Special Interest Group Object Technologies (SIGOBT)
Health-Level Seven

From:	Daniel Trainor (Co-Chair SIGOBT)	Date:	19 Jan 1998
To:	CORBAmed Technology Desk Object Management Group 492 Old Connecticut Path Framingham, MA 01701-4658 USA	Subject:	SIGOBT Response to CORBAmed RFI 4- OMG Document # corbamed/97-09-15
Cc:			

The HL7 Special Interest Group for Object Brokered Technologies (SIGOBT) is pleased to submit the following information in response to the CORBAmed RFI - OMG Document # corbamed/97-09-15.

The attached response provides information in the areas of :

- Mappings which have been used to implement CORBA based HL7 solutions (could be in the form of IDL with textual explanation).
- Any object model examples which make use of the HL7 2.X specification or V3 model.
- Performance experiences in using CORBA based HL7 implementations (what has worked well, what has not?).
- Other information which responders to this RFI believe might be useful to CORBAmed.

Please send information regarding this RFI and subsequent information regarding forthcoming RFPs to :

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Regards,
Daniel Trainor

On January 12, 1998 the HL7 SIGOBT meeting attendees agreed unanimously that a response to the CORBAmed RFI4 should be drafted and submitted and to accept this submission as written by Dan Trainor as a reply to the CORBAmed RFI on HL7.

The HL7 Special Interest Group for Object Brokered Technologies (SIGOBT) is currently investigating the use of object brokered (or distributed component) technologies within the scope of the HL7 2.X messaging standard. The work is targeting both CORBA ORB-based and ActiveX COM technologies.

Further information about HL7 SIGOBT can be found on the Web at URL:

http://www.mcis.duke.edu/standards/HL7/sigs/SIGOBT/obt.html

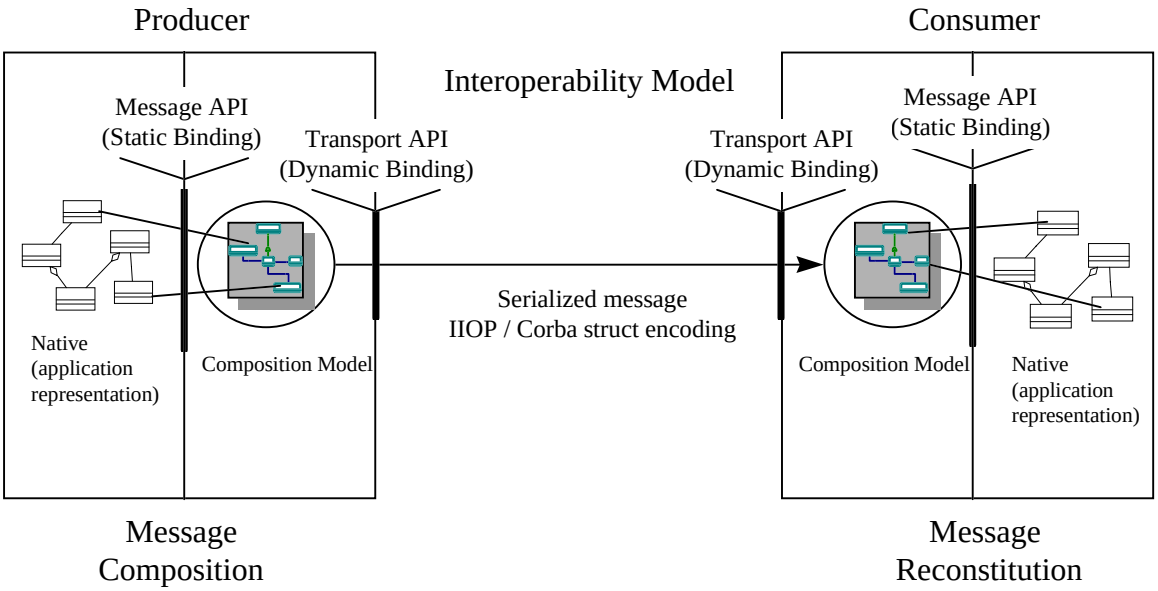
The first work product of SIGOBT is a document that describes a set of recommendations. The document is Titled:

Recommendations for HL7 Messaging over Component Technologies
Version 1.0
Revision 9
January 12 , 1997

The SIGOBT recommendations primarily fall into two areas:

1) **Application Interface Model**
   The document provides a set of recommendations for mapping of HL7 2.X abstract message definitions to object-oriented interfaces specifications for use at the application programming level. The mapping rules are formalized such that these API specifications can be derived in a standard (portable) way. SIGOBT does not address implementation mappings of these specifications.

2) **Interoperability Model**
   The document also provides recommendations for transporting HL7 messages over the network as whole atomic units of transfer, rather than manipulating the finer-grained message components (segment, data fields) over the network. See sections 2.2 *Producer/Consumer Model* and 2.9 *Interoperability Model*. The document does not fully elaborate the specific use of CORBA Object Request Broker (ORB) technology (or any other technology) as a means to implement inter-operability between HL7 applications. That work is planned for version 2.0 of the document. The version 2.0 SIGOBT interoperability model shall be elaborated with the definition of a dynamic (transport) meta-model for HL7 messages and OMG IDL interface definitions to facilitate the transport of HL7 messages between applications. More specifically, this work shall include (but not limited to) connection/disconnection interfaces, send/receive interfaces as well as a serialization representation using an IDL struct-based encoding to facilitate the transport of HL7 messages using IIOP.



Mappings which have been used to implement CORBA based HL7 solutions (could be in the form of IDL with textual explanation).
The SIGOBT document recommends the rules for mapping HL7 v2.X message structures to object-oriented interfaces at the application programming level. More specifically, the mapping rules enforce the structural constraints of HL7 abstract message specifications as well as establish standard naming conventions for application level interfaces. Although OMG IDL is used as a specification language, the implementation is not limited to any particular interface technology or language binding. In particular, the use of OMG IDL as a general specification language here does not necessarily imply the use of CORBA ORB-based implementations.

This approach is motivated by the fact that HL7 messages are inherently complex information structures, and many of the rules that govern application programs that operate on them are not clear upon casual inspection. This has been traditionally the source of bugs and protracted testing times. The SIGOBT mapping approach greatly simplifies message composition by providing a OO specification for manipulating HL7 messages and in a way that enforces HL7 2.x abstract message definitions.

Our use of OMG IDL as a general specification language for describing HL7 message structures was beneficial in terms of specifying application program interfaces (APIs) to HL7 message structures in a way that is independent of the technology used to implement the specification. More specifically, it is independent of the language binding, underlying technology and object location. Through the use of an abstract specification language, a wide variety of implementation approaches are possible.

Any object model examples which make use of the HL7 2.X specification or V3 model.

See section 2.31 *HL7 - Analysis Meta-Model* and section 2.3.2 *Interface Mapping - Design Meta-Model* in the SIGOBT document. These models formalize the HL7 2.X message structure.

Performance experiences in using CORBA based HL7 implementations (what has worked well, what has not?).
The development of the SIGOBT recommendation included a number of prototypes and demonstration projects. Some of the earliest prototypes used a CORBA ORB-based implementation of the API specification that enabled accessing fine-grained message objects (segments and data fields) across the network. As expected, this experience found that this specific use of CORBA ORB-technology yielded data interchange implementations which had relatively poor run-time performance characteristics when compared to the traditional HL7 Producer/Consumer model. In the HL7 Producer/Consumer model, an entire message and all its components is transmitted in a single network interaction.

Subsequent experience with the SIGOBT mapping specification has shown the advantages of the object-oriented approach can be fully achieved without any significant performance penalty through the use of local "in-process" message composition using the static binding defined by the SIGOBT mapping rules. Access to the finer-grained components occur locally within the application process space without network or inter-process overhead. Using this approach, messages are serialized and transmitted as whole atomic units using the traditional HL7 ASCII-based encoding and/or CORBA struct-based encoding. This approach combines the efficiency of transmitting the message as a single unit with the benefits of the object-oriented API.

Other information which responders to this RFI believe might be useful to CORBAmed.

Additional Information on HL7 SIGOBT can be obtained from :

http://www.mcis.duke.edu/standards/HL7/sigs/SIGOBT/obt.html

Summary
Implementation experience of the SIGOBT specification has demonstrated that basing the interoperability model on the message as the atomic unit of transfer has significant advantages in terms of performance and adaptability. This is consistent with the HL7 Producer/Consumer model that specifies an interoperability model based on the message as the atomic unit of transfer. It has been incorporated as a key recommendation of the SIGOBT document and the basis for the interoperability model in section 2.9 of the document that shall be specified in SIGOBT version 2.0

We recommend the use of CORBA ORB-based technology as an implementation of SIGOBT interoperability model in terms of marshaling messages (as atomic units) over the network. It leverages the capabilities of CORBA IIOP and provides an acceptable performance profile.