

Online Access to the Encyclopaedia Slavica Sanctorum

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Abstract. Encyclopaedia Slavica Sanctorum project aims at building a repertoire of medieval and early modern Bulgarian texts for saints in combination with ethnological data and some visual sources. A basic project task is to produce an accessible on-line digital repository of this valuable cultural heritage treasure. The paper presents the Encyclopaedia Slavica Sanctorum environment, its architecture, functional specification, application modeling process and software implementation. The paper also discusses the specifics of the “Encyclopaedia Slavica Sanctorum” project and its knowledge domain. The paper also presents the integration between the Encyclopaedia Slavica Sanctorum and the Bulgarian Iconographical Digital Library, a digital library keeping rare specimens, private collections of Orthodox icons, wall-paintings and other iconographical objects, selected from difficult-to-access storages, distant churches, chapels, and monasteries, objects in a risk environment or unstable conditions.

Keywords: Multimedia Digital Libraries, Services, Slavic Saints, Orthodoxy, Orthodox Iconography

1 Introduction

Encyclopaedia Slavica Sanctorum is a joint project of St. Kliment Ohridski University of Sofia and Institute of Literature, Old Bulgarian Literature section. Its main goal is to build a repertoire of medieval and early modern Bulgarian texts for saints in combination with ethnological data and some visual sources. The repertoire is not limited to Bulgarian, Slavic, or Balkan saints. Rather, the idea is -- through the study of the history of adoption of numerous Christian cults mostly from Byzantium -- to shed additional light on the reception of Byzantine culture, of *Romanitas* perceived as *Christianitas*, in Bulgaria.

In the framework of this project, a large number of diverse source materials is planned to encode, such as mediaeval vitae of saints, homilies about saints and feasts, synaxarion readings, offices, prayers (both apocryphal and canonical), calendars with liturgical directions in various liturgical books (Gospels, Acts and Epistles manuscripts, Typika), present-day interviews about personal experience of believers,

Church and social rites and rituals and their perception by the members of the communities, intercultural and inter-confessional relations and exchange in respect to sainthood. All these primary sources will be published in their original language with scholarly notes and some translations into modern Bulgarian.

An advantage for the users of the platform chosen is the multiple access to the data. If interested in a date of the calendar, the users could find all the saints and feasts that are recorded in the sources consulted for this particular date. If interested in a certain saint or feast, the users could find all the information for him/her/it, for different dates on which he/she/it is celebrated and different books (sources) in which it appears.

The main goal of the project is to produce a digital repository which could be used for on-line access to the Bulgarian (or more widely speaking medieval Slavonic) information on saints which could satisfy scholarly and educational needs. Also there would be information which could be of interest to the general public, for instance lectures, multimedia products, exhibitions. The repository, called *Encyclopaedia Slavica Sanctorum* or *Encyclopaedia Slavica Sanctorum Calendar* or simply *Calendar*, is developed using digital libraries and Semantic web technologies. The software implementation is executed by a team from the Institute of Mathematics and Informatics – Bulgarian Academy of Sciences. Another aspect planned is to offer limited access and a guided access to those who are not experts in medieval Bulgarian writing and cannot read Old Bulgarian texts but are interested in the history of Christian cults in the Bulgarian lands and their interaction with other confessions in the Balkans.

The paper presents the *Encyclopaedia Slavica Sanctorum* environment, its architecture, functional specification, application modeling process and software implementation. Further, the paper discusses the specifics of the *Encyclopaedia Slavica Sanctorum* project and its knowledge domain. The paper also presents the integration between the *Encyclopaedia Slavica Sanctorum* and the Bulgarian Iconographical Digital Library, a digital library keeping rare specimens, private collections of Orthodox icons, wall-paintings and other iconographical objects, selected from difficult-to-access storages, distant churches, chapels, and monasteries, objects in a risk environment or unstable conditions [8][12][13][14].

2 Encyclopaedia Slavica Sanctorum Project Specifics

The *differentiae specificae* of the *Encyclopaedia Slavica Sanctorum* project in comparison with other reference books on cults and saints, such as [1-2][4-7][16-17][20-21][23], are:

1. The encyclopaedia includes information only on saints that are identified in medieval and early modern Slavonic sources.
2. The approach towards the sources concerning the cults of saints is not religious and is rather diachronic than synchronic. We are interested not in the beliefs themselves or in the present-day Church canon about holiness but in the formation of the cults and their role in political, cultural, and everyday life of the Bulgarians through the centuries.

3. The focus of our project is not on the Christian calendar in general but on its reception in the Bulgarian cultural and religious life and in Bulgarian sources. Thus we concentrate on the adaptation of Christian cults and beliefs in the Bulgarian lands, in Bulgarian medieval translational and original texts and practices, and on their influence for formation of certain mentality in the Bulgarian lands.
4. Our approach is predominantly philological: the emphasis is on the edition and representation in an e-version of primary sources according to scholarly standards. These sources are mostly texts: vitae, homilies, offices, calendars in medieval and early modern manuscripts (as well as some translations into modern Bulgarian) and ethnological records of interviews. To a lesser degree images will be added to the textual material: their role in the life, beliefs, sensitivities will be focused rather than their iconographic and stylistic features.
5. The e-collection of the texts includes not only original works in Old Bulgarian literary language (known also as Old Church Slavonic) but also numerous translations from Greek into Old Bulgarian. As far as it is possible, the date and place of a given translation will be specified as well as its dissemination in those lands in which was used the Cyrillo-Methodian (Old Bulgarian/ Old Church Slavonic) literary language.

It is our understanding that when all the accessible primary sources are put together in a clearly structured e-ontology with multiple access points it will become possible to analyze – without prejudice and bias – the history of cults and their role in political and social life and even the lives of individuals.

The main concern of the project and its main *differentia specifica* is to publish the texts with the necessary *apparatus criticus* according to scholarly standards in classical studies, palaeoslavistics and ethnology, so that they could serve as a reliable basis for objective scholarly approach. Therefore all possible resources should be used for representation of texts as close as feasible to their originals (without scholarly intervention and manipulation of the sources), on the one hand. On the other, the e-editions should allow for accompanying the text with detailed scholarly notes clearly discernible from the “voices” or the primary sources.

The idea is to combine different approaches towards hagiology. Such diversity in the approaches towards sainthood and its representation in sources has already been demonstrated by the project members in their previous research (see for instance [3], [15], [18-19], [22], [24-25]). It is our belief that the use of different methods of analysis could offer a more detailed picture of sources of the cults in the Bulgarian lands and deeper insight in the perception and role of sanctity in social life from the Middle Ages until the present day.

3 Architecture and Functional Specification of the Encyclopaedia Slavica Sanctorum

The architecture of the Encyclopaedia Slavica Sanctorum contains two main service panels Object data management and Administrative services (see figure 1), jointed to a Media repository and a User profile repository.

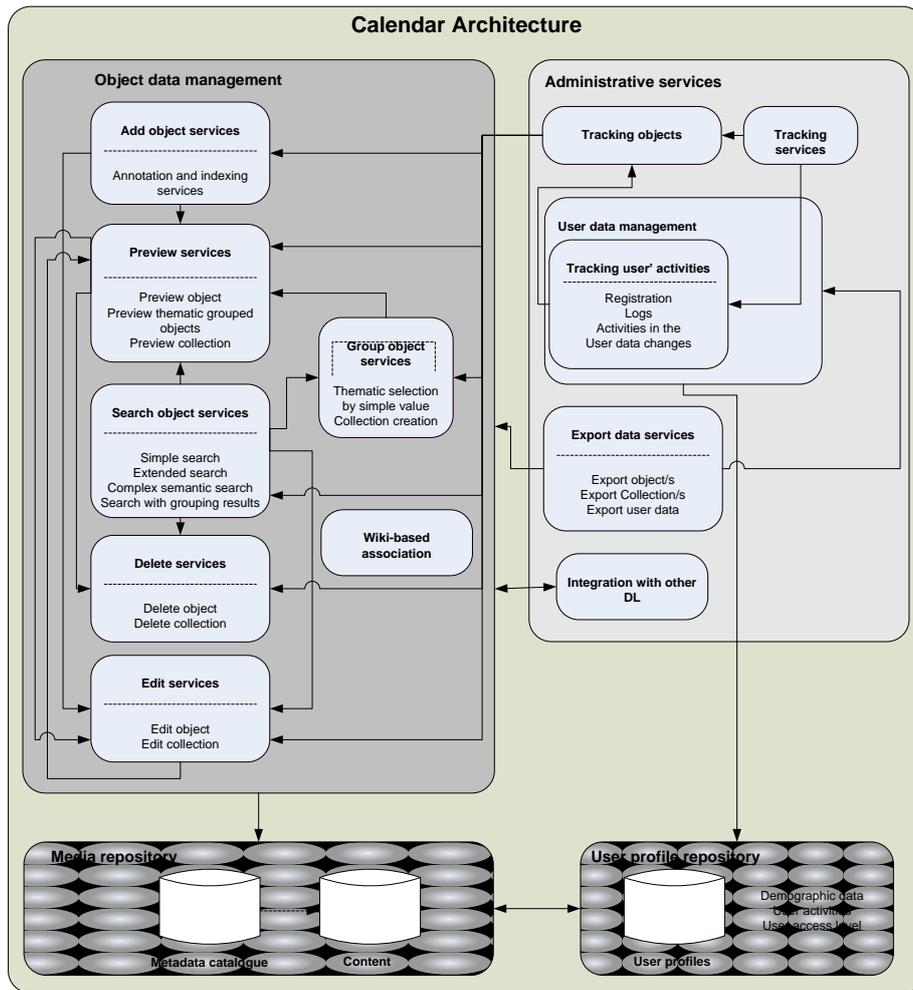


Fig. 1. Encyclopaedia Slavica Sanctorum Calendar Architecture

The Object data management panel refers to the activities related to content creation: add (annotate and semantic indexing), store, edit, preview, delete, group, and manage multimedia digital objects; manage metadata; search, select (filter), access and browse digital objects, collections and their descriptions. A Wiki-based

functionality is provided to manage the association between the metadata and data (the Wiki-based association panel). A panel providing content and services interoperability of the Calendar with similar digital libraries and repository in the domain is included (Integration with other DL panel). In the presented system this panel realizes the system integration with the Bulgarian iconographical digital library (BIDL), an Internet-based environment providing the registration, documentation, access and exploration of a practically unlimited number of Orthodox iconographical artefacts and knowledge [8] [12] [14].

The Administrative services panel mainly provides user data management, data export and tracking services. User data management covers the activities related to registration, data changes, level set, and tracking of the user. The export data services provide the transfer of information packages (for example, packages with objects/collections, user profiles, etc.) compatible with other data base systems. For example, with these services a package with objects could be transported in an XML-based structure for new external use in e-learning applications. The tracking services have two main branches: tracking of objects and tracking of users' activities. The tracking of objects watch the activities of add, edit, preview, search, delete, selection, and group of objects/collections in order to provide a wide range of statistic data (for frequency of service use, failed requests, etc.) for internal use and generation of inferences about the stability and the flexibility of the work and the reliability of the environment. The tracking of users' activities monitors user logs, personal data changes, access level changes and user behaviour in the environment. For every object all semantic and technical metadata are saved in the Media repository. These metadata are represented in catalogue records that point to the original media file/s associated to every object.

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The User profile repository manages all user data and their changes. Several user roles are included, having different privileges. For example the ESS guest user could have access to most of the parts of the metadata, but the access to the media repository is granted only for registered users. The simple search and object preview functionality are enabled to the guest users. Extended semantic- and context-based search could be used only from registered users, etc.

4 The Encyclopaedia Slavica Sanctorum Environment

The Encyclopaedia Slavica Sanctorum (ESS) environment should consist of standard functionalities for a digital library, managing cultural heritage content. As extension in ESS there are also additional domain specific functionalities that must be implemented within the system, providing enhanced document management.

As a base and framework for ESS we are using the Bulgarian iconographical digital library (BIDL), mentioned above. This library is produced to be easy modifiable for new domain and application.

The next use case diagram describes the main use cases for the BIDL, extended with the use cases required for the ESS (models are described according to the UML notation).

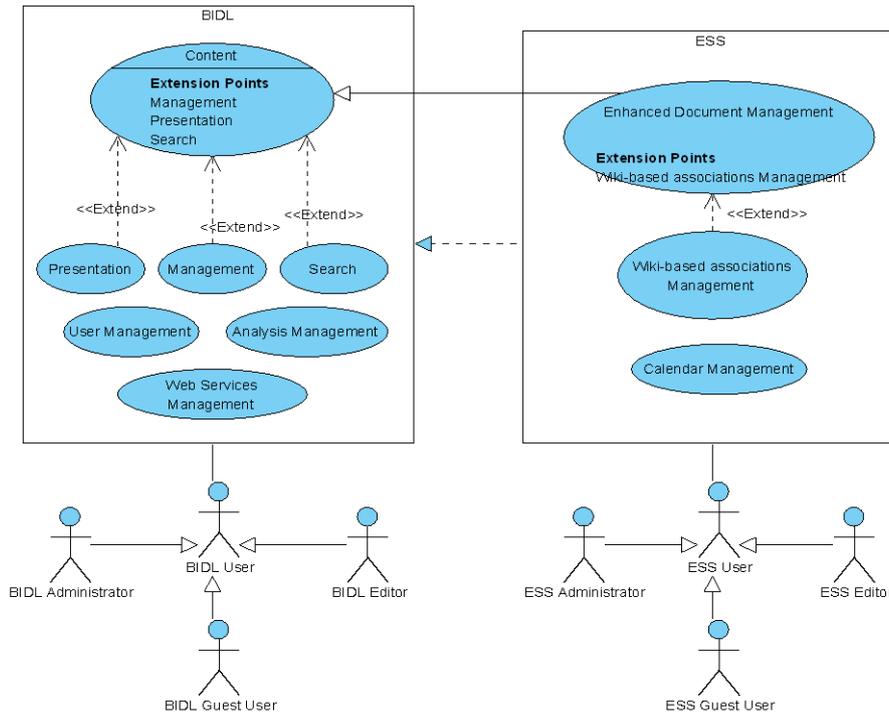


Fig. 2. UML Use Case Diagram

The base BIDL use cases are: *Content Presentation, Management and Search*. The environment also provides *User, Analysis and Web Services management*.

The specific ESS use cases are:

- Document management, which should be more powerful, because of the large amount of documents (media files) related to one ESS object;
- Wiki-based associations, which are required for the structured presentation of the ESS objects;
- Calendar management - this functionality is needed because the base ESS object is the Calendar. All other objects - dates and memories (events and saints) are concerned in the hierarchy as secondary objects.

ESS provides functionalities, such as *Content Management, Content Presentation, Content Search and Filtering, User Management, Analysis Management* (which includes content analysis and user activities analysis and monitoring) and *Web Services Management* (required for the Integration of the system with other content management systems).

The following diagram (see figure 3) presents the main entity classes that should be implemented in the ESS.

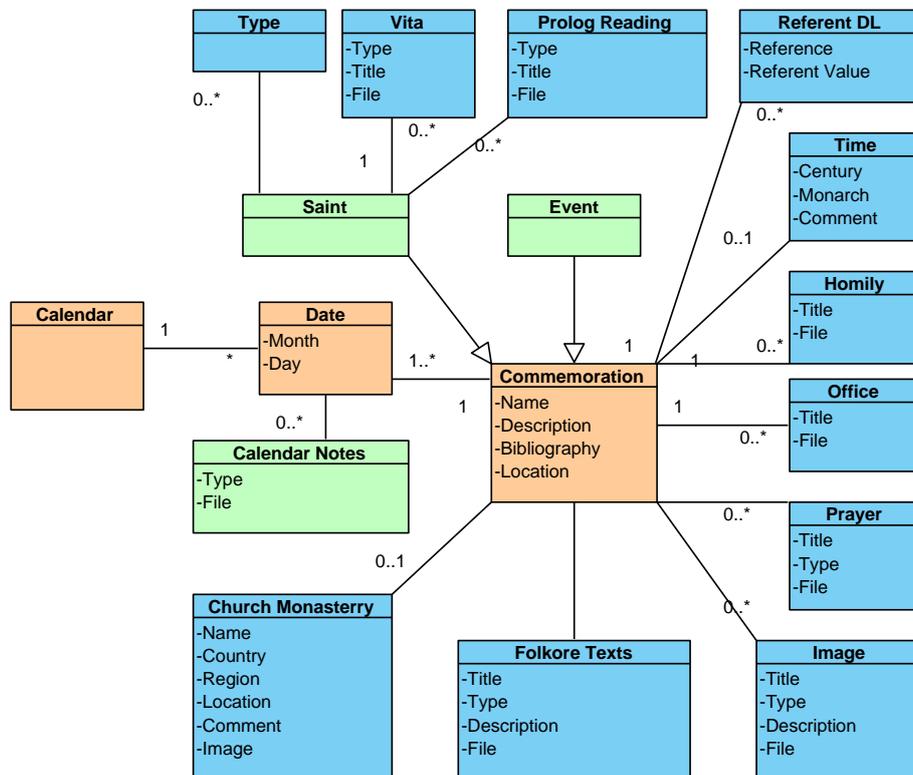


Fig. 3. UML Analysis Class Diagram of the main entity classes in the Encyclopaedia Slavica Sanctorum

The *Calendar* class is the primary class. It contains *Dates*. Each date can contain *Calendar Notes* for the day and also objects from the *Commemoration* (sanctoreme) class. The *Commemoration* class is used to generalize the classes *Saint* and *Event*, i.e. the *Commemoration* can be a *Saint* (*St. John of Rila*, for instance) or an *Event* (e.g. *Translation of St. John of Rila's relics to the Rila Monastery*). *Saints* have more specific characteristics than *Events* – *Type* and *Vita*. All of these classes also have their own descriptive ingredients.

The presented structure represents the backbone of the domain specific ontology used in Encyclopaedia Slavica Sanctorum for semantic content annotation.

Alpha version of the Encyclopaedia Slavica Sanctorum Calendar is available at: <http://ess.bg73.net/index.php?lang=bg>.

5 Integration between the Encyclopaedia Slavica Sanctorum and the Bulgarian Iconographical Digital Library

The *Bulgarian Iconographical Digital Library* (available at: <http://bidl.cc.bas.bg>) is a digital library keeping rare specimens, private collections of Orthodox icons, wall-paintings and other iconographical objects, selected from difficult-to-access storages, distant churches, chapels, and monasteries, objects in a risk environment or unstable conditions. This Internet-based environment becomes a place where iconographical objects of different kinds and origins were documented, classified, and “exhibited” in order to be widely accessible to both professional researchers and the wide audience. The library provides services for registration, documentation, access and exploration of a practically unlimited number of Orthodox iconographical artefacts and knowledge and the end users can use this rich knowledge base through its interactive preview, objects complex search, selection, and group. A complete description of the rich BIDL functionality is made in [12][8][14]. Until now, the library was used in several cross-media, ubiquitous and technology-enhanced learning applications [9-11].

The Bulgarian Iconographical Digital Library and the Encyclopaedia Slavica Sanctorum being in the same domain could be integrated in order to extend the knowledge about their common objects or to exchange data.

The following class diagram (see picture 4) shows the conceptual relationship between the ESS and BIDL entities.

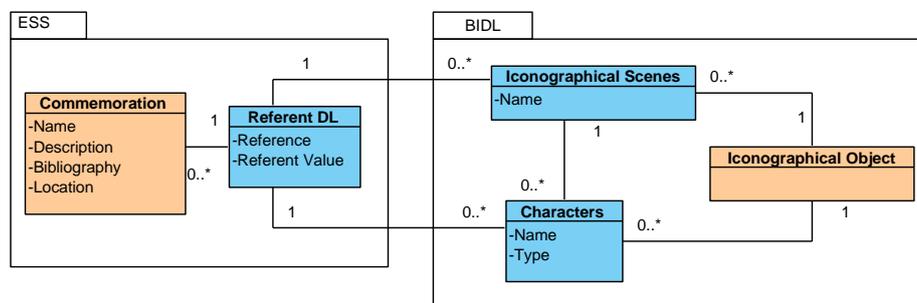


Fig. 4. UML Analysis Class Diagram of the Conceptual Relationship between the ESS and BIDL Entities

By now, there are defined two relationships between the systems. First relationship describes the connection between the *ESS object* with the *Characters* from the *Iconographical objects*. Second connection is between the *ESS object* and the *Iconographical scenes* of an *Iconographical object*.

Figure 5 illustrates an UML deployment diagram of the current (and to-be-developed) service interfaces which implement the integration between the selected digital libraries. The User Profile interface aims to synchronize user profiles and to manage user authentication and authorization among the two DLs.

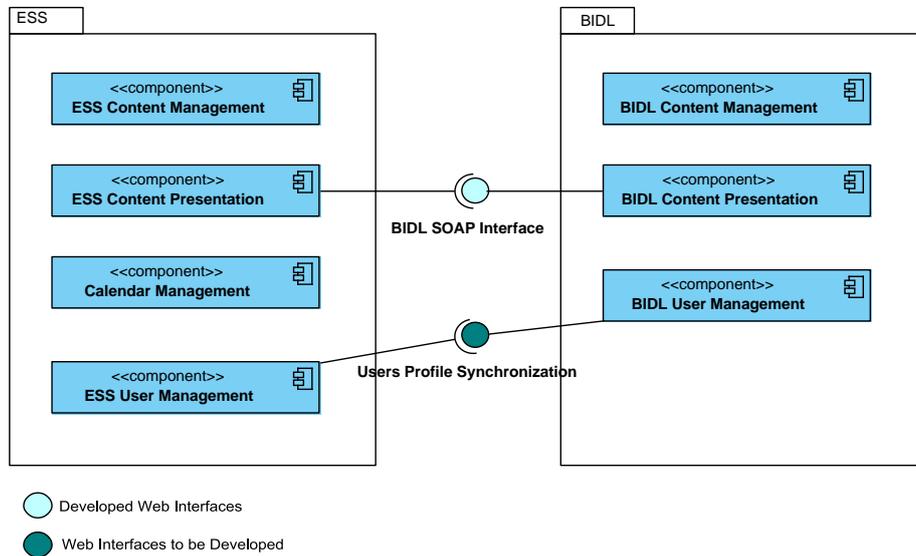


Fig. 5. UML Deployment Diagram of the Web Service Interfaces

The Web Service Interfaces are implemented using the Simple Object Access Protocol (SOAP) and the Web Service Definition Language (WSDL). These very popular standards on the Web could guarantee better interoperability between our two integrating digital library systems. The implemented Web-services are available for all Internet users and can be used according to the WSDL specification. Having in mind that WSDL could describe one operation independently of the program language used, i.e. no matter if we write a function with PHP, C, Java or any other programming language, we describe in WSDL our integrating operations.

The next listing in WSDL shows the operation returning an array of BIDL objects which have a specific characteristic (e.g. objects which contain certain iconographical scenes, or objects containing certain iconographical characters.)

```

<?xml version="1.0" encoding="UTF-8" ?>
- <definitions name="DL_WebServices" targetNamespace="urn:DL_WebServices"
  xmlns:typens="urn:DL_WebServices"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
  xmlns="http://schemas.xmlsoap.org/wsdl/">
- <message name="wsTerms">
  <part name="cid" type="xsd:integer" />
  <part name="val" type="xsd:string" />
  <part name="limit" type="xsd:integer" />
</message>
- <message name="wsTermsResponse">
  <part name="wsTermsReturn" type="soapenc:Array" />
</message>
- <portType name="wsPortType">
- <operation name="wsTerms">
  <documentation>wsTerms</documentation>
  <input message="typens:wsTerms" />
  <output message="typens:wsTermsResponse" />
</operation>
</portType>
- <binding name="wsBinding" type="typens:wsPortType">
  <soap:binding style="rpc"
    transport="http://schemas.xmlsoap.org/soap/http" />
- <operation name="wsTerms">
  <soap:operation soapAction="urn:wsAction" />
- <input>
  <soap:body namespace="urn:DL_WebServices" use="encoded"
    encodingStyle="http://schemas.xmlsoap.org/soap/encoding/" />
</input>
- <output>
  <soap:body namespace="urn:DL_WebServices" use="encoded"
    encodingStyle="http://schemas.xmlsoap.org/soap/encoding/" />
</output>
</operation>
</binding>
- <service name="DL_WebServicesService">
- <port name="wsPort" binding="typens:wsBinding">
  <soap:address
    location="http://bidl.cc.bas.bg/webservices.php" />
</port>
</service>
</definitions>

```

6 Conclusions

Undoubtedly, the exceptional values of the knowledge for Orthodox Saints have to be made available in the global information medium. Its virtual presentation has to be executed through the best tools and techniques in order to continue to write traces in the world history. This paper presented Encyclopaedia Slavica Sanctorum Calendar and the developers' effort to build an applicable repository of medieval and early modern Bulgarian texts for saints, ethnological data and visual sources. The paper also presented the integration of the Encyclopaedia Slavica Sanctorum with the Bulgarian Iconographical Digital Library.

The future work is related to the content enrichment and the inclusion of texts for saints, ethnological data and visual sources. In ESS will also be included services for aggregating the content for the European digital library EUROPEANA, thus

providing possibilities for pan-European access to rich digitalised collections of Orthodox heritage.

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References

1. Attwater, D.: *The Penguin Dictionary of Saints*. Harmondsworth (1965)
2. *Bibliotheca Sanctorum*. Eds. Iosepho Vizzini et al.. 13 vols. Roma (1961-69)
3. Dimitrova, M.: *The Vita Mariae Egyptiacae in medieval and early modern Bulgarian literature*. In: *Kobieta w kulturze średniowiecznej Europy*. Poznań, s. 235-242, 1995 (2d ed. 1999)
4. Farmer, D.: *The Oxford Dictionary of Saints*. Oxford (1992) (revised ed.)
5. Halkin, F.: *Bibliotheca hagiographica graeca*. Bruxelles (1957)
6. *Histoire des saints et de la sainteté chrétienne*. Eds. André Mandouze, André Vauchez, et al. 11 vols. Paris (1986-88)
7. Ivanova, K.: *Bibliotheca hagiographica balkano-slavica*. Sofia, Bulgaria (2008)
8. Paneva-Marinoва, D., Pavlov, R., Goynov, M., Pavlova-Draganova, L., Draganov, L.: *Search and Administrative Services in Iconographical Digital Library*. In: *International Conference „Information Research and Applications” – i.Tech 2010*, pp. 177—187, Varna, Bulgaria (2010)
9. Paneva-Marinoва, D., Pavlova-Draganova, L., Draganov, L., Pavlov, R., Sendova, M.: *Development of a Courseware on Bulgarian Iconography for Ubiquitous On-demand Study*. In: *International Conference “New Technology Platforms for Learning – Revisited”*, pp. 37—46, Budapest, Hungary (2009)
10. Paneva-Marinoва, D., Pavlova-Draganova, L., Pavlov, R., Sendova, M.: *Cross-media and Ubiquitous Learning Applications on Top of Iconographic Digital Library*. In: *International Conference on Virtual Systems and Multimedia*, pp. 367—371, Limassol, Cyprus (2008)
11. Pavlov, R., Paneva, D.: *Toward Ubiquitous Learning Application of Digital Libraries with Multimedia Content*. *Cybernetics and Information Technologies*, 6(3), 51—62 (2007)
12. Pavlov, R., Paneva-Marinoва, D., Goynov, M., Pavlova-Draganova, L.: *Services for Content Creation and Presentation in an Iconographical Digital Library*. *Serdica Journal of Computing*, 4(2), 279—292 (2010)
13. Pavlov R., Pavlova-Draganova, L., Draganov, L., Paneva, D.: *e-Presentation of East-Christian Icon Art*, In: *Open Workshop “Semantic Web and Knowledge Technologies Applications”*, pp. 42—48, Varna, Bulgaria (2006)
14. Pavlova-Draganova, L., Paneva-Marinoва, D., Pavlov, R., Goynov, M.: *On the Wider Accessibility of the Valuable Phenomena of Orthodox Iconography through Digital Library*. In: *3rd International Conference dedicated on Digital Heritage (EuroMed 2010)*, pp. 173—178, ARCHAEOLINGUA, Lymassol, Cyprus (2010)
15. Petrova, M.: *Holy Harlots from the Bdinski Sbornik: Some Observations on the Function of the Lives of Mary of Egypt, Thais, and Maria, Abraham's Niece, within the Slavic Tradition*. In: *Annual of Medieval Studies at CEU, 1997-1998*. 273—282, Budapest, Hungary (1999)

16. Schiller, G.: *Ikonographie der christlichen Kunst*. 5 vols. Gütersloh (1966-91)
17. *The Bible and the Saints*. Eds. Gaston Duchet-Suchaux and Michel Pastoureau, trans. David Howell. Paris, France (1994)
18. Yovcheva M., Taseva, L.: The Slavonic Vita of Pope Stephen I of Rome; the Issue of Its Latin or Greek Origin. *Scripta & e-Scripta* 8-9, 365—385 (2010)
19. Йовчева, М.: Календарните особености на Путятиния миней - отправна точка за многопосочни разисквания [Yovcheva, M.: Calendar in the Putiata Menaion]. In: *Slavia Orthodoxa (Festschrift Rumjana Pavlova)*, 182—193, Sofia, Bulgaria (2003)
20. Православный календар [Orthodox Calendar]: <http://days.pravoslavie.ru/Days/20110803.htm>
21. Православная энциклопедия (под редакцией Патриарха Московского и Всея Руси Кирилла) [Orthodox Encyclopaedia, ed.-in-chief Kiril, Patriarch of Moscow and Whole Russia], 25 vols., e-version: <http://www.pravenc.ru/>
22. Стойкова, А.: Произведенията за св. Георги в балканските кирилски ръкописи (Предварителни бележки) [Stoykova, A.: Texts for St. George in Balkan Cyrillic Manuscripts (Preliminary Notes)]. In: *България и Сърбия в контекста на византийската цивилизация [Bulgaria and Serbia in the Context of Byzantine Civilisation]*, 413—422, Sofia, Bulgaria (2005)
23. Християнска агиология и народни вярвания [Christian Hagiology and Popular Believes]: http://slovo-aso.cl.bas.bg/hagiology/ilist_frame3.htm
24. Христова-Шомова, И.: Календарните указания в някои славянски апостоли и византийските синаксари [Hristova-Shomova, I.: Calendar Notes in Slavonic Apostoloi and Byzantine Synaxaria]. *Palaeobulgarica* 34.3, 3—25 (2010)
25. Христова-Шомова, И.: Службата за св. Теодор Тирон в старобългарския Драготин миней [Hristova-Shomova, I.: Office for St. Theodore Tyron in the Old Bulgarian Dragotin Menaion]. *Български език [Bulgarian Language Journal]* 57, 17—38 (2010)