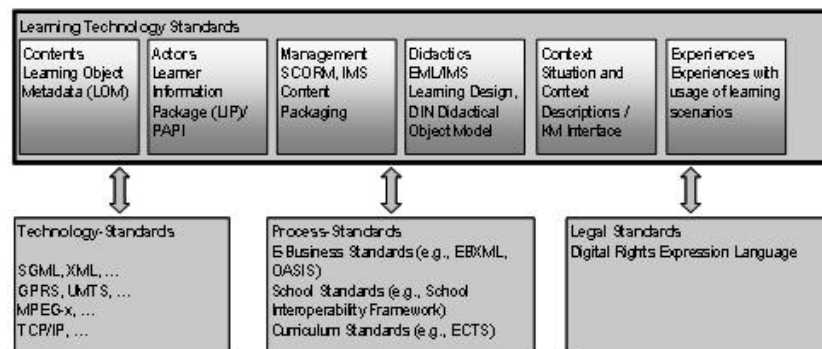


Figure 1: Classification of learning standards [PaBi06]

Standards, until now, have been written for the description of contents [IEEE02], for the interactions between LMS and learning objects [DoTh04], for didactical scenarios [Kop+02] and for actor user modeling [Smy+01]. As an addendum of the German specification [DIN04a] which was written to provide a useable reference model for quality insurance and additionally to define didactic demands, the DIN PAS 1032-2 [DIN04b] has been written. It rudimentary deals with the context of e-Learning. Since this specification is (only) defined as an addendum of the specification ISO/IEC 19796-1 [ISO05], [DIN04a], it cannot make the specified subject, the context, appearing meaningful enough for the community. Further on, the specification is not as flexible, as it is needed to obligatory define different kinds (case dependent) of data-structures, nor does this specification support any class definitions or related conditions / restrictions on the data, as it would be needed.

## The e-Learning Context

The 'Context of e-Learning' denotes and consists of all parameters which influence the e-Learning scenario without self directly being influenced by it. The context of e-Learning, as our research showed, can be described by taking different points of view. Up to now, specific aspects have already been taken into consideration. As an example, the approach of EDMUNDSON [Edmu07], [EdmuS07] is mainly related to the cultural view, but depending on the definition of culture, also includes further aspects. Different to this approach, GUETL, GARCIA-BARROS and MOEDRITSCHER [Gue+04] focus on the user needs. The approach of BRUSILOWSKI [Brus97] is related to Adaptive Hypermedia Systems and CRISTEA & DEBRA [CrDe02] focus on intelligent software. In particular because of the lack of a clear definition of the term culture ([HoHo05], [HaHa90], [Hend07], a.o.), those approaches which focus on parts of the context only, take different aspects into consideration and so it comes to intersections and significant differences. As a consequence, the direct comparison of the results by using related

methods has not been possible. Further on, the terminology between the different approaches is not consequently used (in particular, again, related to the term culture) so that even such aspects which are in common also cannot directly be compared.

In our approach which as side effect intends to clear this situation, the context as a whole (as we could determine it through analyzing the literature and deducing further influence factors) is taken into consideration and classified into 16 different sets of context-blocks. Each context-block contains a set of such influence factors, which directly are related to the subject forming its name. The context-blocks are shown in Figure 2. First, in the following Figure 1, the context of the e-Learning situations is shown [RiPa07b].

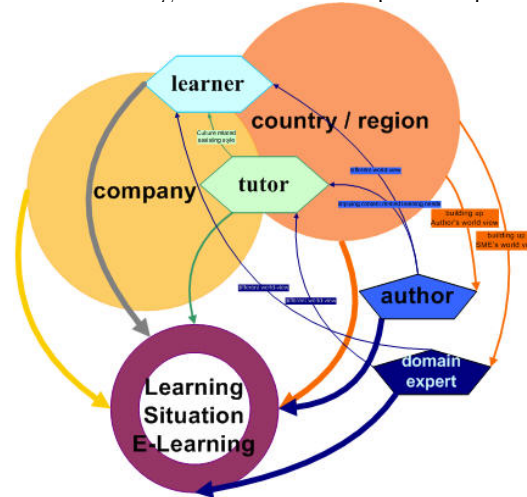


Figure 2: The context of e-Learning scenarios

The shown entities within the e-Learning scenario can directly or indirectly influence the learning situation in the one or the other way. We have modeled the e-Learning scenario in a way that the participating groups of actors as well as the different kinds of environments, have been taken into consideration. We have isolated two basically different environments in which e-Learning is taught, on the one hand the country /region and on the other hand companies. The basic difference between a company and a country / region is related to the kind of restrictions, which are demanded: Related to their corporate identity and corporate design, companies, as meaningful producers and distributors of e-Learning contents, especially concerning the adult education, basically, have very different types of demands and restrictions than countries,. Anyways, they must follow the rules and restrictions which a country demands / provides. So their needs on the one hand must be seen as inferior to the demands of the corresponding countries but nevertheless as additional ones which not necessarily substitute the country's demands. Further on the type of their needs is different (Design, professional language, a.o.) what requires other attributes.

A country additional can have societies and also contain different cultures with own needs, so that this also has to be modeled. The same representation model (country) has been chosen for societies and cultures: Although a region or society must follow the rules of a country, it can have own rules which are not demanded by the country and which have a similar type. Examples for such are the federal states in the United States of America or in Germany.

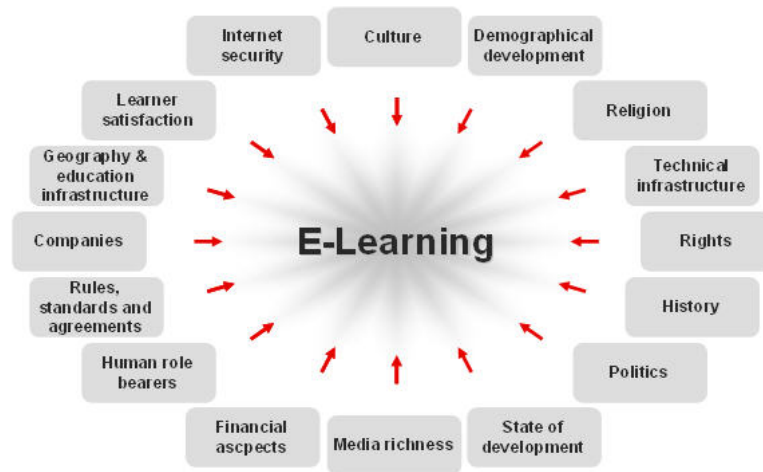
The considered actors in the environmental model represent the basically different allocated roles in the scenario: The learner, who must be seen as a general learner type, has various needs, depending on his / her culture, education and life experience. Designing learning situations which may lead to a successful learning process, in particular in the field of adult education, requires taking the needs of the customers into consideration. In opposite to the learning situation in school where children independently of the kind of attendance and pedagogical approaches are (rightfully) forced to participate within the education system because of the applicable law, learners participating in adult education programs are not. Finally, the learning success and willingness for participation may rise if the learners are satisfied. Anyways, the influence of learner satisfaction on the learning success still is a subject of controversial discussions on a general level ([Sim00], [Kear90], [Noce06], [HoKo06], a.o.). Culture, is considered being the most dominant influence factor on learning-environments [Maba03].

The tutor has been modeled as participant with an own data-set, because within an e-Learning situation a tutor ideally should be part of the society where a course is implemented, fitting the cultural needs of the learners (what nevertheless may be a conflict in internationally distributed learning scenarios). He influences the learning situation through his behavior which may be related to his context. Although the basically required skills of a tutor already are defined within the courses, the actual skills are not known. Those in particular are interesting

when it comes to a search for a local tutor within a targeted country. In the international model, the distributor may be attached to another country and he needs to know if for example further education for the expected tutor is needed. Modeling the tutor as assistant of learners primarily is a western approach, since the tutor in the eastern cultures fits more the role of an assistant of the professors than directly assisting the learners in their education process. In the western model of e-Learning, the tutor plays one part of the role which the teacher in the face to face teaching takes, the assisting one. The tutor generally is considered being attached to his country but also has typical skills and views which are related to his country's education system and the common living conditions (for example wars, blights, a.o.). Tutors are not modeled individually but in a general form: In particular it is interesting which skills generally can be expected.

Authors, who produce the content, in the e-Learning scenario, represent the other part of the classical teacher's role in the face to face teaching. The author (together with learning designers, if such are part of the model) writes the contents, decides about subjects which are being taught and the method how he teaches (presents) them. The culture and life experience of the author has significant influences on his picture of the world and therefore, unconsciously, also on his writing style, his decisions which kind of information he chooses to teach and last but not least, the way how he understands his environment. Especially concerning historical, religious and political courses, this may be significant and can cause massive conflicts for the learners. The author's data-set is considered being an individual one. This way of modeling is different to the others but necessary, because the skills and experiences can be very different to those which could be deduced from the country he comes from (maybe he made experiences within various countries). Handling individual data-sets may hardly be manageable on a general level and so the author is responsible for his own data-set. He may be led through the self-characterization by a questionnaire, is self-responsible for updates and locally stores his contextual profile. In the moment when he writes a course, his / her recent data-set is attached to the course. Once attached to the course, it is static because it reflects the author's attributes concerning the moment when he wrote the course. Support through authoring tools would make the author's participation much easier and more acceptable.

The Domain Expert (DE) has been included into the system, because in some countries, as we found out, this actor is the one who may be responsible for the adaptations. In such cases it could be useful to supplementary or alternatively attach his contextual information to the course. How many changes are needed or how momentous a change must be so that a substitution of the originated author's data-set is reasonable, is not yet understood. The role of the DE also is not fully understood yet. Simultaneously to the author, he for now is modeled individually. Maybe it would be sufficient, modeling him similar to the tutor on a general level. The reasonability of this way of modeling may be evaluated through future experiences and in the case of need it can be changed later on. In the following Figure 2, we show the context-blocks as we have classified them.

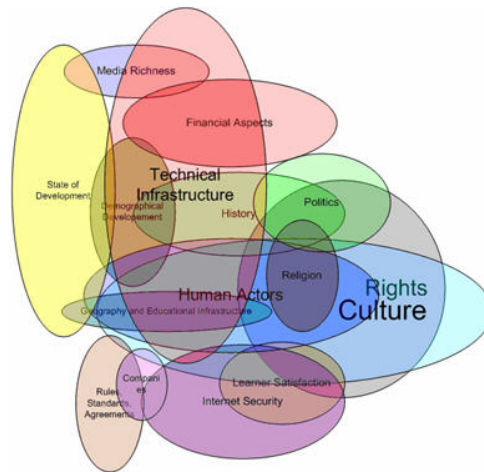


**Figure 3: The context-blocks influencing e-Learning situations**

The 16 context-blocks in relation to each other's content are designed in a disjunctive way. The contained influence factors, in a lot of cases have similar requirements on data structures and description fields concerning the related data-sets or if not, at least topically (only) belong to this group. Nevertheless, in particular because all intersections artificially have been eliminated for preparing consistent preconditions for a later database (doubled stored data within a database are a cause for inconsistent data-sets and must be eliminated within the normalization process), a lot of relations remained between single influence factors within the context-blocks. They crucially must be documented within the description of the single influence factors, because they give necessary hints on cross effects which influence the impact depth of the influence factors. The complete list of relations be-

tween the influence factors is presented in the table in Annex B.

The following Figure 3 [RiPa07a] illustrates the dependencies through the overlapping of the context-blocks in the way, as we understand them right now. The impact depth of the single influence factors on the system and in particular on the learner, strongly seem not only being related to the single conflicting influence factor and its certain characteristic, but also being related to the existence and impact depth of further influence factors.. The term ‘*impact-depth*’ of an influence factor describes the degree of persuasion on the impacted person or system which has been caused by the specific influence factor. Finally, the combination of events may be the reason why the acceptance level of a learner has been overcome in a certain situation. In particular influence-factors within the field of ‘*Culture*’ often are related to other context-blocks (or vice versa) and the influence factors related to ‘*Technical Infrastructure*’ also have a lot of dependencies or aspects in common with other context-blocks (or vice versa). Anyways, in particular the cross effects between the influence factors are not yet researched.



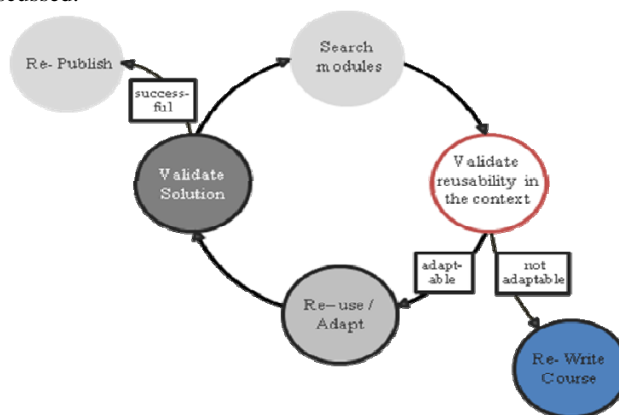
**Figure 4: Dependencies between context-blocks**

Which of the known dependencies are most relevant for being taken into consideration and which minimum level of differences between contextual attributes crucially requires changes in the content during the adaptation process, also in a lot of cases still is unknown.

## Adaptation

Adaptation which HAN et. al. define as a ‘*process of selection, generation or modification of content (text, image, and animation, etc.) to suit to users’ computing environment and usage context*’ [Han98+], within the common literature mostly is focused on technological aspects, as for example, mobile technologies ([Ble+05], [GoKi06], [Vite00]). Because of our different, holistic approach, we have defined a new adaptation model which in the following briefly will be introduced.

As far as necessary, learning situations which are designed for a certain context and shall be implemented into another context, strongly may require changes in some aspects. The adaptation, in which learning scenarios are found and ported from one to another context, contains four significant steps which in the following Figure 4 are shown and afterwards discussed.



**Figure 5: The adaptation circle for e-Learning contents**

The four significant steps are:

1. The search for modules
2. The validation of reusability of found contents in the new context
3. The adapting process
4. The validation of the solution

We consider course-modules (or whole courses) as already being written and being analyzed for reuse. The course modules first have to be searched and evaluated if they correspond to the specific needs of a targeted learning situation. Because of possible significant differences between both contexts, the origin and the targeted one, it cannot be expected that course modules are one on one reusable and so, changes on the original must be performed. Such changes may be needed, because the learners have a different way of understanding than those, living in the origin context but also can have their reason in regional different accreditation needs (curricula) or a different infrastructure in the targeted context which does not allow to implement the course in the origin way. First of all, the course or course-module has to be searched (1). Once, a corresponding course has been found, it has to be validated (2), if it is transferable into the new context. A significant condition for such a transfer is that the costs which the adapting process affords undergo the costs of rewriting the course (cost / benefit relation). The way, how the validation can practically take place, later on will briefly be discussed.

After the reusability is validated, the adapting process (3) can be started, else a new course must be found or if the search is unsuccessful, the course has to be rewritten. The adapting process is the transformation of the origin (old) course into the new course which fits the requirements of the new context and provides a similar successful learning output as the origin course (if no changes are needed, the new and the old course are the same). When the adapting process is finished, the solution has to be validated (4), for example, using similarity comparisons and recommender systems [Wolp07]. This can take place within a defined test scenario, as we have defined it for our current research for impact depths and dependencies [PaRi07], but also within the targeted environment after the implementation has taken place. Anyways, it has to be proven if the learners can deal with the course and if the results correspond to the expected ones. If so, the adaptation process can be seen as successfully terminated or it has to be redone. Dependent on the experienced conflicts during the validation process, the point of reentry into the adaptation circle can vary. If the results correspond to the expected ones and no significant conflicts appeared, the course finally can be republished.

## Context Metadata

In our approach describing the context of e-Learning, we represent the influence factors with (abstract) context-metadata. Metadata are considered being '*data about data*' [W3C98] and regarded to the IEEE, they are considered being '*information about an object, be it physical or digital*' [IEEE02]. Therefore, they only allow a certain view on the aspects which they represent – in our case, a description of the attribute which is responsible for a potentially conflicting influence factor. During our research, we isolated a set of about 160 influence factors by analyzing the appropriate literature for intercultural learning and cultural research on conflicting parameters and documented conflicts. We defined them in accordance with the specification DIN-PAS 1032-2. Anyways, as it has been shown, this specification is insufficient for a significant definition. All context-metadata are related to the context-classes as they are illustrated in Figure 2.

The context metadata describe influence factors which can have an impact on e-Learning situations. They not necessarily are all together relevant within every adaptation process, (some are specifically dependent on the entity they describe and not all entities must be represented within one scenario). A case-dependent decision has to be found so that it can be determined which influence factors impact a certain learning situation intensively enough, that changing needs might be given. Therefore, between others, previously made experiences shall be taken into consideration [BiPa06].

The concrete attributes for the context metadata which represent certain countries, are considered being stored within a publicly accessible database. Regarding to the concept, it can be addressed by applications and serves automatic requests. Therefore, a common definition of data and data-types is crucial. This database also may be the location for storing best practice reports and experience documentations. Anyways, the collection process for the data for each country is quite time-expensive. Additionally, in some cases, further research is needed and in others, only persons within the countries and with the related access rights may have the authority to determine the needed data. Recently, we research for the concrete data related to Germany and South Korea as an example. In the case of other countries, we hope for the related support. In our vision, everyone in the world shall be able to determine the changing needs on learning situations so that reuse and adaptation of contents in the long term can become a common process. The complete list of abstract context metadata, as it is defined right now, is presented in the Annex A of this paper. In the following Table 1, a summary of our collection of context metadata, related to Germany and South Korea is presented.

<b>GID</b>	<b>Id.-Nr.</b>	<b>MD-Name</b>	<b>Germany</b>	<b>Republic of Korea</b>
1	CM10001	Teacher's Role	Assistant on the way to knowledge	All-knowing Authority
2	CM1002	Value of Errors	Chance to learn	Failure
3	CM10003	Context Type of Society	Low Context	High Context
160	CM10040	Life-Style	Individual Oriented	Group Oriented
15	CM10015	Cultural Variable, Language	Various dialects, High German cultural elements in understanding	Various dialects, Korean cultural elements in understanding
45	DDM20005	Education Achievement	Regionally balanced, primary school (4yrs), mid. school (6yrs), high school (3yrs), free of charge, balanced between women and men. University 1st education free. Duty middle school	Concentrated on towns, primary school (6yrs) and middle school (3yrs) free of charge, high school (3yrs) and university must fully be paid. Duty middle school
65	TIM40010	Implemented Mobile Standard	High-speed mobile technology is only available in urban regions – about 30% of population	High-speed mobile technology seamless available for about 70% of population (urban)
129	HAM10039	Self Set Educational Goals	Knowledge and interest	Carrier and social position
132	HAM11029	Preferred Learning Style	Understanding	Memorizing
135	HAM11045	Way How to Give Feedback	Direct feedback incl. critics	Direct critics can cause face loss

**Table 1: Context Metadata, Germany / Republic of Korea**

Finally, the context metadata can serve various purposes. Within our scenario, they primarily are designed being integrated within the changing needs determining process. As already stated, the changing needs determination can be seen as the crucial part of the adaptation process and comprehensively determining those in the forefront of the adaptation process is a basic precondition for the level of the later success. Since additionally to the list of context metadata which is located in the Annex B also a brief (further) introduction to the single metadata is included (in the table), they shall not further be discussed at this point. In the following chapter, the procedures, as we have determined and predefined them in our past research, are being shown and, related to their functionality, briefly explained. The processes are related to the context-metadata and take use of the database. Some of the processes can automatically be determined and therefore, lower the costs enormously. Others, although parts can automatically be realized, still require human decisions. The amount of human decisions and work can massively be lowered by the time as far as experience-documentations and -reports can be integrated into the decision supporting systems. Realizing a fully automated adaptation process seems not being possible in nearer future, because knowing about potential changing needs, related on differences between two contexts, does not necessarily mean that all those (or at least a single one) aspects also are included or documented (what would be needed for an automatic changing needs determination) within an e-Learning course. There might be a huge discrepancy between the documented potential differences (conflicting parameters) between two contexts and those which actually appear within a certain course.

The high complexity which is given for semantical analysis in documents and contents generally is not yet manageable, so for now, it circumvents full automatic search processes. Also the dependency of the certain course subject plays a fundamental role concerning the decision of changing needs and this also still is not fully understood. There is some research in this subject which shows that certain subjects are better understandable than others [ChWe04] when being taught with e-Learning. Another aspect which makes final automatic decisions meaningless is the fact that the metadata cannot be considered being statically. The context changes from time to time and as we have found out, changes in influence factors not necessarily impact the whole environment at once or at all. On the example of the German-German history, we have been able to detect a significant time delay between the entities (Figure 1) within the e-Learning scenario in which the impact of events (in this case, the German Reunification) showed reactions (the learners and authors reacted for example far later than the regions, and sometimes, they did not even react). Although the data collection process in a lot of cases can be realized automatically, the final prove if the data still are valid must be determined by humans. Under normal circumstances, changes on the data may rarely happen from now to then but nevertheless they could have taken place in

the meantime since the last update, and not yet detected nor documented within the database. Such cases shall be covered (and avoided) by for example, laying the responsibility for the specific data in the hands of local universities and institutions. In particular concerning cultural changes a final control may be indispensable.

## **Procedures, Leading to Adaptation**

SPECHT and KRAVCIK write *‘One of their primary objectives is to generate as much metadata as possible automatically, based on the current context and by means of sensors’* [SpKr06]. Considering this, the automation of processes is focussed within our research for procedures which can support the adaptation process.

The procedures which use the context metadata, can be divided into two categories. The one directly needs access to the database and the other uses the datasets which already have been collected and locally stored. The number of direct accesses per transaction on the database and needed transmission rates may be limited to the lowest possible amount of transactions. This ensures the highest possible availability of the database for further requests. Simultaneously, the amount of data which are to be taken also shall be as small as possible, reducing the risk of transmission errors. Therefore, the data in the database may be limited to reference values which can be seen as representations of data which are clearly classified. Most of the basic data (text) shall be stored on the side of the clients. If a data-set for a concrete country is needed, the corresponding references can be taken out of the database. This allows tracking whole datasets (country, society, company) including documented cross effects within a relatively small (related to needed storage) matrix, basing on binary coding. Updates in the database which are caused through, for example, additional or changed attributes, require an update of the data on the client’s side. This update does not inflict the performance of the database, since it externally can be realized as a simple file-download. It may be initialized when a related application gets started by the client and his data-set version does not correspond with the actual data-set version in the database.

### **Automated Data Gathering Process – Retrieving (Pulling) Data**

The first procedure is the data gathering procedure (the data which are being stored within the database) which at least includes three basically different methods. A part of the data, in particular those data which consider commonly known and available aspects of a country, like population density or common gross annual income, can be tracked automatically by using public (online-)databases like the one of Fischer Weltalmanach [Fisc07] or the CIA World Factbook [CIA07] which both at least yearly are updated. Further data may automatically be tracked and published by polling centers. A corresponding procedure must be set up and related to the database.

### **The Community Concept for Data Collection – Pushing Data**

The second group of gathering processes considers such data which may not be automated collectible and must be manually researched. In those cases, in the longer term, we think of a principle close to the Wikipedia system in which the countries, societies and in particular also companies can upload their own data-sets, as far as they are interested in taking part in the system (we consider that the common interest grows with the number of already participating countries). This community concept is a fundamental part of the whole project because it will not be manageable collecting all data on our own (we face providing the data for as many countries as possible) so that an international collaboration is indispensable.

### **The Data Production – Producing Data through Combination and Deduction**

The last group of processes targets data which can be deduced by combining already available data. Once, stored as metadata within the database and as available attribute-values in the download-list, only updates have to be monitored. For updates also the community concept should work.

### **The Data Collection Process**

Authoring tools may use those data (or parts of the data-sets) assisting the authors, Domain Experts or publishers defining their courses. The related data representation matrix may be added to each course. If after that, an already written course is being adapted, the origin dataset already is known. Simply the concrete data for the combination of contexts must be taken out of the database (collected). The related data in the course are static, because the course does not change, even if the context of the course author will change later on. The process, used by for example authoring tools, can be realized automatically and is called the data-collecting process (1; 2).

### **The Data Comparison and Contrasting Process – Determining Differences**

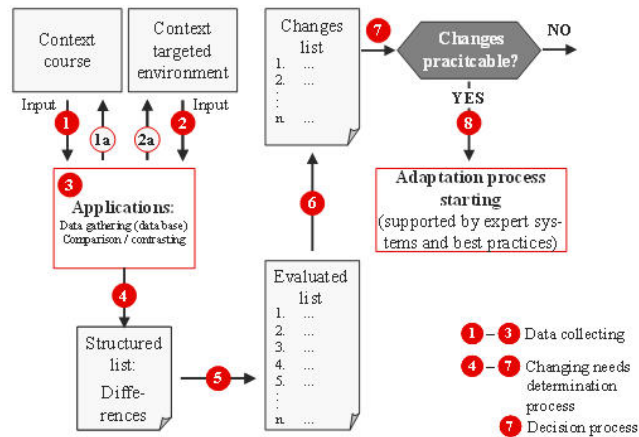
The data comparison process which is the next process directly related to the database, has a plain list as output (3). This comparison can also be realized automatically. The content of the unstructured list now has to be categorized so that finally a structured list is created which is ordered by a given schemata (4).

### **The Evaluation Processes – Determining Concrete Changing Needs**

The next procedure uses the structured list of the data comparison process and basing on additional experience



reports its content gets prioritized, by defining more and less necessary aspects (5). Moreover it can point on cross effects which already are known, so that further – maybe under different circumstances ignorable attributes – can be taken into consideration. The output of this procedure is an evaluated list which may be taken as a tool for the decision which changing needs could be given. In later times, this also may be the input file for decision support systems. After the evaluated list manually has been compared with the actual course’s content, the changing list can be defined (6) what finally leads to the decision, if an adaptation process is meaningful (7). After this point, best practices, basing on the context metadata and experience reports, can be provided in the longer term (after those are collected), but the adaptation process itself (8), as already explained, (for now) must be realized manually. In the following Figure 5 the above described processes are illustrated.



**Figure 6: Processes leading to the adaptation process**

Making the system attractive for governments and research institutions to participate in the data collection process and as well make it usable and attracting for developers to produce applications which take use of the data, as authoring tools, Learning Management Systems or Decision Support Systems, standardized interfaces and data structures are crucially necessary. As it has been shown, the recently defined standards cannot fit the needs for services and features which the context-metadata demand.

## Conclusion

We have shown that the context of e-Learning can be considered as the key for a successful internationalization of learning situations. We also have shown that a commonly usable context-metadata database on the one hand has a potential reducing production costs and on the other hand speeding up development cycles for e-Learning contents. Both support the reuse of e-Learning contents as alternative to re-authoring them. Therefore, such a database for context related metadata and the related adaptation approach not only can support the knowledge transfer between Asia and Europe but also can be a solution for a fairer education distribution throughout our entire world.

Finally, implementing such a database-system and expecting a wide support and common use of it by institutions, software developers and end users is only reasonable with standardized interfaces and data-structures. Else, they must fear that their effort is useless because of for example, later changes in the system. The recent standardization primarily addresses the content, the technology which is needed to run LMSs and contents and the definable requirements, related to a certain course. If we want to set up such a commonly usable data-base project in a meaningful way so that it finally assists us in spreading education and knowledge, we not only are dependent of the active support of various institutions and governments, but in particular a standardization of the context metadata for e-Learning environments is needed.

Our recently finished project focused on the development of a test environment and related test cases for the determination of user-related influence factors and their actual impact depth. As a related method, we developed a special design strategy for an internationally usable course model (theoretically adaptable to any subject) which shall provide information on specific learner’s (learning) behavior in (possible) conflicting situations which we provoke throughout the course.

The next step of this research is the implementation of test cases within a concrete course and determining the differences between Germany and Korea. Further, we try to evaluate the impact of conflicts on learners. The output of the exploration phase of this experiment (this first step) shall help us balancing the test cases, collecting additional influence factors for the context metadata list and determining hypotheses for statistical evaluations which we later on will apply to further experiments within the validation phase.

## References

- [Lync07] LYNCH, M.: *Driving Forces behind e-Learning, Megatrend #1, Changing Demographics*; Utah, USA; 2007; Retrieved on 2007 February 26, 2007 at <http://www.allenacademy.com/elearning/about/page10.htm>
- [Bea+06] BEATTY, K.; ELLIOT, R.; FAIOLA, A.: News on the Internet: do people seek a news bias? In: SUDWEEKS F., HRACHOVEC, H.; ESS, C. (eds.): *CATaC'06 Proceedings: Cultural Attitudes towards Technology and Communication*. (Tartu, Estonia); 2006, pp. 130-141
- [BiPa06] BICK, M.; PAWLOWSKI, J. M.: Managing & Re-Using Didactical Expertise: The Didactical Object Model. *Educational Technology & Society*, 8 (1); 2006, pp. 84-96
- [Ble+05] BLECKMANN, P.; SPROTTE, R.; EBMANN, B., HAMPEL, T: Interactive Learning Objects in Mobile E-Learning. In RICHARDS G. (ed.): *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*. Chesapeake, VA: AACE; 2005, pp. 2809-2816
- [Bour92] BOURDIEU, P.: *Distinction: A Social Critique of the Judgment of Taste*. Harvard University Press, Cambridge, Massachusetts; 1992, Reprint edition 2007
- [Brus97] BRUSILOWSKY, P.: Efficient Techniques for Adaptive Hypermedia in Intelligent Hypertext. In NICHOLAS, C.; MAYFIELD, J. (eds.): *Advanced techniques for the World Wide Web, Lecture Notes in Computer Science*. vol.1326, Springer-Verlag, Berlin; 1997, pp. 12-30
- [Cak+02] CAKIR, H.; BICHELMMEYER, B.; CAGILTAY, K.: Effects of cultural differences on e-Mail communication in multicultural environments; In: SUDWEEKS F.; H.; ESS, C. (eds.): *CATaC'02 Proceedings: Cultural Attitudes towards Technology and Communication*. (Montréal, Australia); 2002, pp. 29-50
- [ChWe04] CHEN, W.; WELLMAN, B.: The global digital divide – Within and between countries. *IT&Society*, Volume 1(7); 2004, pp. 39-45
- [CIA07] CENTRAL INTELLIGENCE AGENCY: *The online World-Factbook*. CIA; 2007, retrieved on Mai 23, 2007 from <https://www.cia.gov/library/publications/the-world-factbook/>
- [CrDe02] CRISTEA, A.; DEBRA, P.: ODL Education Environments based on Adaptivity and Adaptability. In: G. Richards (Ed.): *Proceedings of the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*. Chesapeake, VA: AACE; 2002, pp. 232-239
- [DIN04a] DEUTSCHES INSTITUT FÜR NORMUNG e.V., DIN, Stabsabteilung Technik: *PAS 1032-1:2004-2: Aus- und Weiterbildung unter besonderer Berücksichtigung von e-Learning - Teil 1: Referenz-modell für Qualitätsmanagement und Qualitätssicherung - Planung, Entwicklung, Durchführung und Evaluation von Bildungsprozessen und Bildungsangeboten*; Beuth Verlag GmbH; 2004, retrieved on May 22, 2007 at <https://secure.beuth.de/>
- [DIN04b] DEUTSCHES INSTITUT FÜR NORMUNG e.V., DIN Ref. Nr. PAS 1032-2:2004: *Aus- und Weiterbildung unter besonderer Berücksichtigung von e-Learning - Teil 2: Didaktisches Objektmodell - Modellierung und Beschreibung didaktischer Szenarien*; Beuth Verlag GmbH; 2004; retrieved on May 22, 2007 at <https://secure.beuth.de/>
- [DoTh04] DODDS, P., THROPP, S.E.: *SCORM 2004*, 2nd Edition Overview. Retrieved on July 5, 2005 from <http://www.adlnet.org/downloads/70.cfm>
- [DuMa07] DUNN, P.; MARINETTI, A.: Beyond Localization: Effective Learning Strategies for Cross-Cultural e-Learning. In: EDMUNDSON, Andrea (ed.): *Globalized E-Learning, Cultural Challenges*. Idea Group, U.S.; 2007, pp. 255-266
- [Dys+06] DYSON, L.; SALAZAR, J. F.; HENDRIKS, M.; UNDERWOOD, J.; KAY, R.: ICTs for intercultural dialogue: An overview of UNESCO's Indigenous Communication Project. In: SUDWEEKS F., HRACHOVEC, H.; ESS, C. (eds.): *CATaC'06 Proceedings: Cultural Attitudes towards Technology and Communication*. (Tartu, Estonia); 2006, pp. 340-359
- [Edmu07] EDMUNDSON, A.: The Cultural Adaptation Process (CAP) Model: Designing E-Learning for Another Culture. In: EDMUNDSON, A. (ed): *Globalized E-Learning, Cultural Challenges*. Idea Group, U.S.; 2007, pp. 267-290
- [EdmuS07] EDMUNDSON, A.: *Edmundson cultural content adaptation service*. Retrieved on May 10, 2007 at: <http://www.elearning.com/Solutions.asp>
- [Fisc07] FISCHER Verlag; *Fischer Weltalmanach*. 2007 (yearly updated)

- [GoKi04] GOH, T.; KINSHUK, D.: An Adaptation Framework for Web Based Learning System. *Lecture Notes in Computer Science*. 3213/2004, Springer Berlin/Heidelberg; 2004, pp. 277-283
- [Gue+04] GUETL, C.; GARCIA-BARRIOS, V.; MOEDRITSCHER, F.: Adaptation in E-Learning Environments through the Service-Based Framework and its Application for AdeLE. In RICHARDS, G (Ed.): *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*. Chesapeake, VA: AACE; 2004, pp. 1891-1898
- [Guna05] GUNAWARDANA, K., D.: An Empirical Study of potential challenges and Benefits of Implementing E-learning in Sri Lanka; In: *Proceedings of the Second International Conference on eLearning for Knowledge-Based Society*; Bangkok, Thailand; August 4-7; 2005, pp. 33.1-33.8
- [HaHa90] HALL, E. T.; HALL, M. R.: *Understanding cultural differences*. Yarmouth, ME: Intercultural Press; 1990
- [Han+98] HAN, R.; BHAGWAT, P.; LAMAIRE, R.; MUMMERT, T.; PERRET, V.; RUBAS, J.: Dynamic adaptation in an image trans-coding proxy for mobile WWW Browsing. *IEEE Personal Communication*; vol. 5 (6), Dec. 1998
- [Hend96] HENDERSON, L.: Instructional design of interactive multimedia: A cultural critique. *Educational Technology Research and Development*, 44 (4); 1996, pp. 85-104
- [Hend07] HENDERSON, L.: Theorizing a Multiple Cultures Instructional Design Model for E-Learning and E-Teaching. In: EDMUNDSON, A. (ed.): *Globalized E-Learning, Cultural Challenges*; Idea Group, U.S.; 2007, pp. 130-154
- [HeNk06] HEATON, L.; NKUNZIMANA, G.: What makes a technology appropriate or appropriable? In: SUDWEEKS F., HRACHOVEC, H.; ESS, C.; (eds.): *CATaC'06 Proceedings: Cultural Attitudes towards Technology and Communication*. (Tartu, Estonia); 2006, pp. 102-114
- [Hens90] HENSSEN, J. L. G.: Cadastre: Indispensable for development. *ITC Journal*, 1990-1, Netherlands; 1990, pp. 32-39
- [HoHo05] HOFSTEDE, G.; HOFSTEDE, G., J.: *Cultures and Organizations. Intercultural Cooperation and Its Importance for Survival*. USA, revised and expanded 2nd edition, McGraw-Hill Publishers; 2005
- [HoKo06] HO, J.; KO, L.: The Effect of Students Successful Factors in E-Learning; In: REEVES, T.; YAMASHITA, S. (eds.): *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*, Chesapeake. VA: AACE; 2006 pp. 1996-1999
- [IEEE02] IEEE Learning Technology Standards Committee: *Learning Object Metadata Standard*, IEEE 1484.12.1-2002
- [ISO05] ISO/IEC JTC1/SC36: ISO/IEC 19796-1:2005 (E), *Information Technology - Learning, Education, and Training - Quality Management, Assurance and Metrics - Part 1: General Approach*; 2005; Retrieved on February 08, 2007 at <http://www.iso.org/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=33934>
- [Kear90] KEARSLEY, G.: Designing educational software for international use. *Journal of Research on Computing in Education*; 22 (4); 1990, pp. 270-274
- [KiNk05] KINUTHIA, W.; NKONGE, B.: Perspectives on Culture and e-Learning Convergence. In: RICHARDS, G. (eds.): *Proceedings of the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*. Chesapeake, VA: AACE; 2005, pp. 2613-2618
- [Kop+02] KOPER, R.; OLIVIER, B.; ANDERSON, T.: *IMS Learning Design Information Model*. Version 1.0, retrieved on June 12, 2003 from [http://www.imsglobal.org/learningdesign/ldv1p0pd/imsld\\_infv1p0pd.htm](http://www.imsglobal.org/learningdesign/ldv1p0pd/imsld_infv1p0pd.htm)
- [LaZh03] LANHAM, E.; ZHOU, W.: Blended Learning for Cross-Cultural E-Learning. In: RICHARDS, G. (ed.): *Proceedings of the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*. Chesapeake, VA: AACE; 2003, pp. 1927-1930
- [Lean05] MCLEAN, N.; Macquarie University, Sydney, Australia: *Libraries and E-Learning: Organisational and Technical Interoperability*. COLIS (Collaborative Online Learning & Information Services); Authorised by: Professor James Dalziel, Macquarie University; 2002, project closed; Retrieved on March 05, 2007 at [http://www.colis.mq.edu.au/news\\_archives/demo/docs/lib\\_e\\_learning.pdf](http://www.colis.mq.edu.au/news_archives/demo/docs/lib_e_learning.pdf)
- [LeCo06] LEFEVRE, D.; COX, B.: Do cultural schemata impact on students' engagement with eLearning content? In: SUDWEEKS F., HRACHOVEC, H.; ESS, C.; (eds.): *CATaC'06 Proceedings: Cultural Attitudes towards Technology and Communication*. (Tartu, Estonia); 2006, pp. 459-464

- [Maba03] MABAWONKU, A. O.: Cultural framework for the development of science and technology in Africa. *Science and Public Policy*, 30 (2); 2003, pp. 117-125
- [Marc04] MARCOVA, MARIANA I.: *Barriers for Information Technology Adoption in Post-Soviet Central Asia*. In: SUDWEEKS, F., ESS, C. (eds.): *CATaC'04 Proceedings: Cultural Attitudes towards Technology and Communication*. (Carlstadt, Sweden); 2004, pages 277-281
- [MaSa04] MANOUSELIS, N., SAMPSON, D.: Recommendation of Quality Approaches for the European Quality Observatory. In: *Proceedings of ICALT 2004*. Joensuu; 2004, pp. 1082-1083
- [Mcca07] MCCARTHY, S.: Theorizing and Realizing the Globalized Classroom. In: EDMUNDSON, Andrea (ed.): *Globalized E-Learning, Cultural Challenges*. Idea Group, U.S.; 2007, pp. 90-115
- [McLa99] MCLAUGHLIN, C.: Culturally responsive technology use: Developing an online community of learners. *British Journal of Educational Technology*, 30 (3); 1999, pp. 231-245
- [Mer+02] MEREDYTH, D; HOPKINS, L.; EWING, S.: Measuring social capital in a networked housing estate. In: SUDWEEKS F.; H.; ESS, C. (eds.): *CATaC'02 Proceedings; Cultural Attitudes towards Technology and Communication*. (Montréal, Australia); 2002, pp. 281-296
- [MoKe96] MOORE, G.G.; KERRSLEY, G.: *Distance education: A systemic view*. Wadsworth Publishing, Belmont, CA; 1996
- [NASB01] National Association of State Boards of Education: *The Report of the NASBE Study Group on e-Learning: The Future of Education*. 2001; retrieved on October 24, 2007 at [http://www.nasbe.org/Organization\\_Information/e\\_learning.pdf](http://www.nasbe.org/Organization_Information/e_learning.pdf)
- [Noce02] NOCERA, J. A.: *Context and culture in human computer interaction: "Usable" does not mean "senseful"*. In: SUDWEEKS F.; H.; ESS, C. (eds.): *CATaC'02 Proceedings: Cultural Attitudes towards Technology and Communication*. (Montréal, Australia); 2002, pp. 505-524
- [Noce06] NOCERA, J. L.: The politics of technology culture: Understanding the co-configuration of people and systems through technological frames. In: SUDWEEKS F., HRACHOVEC, H.; ESS, C. (eds.): *CATaC'06 Proceedings: Cultural Attitudes towards Technology and Communication*, (Tartu, Estonia); 2006, pp. 289-315
- [Noe+04] NOELTING, K.; LEYPOLD, M.; ROESER, M.; VOIGT, D.: Learner Centrism and Constructivism - New Paradigms for E-Learning? In: *Proceedings of the World Conference on Educational Multimedia, Hypermedia and Telecommunications (EDMEDIA)* in Lugano, Swiss; 2004; Retrieved on March 09, 2007 at E/ItLib, AACE Digital Library
- [Oga+06] OGASAWARA, A.; SAITO, H.; SAITO, K.; MAEDA, T.: An Approach to Effective Educational Methodology in an e-Learning Environment; In: *Proceedings of the World Conference on Educational Multimedia, Hypermedia and Telecommunications (EDMEDIA)* in Lugano, Swiss; 2006, Received at AACE Digital Library: E/ItLib on March 05, 2007
- [PaBi06] PAWLOWSKI, J.M.; BICK, M.: Managing & Re-Using Didactical Expertise: The Didactical Object Model. *Educational Technology & Society*, 9 (1); 2006, pp. 84-96
- [PaRi07] PAWLOWSKI, J. M.; RICHTER, T.: A Methodology to Compare and Adapt E-Learning in the Global Context. *Proceedings of the Multikonferenz Wirtschaftsinformatik, MKWI*, München; Feb. 08 (submitted for publication)
- [Pitt06] PITTERLE, R.: Hard parties. An interview of the free journalist Ropert Pitterle from Berlin made with a musician named DJ-Kollektiv Botanica; Berlin, 2006; responsible authority: German ministry for political education; Retrieved on Feb. 27, 2007 at [http://fluter.de/look/dossier\\_section.tpl?IdLanguage=5&IdPublication=2&NrArticle=5357&NrIssue=51&NrSection=20&tpid=82](http://fluter.de/look/dossier_section.tpl?IdLanguage=5&IdPublication=2&NrArticle=5357&NrIssue=51&NrSection=20&tpid=82)
- [Pos+00] POSTMES, T.; SPEARS, R.; LEA, M.: The formation of group norms in computer-mediated communication. *Human Communication Research*, 26; 2000, pp. 341-371
- [Ram+07] RAMSEY, R.; MARSHALL, G.; JOHNSON, M.; DEETER-SCHMELZ, D.: Ethical Ideologies and Older Consumer Perceptions of Unethical Sales Tactics. *Journal of Business Ethics*, 70/2 (17) Springer; 2007, pp. 191-207
- [RiPa07a] RICHTER, T.; PAWLOWSKI, J. M.: Adaptation of e-Learning Environments: Determining National Differences through Context Metadata. Proc. of KCTOS, Vienna; Dec. 2007 (accepted for publication)
- [RiPa07b] RICHTER, T.; PAWLOWSKI, J. M.: Culture Metadata – A Tool for the Internationalization of E-

- Learning. In the *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications*. Chesapeake, VA: AACE; 2007, pp. 4528-4537
- [Sim+00] SIMONSON, M.; SMALDINO, S.; ALBRIGHT, M; ZVACECK, S.: *Teaching and learning at a distant: Foundations of distance education*; Prentice Hall, Upper saddle River, NJ; 2000
- [SKPH07] Arbeitsgruppe eLearning der SKPH: *Was ist e-Learning? – ein Definitionsver-such!* Retrieved on May 21, 2007 at <http://edublog-phr.kaywa.ch/e-learning/index.html>
- [SmMa06] SMAHEL, D.; MACHOVCOVA, K.: *Internet use in the Czech Republic: Gender and age differences*. In: SUDWEEKS F., HRACHOVEC, H.; ESS, C. (eds.): *CATaC'06 Proceedings: Cultural Attitudes towards Technology and Communication*. (Tartu, Estonia); 2006, pp. 521-533
- [Smy+01] SMYTHEY, C.; TANSEY, F.; ROBSON, R. (2001): *IMS Learner Information Package, Information Model Specification, Version 1.0.*, retrieved on March 13, 2007 from URL <http://www.imsproject.org/profiles/lipinfo01.html>
- [SpKr06] SPECHT, M.; KRAVCIK, M.: *Authoring of Learning Objects in Context*. *International Journal of E-Learning*, 5 (1); 2006, pp. 25-33
- [TrHa06] TROMPENAAR, F.; HAMPDEN-TURNER, C.: *Riding the waves of culture: Understanding cultural diversity in business*. Nicholas Brealey Publishing; first publishing 1997, herein used reprint from 2006
- [unkn06a] UNKNOWN AUTHOR: *Mohammed: Darstellung nicht direkt verboten – kein explizites Darstellungsverbot im Koran*; 10.02.2006, retrieved on February 27, 2007 at <http://europenews.blogg.de/eintrag.php?id=110>
- [Vite00] VITELI, J.: *Finnish Future: From eLearning to mLearning?* ASCILITE 2000 conference proceedings; 2000; retrieved on May 23, 2007 at [http://www.ascilite.org.au/conferences/coffs00/papers/jarmo\\_viteli.pdf](http://www.ascilite.org.au/conferences/coffs00/papers/jarmo_viteli.pdf)
- [W3C98] WORLD WIDE WEB CONSORTIUM; MILLER, E.; SCHLOSS, R.; SWICK, R. R.; IANELLA, R.; LASSILA, O.: *Using Web Metadata – Part II The Ressource description framework*. Retrieved on May 29, 2007 at <http://www.w3.org/People/EM/talks/www7/tutorial/part2/sld001.htm>
- [Wils02] WILSON, M.: *Communication, organizations and diverse populations*; In: SUDWEEKS F.; H.; ESS, C. (eds.): *CATaC'02 Proceedings: Cultural Attitudes towards Technology and Communication*. (Montréal, Australia); 2002, pp. 69-88
- [Wol+07] WOLPERS, M., NAJJAR, J., VERBERT, K., DUVAL, E. (2007). *Tracking Actual Usage: the Attention Metadata Approach*. *Educational Technology and Society, Special Issue on "Advanced Technologies for Life-Long Learning"*; 2007

## Annex A

In the following, the list of collected Context Metadata is shown in the version of August 2007: The original table contains further columns, as for example dependencies, relations, implementation status, expected data-structures, a.o., It still extends as well in width as also in length. For further information, please be free to contact us.

GID	Context-Block (Type)	Id.-Nr.	Name	Description (kind)	Source
01	<b>1. Culture</b>	CM10001	Teacher's Role	Assistant or unfaultable authority	Hend96
02		CM10002	Value of Errors	What do errors mean: a chance to learn or a disaster?	Hend96
03		CM10002	Context Type of Society	Low context / high context	HaHa90
04		CM10004	Acceptance Level for New Technologies	Is new technology seen as good or as possibly evil?	HoHo05
05		CM10005	Masculinity Index	The Hofstede Value for Masculinity Index	HoHo05
06		CM10006	Index For Avoiding Insecurities	Hofstede UAI value	HoHo05
07		CM10007	Power Distance Index	The PDI for comparison functions	HoHo05
08		CM10008	Individualism Index	The IDV for comparison functions	HoHo05
09		CM10009	Cultural Meaningful Symbols	a list of meaningful symbols	HoHo05
10		CM100010	Culture Related Heroes	Names of meaningful heroes within a society	HoHo05
11		CM100011	Cultural Rituals	A list of meaningful rituals	HoHo05
12		CM10012	Language	Language name(s)	[Leon02]]
13					
14		CM10013	Number of Different Societies	Dependent of # of languages	deduced
15		CM10014	Cultural Variable Concerning Language	if and how cultural related semantic is interpreted	[HaHa90]
16		CM10015	Communication Style	Direct or unsealed communication style	[Cak+02]
17		CM10016	Humor	Kind of humor, classification possible?	[KiNk05]
18		CM10017	Culture Specific Idioms	are there certain used idioms?	[KiNk05]
19		CM10018	Prefered Media Types	Are there preferences implied by the type of society?	[Wils02]
20		CM10019	Gender Differences	Are there cultural differences between genders	[Pos+00]
21		CM10020	Gaps through Gender Differences	Gaps through gender differences	[SmMa04]
22		CM10021	Social Capital	Key-value for social development	[Mer+02]
23		CM10022	Language Writing Styles	Special writing styles (formal, direct,...)	[Noce02]
24		CM10023	Date & Time Formats	Special formats for date and time	[Noce02]
25		CM10024	Grammar	Special grammar available (or dialects)	[Noce02]
26		CM10025	Measures	Which kind of measures are common (i.e. metric, inch,...)	[Noce02]

27		CM10026	Currency	The currency within the country (name)	[Noce02]
28		CM10027	Icons	Are there known icons which are declined / preferred	[Noce02]
29		CM10028	Interaction Protocols	How do people communicate	[Noce02]
30		CM10029	Decoding Process	Previous cultural background, workplace, tool-related	[Noce02]
31		CM10030	Meditation Model	How people deal with information and store it	[DuMa07]
32		CM10031	Common Scheme of Behavior	Is there a general opinion available	[HeNk06]
33		CM10032	General Opinion	Society related opinions concerning certain subjects	[Bea+06]
34		CM10033	Cultural National Taste	Does a national taste exist	[Bour92]
35		CM10034	Indigenous Cultures	Special attributes, open	[Dys+06]
36		CM10035	Ability to Self-Motivation	Do learners need motivation help or can they motivate themselves	[Hens90]
37		CM10036	Emotional Stability	How (& fast) do learners react on unexpected influences (acceptance level)	[Hens90]
38		CM10037	Culture Related Knowledge	Indigenous knowledge in special is meant	[KiNk05]
39		CM10038	Pedagogical Approach	Are there culture related special pedagogical approaches	[Mcca07]
40		CM10039	Regional Common Pedagogical Approach	Is a single approach preferred	deduced
41	<b>2. Demographical</b>	DDM20001	Birth Rate	Absolute, maybe regional differences	deduced
42	<b>Development</b>	DDM20002	Number of Inhabitants per Age-Group	Absolute value, maybe regional differences	deduced
43		DDM20003	Time related Population Development	Population development over time	[Lync07]
44		DDM20004	Family Status	Role of the family and divide	deduced
45		DDM20005	Education Achievement	National divide of education (absolute / percent)	deduced
46		DDM20006	Ethnic Makeup	Ethnic groups, divide	[Ram+07]
47		DDM20007	Economic Status	Divide of riches	deduced
48		DDM20008	Technological State of the Art	Kind and divide	deduced
49		DDM20009	Technological Development	Expectable development within households, trends	deduced
50		DDM20010	Regional Population Density	Population density per region	deduced
51		DDM20011	Population Density & Time Zones	Population density per time zones (if there are more than 1)	deduced
52	<b>3. Religion</b>	RM30001	Main Religion	Name of religion and attribute	deduced
53		RM30002	Religious Conflicts	List of existing conflicts	[Pitt06]
54		RM30003	Common Religious Rules	If religion rules inflict all-days live	[unkn06a]

55		RM30004	Number of Significant Religions	Absolute value	deduced
56	<b>4. Technical</b>	TIM40001	Ownership of PC	Is it expectable? divide?	deduced
57	<b>Infrastructure</b>	TIM40002	Private Internet Accounts	Is it expectable? divide?	deduced
58		TIM40003	Television at Home	Is it expectable? divide?	deduced
59		TIM40004	Cell Phone	Is it expectable? divide? technology?	deduced
60		TIM40005	Com. Speed of PC	Common used PCs technology (MHz, graphic)	deduced
61		TIM40006	Com. Graphics Accelerator Technology	Expectable graphics power	deduced
62		TIM40007	Power Supply Infrastructure	Power supply given everywhere or only in congested areas	deduced
63		TIM40008	Communication Technologies	Kind of useable and used communication technologies	deduced
64		TIM40009	Mobile Technology Infrastructure	Quality of mobile access per region	deduced
65		TIM40010	Implemented Mobile Standard	Which standards are used, i.e. GSM, UMTS; density	deduced
66		TIM40011	Network Coverage Internet	Is Internet available everywhere or only in congested areas	deduced
67		TIM40012	Network Coverage Mobile Technologies	Is mobile technology (widely) usable everywhere	deduced
68	<b>5. Rights</b>	RM50001	Special Laws	Unique laws or rules (company, society), sources	deduced
69		RM50002	Base Set of Laws and Rules	Base set, containing education-relevant laws, sources	deduced
70		RM50003	Accreditation Needs (Government)	Are there certain accreditation forms necessary	deduced
71		RM50004	Intellectual Property Rights	Specials? IList of sources	[IEEE02]
72		RM50005	Data Protection Rights	Specials? list of sources	[IEEE02]
73		RM50006	Specific Copyright	Specials? list of sources	[Lean04]
74		RM50007	Usage of Internet	Is the usage of Internet anyhow limited for example because of censorship	deduced
75		RM50008	Accessibility of Contents -Age Dependent	Are there age-related restrictions? which	deduced
76		RM50009	Access and Spreading of Content	Is there censorship and are there restricted information	[Marc04]
77		RM50010	Business Rights	Specials? list of sources	[ebXML01-b]
78		RM50011	Gender Specific Laws	Are there Gender specific laws	deduced
79		RM50012	Religious Motivated Laws	Are there Laws which belong to religion	deduced
80		RM50013	Duties which affect e-Learning	Are there duties for learning (i.e. duty to go to school)	deduced



81		RM500014	Controlled Historical Views	Restrictions concerning publishing historical views?	deduced
82	<b>6. History</b>	HM60001	Point of Historical View	What's the society's point of view concerning history	deduced
83		HM60002	Originator's Historical View	What's an author's historical view	deduced
84		HM60003	Religious motivated Views of History	Are there special roles or historical events with religious influences	deduced
85		HM60004	Special expected History-Related Views	Are certain history related views expected from certain societies	deduced
86	<b>7. Politics</b>	PM70001	General Political System Type	What kind of political system reigns	deduced
87		PM70002	Political Implementation	How is the political system implemented	deduced
88		PM70003	Special Political Positions	Special positions different than expectable	deduced
89		PM70004	Foreign Affairs	Country's relationship to others	deduced
90		PM70005	Political Wildcard	i.e. for certain political tendencies within a country apart of the official politics	deduced
91	<b>8. State of De-</b>	SDM80001	Current Technologies	Current technologies	deduced
92	<b>velopment</b>	SDM80002	Expectable Development	Tendencies in technical development	deduced
93		SDM80003	Duration Time	How long is state of the art active	deduced
94	<b>9. Media Richness</b>	MRM90004	Commonly Used Media Types	Are there already used media types (if others aren't)	[Wils02]
95	<b>10. Financ. Aspects</b>	FAM01001	Country Efforts Supporting Education	What invests a country in: programs, schools, kids education, adult education,...	deduced
96		FAM01002	Financial Power Private Households	Income vs. outcome	deduced
97		FAM01003	Spending Capacity Private Households (Education)	Acceptance to spend private money for education (common amount / year)	deduced
98		FAM01004	Relation Internet Cost / Private Income	Percent internet access costs concerning private income	[Guna05]
99		FAM01005	Gross Natural Product	Value – shows the ability of a country to invest in education	deduced
100		FAM01006	Total Indebtedness	Value – shows the ability of a country to invest in education	deduced
101		FAM01007	Discharge of the Dept	Value – shows the ability of a country to invest in education	deduced
102		FAM01008	Yearly Budget for Education	(From gGovernment) in total	deduced
103		FAM01009	Common Expectable Kids Education Cost	Amount of money a family has to commonly spend for kids education, i.e. in countries where basic education isn't free	deduced
104	<b>11. Human Actors</b>	HAM11001	Ability to stand Critics	Is critic comparable by learners?	HoHo05
105		HAM11002	Relationship to Authorities	Are authorities being out into question or do people blindly obey, Who is authority	HoHo05

106		HAM11003	Expectable Attendance for Volunteer Cooperation	is volunteer work expectable? In which level	HoHo05
107		HAM11004	Expectable Training Level concerning Group Work	Are the learners used group work? In which way	HoHo05
108		HAM11005	Expectable Group-Behavior	Are group members emancipated or is a single group member responsible	HoHo05
109		HAM11006	Expectable Teaching-Goal	What are the targeted teaching goals	HoHo05
101		HAM11007	Need for Written Rules and Clear Duties/Goals	Do the learners prefer unchangeable rules / goals or want to have possibilities to self-control their effort	HoHo05
111		HAM11008	Learning Preferences	Are certain learning styles preferred	HoHo05
112		HAM11009	Language Styles	Shown respect according recipients	HoHo05
113		HAM11010	Expected Tutor Behavior	Which role does the tutor have, assistant or authority	HoHo05
114		HAM11011	Laud for Motivation Needed (How)?	What kind of motivation is expected	HoHo05
115		HAM11012	LMS Style	Shall every courses have the same appearance	HoHo05
116		HAM11013	Level of Necessary Control	How much control is needed and expected	HoHo05
117		HAM11014	Self-Determination	Do learners want to have influence on their course management system and content	TrHa06
118		HAM11015	Time Management	How do learners manage tasks	HaHa90
119		HAM11016	General Pedagogical Philosophies	Are there general cultivated pedagogical philosophies	Hend96
120		HAM11017	General Goal Orientation	Sharply focused, unfocussed	Hend96
121		HAM11018	Experimental Value	Abstract or concrete information preferred at learners side	Hend96
122		HAM11019	Program Flexibility	Learner need clear definitions or can change content	Hend96
123		HAM11020	Personal coaching	Is personal coaching known and expected	Hend96
124		HAM11021	Learner Control	Learners want to be guided or let free	Hend96
125		HAM11022	User Activity	Self creation of content expected or clearly defined program	Hend96
126		HAM11023	Cooperative Learning	Do learners work together to reach aims or do they rather work besides or alone	Hend96
127		HAM11024	Cultural Sensitivity	Is additional help provided because of cultural differences or exists xenophobia	Hend96
128		HAM11025	Expectable Skills	Learner / tutor / Domain Expert	[KiNk05]
129		HAM11026	Conflict Management	Define if tutor can help to avoid conflicts	HoHo05
130		HAM11027	Social Background	Region: learner, tutor	[McLa00]
131		HAM11028	Personal Background / Experiences	Learner (i.e. relationship to Nature, Water, Fire, ...)	[McLa00]

132		HAM11029	Preferred Learning Styles	Learner related – how do learners learn	[Ya+04]
133		HAM11030	Known Assessment Forms	Learner, tutor, Domain Expert	[Liu07]
134		HAM11031	Cultural Background	Learner, tutor	[Liu07]
135		HAM11032	Significant Life Experience	Wars, times of extreme fast development, catastrophes, ...	[MoKe04]
136		HAM11033	Learner Educational Background	Quality / content of classical education career	[MoKe04]
137		HAM11034	Type of Learning Pace	How fast can be learned	[MoKe04]
138		HAM11035	Type of (used) Interaction	Group work, relationship to others and teachers, ...	[MoKe04]
139		HAM11036	Instructional Strategies & Methods	Familiar strategies and methods	[MoKe04]
140		HAM11037	Computer Literacy	Expectable computer literacy sites learners	[Guna05]
128		HAM11038	Preferred Learning Environments	What is known, what is used	[LaZh03]
129		HAM11039	Self Set Educational Goals	Learner – what aim do learners have (i.e. social position, marriage, job, fun, interest)	[MoKe04]
130		HAM11040	Learner Types	Classification of learner types corresponding to	[Oga+06]
131		HAM11041	Common Learning Styles	Not necessarily the same as preferred learning styles	[Oga+06]
132		HAM11042	Learner History	Names of educating institutions (no quality statement)	[MoKe96]
133		HAM11043	Common Knowledge	In special in indigenous cultures: what is the learner supposed to know	deduced
134		HAM11044	Official Curricula	Governmental curricula if existent and available	deduced
135		HAM11045	Way how to give Feedback	Direct feedback or Indirect critic	[Noe+04]
136		HAM11046	Level of Needed Assistance	Learners used to work solo? How much help are they used	deduced
137		HAM11047	Presentation Form	Special presentation form expected (i.e. film, text, tables)	[Kop+02]
138		HAM11048	Experience / Academic Knowledge	Authors / Domain Experts	deduced
139		HAM11049	Special Expertise	Authors Domain Experts	deduced
140		HAM11050	Political Context	Authors, Domain Experts (which they have adapted)	deduced
128		HAM11051	Religion where grown up	Authors, Domain Experts – religious background / experience	deduced
129		HAM11052	Religion practicing	If different to “Religion where grown up”	deduced
130	<b>12. Rules</b>	RM12001	Standards, Specific Agreements	Regional, company, industrial standards -> region, company	deduced

131	<b>13. Companies</b>	CoM13001	Business Model	Company's business model	[DIN04a]
132		CoM13002	Organization Structure	Company's organization structure	[DIN04a]
133		CoM13003	Corporate Design	Company's corporate design	[DIN04a]
134		CoM13004	Company Internal Policy	Company's policy (how, what and why to learn, how to deal with each other, etc.)	[DIN04a]
135		CoM13005	Company Own Contents	Own technical language, own processes, ...	[DIN04a]
136		CoM13006	Learning History	Company internal learning program - duties	[DIN04a]
137		CoM13007	Undefined for Company	-----	[DIN04a]
138	<b>14. Geography</b>	GM14001	Number of Schools /Square meter/Inhabitant	Geographical divide	deduced
139		GM14002	Number of Learners / Region, Class, School	Geographical divide	deduced
140		GM14003	Level of Schools, Universities, Academies	In general and geographical divide	deduced
141		GM14004	Type of Schools, Universities, Academies	In general and geographical divide	deduced
142		GM14005	Available Subjects / Majors	In general and geographical divide	deduced
143		GM14006	Geographical Ground	Hilly, Forest, See, Lakes, Flat ground profile, ...	deduced
144		GM14007	Regional Symbolisms	i.e. Landmarks, etc.	deduced
145		GM14008	Geographical Experiences	Raised in a desert may prevent understanding floods & related problems	deduced
146		GM14009	Multiple Time Zones	Are there multiple time zones? How many, which direction	deduced
147	<b>15. Learner Satisfaction</b>	LSM15001	Learner Satisfaction, Known Demands	Blank field for documented learner wishes and expectations	deduced
148	<b>16. Internet Security</b>	ISM16001	Expected Data Security	Is something used and expected	deduced
149		ISM16002	Encryption Restrictions	Government issue	deduced
150		ISM16003	Transmission Protocol Restrictions	Government issue	deduced
151		ISM16004	Services Restrictions	Government issue	deduced
152		ISM16005	Internal Restrictions	Company issue	deduced
153		ISM16006	Demands concerning Encryption	Company issue	deduced
154		ISM16007	Usable Transmission Protocols	Company issue	deduced
155		ISM16008	Usable Telecommunication Protocols	Company issue	deduced
156		ISM16009	Use of Personalized Data	Company issue	deduced
157		ISM16010	General State of the Art	Region / Country / Company	deduced
158		ISM16011	User Needs For Security	Region / Country / Company	deduced

## Annex B

In the following, a list of dependencies between the determined context-blocks is shown:

Context-Block	Metadata Type	Related to	Also Concerning or Dependent of
<b>Culture</b>	number of different societies	country/region	Demographical Development, Geography
	Communication Style	country, company, learner, author, Domain Experts	Human Actors, Learner Satisfaction, Companies, Rules
	Cultural Specific Idioms	country, company	Religion, Rights, Politics, Rules
	Preferred Media Types	learner (country)	Learner Satisfaction, Human Actors, Companies
	Gender Differences	country, company	Religion, Rights, Politics
	Interaction Protocols	learner, tutor, country, company	Learner Satisfaction, Companies, Technical Infrastructure
	Icons	country, company	Religion, Politics, History, Companies
	General Opinion	country, company	Religion, Politics, Companies
	Indigenous Cultures	country/region	Rights, Politics
	Ability to Self Motivation	learner (country)	Learner Satisfaction, Human Actors
	Culture Related Knowledge	learner, country	Religion, Politics, Companies
	Pedagogical Approach	country/region, company	Companies, Politics
	Regional Common Pedagogical Approach	country/region, company	Companies, Politics
<b>Internet Security</b>	Official Restrictions	country	Technical Infrastructure, Companies, Rules, Rights
	Internal Restrictions	company	Technical Infrastructure, Companies, Rules
	Usable “xxx” Protocols	company	Companies, Technical Infrastructure, Rules
	User Needs for Security	country/region, author, tutor, learner, Domain Experts	Human Actors, Learner Satisfaction, Culture
<b>Learner Satisfaction</b>	Learner Satisfaction, Known Demands	country/region, company, tutor, Domain Experts, learner	Culture, Internet Security, Human Actors, Geography
<b>Geography &amp; edu. Infrastr.</b>	Geographical Ground	country/region	Technical Infrastructure, State of Development
	Geographical Experiences	country, learner, author, tutor	Culture, Religion, Human Actors
<b>Companies</b>	(general)	country	Culture
<b>Rules, Standards, Agreem.</b>	(general)	country, company	Culture, Companies (if applied to a company)
<b>Human Actors</b>	Expectable Skills	learner, tutor, Domain Experts	Culture, Rights, Politics, Geography, Technical Infrastructure, Financial Aspects, State of Development, Learner Satisfaction
	Social, Personal, Cultural Background	region, learner, tutor, Domain Experts	Culture, Rights, Politics, Religion, Geography, Technical Infrastructure, History, Financial Aspects, State of Development, Learner Satisfaction
	Significant Life Experience	learner, tutor, Domain Experts	History, Religion, Technical Development, Geography
	Learner Educational Background	learner	Politics, Rights, Culture
	Type of Interaction	learner	Rights, Culture
<b>Financial Aspects</b>	Country Effort Supporting Education	country, company	Politics
	Yearly Budget for Education	country, company	Politics
	Relation Internet Cost / Private Households	country	Technical Infrastructure
<b>Media Richness</b>	Commonly Used Media Types	country, company	Technical Infrastructure, Financial Aspects, State of Development
<b>State of Development</b>	Current Technologies	country, company	Technical Infrastructure

	Expectable Development	country, company	Politics
<b>Politics</b>	General Political System	country	Culture, Religion, History
	Political Implementation	country	Culture, Religion, History
	Foreign Affairs	country	Religion, History
	Special Political Positions	country	Religion, Culture, History, (Financial Aspects)
<b>History</b>	Religious Motivated Views of History	country	Religion
<b>Rights</b>	Special Laws	country	Culture, Religion, History
	Data Protection Rights	country	Politics, Culture
	Access and Spreading of Content	country	Politics
	Gender Specific Laws	country	Politics, Culture
<b>Techn. Infrastructure</b>	Ownership of a PC, Private Internet Access, Cell Phone, ...	country, learner, tutor, Domain Experts	Human Actors, Financial Aspects, Culture, History, State of Development
	Mobile Technology Infrastructure, Network Coverage Internet / Mobile Technologies		Financial Aspects, State of Development
	Communication Technologies		Rights, Politics
<b>Religion</b>	Common Religious Rules	country	Culture, Human Actors, History
	Main Religion	country, company	Culture, Human Actors, History
<b>Demograph. Development</b>	Ethnic Makeup	country, company	Culture
	Economic Status	country	Technical Infrastructure, State of Development Financial Aspects
	Technological State of the Art	country, company	Technical Infrastructure