



# GELLO v.2 Ballot Preface

(Guideline Expression Language)

HL7 Project # 229  
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“Informative” Ballot

Technical Lead: Robert Dunlop, MD; Clinical Director, InferMed UK  
Project Facilitator: Barbara McKinnon, Principal Consultant, McKinnon Associates  
Project Sponsor: HL7 Clinical Decision Support Work Group

## 1. Executive Summary

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*Automated evidence-based clinical guidelines support quality care pathways, improved patient safety, and more effective utilization of resources.*

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HL7 GELLO is a guideline expression language that was originally passed as both an HL7 and ANSI standard in 2005 with the goal of working in conjunction with clinical guideline ontologies to access patient data through HL7 v.3 RIM compatible class models. GELLO also incorporated aspects of the OMG-Object Constraint Language (OCL) v.2 to increase its extensibility in being implemented across a broad range of applications, institutions, and locations.

The added value GELLO brings to clinical decision support, and the healthcare industry, is the potential of delivering unambiguous executable code that is platform-independent, vendor and implementation free, and can be translated into other languages, such as SQL and Java.

Since its original release, GELLO has undergone extensive analysis following efforts to develop (a) authoring and compiler tools (b) HEDIS and European Union business use cases, and (c) clinical implementations. The HL7 GELLO Syntax Re-Ballot work group has held bi-monthly teleconferences since 2007 and continuously worked to identify key issues to address within the next version of GELLO.

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In this “Informative” ballot, an updated GELLO v.2 approach will be proposed that presents GELLO as a proper subset of OMG-OCL and outlines the changes required to both specifications to support this alignment.

**Note:**

Under Item 2b of this ballot, OMG-OCL v.2.1 updates are outlined.

Under Item 2c of this ballot, HL7 GELLO v.2 updates are outlined.

## 2. Key Issues

### a) Value of Using OCL with GELLO:

- Maintains alignment with the Object Management Group (OMG) standards organization that is responsible for the development of both UML and OCL.
- Increases the capability and implementation options for applications to support the language.
- Enables engineers with existing skills in OCL to apply those skills to the use of GELLO which will in turn extend the number of individuals and organizations that can utilize the language.
- Allows the use of GELLO in HL7 RIM models to be supported by existing UML based tools without modification.

### b) OMG-OCL v.2.1 Updates:

In the process of developing authoring and compiler tools, and encoding complex population-based business use cases, it became apparent that the OCL v.2 BNF contained inconsistencies and ambiguities that would have to be resolved in order to support standard compiler tools. HL7 communicated these issues to OMG. The relevant OMG group is updating OCL v.2 to v.2.1. This will include corrections to the BNF. OCL v.2.1 will be available early in 2009. It will provide the basis for the new GELLO v.2 BNF.

In addition, the HL7 GELLO Project team has submitted additional GELLO-specific information on behalf of the HL7 Clinical Decision Support (CDS) work group for inclusion in OCL v2.1. This includes the list and specifications of GELLO collection operators, which will be added to the current list of OCL collection operators. This will enable OCL v2.1 compliant compilers to process GELLO expressions.

During the extensive analysis, another problem was identified with OCL that has been brought to the attention of OMG. OCL can create an instance of a simple datatype and initialize it. Complex datatypes, which are common in the HL7 datatypes class model, cannot be assigned values. GELLO uses the *'factory'* method to deliver this functionality, but this is not consistent with OCL. The HL7 GELLO Project team has submitted a request for this functionality to be implemented within OCL v2.1.

### c) GELLO v.2 Updates:

Along with the changes that will be incorporated into OCL v2.1 in support of GELLO, there are some issues that must be addressed within GELLO:

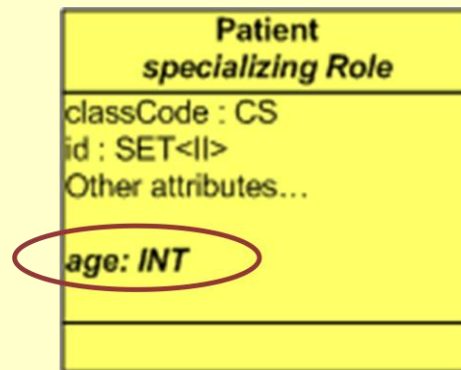
- *'let'* variable assignments will change. GELLO uses *'let'* to create variables that persist throughout the same context of multiple GELLO expressions. In OCL, *'let'* is used to create temporary variables that can repeat complex sub-expressions within an expression. The values assigned to these variables do not persist.

- The *'def'* method will be used, as per OCL, to create persistent 'variables'. *'def'* creates attributes or operations within classes that are defined in the UML model. For example, to create a patient's derived age, then *'def'* would be used to create a new attribute:

*context Patient*

*def: age: Integer = 43*

A 'variable' that is created in this way will persist. It is the equivalent of creating a new attribute within the Patient class:



The GELLO Project team recommends that the GELLO Implementation Technology Specification should explicitly state that attributes or query operations defined with *'def'* in GELLO expressions do not represent a substantive change to HL7 Class Models, but only persist as long as the GELLO expression/s are processed. In the example of *'age'* illustrated above, the attribute would be re-created and re-initialized every time the expression is executed.

*NB: 'age' would normally be calculated as the difference between Person.birthTime and the current PointInTime.*

- OCL, and therefore GELLO v2, expressions require the base class model to be specified. This is done using the *'package'* and *'endpackage'* keywords, which enclose a set of GELLO expressions based on the same class model. In UML, a package is analogous to a file directory and contains all elements of a related class model. The HL7 v3 RIM is equivalent to a package, as is any R-MIM. The latter can be referenced by the unique name assigned to the R-MIM. The RIM should be referenced by a package name such as *'HL7v3RIM'* or *'HL7\_v3\_RIM'*. GELLO expressions will be easier to author if RIM or R-MIM packages contain the HL7 Datatypes Class Model as well. This will avoid the need to reference HL7 Datatypes with namespaces.

#### d) GELLO/Virtual Medical Record/Guideline Representation Language

GELLO expressions will enable constraints or queries to be applied to any named HL7 Class Model. For clinical decision support (CDS) purposes, a parallel project is underway to define the R-MIM for a Virtual Medical Record (vMR). The vMR defines how a patient's clinical data can be submitted to a CDS service, and how the outputs of the service will be returned to the user. Together, GELLO and the vMR will form a set of HL7 products that can facilitate the development and uptake of CDS services.

By defining how CDS inputs and outputs will be represented in the HL7 v3 standard, the vMR can provide the basis for the development of an HL7 Guideline Representation Language (GRL). The vMR will not be sufficient but will provide an excellent starting point. GELLO will provide the GRL with the expression language, for example to define pre-conditions on guideline tasks.

### 3. Ballot Goals:

This ballot is seeking input on:

- a) Its proposed approach.
- b) Updates being applied to OMG-OCL v.2.1.
- c) Updates being applied to HL7 GELLO v.2.
- d) Other HL7 or external projects that should be coordinated with this project.

### 4. Pilot Tests:

During 2009, the HL7 GELLO v.2 will be tested in conjunction with the HL7 Virtual Medical Record (vMR) that was initially balloted in September 2008 ballot.

One pilot opportunity has been confirmed. This will involve the use of GELLO expressions to query distributed clinical databases on behalf of an individual patient. The patient's data will be collated from different medical records, and then returned to the requesting service. This pilot is part of the EC-funded @neurIST Project (<http://www.aneurist.org>).

### 5. Future Plans:

#### DSTU Ballot:

Following the 2009 pilot tests, comments from this ballot, and additional analysis of a broader range of business use cases, a DSTU and Implementation Guide ballot will be submitted for ballot.

- Business use cases already targeted for additional analysis include the use of GELLO with Arden Syntax, Clinical Research, and Pharmacovigilance.

## Attachments Included within Ballot:

- a) HEDIS - Hypertension Business Use Case (GELLO v.2 - Jan 09 - HEDIS BUC).
- b) GELLO OCL Primer - a primer designed to illustrate the key OCL functions that will be used within GELLO v.2 (GELLO v.2 - Jan 09 - GELLO OCL Primer).