

# ONE for all - and all for ONE?

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## Abstract

*The ONE project aimed at connecting the major bibliographic services in Europe via z39.50 and to improve the quality of search results by implementing the EXPLAIN service.*

*We developed software for general handling of z39.50 in Origin and Target, a stand-alone client (ICONE), a neutral entry point (NEP) and a Toolbox for different types of conversion (format, characters etc.). The local systems in 10 servers were enhanced in order to use the general software. We defined a profile of z39.50 for bibliographic databases and a profile for Explain. Ten ONE servers, with 18 databases, and six different clients were used in the 8-month trial service.*

ONE-2 is a new project which will build on the results from ONE. We will include ILL and electronic document delivery and the software will be installed in other libraries.

## 1. Project background

The ONE project - OPAC Network in Europe - started January 30th 1995 and ended December 31st 1997. 15 European institutions from 8 countries participated in the project. BRODD - Oslo College was the project coordinator. Nearly all partners had previous experience with implementation of network protocols.

ONE was an R&D project. The research objective was in the area of user assistance in networked systems and in the area of character sets in library network communication .

The main objective of the project was to link users to information by linking together library systems via an open systems network, and through the implementation of such a network to enhance the international standards for intersystem communication.

When many systems are linked together in a network the end-users have the possibility to find and retrieve a large number of relevant records as well as rare records. But the possibility of retrieving mostly garbage is high. One gets the best search results when one knows the server and the databases. The user assistance and intelligence of the systems are more important in a network of systems than in a local one. The quality of the search results concerning precision and recall as well as the possibility to use special characters, special formats etc. was an aspect of all the objectives of the project.

The objective of the project was divided into four groups as follows:

1. Service objectives
2. Technical objectives
3. Research objectives
4. Standardisation objectives

End users can retrieve information in many different ways, using many different tools and communications such as local information systems, Web, different types of dial-up connections to remote systems, etc. The different types of tools offer different facilities. Within the ONE project we wanted the end user to:

- be able to use one and the same user interface towards all remote systems
- be able to be specific in the search request
- be able to see retrieved records in different formats (edited form, MARC etc.)
- be able to use SCAN indices before searching
- be able to get assistance (EXPLAIN service) from the remote systems concerning search criteria, database content, frequency of updates etc.

Only one standard protocol offers all these facilities, namely the ISO 23950/Z39.50 protocol version 3. Therefore this protocol was implemented in all systems.

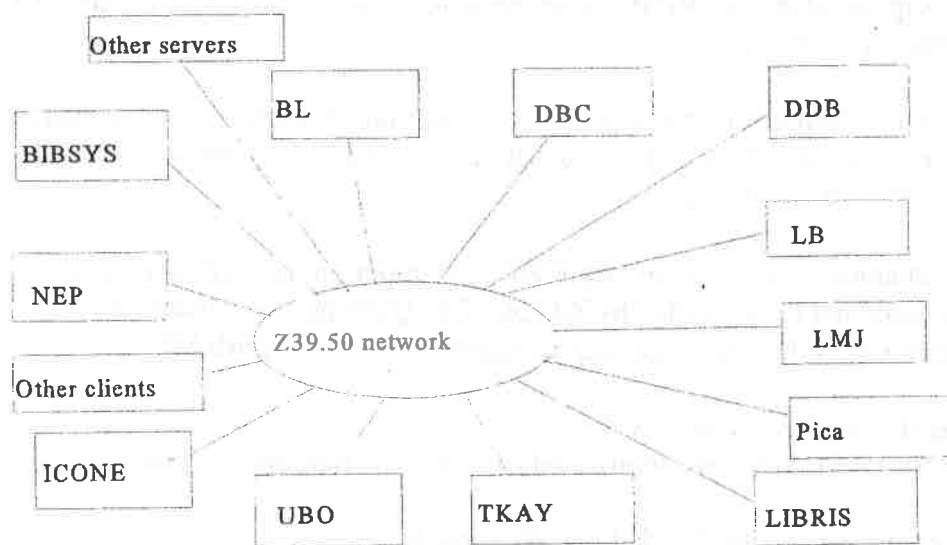
The basic services in this protocol (protocol version 2) have been implemented in many systems. But both new facilities within these services and new services have been defined (protocol version 3). Work is still taking place on the protocol (version 4). In particular the EXPLAIN Service and what is called the EXTENDED Services are not completed. They are both more complex than one believed when first defining them in the standard and more difficult to get a common understanding of the functionality..

The results from ONE are partly documents, partly software.

Nearly all documents have status Open and are available both in machine-readable and printed form.

Most of the software modules are available both in source code and in executable form.

The configuration of ONE was:



**ONE network modules**

## 2. Requirements, specifications, profiles and user guides

The Z39.50 protocol has been defined for many different types of information systems. As a consequence no-one will implement the complete protocol, neither on the server side, nor on the client side. Each type of community needs to define a profile of Z39.50 in order to use it.

In order to define such a profile one must identify the requirements the community has in inter-system communication and then make the specifications for the implementations. Then the actual profile can be agreed upon.

In the ONE project we worked mainly with large library systems and our requirements, specification and profile are for the library community. It must be stressed that this does not limit the **types** of documents treated, only the functions needed to be covered.

### SRPM/API

Our requirements for the Search and Retrieve Protocol Machine (SRPM) and the API state the mandatory and optional services to be supported by the SRPM/API. The SRPM/API is a common software module which means that although a service is

required to be supported in the SRPM, the server using this software does not have to support all included services.

These requirements further state the mandatory and optional parameters and attributes for each service. Our requirements are a subset of the Z39.50 1995 with the addition of character and language negotiation.

Except for the character and language negotiation no important requirements were identified that could not be supported by Z39.50. The question of attribute sets and values for attributes in bib-1 were not seen as requirements for SRPM/API.

#### **EXPLAIN service in client and server**

Requirements for EXPLAIN were separated from general requirements for SRPM/API.

These requirements were again divided into three parts:

- requirements for the EXPLAIN databases
- requirements for EXPLAIN support in servers
- requirements for EXPLAIN support in clients

#### **Stand-alone client**

Requirements for a stand-alone client included both the user interface and the functionality of the client.

The client should be able to support complex search requests. It should be able to display records in different formats and handle result sets. It should offer all required services such as search, present, Scan, Sort, Item order etc.

It should use EXPLAIN in retrieving information about the remote systems and it should be parameterised.

The stand-alone client should run on Windows 3.x and Windows 95.

#### **Neutral Entry Point (NEP)**

The requirements for the NEP were defined over some time. The NEP should act as both origin and target. The NEP should be a gateway to Z39.50 servers for local systems and stand-alone clients which do not themselves support Z39.50. The requirements therefore had to include **how** the communication between NEP and these non-Z39.50 units should be performed.

#### **End-user assistance**

End-users need different types of help at different points in a session. Analysis of the participating systems' user interfaces and help-functions assisted the work in defining requirements for user assistance at different points in a Search and Retrieve session. These requirements were then mapped to EXPLAIN in order to identify types of

assistance that had to be dealt with outside EXPLAIN.

### **Toolbox**

The requirements for the Toolbox were divided into which tools to include and then specific requirements for each tool. The requirements and specifications were made for 13 different modules. Project resources were only sufficient for the implementation of 6 of these (marked with \*)

- Common Command Language (CCL [ISO 8777]) to Z39.50 RPN Conversion \*
- RPN - SQL Conversion \*
- SQL - RPN Conversion
- MARC Conversion Module \*
- Character Conversion Module \*
- Search Query Expansion Module
- Local Line Format Conversion Module \*
- Multi-Lingual Retrieved Record Sorting Module
- Control File Configuration Module
- Segmented Records Sorter Module
- Bib-1 Attribute Verifier Module
- Possible Additions To The DBV-OSI II API
- PED (Pseudo Explain database) \*

### **3 Results**

The results from the project are partly documents, partly software. The documents are both general requirements, profiles and conversion tables.

A profile of the attribute set bib-1 was made in order to ensure consensus of how to interpret a search term (one of the bib-1 attributes) and to ensure a common minimum of search possibilities for all systems.

This profile was based on the ATS-profile from ZIG.

A profile of EXPLAIN was also defined.

A user guide for how to implement and use EXPLAIN in a client was made.

Several software packages have been developed within the project:

- SRPM (SR/Z39.50 Protocol Machine) with API
- stand-alone client
- NEP /Neutral Entry Point)
- Toolbox

### **SRPM (SR/Z39.50 Protocol Machine) with API**

The SRPM with the API is an enhanced version of DBV-OSI software. We have included more services and more facilities for existing services. All new features have been conformance tested according to the rules set down by DBV-OSI.

### **ICONE - stand alone client**

Several stand-alone clients supporting z39.50 version 2 existed when ONE started. No client supported z39.50 version 3, and we were not satisfied with the existing user interfaces.

ICONE was developed for Windows 3.x and Windows 95. ICONE supports most of the required services in ONE.

### **NEP - Neutral Entry Point**

The NEP was designed as both origin and target. It was coded in C++, but the Web user interface to it was coded in JAVA.

### **Toolbox**

The Toolbox consists of many modules. The modules were developed by different partners and made into a package by Crossnet. Each module can be used on its own or be linked to origin and/or target.

Both the MARC-module and CHASE are based on conversion tables. Tools for maintenance of such tables have also been developed.

### **Results of Trial Service**

The Trial Service was an eight-month testing period where end users in all the 15 partner institutions could use the ONE network. There were 10 servers with 18 databases, all regular databases. The total number of records in these databases are close to 49 million, both monographs, series, periodicals, articles and images.

A relatively small number of users handed in the questionnaires (app. 50), but a large number of search sessions took place during the Trial Service. The analysis of the server logs showed a variety of search behaviour.

Most users found the databases interesting, but pointed out some short-comings of the clients. Regardless of which client they had used.

Many users missed the opportunity to see holdings information and to be able to order the found documents right away.

We will try to solve these problems in ONE-2.

## **How and where to get the results**

All common software developed in the ONE project is available for free. Maintenance of the software can be bought from Crossnet.

The ONE Web-page is:

<http://www.dbc.dk/ONE/oneweb/index.html>

Nearly all documents produced in the project which have an "open" status are available. When documents are downloaded from a file server or from Web they are free of charge.

For the time being the file server is: [rosa.nbr.no](http://rosa.nbr.no) directory /pub/one/

## **How the objectives of the project have been met**

At the start of the project we had defined 4 sets of objectives:

- service objectives
- technical objectives
  
- research objectives
- standardisation objectives

### **Service objectives**

The main service objectives of the project was to link all types of users, to information. This has been realised through several achievements.

*The technical requirements for this has been realised through:*

- the implementation of Z39.50 version 3 in the 10 participating servers
- the implementation of the clients, both stand-alone and integrated
- the implementation of NEP
- making a profile for Z39.50 for all ONE servers to comply with

*A service infrastructure has been established as follows:*

Service agreements were made for the duration of the project, and preparation for bilateral service agreements between any two institutions for operation after the project were made.

*Online Explain facilities:*

This has only partly been realised. The requirement for use of EXPLAIN in clients and requirements for which EXPLAIN data should be stored in the EXPLAIN databases

have been made.

Nine of the 10 servers have created EXPLAIN databases locally. The tenth had planned to use the EXPLAIN facilities of another partner.

EXPLAIN facilities are implemented in the stand-alone client and in one of the integrated clients. But not all EXPLAIN facilities have been implemented, not even all defined in the EXPLAIN requirement document.

One partner has created a robot for extracting some types of EXPLAIN information from targets instead of using EXPLAIN.

The Trial Service was carried out according to plan and a wide range of end users participated in this. The results of the Trial Service were analysed. The result of these analyses put the participants in a position to formulate and test their strategies to provide trans-national services.

### **Technical objectives**

The technical objectives have almost been fulfilled. General developments in the IT sector made it necessary to delete some objectives concerning ISO 10163 and OSI.

The main technical outcomes of the project are:

- Operational implementations of Z39.50 version 3 protocol services in nine of the servers, in a stand-alone client and in two integrated clients
- High-quality software packages for network communication between library- and information systems (SRPM/API) are implemented and ported to nine of the ONE servers
- A Neutral Entry Point and a Stand-alone Client package with the full set of Z39.50 version 3 protocol services are implemented. The stand-alone client runs both under Win 3,1x and Win '95
- Communication between Z39.50-implementations on different platforms and in different network environments. The ONE servers can be reached from clients outside the project and the ONE clients can communicate with servers outside ONE.
- The Test Suite for SR/Z39.50 made in the DBV-OSI project has been enhanced to include the extra services included such as Access Control and Resource Control, and to include the Character set Negotiation facility.
- The profile ALD11 (SR/Z39.50 in connection oriented mode) was not tested. The development within ISO on this point made it obsolete to carry out this task.
- The kernel software (SRPM/API) includes the possibility to operate in an OSI environment. However, the general development in this area during the project made it irrelevant to test this. Therefore only one communication stack was defined and used. The ability to switch between different stacks had become



obsolete.

- A Toolbox for functions such as MARC conversion, character conversion, CCL-RPN translation etc. has been developed and integrated in the other software modules.

### **Research objectives**

The research objective was to investigate the need for generic user assistance in library systems and how these needs could be mapped to requirements for an EXPLAIN protocol service. The research objective also included how the generic user assistance could be implemented in different environments.

Requirements for generic user assistance were identified and mapped to EXPLAIN in Z39.50. Part of these requirements were implemented.

The EXPLAIN part in Z39.50 was finalised within ZIG during the project. All requirements identified within the project could be mapped to EXPLAIN as it had developed. The use of EXPLAIN in the clients, however, was not clear.

A User's guide for how to utilise EXPLAIN in a client is one of the results from this work.

The problems of different character sets had to be addressed. The partners in ONE used different character sets as default sets in their systems. In order to be able to send and receive non-ASCII characters between any two systems, in any text field, an agreement on which character set to be used must be made.

The character set negotiation in the Initialize Service was the result of this work.

### **Standardisation objectives**

The standardisation objective of the project was to influence the development of SR/Z39.50 through the experience gained in achieving communication between the participating systems, and through participation in the standardisation bodies.

Since the harmonisation between ISO 10162/63 and NISO Z39.50 took place in parallel to the project, there was no need to work on ISO 10162/63. Development of Z39.50, however, takes place constantly and the ONE partners participated in this work. Our work on character set negotiation was forwarded to ZIG and accepted. Also errors in the protocol were discovered by ONE partners and reported to ZIG.

The International Standardised Profile (ISP) for Search and Retrieve (SR) using connection-oriented ACSE, ALD11 is defined for the SR standard version 1. Many enhancements were proposed for the SR standard and therefore it might have been thought that either an update of ALD11 concerning the additional protocol services

would be defined, or a new profile would be needed.

However, the ALD11 profile is (almost) obsolete and no further work has been carried out on it. But a bib-1 profile has been made within ONE based on the ATS profile.

This ONE bib-1 profile has been presented to the ZIG.

## 4. CONCLUSION

The big question is: "Has the project produced results others can use?"

We think the answer is YES!

To start with the bib-1 profile. We called it the "ONE bib-1 profile". This profile was the basis for the CENL profile and thus for the different national profiles (Danish, Finnish, Norwegian, Swedish etc.). It has also been met with enthusiasm in ZIG. We believe that this profile is a good basis for interoperability and thus "for all".

Our common software, the SRPM/API module, has been distributed to many institutions both within and without the project. It is a software package that is both efficient, includes most of the z39.50 services and it has been thoroughly tested. Several institutions have switched to this software. This software can be used by information systems in general (libraries, archives, museums etc.)

There are of course also other packages available, and it is a healthy sign that many of them are very good and that they all interoperate given they use the same profile. Our software is free and "for all". It runs both under UNIX and Windows.

The stand-alone client has a more traditional user interface than many Web-clients. It has therefore been possible to integrate more functionality in it. It operates with parameterfiles and the remote servers must be entered into such a file before it is available. All possible search criteria in the remote server can therefore be made available in the client. The client can also switch between different formats of the records (USMARC, UNIMARC, local MARC, plain text etc.). One may also save records from result sets on a local file.

The client can handle different profiles, but today it has only been used with the ONE bib-1 profile.

The client is available for free both as a Windows 3.x and Windows '95 version. It is therefore definitely "for all"

The NEP has only been installed at one place, DBC. It has a Web user interface made in JAVA. The NEP allows you to search several databases in parallel. As with the stand-alone client it can be tailored to other profiles.

The last piece of software is the Toolbox. It consists of several modules. Each module may be used alone or as part of the Toolbox. Particularly the MARC-converter and the Character-set converter have been asked for separately.

The MARC-converter converts records in one MARC format to records in another MARC format on the fly. It works with sets of conversion tables. Such tables have been defined for conversion to/from USMARC and UNIMARC for 5 national formats. The programme is generic and can convert between any two formats. This is an

alternative to the result from USEMARCON project. It is freely available.

The ONE project was finalised 5 months over schedule. The delay was caused by the need for more time in the development of some of the software, and in particular for the specification and development of EXPLAIN.

Nearly all the objectives of ONE have been fulfilled. Some original objectives became obsolete due to general development in the area.

The project was carried out well within the financial limits given. The amount of resources planned for project meetings turned out to be insufficient and man days had to be converted into travel resources.

In a project of this type with many different partners who are geographically widespread it is important to have fairly frequent project meetings. Such meetings help solving potential coordination problems as well as technical problems.

The fairly large number of participants in ONE improved the quality of the deliverables because many different types of experience and know-how were behind each deliverable.

The project is over. There were 10 servers operational in the project. Most of the institutions have either already set them in regular operation or plan to do so soon. Many of the institutions also plan to offer more databases from their ONE-servers.

Some of the databases can only be reached if one has a user-ID and password, partly due to the type of software used, partly for economic reasons.

The results from ONE are for all. That part of the title of this paper is therefore accurate. What about the question in the title? I do not think that all institutions will switch to ONE software. But I do hope that we all will use the same profile (ONE - CENL) and thus ensure interoperability.

## **Further work - ONE-2**

The work in project ONE will be continued in the project ONE-2.

Areas for work in this project are:

- quality testing of further developments
- Extended Services, requirements and how to use them in particular Update
- the use of GRS-1 records
- external compSpec
- ILL

## Participants in ONE

ACRONYM USED IN PROJECT	FULL NAME	COUNTRY	WEB PAGE
BIBSYS	BIBSYS	Norway	<a href="http://www.bibsys.no/">http://www.bibsys.no/</a>
BL	British library	UK	<a href="http://www.bl.uk/">http://www.bl.uk/</a>
BRODD	Oslo College - faculty of journalism, library and information science - unit BRODD	Norway	<a href="http://www.hioslo.no/brodd/">http://www.hioslo.no/brodd/</a> <a href="http://www.hioslo.no/JBI/">http://www.hioslo.no/JBI/</a>
DBC	Danish Library Centre	Denmark	<a href="http://www.dbc.bib.dk/">http://www.dbc.bib.dk/</a>
DDB	Die Deutsche Bibliothek	Germany	<a href="http://www.ddb.de/">http://www.ddb.de/</a>
JR	Joanneum Research	Austria	<a href="http://www.joanneum.ac.at/">http://www.joanneum.ac.at/</a>
LB	Die Steiermärkische Landesbibliothek	Austria	<a href="http://www.stmk.gv.at/verwaltung/stlbib/start.stm">http://www.stmk.gv.at/verwaltung/stlbib/start.stm</a>
LIBRIS	Royal Library of Sweden, LIBRIS department	Sweden	<a href="http://www.kb.se/">http://www.kb.se/</a>
LMJ	Steiermärkisches Landesmuseum Joanneum	Austria	
NB	National Library of Norway	Norway	<a href="http://www.nbr.no/">http://www.nbr.no/</a>
NM	Danish national Museum, The library	Denmark	<a href="http://www.natmus.min.dk/">http://www.natmus.min.dk/</a>
Pica	Centrum voor Bibliotheekautomatisering	The Netherlands	<a href="http://www.pica.nl/">http://www.pica.nl/</a>
Crossnet	Crossnet Systems Limited	UK	<a href="http://www.crxnet.com/">http://www.crxnet.com/</a>
TKAY	Helsinki University Library - TKAY	Finland	<a href="http://renki.helsinki.fi/hyk/hul/">http://renki.helsinki.fi/hyk/hul/</a>
UBO	University of Oslo Library	Norway	<a href="http://www.ub.uio.no/">http://www.ub.uio.no/</a>

