

# Portfolios and Guided Tours for Digital Cultural Repositories

**Keywords:** Web site design, digital cultural repositories, digital libraries, data exchange formats, XML.

Marco Casanova<sup>1</sup>, Luiz Tucherman<sup>2</sup>, Daniel Schwabe<sup>1</sup>, Tatiana Coelho<sup>1</sup>, João C. Portinari<sup>2</sup>

<sup>1</sup>Informatics Department, Pontifical Catholic University of Rio de Janeiro  
Rua Marquês de São Vicente, 225 – 22453-900 – Rio de Janeiro – Brazil  
{casanova, schwabe, tati}@inf.puc-rio.br

<sup>2</sup>Portinari Project  
Rua Marquês de São Vicente, 225 – 22453-900 – Rio de Janeiro – Brazil  
{portinari, luiz}@portinari.org.br

## Abstract

This paper describes two tools - a digital portfolio generator and a guided tour generator - designed to facilitate the dissemination of digital cultural repositories. These tools address the needs of three types of users: specialists, interested in recovering all documents pertaining to a given work of art, theme or fact; academic users, attracted by educational uses of the repository; and casual visitors, interested in “cultural sightseeing”. A *digital portfolio* is a subset of the repository, containing only items of interest to the user, and maintaining the meaningful organization of the full repository. A *guided tour* establishes a predetermined navigation path over a set of repository items, and consists of a set of Web pages that tell the users a story or that guide him through a tour or virtual exhibit.

Underlying these tools is a set of relatively simple, core computing technologies that, when used appropriately, can support useful metaphors for museum applications on the Web. In addition, these tools allow non-expert (in computing) users, responsible for cultural repositories, to quickly generate and disseminate material of interest to their target audience in the Web. Finally, by automating the repetitive portion of the task, they reduce the cost of developing and deploying these applications.

## 1. Introduction

This paper describes two tools - a digital portfolio generator and a guided tour generator - designed to facilitate the dissemination of digital cultural repositories. These tools address the needs of three types of users: specialists, interested in recovering all documents pertaining to a given work of art, theme or fact; academic users, attracted by educational uses of the repository; and casual visitors, interested in “cultural sightseeing”.

A *digital portfolio* is a subset of the repository, containing only items of interest to the user, and maintaining the meaningful organization of the full repository. A *guided tour* establishes a predetermined navigation path over a set of repository items, and consists of a set of Web pages that tell the users a story or that guide him through a tour or virtual exhibit. It is up to the *guided*

*tour curator* to link the pages and multimedia documents, found in the repository, write additional material, or add new media in order to create an attractive tour.

The digital portfolio generator is designed to address the needs of the specialists and academic users. It offers a user friendly query interface, geared to in-depth search of the repository. The generator exports the results of the queries as stand-alone XML documents that organize the repository items and their relationships in a neutral format, suitable for data transfer among different systems and for independent manipulation.

The guided tour generator is designed for those that are responsible for the dissemination of the content of the repository. It offers an interface for fast publication of Web pages, based on the content of the repository and designed according to the guided tour or virtual exhibit metaphors. The tool uses pre-defined navigation frameworks and Web page templates.

Underlying these tools is a set of relatively simple, core computing technologies that, when used appropriately, can support useful metaphors for museum applications on the Web. In addition, these tools allow non-expert (in computing) users, responsible for cultural repositories, to quickly generate and disseminate material of interest for their target audience in the Web. Finally, by automating the repetitive portion of the task, they reduce the cost of developing and deploying these applications.

The design of the tools benefits from the previous experience of the Portinari Project and uses its rich multimedia repository for extensive testing. Although the examples presented are taken from that collection, it should be immediately clear that they could be applied to similar repositories.

This paper is organized as follows. Section 2 describes the Portinari Project. Section 3 introduces a model for digital cultural repositories. Section 4 addresses digital portfolios and section 5, guided tours. Section 6 contains the final remarks. The Annex contains a DTD and an example of an XML document representing a digital portfolio.

## **2. The Portinari Project**

The painter Candido Portinari (1903-1962) lived in a period of time which was very significant for the development of modern Brazilian culture (see Figure 1). His work and his interaction with other artists, poets, writers, architects, journalists, educators and politicians reflect the essence of the esthetical, artistic, cultural, social and political concerns of 20th-century Brazil. In the words of Clarival do Prado Valladares, art historian “...*Portinari was a member of the Brazilian intellectual elite, along with the most celebrated poets, writers, architects, educators, politicians and journalists, in the exact period when they were all promoting a remarkable change in the esthetic attitude and in the culture of the major Brazilian centers. From no other artist or scholar, painter or writer, have we received a legacy of lyric transcendence of our history comparable to his...*”.



Figure 1 - Portinari and his time.

The broader goal of the Portinari Project is, in addition to documenting the entire painter's artistic production, to provide a view of Brazilian life and culture during his lifetime. Capturing all the information related to his work and making it available to new generations is a challenge. Moreover, as many of the works are geographically dispersed, spanning all over Brazil and in more than 20 countries in the three Americas, in Europe and in the Near East, this task involved a considerable research effort.

Started in 1979, at the Pontifical Catholic University of Rio de Janeiro, the Portinari Project has been able to locate, document and catalog more than 5,300 works attributed to the artist, from which 4,700 have been declared authentic. The works, which include paintings, drawings and prints, have been photographed in color and in black and white, and also extensively researched for the authentication of every work and for the establishment of the complete chronology of the artist's oeuvre.

The project catalogued more than 20,000 documents. There are 6,000 letters exchanged with the major writers, poets, musicians, architects, artists, journalists, educators and politicians of Portinari's generation. An oral history program interviewed 72 of the painter's contemporaries, totaling 130 hours of recordings, now in digital format. These records, plus more than 12,000 clippings from publications, from 1920 to the present, more than 400 exhibition and auction catalogues, 1,200 epoch photographs, films and videos, and various memorabilia, now make up the Portinari Project's archives.

This material is a true synthesis of all aspects of Brazilian life during that period. Images, texts and sounds, highly correlated, form a large multimedia database on one of the most creative and important periods in the history of Brazil. The project's Web site, although still in its Portuguese-only version (although it includes two guided tours in English), might be useful to get an overall grasp of the project. Its URL is <http://www.portinari.org.br>.

The methodology developed during the execution of the work, which has now been established, makes the Portinari Project an example that can be followed by similar endeavors, even outside the sphere of the visual arts. In order to arrive at this model, the Portinari Project went through three phases, each with its own clearly differentiated characteristics. The first phase was devoted to locating and documenting Portinari's works and to collecting documentary material. The second phase focused on cataloguing this information and on further research. The third phase, currently in progress, will make as widely available as possible all the material that has been gathered, researched and documented.

It has become evident that computer-based support is essential to make the documented material available publicly. Thus, in order to support such endeavor, a database has been designed, and work is underway to extend the material in the database to provide a hypermedia application to access the collected material. This application will later be used in the scope of a planned multimedia museum.

This interdisciplinary approach has already yielded concrete results, in opening a dialogue between researchers in the various areas involved, particularly in Computer Science, but also in raising interesting problems in non-conventional databases, multimedia and hypertext.

### 3. The Digital Cultural Repository

A *digital cultural repository* is a set of digital representations of artifacts of cultural value, stored in a database that allows efficient access to the data. An example is the Portinari Project database described in Section 2.

We model a digital cultural repository as shown in Figure 2, where the arrow next to the relation labels, such as “Is Part of”, indicates the preferred reading direction, whereas the line with empty arrowhead denotes a “A kind of” relation, such as Owner may be a Person or an Institution. We note that most repositories, including the Portinari Project, are far more complex, but Figure 2 shows only what we consider to be the core object classes and their relationships. Figure 2 also omits the properties (or attributes) of the classes, for the sake of simplicity.

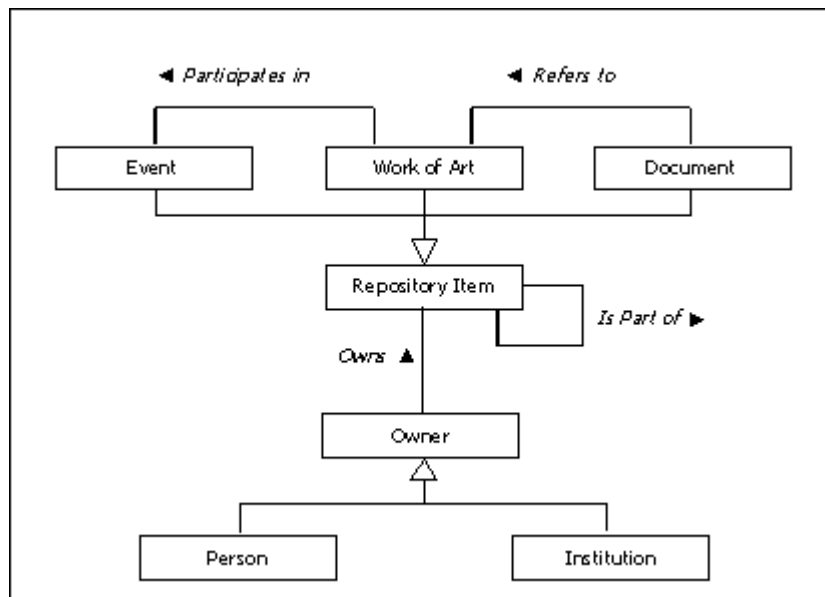


Figure 2 – A Conceptual schema for digital cultural repositories.

## 4. Digital Portfolios

On a first approximation, a *digital portfolio* is nothing more than a subset of the digital cultural repository. However, we go further and define the *exchange format* of a digital portfolio as an XML document that organizes the repository items and their relationships in a neutral format, suitable for data transfer among different systems and for independent manipulation. Annex A.1 contains a simplified DTD for XML documents representing digital portfolios.

The digital portfolio generator has the following dynamics:

1. The user first specifies a filter that defines the subset of the repository he wants to work with. The generator allows only simple filters, such as “all works of art, events and photos from 1930 to 1950”.
2. He then accesses the repository by posing a keyword search.
3. The generator replies with the list of repository items that meet the conditions of the filter and the search criterion. The retrieved items may be represented by their thumbnails, if available.
4. The user then selects one or more items to include in the portfolio.
5. For each item he decided to include in the portfolio, he may request detailed information about the item and he may direct the generator to retrieve all related items of one or more classes (again, that meet the conditions of the filter) and select some of them to include in the portfolio.
6. He then recurses into other items from this point, repeating steps 3 and 4, or closes the portfolio.

The filter and the list of keywords, specified in Steps 1 and 2, define the *focus* of the portfolio the user will construct.

Figure 3 abstracts the dynamics of the portfolio generator, where: square boxes indicate navigation contexts, i.e., sets of related repository items, whose class is shown in the grey area (in italics); arrows between boxes indicate navigation alternatives, e.g., from a work of art (in the results of a query) to the set of related documents (“Documents by Work of Art”); and dashed boxes represent indexes (menus).

Figure 4 symbolically represents a digital portfolio, obtained from the Portinari Project repository, while Annex A.2 shows the corresponding XML document, with the full details of the items. This portfolio was obtained as follows:

1. The user starts by defining the filter “all works of art, exhibitions and photos since 1930”.
2. He then searches the repository using the keyword “Saint John”.
3. The generator replies with the list of works of art, exhibitions and photos since 1930 that are related to “Saint John”.
4. The user selects item 1512 to include in the portfolio, along with detailed information about this work of art (shown in Figure 5).
5. He then requests to retrieve all works of art, exhibitions and photos since 1930 that are related to item 1512.

From the retrieved items, he selects to include in the portfolio: one related work of art, item 5177; two related exhibitions, items EX 42.1 and EX 498.1; and two related photos, items AFRH 39.1 and AFRH 658.1.

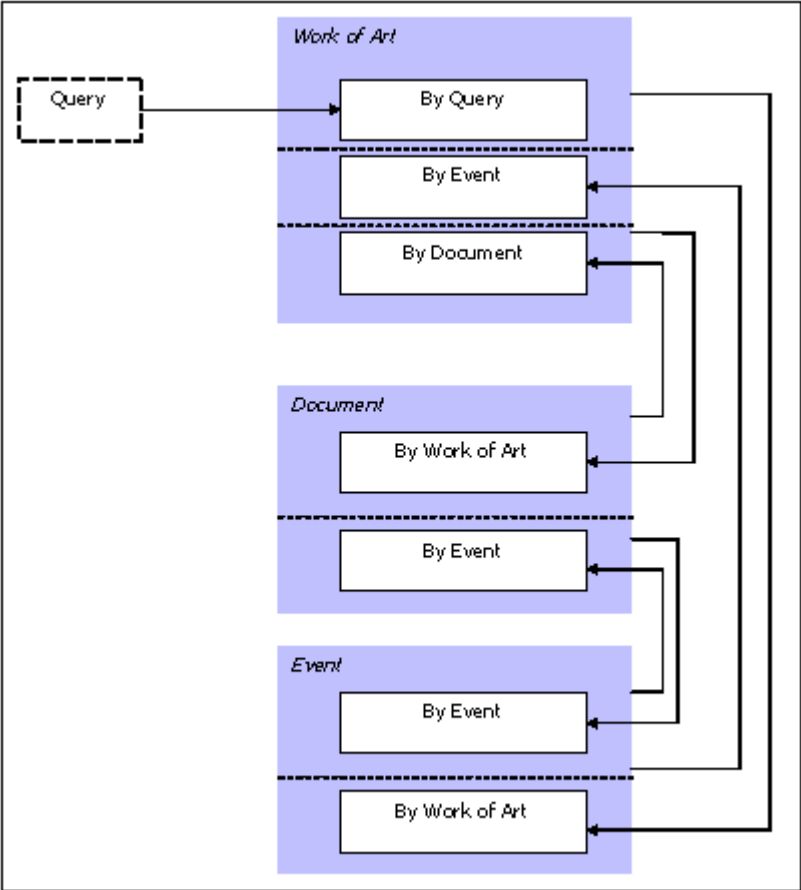


Figure 3 - General Navigation Schema for Digital Portfolios.

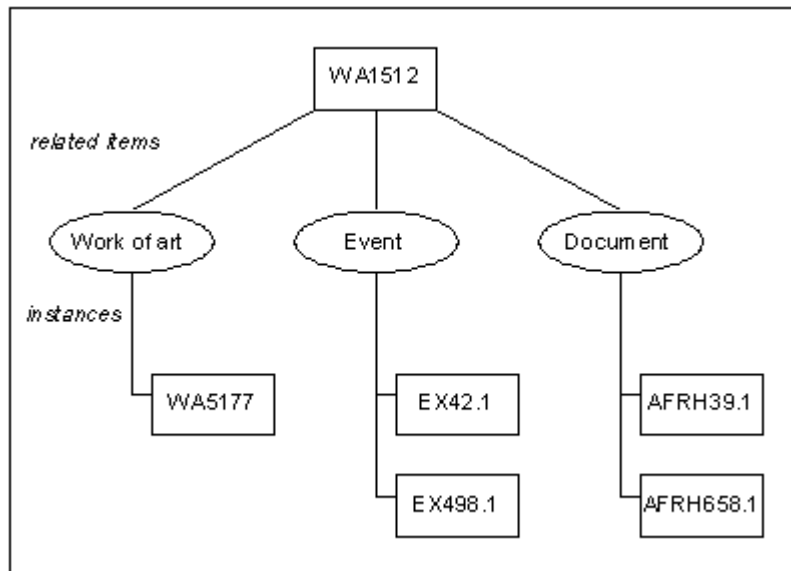


Figure 4 - Schematic example of a portfolio.



Figure 5 – “Saint John's Festivities” (Item 1512).

## 5. Guided Tours

A *guided tour* is a sequence of description items or guided tours, except that a guided tour may not be part of itself, direct or indirectly. A guided tour is *simple* if it contains only description items, otherwise it is *complex*. Thus, guided tours may be *nested* and both description items and guided tours may be part of several distinct guided tours. A *description item* refers to a repository item and it has a *title*, typically a short text exposing the item's theme, and a *description*, typically a longer text, or a richer object, that may contain hyperlinks to external Web pages. Figure 6 contains a conceptual schema for guided tours that captures this intuitive explanation.

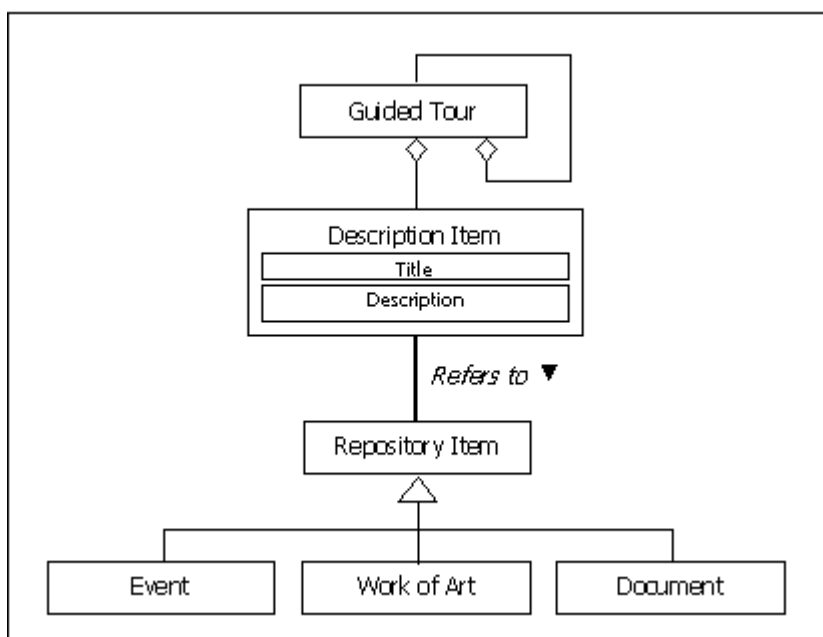


Figure 6 – A Conceptual schema for guided tours.

The navigation structure of a guided tour is a nested circular list, each description item or (nested) guided tour is linked to the next in the tour, and the last to the first. The navigation to a nested guided tour returns to the containing guided tour. In addition, a guided tour has an index pointing to its items and allowing direct access to any of them.

We again stress that the same repository item may be referred to by several guided tours, with different navigation alternatives. In other words, the curator need not commit to one specific arrangement criterion to organize an exhibit, since he may define as many guided tours as he sees fit over the same repository items.

The guided tour generator is a tool to create Web pages that implement guided tours. The generator offers *page templates* that define how to format description items and that implement the predetermined navigation structure of guided tours, as discussed above. Each page template

necessarily has placeholders for a title, a description and a hyperlink to a repository item. The template for works of art, and other classes of objects with an associated image, also has a placeholder for an image, which is the anchor of the hyperlinked to the repository item. Figure 7 contains an example of a typical page of a guided tour.

The generator also offers navigation templates to index guided tours. An example is a template that organizes the index by mimicking the two-dimensional floor plan of a hypothetical museum, with the description items and nested guided tours indicated where appropriate, according to their physical location. The tour itself would navigate through the items in the recommended order, much in the same way as the recommended visits in actual museums.

The authoring of guided tours is a very simple process. The user start out by creating a high level definition of the tour, that is, by choosing the repository items that will be part of the tour and by defining an arrangement for them. Next, he fills in page templates with the necessary elements. The author may also insert links to other guided tours to create complex guided tours.

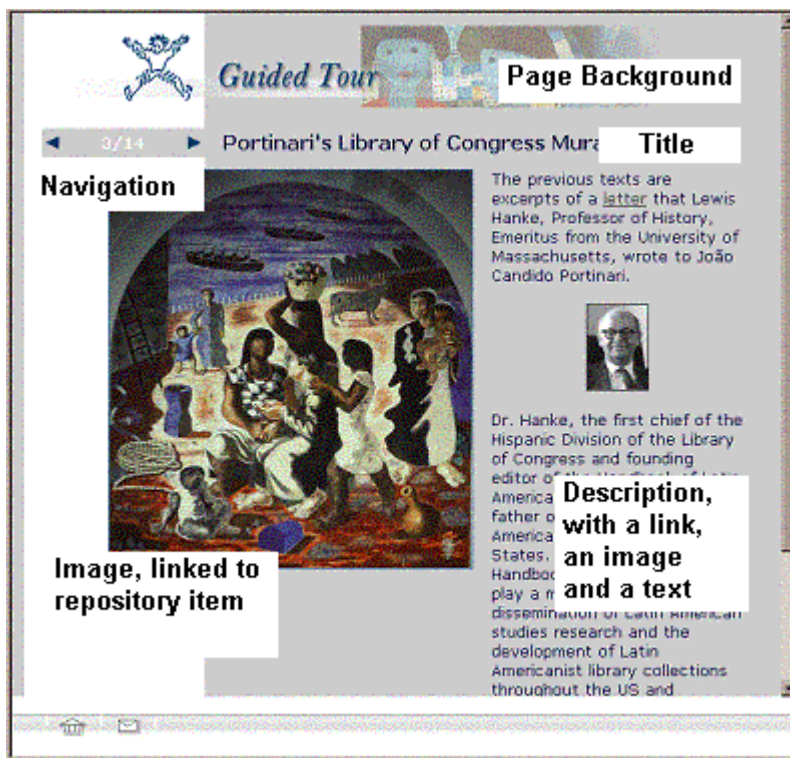


Figure 7 – Example of a Web page of a guided tour.

## 6. Final Remarks

We briefly described in this paper a digital portfolio generator and a guided tour generator, designed to facilitate the dissemination of digital cultural repositories. These tools address the needs of specialists, interested in recovering all documents pertaining to a given work of art, academic users, attracted by educational uses of the repository, and casual visitors, interested in “cultural sightseeing”.

The guided tour generator uses predefined page layouts and a fixed navigation strategy. It can be improved by allowing the user to customize page layouts, as well as navigation strategies, to some extent. The portfolio generator offers an interface that favors “hand picking” the repository items the user is interested in. A dual approach would be to design a second interface that would let the user create portfolios containing the result of a single query.

Finally, our previous experience with the Portinari Project repository strongly influenced the design of the tools. In particular, the DTD shown in Annex A.1 should be viewed as just a first approximation for the exchange format of digital portfolios that reflects the repository’s design. We are now in the process of evaluating current standard proposals for digital content held in museum collections, such as that of the Consortium for Interchange of Museum Information (CIMI), to incorporate them into the tools' design and thereby improving their usefulness to cultural entities.

## Acknowledgements

The Portinari Project is partially funded by the Fundação de Amparo à Pesquisa do Rio de Janeiro - FAPERJ.

## References

- Guell, N.; Schwabe D.; Vilain, P., “Modeling Interactions and Navigation in Web Applications”, Lecture Notes in Computer Science 1921, Proceedings of the World Wild Web and Conceptual Modeling'00 Workshop, ER'00 Conference, Springer, Salt Lake City, 2000. ISBN 3-540-41073-2. Pp. 115-127.
- Lanzelotte, R.S.G.; Marques, M.P.; Penna, M.C.S.G.; Portinari, J.C.; Ruiz, F.D.; Schwabe, D. “The Portinari Project: Science and Art team up together to help cultural projects”, Anais de Second International Conference on Hypermedia and Interactivity in Museums (ICHIM'93), Cambridge, Inglaterra, Set. 1993.
- Rossi, G; Garrido, A.; Schwabe, D.; “Designing computational hypermedia applications”, Journal of Digital Information, British Computer Society e Oxford University Press, Southampton, Inglaterra, 1998. (<http://jodi.ecs.soton.ac.uk>)
- Rossi, G.; Schwabe, D.; Lyardet, F.; “Integrating Patterns into the Hypermedia Development Process”, New Review of Hypermedia, Vol. 5, 1999, Taylor Graham Publishers pp. 59-80, ISSN 1361-4568.

- Rossi, G.; Schwabe, D.; Lyardet, F; “Web application models are more than conceptual models”, Lecture Notes in Computer Science 1727, pp. 239-252, ISBN 3-540-66653-2, Proceedings of the World Wild Web and Conceptual Modeling'99 Workshop, ER'99 Conference, Springer, Paris, 1999.
- Rossi, G.; Schwabe, D.; Lyardet, F; “Abstraction and Reuse Mechanisms in Web Application Models”, Lecture Notes in Computer Science 1921, Proceedings of the World Wild Web and Conceptual Modeling'00 Workshop, ER'00 Conference, Springer, Salt Lake City, 2000. ISBN 3-540-41073-2, pp 76-100.
- Schwabe, D.; Rossi, G.; Barbosa, S.D.J.; “Systematic Hypermedia Application Design Using OOHDM”, Proc. of Hypertext'96, ACM, Washington, March 96, pp 116-128.
- Schwabe, D.; Rossi, G.; “An Object Oriented Approach to Web-Based Application Design”, Theory and Practice of Object Systems, Special Issue on the Internet, v. 4#4, pp.207-225, 1998.
- Schwabe, D.; Rossi, G.; Esmeraldo, L.; Lyardet, F. ; “Engineering Web Applications for reuse”, IEEE Multimedia 8(1)– Special Issue on Web Engineering, Jan-Mar 2001. pp 20-31 ISSN 1070-986X.

## Annex - Representing digital portfolios in XML

### A.1 - A DTD for documents representing digital portfolios

```
<?xml version = "1.0"?>
<!DOCTYPE portfolio [
<!ELEMENT portfolio (focus, item+)>
<!ELEMENT focus (view, keywords)>
<!ELEMENT view (#PCDATA)>
<!ELEMENT keywords (#PCDATA)>
<!ELEMENT item (name, verbete?, image_item?, related_items)>
<!ATTLIST item id ID #REQUIRED
              type (work_of_art | event | document) #REQUIRED
              subtype (ev_auction | ev_exhibition | doc_aptx | doc_pr | doc_co |
                       doc_de | doc_doc-ev | doc_afrh | doc_livfol | doc_matav |
                       doc_matico | doc_ppe) #IMPLIED>
<!ELEMENT name (#PCDATA)>
<!ELEMENT verbete (#PCDATA)>
<!ELEMENT image_item EMPTY>
<!ATTLIST image_item image ENTITY #REQUIRED>
<!ELEMENT related_items (item*, ref_items*)>
<!ATTLIST related_items
              work_of_art CDATA #IMPLIED
              ev_auction CDATA #IMPLIED
              ev_exhibition CDATA #IMPLIED
              doc_aptx CDATA #IMPLIED
              doc_pr CDATA #IMPLIED
              doc_co CDATA #IMPLIED
              doc_de CDATA #IMPLIED
              doc_doc-ev CDATA #IMPLIED
              doc_afrh CDATA #IMPLIED
              doc_livfol CDATA #IMPLIED
              doc_matav CDATA #IMPLIED
              doc_matico CDATA #IMPLIED
              doc_ppe CDATA #IMPLIED>
<!ELEMENT ref_items EMPTY>
<!ATTLIST ref_items ref IDREFS #IMPLIED>
]>
```

### A.2 An XML document exporting the digital portfolio of Figure 4

```
<portfolio>
  <focus>
    <view>Todas as obras, exposicoes e fotos de 1930 a 1950</view>
    <keywords>Sao Joao</keywords>
  </focus>
  <item id="1512" type="work_of_art">
    <name> Festa de Sao Joao </name>
    <verbete>
      Festa de Sao Joao
      1936 e 1939
      Pintura a oleo/tela
      172 x 193cm (C) (aproximadas)
      Rio de Janeiro, RJ
      Assinada e datada no canto inferior esquerdo "PORTINARI 193[6]-1939"
    </verbete>
    <image_item image="OAm_5177.JPG"/>
  </item>
</portfolio>
```

```

<related_items work_of_art="4" ev_exhibition="61" doc_afrh="7">
  <item id="5177" type="work_of_art">
    <name/>
    <verbete>
      Festa de Sao Joao
      1936
      Pintura a oleo/tela
      172 x 193cm (C)
      Rio de Janeiro, RJ
      Sem assinatura e sem data
    </verbete>
  </item>
  <item id="42.1" type="event" subtype="ev_exhibition">
    <name/>
    <verbete>
      EX 42.1 - Hampton Woman's Club House (Newport News, VA). National Art Week, 23
      nov. 1941. [coletiva - Portinari: 99 reproducoes]
    </verbete>
  </item>
  <item id="498.1" type="event" subtype="ev_exhibition">
    <verbete>
      Parque Ibirapuera (Sao Paulo, SP). Mostra do Redescobrimento: arte moderna, 23
      abr.-7 set. 2000. Org., curador. Nelson Aguilar. [coletiva - Portinari: 2
      obras]
    </verbete>
  </item>
  <item id="39.1" type="document" subtype="doc_afrh">
    <name/>
    <verbete>
      AFRH 39.1- Vosylius, Kazys. [Exposicao Portinari]. Museum of Modern Art, Nova
      York, NY, [out. 1940]. Reprod. fot. Camara Tres Fotografia.
    </verbete>
    <image_item image="AFm_00391.jpg"/>
  </item>
  <item id="658.1" type="document" subtype="doc_afrh">
    <name/>
    <verbete>
      AFRH 658.1 - [Exposicao Portinari]. Museu Nacional de Belas Artes, Rio de
      Janeiro, RJ, [nov. 1939]. Reprod. fot. Camara Tres Fotografia.
    </verbete>
    <image_item image=" AFm_06581.jpg"/>
  </item>
</related_items>
</item>
</portfolio>

```