HL7 Infobutton API Proposal

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1. Introduction

1.1 Proposal Background

Infobutton is a point-of-care information retrieval application that automatically generates and sends queries to digital libraries using patient data extracted from the electronic medical record. Cimino proposed the concept of an Infobutton Manager as a software component that supports the implementation of Infobuttons in an institution and application independent fashion[1]. In a nutshell, the Infobutton Manager is called by a Clinical Information System, receiving a set of query parameters, and then generates a URL (following the syntax of the target content source) that is used to run a query on the target content sources. Currently, though, there are two major problems that preclude an Infobutton Manager from being a completely independent component (Figure 1):

- Currently, there are several content sources available in the market providing an API that allows Infobutton searches to be performed. On the other hand, each of these APIs has its own proprietary syntax and vocabularies, requiring the development of additional pieces of software for each content source that is to be made available to an Infobutton.
- On the other side, several clinical information systems in the same institution may implement calls to an Infobutton Manager (e.g., Order Entry, Medical Record, Nurse charting application, Lab Results). Since many of these applications are provided by vendors, additional software would be necessary for each Infobutton Manager that the vendor would like to link to.

The focus of this proposal is to address the two problems above by developing a standard for (Figure 2):

- Search APIs to be implemented by content sources.
- Infobutton APIs to be implemented by Infobutton managers and called by Clinical Information Systems

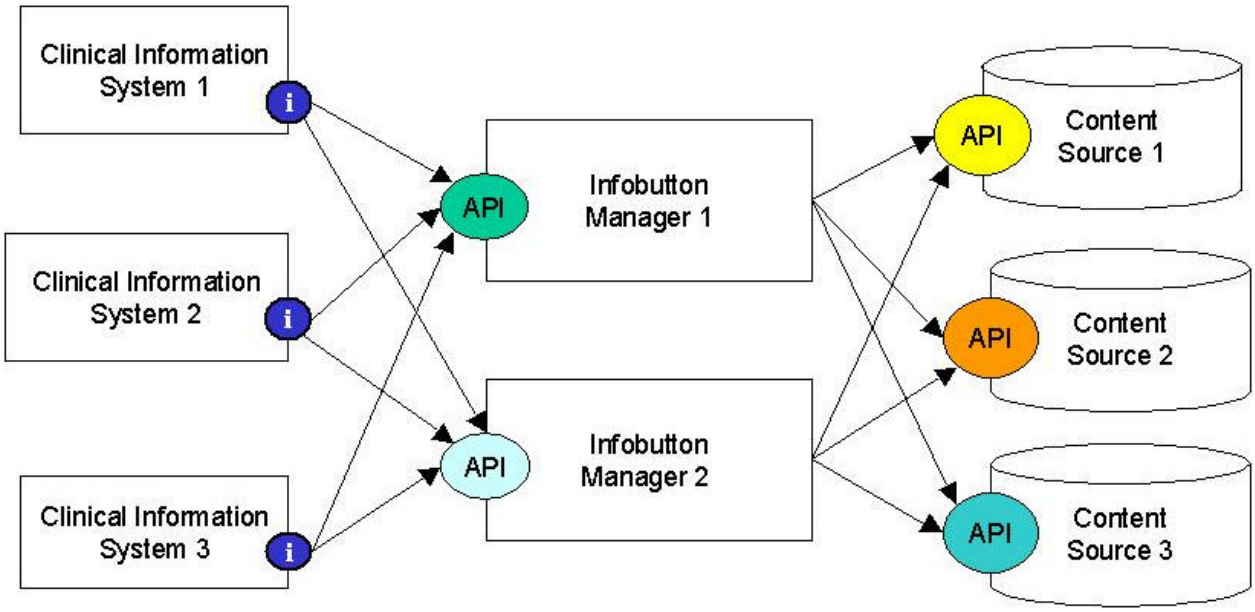

Figure 1 - Current problem: multiple Clinical Information Systems, multiple Infobutton managers, and multiple content sources.

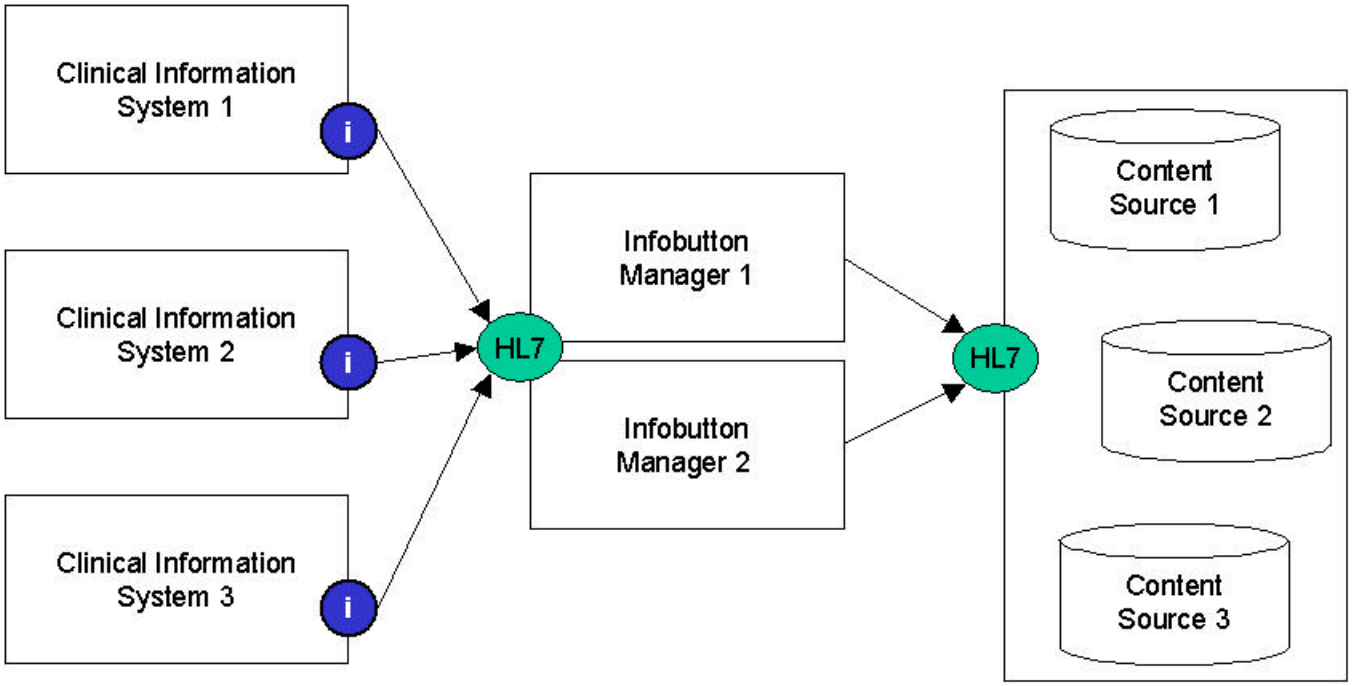

Figure 2 - Proposed standard

1.2 Scenarios

Scenario 1 (steps in bold are the ones where the proposal applies)

- A clinical information system (CIS) presents patient data to the user (a medication, for example) with an Infobutton linked to it
- **The user clicks on the Infobutton. The CIS calls an Infobutton Manager API passing the medication, patient age, and gender, as well as a username, password, and user institution to authenticate the user against the Infobutton Manager**
- The Infobutton Manager creates a query that can be refined with and/or without user intervention (specific to each Infobutton Manager implementation, not within the scope of this proposal):
  - Builds and presents a list of appropriate questions to the user using the context that was passed by the CIS
  - Presents a list of all clinical concepts that were passed from the CIS, allowing the user to further refine the query concepts (add / remove concepts)
  - Ranks the available content sources according to the likelihood that each of the sources will have an answer for the question
  - Explodes clinical concepts
  - Gets a valid user name and password for each of the knowledge sources that are available
- **After the user has made his/her selections, the Infobutton Manager builds HTTP requests for each of the knowledge sources. All requests are HL7-based, but the parameter values may differ from source to source (e.g., different usernames and passwords, different indexing method)**

- The user clicks on the hyperlink to one of the available content sources. The user is taken to the content source web site, the query is run and the results are displayed.

Scenario 2 (steps in bold are the ones where the proposal applies)

- A clinical information system (CIS) presents to the user a link to a page that contains a list of content sources that are available within the user's institution
- **The user clicks on that link. The CIS passes to the Infobutton Manager API: user name / password (authenticates against the Infobutton Manager), user role, and institution**
- **The Infobutton Manager dynamically builds the list of available sources that are applicable to the user's role and institution and presents it as a set of hyperlinks to the user.**
- The user clicks on one of the hyperlinks and is taken directly to the content source search page (automatically authenticated). The user navigates and builds searches using the content source UI.

1.3 Requirements/Scope Summary

The main requirements of this proposal are:

1) The standard should be based on HTTP requests (post and get methods).
2) The request should include data required for authentication within the Infobutton Manager and Content Sources
3) Enable queries with different levels of sophistication (e.g., from non-structured free-text searches to structured, coded, context enabled searches)
4) Include context information. The following context dimensions should be part of the standard: age, gender, user role, and clinical conditions.
5) Additional search qualifiers (e.g., treatment, diagnosis, complications, prognosis)
6) Additional search filters (e.g., patient vs provider content)

2. Draft proposal

2.1 HTTP request parameters

The following parameters should be passed in the HTTP request from a Clinical Information System to an Infobutton Manager and from an Infobutton Manager to a Content Source.

Parameter	**Data type**	**Required**	**Repeat**	**Vocabulary domain**
username	String	Yes	No	N/A
password	String	Yes	No	N/A
patientAge (in days)	Int	No	No	N/A
patientGender	String	No	No	Male, Female

Parameter	Data type	Required	Repeat	Vocabulary domain
searchConcept^searchString^terminology (if terminology is blank = free-text search)	String	No	Yes	Problems = MeSH, ICD-9CM Meds = NDC Lab tests = LOINC
UserRole	String	No	No	Physician, Patient, Nurse and other clinicians
Institution	String	No	No	N/A
ContentDimension	String	No	No	Problems, Meds, Lab tests
ContentTarget	String	Yes	No	Patient, provider
Question	String	No	No	PubMed query modifiers

2.2 Examples

a) Authenticates user and runs a search for D018410 (MeSH), on the problems section of the knowledge source, and with focus on provider content (the fragment in bold is part of the standard, the fragment in normal font is fixed and specific to the knowledge source).

http://www.knowledgesourcewebsite.com/search.cgi?**username=userID&password=pass&contentDimension=problems&searchConcept=D018410&SearchString=Bacterial Pneumonia&terminology=MeSH&contentTarget=provider**

a) Authenticates user and runs a free-text search for “azythromycin” and “bacterial pneumonia”, for a patient with 75 years old, and with focus on provider content.

http://www.knowledgesourcewebsite.com/search.cgi?**username=userID&password=pass&patientAge= 27375 &contentDimension=treatment&searchString=azythromycin&searchString=Community acquired pneumonia&contentTarget=provider**

3. References

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