ViSiCAST Deliverable D5-2: SiGML Definition
Peer Review

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Author(s):	Ralph Elliott (UEA) John Glauert (UEA) Richard Kennaway (UEA) Kevin Parsons (UEA)

Peer Review Author(s):	Prof. Ipke Wachsmuth, University of Bielefeld, Germany
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Executive Summary:

As Deliverable D5-2, this report provides the definition of a first (1.0) version of a Signing Gesture Markup Language (SiGML) within the Language and Notation workpackage 5 of the ViSiCAST project. SiGML is based on HamNoSys, a well-established transcription system for sign-language. Overall, the deliverable meets the expectations with respect to the content and the status of the work. In particular, it provides an elaborated definition of an XML compliant sign language notation system that is suited for animation purposes and that clearly reflects the state-of-the-art. Some as yet unresolved issues pertaining to the formal transformation from HamNoSys-like gesture markup languages to SiGML and a better comprehensible introduction to the formal structure of SiGML can be expected to be part of future reports.

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Qualifications and Expertise as Peer Reviewer:
I have served as peer reviewer in many instances, in the first place for Deutsche Forschungsgemeinschaft (DFG) with respect to informatics, linguistics, and engineering proposals and work reports. In my Bielefeld AI lab, human-computer interaction and especially gesture input/output is researched widely, and the HamNoSys description language has been used in this since roughly five years. In particular we employ a HamNoSys-based description language with respect to the automatic generation of coverbal gesture for synthetic agents in 3D environments. In this work, which is part of the Collaborative Research Centre "Situated Artificial Communicators" (SFB 360), we face many problems comparable to those of ViSiCAST, so I am quite familiar with the specifics and difficulties of this kind of an endeavor.

X	**I have read the report of the Deliverable.**
X	**I have read the Workpackage Description relating to the Deliverable.**

Rating of the report as a whole:

1	2	3	4	5	Poor = 1, Excellent = 5
			X		Overall quality
				X	Reflecting the state-of-the-art
			X		Meeting the objectives of the Workpackage
				X	Meeting a real need
			X		Contributing to this field
		X			Style and clarity of the report

General Comments on Deliverable:
To summarise, the deliverable meets the expectations with respect to the content and the status of the work. It provides an elaborated definition of an XML compliant sign language notation system that is presumably (since not yet tested) suited for animation purposes.

SiGML is based on HamNoSys, a well-established transcription system for sign-language. HamNoSys is under development since 1987 and it was already used in a number of gesture and sign-language related projects. SiGML departs from the HamNoSys structure where it is necessary to adjust to the needs of skeleton-based animation software. It follows the XML standard for mark-up languages in that its syntax is formally expressed using a document type definition (DTD). Thus, it reflects the state-of-the-art from both a linguistic and technical point of view. The further technical development path of SiGML as indicated in the deliverable is planned to catch up with novel or emerging standards like XML Schema (replacing the DTD), SMIL, and XMT. The function of SiGML in the ViSiCAST project can be described as mediating between a behavioural and a physical/anatomical sign definition for the (semi-) automatic production of sign-language sequences. Both sides have their special - sometimes contrasting - needs as described in the deliverable. The problem is not specific to the ViSiCAST approach; any sign/gesture generation system based on behavioural definitions needs to map its input data onto trajectories and postures. SiGML contributes to the solution of the problem by a detailed definition of such a description language that may possibly be the basis for adoption through the WWW consortium.

The report is written in a close and mostly clear style, though it sometimes lacks precise information as well as exemplifying or illustrating sections. The latter point applies in particular to the SiGML description. The listing of the SiGML-DTD, though annotated, as the sole source of detailed information is not very practical to get an impression of its structure. Future SiGML users and reviewers may need a more comprehensible introduction. A few examples showing HamNoSys notations of complex signs and the corresponding SiGML string could help to achieve this. In addition, a (semi-formal) graphical representation of SiGML, e.g. employing a tree-structure, could be included. Remember that XML is not designed for documentation purposes or to improve readability. Further, it would be beneficial to include some bibliographic references or Web-links about the fundamentals of the most important concepts in the deliverable, like HamNoSys, XML, SMIL, XSLT, etc.

Comments on 1: Introduction

The introduction provides quite a clear structure and content overview of the deliverable. However, the contribution of the work within the processing chain „from written language to sign-language animation“ was not pointed out clearly; it apperared necessary to consult other sources (e.g., D5-1) for clarification. The definition of HamNoSysML (HML) and the formal XSLT-specification of a transformation between HML and Manual SiGML - as indicated in the overview for section 3 - is apparently a very resonable way to test the desired compatibility.

Comments on 2: SiGML Development Framework
No particular comment.

Comments on 3: Manual SiGML 1.0

The definition seems to meet the objective of linking linguistic analysis and animation technology requirements, though this is not clearly evident. On the one hand the derivation from HamNoSys, i.e. the linguistic side, is recognisable with respect to the top-level structure and the leaf elements of the DTD. Thus it can expected that users who are familiar with HamNoSys will not have serious problems with the SiGML structure. The new extensions and features from HamNoSys, Version 4 have been taken into account and can apparently be expressed in SiGML. On the other hand, SiGML also reflects the needs of animation due to the flexibility of the language. A particular example is the definiton of hand configurations which includes both approaches, the joint angle type representation of a hand-shape, and the more abstract definition of hand-shapes using a single sign. The compatibility of HamNoSys, its XML version, and SiGML is an important issue for the success of the transformation from english text to an animation. The development of software tools for the translation from HamNoSys (3) to HML and from HML to SiGML will provide a basis for a compatibility check. Unfortunately the authors do not comment on the structural differences between the HML definition given in appendix D, the revised manual SiGML version from M5-10, and the new version at a more detailed level. This would presumably show the balance of the new definition with respect to the linguistically and the technologically-focused formats. A formal XSLT transformation between HML and the new manual SiGML definition, which seems to be not yet finished, should be included in a future report. According to the current report, a synthetic animation software can generate parts at least of the SiGML descriptions. To illustrate how the processing chain works, or is planned to work, a description of the transformation from SiGML to animation commands/trajectories should then be provided. This will hopefully illustrate the adequacy of SiGML for animation purposes.

A few comments on details of the DTD:

In the current approach, a `posture` may consist of several (i.e., a set of) `hand-configuration`s. This seems to be unnecessary, since all elements can equally well be described in a single `hand-configuration`. Check if this other way is actually needed. To specify a single location with separate hand shapes, as exemplified, seems not evident. The `location_bodyarm` and `location_hand` element may include an optional `location_hand` subelement. According to the comment, this is just for contact/distance specification, but its meaning remains somewhat unclear for now.

Comments on 4: Non Manual SiGML 1.0

The DTD of the non-manual SiGML part implements the structure as described in D5-1 in a rather straightforward way, following the idea of different parallel tiers. The inclusion of optional timing attributes exclusively in the non-manual part should be reconsidered. From a systematic point of view the temporal relations between all the different tiers, including the manual part, would better fit in the top-level definition.

Comments on 5: Top Level SiGML 1.0
A clear concept, no special comment.

Comments on 6: Future Development of SiGML

The proposal of SiGML for adoption through the W3C would benefit from compatibility with existing standards. Insofar it is advisable or it should be at least considered to adopt modules from suited languages like SMIL or XMT. (A side remark: SMIL and SMIL attributes are mentioned in the section several times before SMIL is actually introduced (6.2); this may puzzle readers who are not familiar with the language.) However, the survey of the SMIL and XMT key components is too brief to be understandable without some basic knowledge about the SMIL/XMT approach. The potentially important modules for SiGML (timing and animation) could be explained in more detail, i.e. it should be characterised what these modules provide. Otherwise their usefulness for particular tasks remains unclear. Possible ways to incorporate SMIL/XMT modules into SiGML should be pointed out a bit more concretely, even when the section just sketches future developments of SiGML. For instance, a notation example in which SiGML code is enriched with SMIL elements or attributes could to clarify the conception help at this point. Although the adoption of SMIL/XMT modules can be advocated in general, a complete replacement of the HamNoSys-based structuring in favour of a SMIL timing model as one option for further development seems to be misleading. It could surely help to „integrate signing with other activities“, but there is no apparent need to do this on the level of sign elements.

The development path sketched for SiGML provides two important aspects, validation of expressive power, and an extension towards multimedia presentations. Since the representation of signing is the main focus of SiGML, its validation through animation to reveal any shortcomings of SiGML or even HamNoSys should be given precedence over an integration with SMIL/XMT.

Comments on Contribution to objectives of Workpackage and ViSiCAST project:

The main objective of WP5.2, the XML-compliant definition of a gesture markup language (which is confined to a sign-language markup language, SiGML, for comprehensible reasons) was largely fulfilled. SiGML apparently accomplishes the objective of linking linguistic analysis and animation technology. However, the final “proof” remains open until the animation tool is able to render an SiGML sequence that was automatically constructed from a HamNoSys description – but this work was not in the scope of the current deliverable. With SiGML, the ViSiCAST project gets an essential chain-link for the animation production process.

Signed: *Ipke Wachsmuth*	**Date:** *21 September, 2001*