

Question/Answer Transaction Protocol Overview

First Committee Working Draft NISO Committee AZ: September 22, 2003

NISO Committee AZ is developing a Question/Answer Transaction (QAT) Protocol to support exchange between Digital Reference systems collaborating in the processing of a question. It is one of a set of committee documents related to the development of the protocol:

- Overview (*this document*)
- Functional Model
- Use Cases
- Protocol Specification
- Implementer Guidelines and Recommended Practices

This document describes the goals, audiences, and anticipated uses and benefits for these various audiences.

NISO Committee AZ requests review and comments from interested parties. Please send comments by November 7 to penkaj@oclc.org.

1. Introduction

This document provides an overview of the environment, processes, core concepts, and audiences that might be addressed by or affected by this standard. In addition, a set of usage scenarios has been provided to offer practical examples of when and how the standard might work. Finally, the document concludes with a list of related standards that might interact with this standard or be used in the delivery of services using this standard. The charge from NISO for the Networked Reference Services committee established the scope and deliverables for the committee's work.

The Committee Charge

Digital reference services constitute a new but rapidly growing extension of the traditional reference service offered to library patrons. While the service may be delivered via real-time chat or asynchronous e-mail, the essential characteristic of the service is the ability of the patron to submit questions and to receive answers via electronic means. There is a growing interest in evolving localized network reference services into more fully interconnected, collaborative reference services.

The Committee is tasked to

- Develop a question processing transaction protocol for interchange of messages between digital reference domains. This will support processing and routing of questions and responses and packaging of other information to be exchanged.
- Develop metadata element sets to identify and describe key components of both question and answer data and institutional and personal data. These include:
 - Question/answer metadata
 - Profiling metadata (of institutions and people)
- Conduct experimentation and/or research in both areas to test the proposed standard.

2. The Environment

There are a wide variety of services built around receiving questions from individuals and providing answers. The exact approach and philosophy of these services in the handling of these queries vary based on the associated industry or domain and the mission of the institution. The process of handling the queries can be modeled in a manner independent of domain, approach, or mission. Examples of these types of services include:

- Library Reference Services
- Ask-a Services or Subject Expert Services

- Brokering Services (locate an expert services)
- Help Desks
- Tutoring Services

In an increasingly networked world, the missions of each of these types of services may remain unique; however, as these systems begin to work together to better serve the needs of a shared audience, they need to define a generalized or standard method of sharing information and communicating with one another. In communicating with one another, services must continue the ability for these services to interact with one another while maintaining the unique nature of their services and domains.

3. The Process

The reference process has been frequently described as an art more than a science, reflecting the complex nature of the interactions and discovery processes. When services collaborate in any fashion, maintaining the context of the interactions can become critical in meeting the questioner's needs in an efficient fashion.

At the most basic level, the standard defines a method and structure for data exchange back and forth between two systems. The ability to share rich data and request specific processing of an interaction through this metadata and protocol messaging, meets both the need of context and efficiency in collaborative question processing.

4. Core Concepts

For the purposes of this document and the standard, the end user or questioner remains outside the standard. The standard describes how various services or agents working within a domain can cooperatively work to answer the user's question. This can be thought of as a black-box to black-box exchange of data. The processing of the data received by the services may be automated by computer systems or manually facilitated.

As covered in the charge, the standard consist of two important and separable areas: metadata and protocol. The metadata serves two purposes. First, it provides a common method for describing and sharing reference interactions and any associated descriptions like constraints, preferences, and actors. Second, the metadata carries necessary protocol data items to allow for easier processing by system receiving the communications and messages. The protocol defines the rules of exchange between systems and models the interactions in a manner allowing for easier automation and exchange between systems. See section **6. Scenarios of Use** for examples of how the standard, the metadata, and the protocol might work in real scenarios of use.

In developing the standard, the committee has focused on providing an extensible and flexible standard, to offer necessary richness in terms of data and flexibility for unanticipated uses and needs encountered by the cooperative services in the implementation of the standards.

5. Audiences

A variety of audiences are interested in the development of this standard for a variety of reasons. This section provides a definition of each of these audiences and offers a look at their point of view as they look at this standard will have on the work they do or services they provide. This analysis is based on four types of audiences (in order of focus and likely interest):

1. Developers of digital reference and help services or software (systems developers)
2. Services that want to incorporate digital reference services into existing systems (Web Portals, E-Learning systems, or ILS systems)
3. Groups assessing, acquiring, and specifying digital reference systems (Purchasing agencies – government, library, corporate and Funding or grant organizations)
4. Information Providers and End Users (Librarians)
5. Standards and Protocol Developers

5.1 Developers of digital reference and help services or software

5.1.1 Who is the audience?

This audience includes:

- Vendors of systems and services supporting reference service providers and their workflow.
- Broker and cooperative services building systems to connect these providers.
- Developers building software that supports key areas of the reference service process.

Some of these audiences build systems for others to then implement while others run services that support both the reference function and actively participate in the process of cooperation.

5.1.2 Why should they care about this standard?

The providers of reference services have a wide variety of software and services available to support their requirements in meeting their users' needs. Developers of the software and services must understand how their users want to work with the supporting software and service. Increasingly, reference services are collaborating with one another and want the ability to work with others that might be using different software and services. This kind of interoperability between proprietary systems can only occur with significant investment of time and money on the part of the developing organizations. The primary concern comes in the fact that this investment in a series of unique, isolated, and non-interoperable solutions must be made and maintained for each service relationship and becomes financially infeasible over time to maintain.

This standard defines a common abstraction for the data these services may want to provide, along with a series of available actions and workflow models for the primary activities these reference services may engage in when cooperating with one another. By implementing the metadata and protocol layers for exchange between services development organizations can simply present data in an agreed upon standard fashion rather than maintaining a series of financially and developmentally unsustainable solutions.

5.1.3 What will they be able to do with it?

The primary focus of the standard for this audience is the ability for their systems to send and receive data in a standard format following a standard set of protocols.

This allows, what is in effect, a new dimension of reference resource sharing. The standard extends the reach of the local reference service by allowing it to assist and to be assisted by other standard-based reference service providers or agencies. Taking advantage of standards-based interoperability extends the capability, access to resources, service offering options, and ease of connectedness of the people providing the reference services to the end users. Recognition and branding is obtained within the user community for the value libraries and other information agencies have. Extending the reach shows the user community that the reference service provider can deliver valuable services, regardless of the information need.

With an agreed upon method for representing metadata and domain specific information, additional capabilities may include:

- Building knowledge bases and tools for assessment and research using standardized data structures for easier import and export of transaction data between systems.
- Providing value added services including question histories or routing/referral services. For example, one reference service could send a request, including metadata about preferences on how the interaction should be handled (constraints), to a broker service. On receiving the request and constraints, the broker service then uses proprietary resources to locate an appropriate third party to handle the question. They then forward the interaction to the appropriate party using the standard.

5.2 Services that want to incorporate digital reference services into existing systems

5.2.1 Who is the audience?

This audience includes services that don't directly provide digital reference services, but they would like to access or provide reference service capability within their software or service. Examples of types of these services might include:

- An Integrated Library Service system that may want to include an "Ask-a Librarian" link on each page

- A web portal or service provider that wants to connect users with experts or support specialists at the point of need
- An e-learning course that may want the ability to forward a question sent to an instructor to another system for additional assistance
- A database provider that wants to connect users with someone who could provide assistance in locating resources within database or instruct the user on how to get the most out of the resource

5.2.2 Why should they care about this standard?

Though these services may not want to provide reference services to end users, the ability to send useful and meaningful messages to other systems will be significantly enhanced by the use of standards based protocol and metadata structures and practices. Similar to other integration efforts based on standards, this requires the service provider to focus on understanding the user, their needs and their working environment, which likely requires that their systems be able to interact with one another. Thus they can provide a more robust solution to their end users and a directive to other systems about their availability for exchanges of this type.

5.2.3 What will they be able to do with it?

The ability to take context from a given system and automatically include it into a help or service request will enhance the serviceability of the end user and help increase efficiency. For example, a user in an e-learning system has the ability to send a question to an expert service or their library. Through the standard, the e-learning system may also include other information that the user doesn't need to manually enter, like class, student number, time of day, language, etc. All very necessary data, but easily handled by the system rather than through manual entry by a user.

5.3 Groups assessing, acquiring, and specifying digital reference systems

5.3.1 Who is the audience?

This audience includes groups, institutions, libraries, and individuals evaluating reference systems for purchase.

5.3.2 Why should they care about this standard?

Based on the current networked environment and the trends towards increased integration of system and cooperation between services, when evaluating a reference service the role of this standard becomes critical. Systems that don't incorporate this kind of functionality are limited from the start in their ability to interact with other systems efficiently and consistently. This will put the purchasing agent in a position where the system being assessed will likely require manual intervention, at a minimum, on the part of those staffing the service when interacting with others or, more significantly, they may not be able to work with other cooperative systems at all.

5.3.3 What will they be able to do with it?

They will be able to specify this standard as a measure of system or service's cooperative capability and functional assessment when evaluating systems for purchase or issuing RFPs.

5.4 Information Providers and End Users

5.4.1 Who is the audience?

This audience includes:

- Individuals asking for assistance from the reference service providers.
- Those providing the reference services.
- Database Providers

5.4.2 Why should they care about this standard?

While they may not see the standard elements in their raw form both of these groups of individuals will see the standard in action.

For those asking questions, they should see an increase in the abilities and services provided by those services they use when asking questions and easier tools for interacting with the reference provider.

For those providing the reference services, a standardized approach to metadata and protocol interactions allows them to focus on the end users needs services they are delivering rather than systems and processes. They will likely have software interfaces making much of the metadata and protocol elements presentable in a relevant fashion. The benefit of the standard for this group is a broadening of the cooperative communities they can interact with and the potential for richer interaction quality based on the available data. By using standard compliant systems, these reference services will be assured that the underlying framework exists to handle their needs in areas like:

- Constraints on the types of services they offer
- Preferences on question handling and disposition
- Transaction requirements like fee management or load balancing

For database providers, understanding the standard and the associated references processes:

- Allows them to build resources in such a way that their services and data can be incorporated into the reference exchanges and interactions. This connection provides another connection forum for the database provider to reach new audiences and enhance fulfillment options for the reference services and their users.
- Opens new database building opportunities based around actual end-user reference interactions and needs. Either by creating knowledge base built on these previous interactions or enhancing their existing database records with value added information connecting database records based on relationships defined by questions from end-users.

5.4.3 What will they be able to do with it?

Those asking questions will likely be able to:

- Ask questions in more areas (web sites, catalogs, courses, etc.) and allow the systems to provide more contexts for the responding service.
- Receive quality and timely data based on the backend-automated processes implemented using the available elements of the standard.

Those answering questions will be able to:

- Provide services more broadly with a more consistent set of information to begin the answering process.
- Cooperate with others in a more meaningful manner by sending questions and context quickly to the most appropriate sites, thus extending their local access to resources on behalf of the question asking users.

Those building and providing databases will be able to:

- Enhance their existing database offerings by better understanding the context of their use.
- Incorporate their databases with the actual reference workflow and possible fulfillment options.

5.5 Standards and Protocol Developers

5.5.1 Who is the audience?

This audience includes those that are currently designing or have designed standards and protocols.

5.5.2 Why should they care about this standard?

Those that develop or have developed other standards can provide unique perspectives on the opportunities for interoperability between the Question/Answer Transaction (QAT) Protocol and other standards to maximize the impact standards-based work can have on helping service providers meet their users' needs.

5.5.3 What will they be able to do with it?

The Question/Answer Transaction (QAT) Protocol will work to leverage existing work from other standards and define the boundaries of standards definition to maximize interoperability opportunities with other standards. Additionally, existing standards or those in development may also have opportunities to interact with QAT or build on the work done by the QAT group rather than duplicating work

6. Scenarios of Use

The following four scenarios provide practical examples of when, where, and how the standard might incorporate into current reference workflows. The four areas covered by the scenarios include:

- Referral Service
- Brokering, Queuing, or Routing Service
- Two-way Interaction
- Knowledge Base

6.1 Referral Service

In the Referral Service model, a general reference service may encounter a user interaction where they need more specialized services. For example, a librarian might encounter a situation where the user is really asking for homework help and a tutor would be more appropriate to handle the interaction or a general help desk agent may determine that the user should speak to a more detailed technical support agent.

In both of these examples, the specialized service wants access to the original interaction for context and efficiency purposes. Likewise, after the specialized service concludes the session with the end user, the original service may want access to interaction for assessment or follow up.

The QAT protocol can facilitate the referral of the original interaction to the other service and the sharing of historical data like completed or previous interactions between services.

6.2 Brokering, Queuing, or Routing Service

With a brokering, queuing, or routing service, a user submits a question/service request along with some specific criteria (e.g. subject area, education level, language, etc.) to a service that then takes the question and based a pool of experts, institutions, or alternative services matches the question with an appropriate responder. The broker wants confirmation that the request was received by the targeted responder and minimally, they want a record that the end user received an answer of some sort. Otherwise, the broker is simply about connecting questioners and responders. They don't want to play a part in the middle.

The QAT protocol can be used by the referral to bundle up the request and send in a standardized format to the individuals in the pool of available participants. By using a standardized protocol, the referral agency can simply require that the receiving participants understand how to handle and respond to a single set of requirements and parameters. Likewise, the participants can determine which referral services they would like to participate in based on adherence to the common routing protocol. This will allow them to focus on the content and interactions rather than systems development and keeping up with a host of competing send and receive approaches.

6.3 Two-way Interaction

In a two-way interaction, a question comes into a reference service and it is determined that they want assistance on some part of the question or the entire question, so they forward to another known institutional partner. The partner responds with an answer and the first library puts together the answer for the end user and sends it off. In this scenario, the original service is using the other service as a resource in providing the end user an answer; much in the same way they would use a book or web site. The responding service sends the information to the original service, which then reviews the answer and then supplies any additional context that might be appropriate for the end user. The original service owns the relationship with the end user, but interacts with other services on their behalf in much the same way they might by phoning around to locate the best resources or answers.

The QAT protocol can be used to establish a common approach to transporting data, requirements, constraints, confirmations, and status inquiries between the two sites. Again, allowing them to focus on the interaction's content rather than processes.

6.4 Knowledge Base

A site might have a number of question and answer exchanges they want to index and share with others using knowledge base or frequently asked question repositories. The standard provides these sites with a method of structuring the data, choosing common areas to index and areas to store in a more general knowledge repository. If other sites would like copies of records or to submit records for addition to a knowledge base, the standard also supplies a method for them to transport and structure data in this networked fashion.

7. Related Standards

This standard must work in the broader context of existing standards and standards efforts. Some of the other efforts, which may be used in conjunction with this standard when providing reference services, include:

7.1 Protocols and Standards

- NCIP
- Z39.50 and ZING
 - SRW/SRU, CQL, ZOOM, ez39.50, and ZeeRex
- OpenURL
- LDAP/X.500
- ISO-ILL
- ISO 2146: Information and Documentation – Directories of libraries and related organizations
- Help Desk Standards Work
- Distributed Management Task Force (DMTF), Consortium for Service Innovation, and Support Standards Working Group (SSWG):
 - Solution Exchange Standard (SES)
 - Service Incident Standard (SIS)

7.2 Metadata

- IPIG Scheme
- ISO2146 – Collection Level Description
- Dublin Core Metadata Initiative
- DDC, LCSH
- Education Descriptions (GEM, etc.)
- Geographic Descriptions