

# Performance Measures of Academic Digital Library Services: A Delphy Study at the University of Camerino

Research proposal

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## **1. Introduction**

### **1.1 General statement**

The digital revolution, in the form of electronic tools, digital resources and networked services, has changed the way in which scholarly information is distributed. Digital technologies have improved university library organisational effectiveness and service performance and imposed a rethinking action on models, practices and standards, which ask for reliable evaluation assets.

Evaluation of digital library services may take different perspectives, according to scope and extent and in a manner consistent to the context under study. One of the core activities of the evaluation process is performance measurement, aiming at a cyclical assessment of services targeted on users, their needs and satisfaction.

Since the emergence of digital libraries, research and practical developments have grown exponentially, while evaluation activities have been lagging far behind. It is widely acknowledged that when getting at the issue of assessment in a digital library environment, much has yet to be investigated (Saracevic, 2000; Shearer, 2002; Chowdhury & Chowdhury, 2003; Cullen, 2003; Bertot, 2004).

As an iterative multistage approach based on consensus, the Delphi research method is suitable for investigating performance measurement processes and their requirement of a stable set of indicators, thought to reflect and assess digital library services and commendable for significantly contributing to broad knowledge within the topic.

A Delphi study, aimed at identifying performance measurement indicators of digital library services, will be carried out. On the one hand, it will be deeply rooted in an international perspective of existent researches, projects and standards, which will work as starting points and in due course as terms of comparison. On the other hand, it will have an exclusively Italian setting, drawing together the expertise of a panel of Italian library professionals and researchers, called to think out and reflect on a taxonomy of measures and indicators. The field of application of findings will be the University of Camerino, focus being on the appropriateness of the resulting classification model for this organisation needs and its prospective applicability.

### **1.2 Broad plan**

The broad plan of this Delphi research project is designed to go through the following steps:

1. building up an initial theoretical measurement framework made of categories, sub-categories and indicators, based on previous research;
2. drawing together a panel of experts to confront their opinions on the proposed model, debate the issue of digital library performance measurement and forward further viable approaches, if any;
3. establishing a taxonomy of academic digital library performance indicators;
4. assessing the relationship between findings and the organisation.

### **1.3 Aims**

Aims of this research are:

1. to improve digital library service quality for users within the organisation;
2. to lay the foundations of a culture of measurement on digital library services in the organisation.

### **1.4 Objectives**

The deriving objectives are:

1. to gather and analyse previous research;
2. to devise a taxonomy of performance measures and indicators;
3. to establish a standard for retaining desired performance indicators;
4. to find consensus about a set of viable measures and indicators suitable for a given context.

### **1.5 Research questions**

Purpose of this research is to answer the following questions:

1. what are the performance measures that can serve as indicators of quality for digital library services critical for users' satisfaction?
2. how can an evaluation model for digital libraries deploy a quality improvement strategy?

### **1.6 Framework and limitations**

This Delphi study will be conducted in an Italian context and related to the needs of the University of Camerino, the researcher's work place.

People involved in the study will be Italian library science professors, researchers and library professionals and library staff at the University of Camerino.

The study starts in November 2005, is suspended in February 2006 and will last 9 months.

The study will be carried out according a principle of flexibility, as for the number of rounds requested by the Delphi method to reach consensus or a stability of response (Crisp et al., 1997) within the panel of experts involved. Assessment can be previewed, but not established a priori. As for the issues of reliability and validity they must be given special care in a Delphi study. The first cannot always be evenly proved by the method (Sackman, 1975;

Woudenberg, 1991) and the latter may be threatened by pressures for convergence of opinions (Rowe & Wright, 1999; Hasson, Keeney & McKenna, 2000).

This is a small-scale study, carried out in an Italian perspective which will strictly involve the issue of digital library performance measurement as experienced in an academic library.

## **2. Background**

### **2.1 Digital libraries and evaluation**

Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically for use by a defined community or set of communities (DLF, 1999).

In the practice community, where it was first conceived, this is widely acknowledged as a comprehensive definition of digital library, because it represents a pragmatic approach, which emphasises the synergy between organisations and collections on the one hand, and the provision and development of services and information resources for a community of users on the other (Saracevic, 2000).

Primary concern of any evaluative approach is to get information from collected data to be used against a set of defined objectives, which may be library-centred or system-centred, focusing on efficiency and effectiveness, or user-centred, pointing at service quality and users' needs (Bertot, 2004). In a digital library environment, attention is also paid to a human-centred approach, studying behaviour, such as information seeking or performance in completion of a given task and a usability-centred approach, assessing features by users, bridging between system and human-centred approaches (Saracevic, 2004).

When the definition of digital library is compared with that of evaluation and its evolution in time: "evaluation serves different stakeholders [...] and target different goals, ranging from increased learning and improved research to improved dissemination" (Marchionini, Plaisant & Komlodi, 2003), it is clear that research is going the same direction. But while purposes are clear, agreement upon what data to collect, what criteria to concentrate on and what methodology to employ is harder to detect (Saracevic & Covi, 2000; Poll, 2001b).

### **2.2 Performance measurement and indicators**

"The general why of evaluation deals with performance to start with and goes on from there to define more specific goals and choices" (Saracevic & Covi, 2000), thus Herson & Altman (1996) add, "the concept of measurement is closely related to evaluation; however, [...] the two processes differ". As a consequence, when coming at performance measurement, at first sight it appears to apply only to a self-contained system-centred approach to evaluation. Nevertheless, it is firmly rooted in literature that performance is about the degree of fulfilment of library objectives in terms of users' needs, while measurement is the process of data analysis to evaluate performance and indicators are the tools to carry out the aforesaid process (Poll & te Boekhorst, 1996; Blixrud, 2002a; Barton, 2004; Bertot, McClure & Ryan, 2000).

Performance measurement, then, is not simply about collecting statistics, or quantitative data. It compares and combines data, adds “subjective” data and relates them to the mission and goals of the library (Poll & te Boekhorst, 1996). ISO TC 46/SC 8 (2002) confirms this view for the electronic and digital environment.

Performance measurement comprises also the gathering of qualitative data about users’ opinions, perceptions and satisfaction, in order to keep compliant with one’s mission and goals. Performance indicators, as tools of measurement, can be used effectively in the evaluation of libraries. They serve the scope of effectiveness, quality and efficiency of resources and services and help the fulfilment of stakeholders’ interests (ISO 11620, 2003).

### **2.3 Performance measurement rationale and categories**

If embedded in its parent organisation culture, performance measurement of digital library services is a powerful management tool for strategic planning and development (Barton, 2004). It assures justification of expenditure and resource allocation of investment efforts or service improvement and impact on users (Tammaro, 2000), that is, effectiveness, efficiency and cost effectiveness (Saracevic, 2000). It checks quality, service level and accountability to customers; it supports decision-making (Abbott, 1994), internal change-tracking and benchmarking (Shim et al., 2001a; Blixrud, 2002b). It helps managing statistical data about digital services and vendors (Luther, 2000). Performance measurement, then, accounts for future collection development, evidence and value-based service provision (Bertot, 2001). On the last issue, a shifting of interest can be traced from showing and justifying the good supporting role of digital services towards their influencing and facilitating changes in learning, parent institutions and scholarly publishing (Bertot, 2004; Poll, 2005a).

If the rationale of performance measurement is clear, the task of devising performance measures and indicators and their components is still a complex one (Hiller & Self, 2004). Calls for standardised measures are still current. Their aim is to compare and aggregate results and spread knowledge about tested methods and practices (Poll, 2005b).

Up to present, attempts to categorise the matter have led to diverse achievements with sometimes overlapping, sometimes different outcomes. Poll (2001b) groups the following: market penetration, provision and use of electronic services, user support, human resources and costs. Bertot, McClure & Ryan (2000) identify the following categories: a technical infrastructure, information content, information services, support and management. In the context of the ARL E-metrics project, Miller & Schmidt (2001) confirm three of them: information content, information services and technical infrastructure.

### **2.4 Measurement methodologies and data collection techniques**

Measurement methodologies must be rigorous. The adoption of both qualitative and quantitative methods is generally agreed upon as a way to provide a better and more reliable picture of the complex nature of digital services (Tammaro, 2000; Galluzzi, 2001; Barton, 2004, Kyrillidou & Giersch, 2004). The employment of these “rich methods” and the use of multiple data collection techniques allow cross-check and increase credibility and reliability (Kyrillidou & Giersch, 2004). Quantitative methods produce dependable statistics; qualitative ones help the attentive reading of those data and explore further behaviours, perceptions and uses.

Qualitative data collection techniques span from case studies, content analysis, critical path analysis, individual and small group interviews to focus groups, observation, user-written diary protocol placed at workstations to explore content, performance and services.

Quantitative data collection exploits new valuable techniques allowed by technology. They comprise: mail and electronic surveys, web-based or pop-up surveys, network traffic use statistics, such as access points, server loads, web downloads times, and web server log files analysis.

## **2.5 Standards and projects: an overview**

ISO standard on measuring the use of library services (ISO 2789, 2003) points out how to make available consistent statistical data to be applied to a digital environment, even if it still gives small consideration to the elusive boundaries of electronic services and how to measure usage of library linked free resources (Poll, 2005a). ISO 11620 on performance indicators collects 32 indicators. It addresses the quantity and quality of provided services. Indicators are recommended but not prescriptive. Most notable is the integration of the two standards with the technical report 20983 by ISO TC46/SC8 (2002) work in progress, which has produced 15 new indicators, purposely identified for a digital environment.

There exist initiatives by various local, national and international associations. In Europe the EQINOX project (2000) designed a set of 14 performance indicators, intended to complement ISO 11620, with the purpose of achieving also quality management. Literature doesn't report on practical applications of the project. The E-measures project (2004) is based in evidence and practice. Measures are studied for decision-making and user support and tested in and for libraries and their electronic information services. The purpose of the eVALUED project (2004) goes beyond performance measurement to pursue outcomes assessment in relation to electronic information services provision. It develops an online toolkit to ease e-libraries qualitative evaluation in UK higher education without dismissing statistical data collection.

In the USA the ARL E-Metrics project (2005) tested a set of measures in four areas: patron accessible resources; use of electronic resources and services; expenditures for networked resources and related infrastructure; library digitisation activities, then expanded to electronic reference transactions, percentage of virtual visits and e-books (Shim et al., 2001a; Miller & Schmidt, 2001). It also supports the COUNTER project (Shepherd, 2004).

In Italy there are no comprehensive projects going on, but there have been initiatives like the CASPUR seminars, which have raised the issue of digital services performance measurement from an operational point of view (Gargiulo, 2003), or CILEA consortium activities on measurement (Rodi, 2003; Dellisanti & Balducci, 2004) concentrated on getting statistics from access and full-text article download counting and performance indicators.

Future developments of performance measurement for digital library services are not foreseeable. Procedures and application tools will progress, as technology does. They will require new evaluation models to reflect those changes (Kwak et al., 2002). As for now, any practice has to be assessed and tested within the particular reality under measurement to prove effectual and there is not just one model or approach agreed upon, or a set of indicators suitable for any context.

### 3. Research design: methodology and procedures

#### 3.1 The Delphi research method and qualitative research

It is generally understood that research is about the “discovery or creation of knowledge, or theory building; [...] and/or investigation of a problem for local decision-making” (Heron, 1991, cited by Gorman & Clayton, 1997). In the realm of qualitative research methodology, whose application has proved most suitable in the so-called “soft sciences” (Marshall & Rossman, 1999), the Delphi method is classified among the group discussion or facilitation processes (Patton, 1990). Its aim is to create a “collective human intelligence capability [...] via structured communications” (Linstone & Turoff, 1975), that is why, apart from its application as a forecasting procedure, it can be especially successful in a variety of areas, like “putting together the structure of a model” (ibid.), where both the creative exploration of ideas, and the production of effectual information for decision-making are involved.

An appropriate definition of the method is offered by Linstone & Turoff (1975)

“Delphi may be characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem.”

Originally born only as a predictive method, designed to see into the future, Delphi has been acknowledged later as “a retro-deductive approach to research” (Bolognini, 2001, p. 68), where informed judgement, or *opinion*, which precedes, in turn, data and argumentative verifications and situates itself somewhere in-between knowledge and speculation, presence or absence of evidence (Dalkey et al., 1972; Fischer, 1978), is submitted to rigorous confirmation procedures.

Assuming that group judgements of professional opinion are preferable to individual ones, the method is either meant to draw together a panel of experts and examine the level of consensus of opinion within the group without requiring face-to-face contact (Dalkey & Helmer, 1963), or to obtain a reliable group opinion (Linstone & Turoff, 1975). The goal is pursued, through reflection and iteration, by resolving differences, eliciting knowledge (Rowe, Wright & Bolger, 1991) and practically administering a series of structured questionnaires or rounds “interspersed with controlled opinion feedback” (Dalkey & Helmer, 1963) to remove irrelevant information; by analysing and statistically aggregate group responses; maintaining the anonymity of participants or at least of their answers (Hasson, Keeney & McKenna, 2000; Mullen, 2003; Landeta, 2005). In conclusion, not without reason the Delphi method connotes itself for its hybrid epistemological status, deriving quantitative estimates through qualitative approaches (Bowles, 1999; Niero, 1987), the first ones used as tools to illuminate the second ones.

Qualitative research methodology and the Delphi method have been found appropriate to develop an evaluation model based on performance measures and indicators of quality to be applied successfully to a digital library environment within a traditional library context, and investigate its applicability and feasibility.

#### 3.2 Research design

This application of Delphi unfolds a slightly modified model from the original classical one (Dalkey et al., 1972) as regards the data collection techniques employed to cover a possibly exhaustive data gathering for a three-step process, involving:



1. identification of a set of concepts, namely an initial evaluation model, framed in past and current research;
2. verification of the initial model content validity (Kwak et al., 2002; Chin, Hsieh, & Wu, 2004; Okoli & Pawlowski, 2004) and development of a taxonomy of performance measures and indicators;
3. pilot test procedures, strategies and criteria prior to adoption and implementation within a given context (Krueger & Casey, 2000).

However precisely intended, qualitative inquiry does not allow for a detailed research design to be entirely planned beforehand, because mid-course unexpected results may arise to cause changes to research questions and design (Gorman & Clayton, 1997; Marshall & Rossman, 1999), so that some flexibility should be reserved. Nevertheless, a provisional plan to function as framework is to be provided.

### **3.3 Participants**

In order to draw the list of digital library experts to be proposed to participate in the study, purposive or criterion sampling has been applied (Patton, 1990, p. 176). Participants are not selected randomly, but for a purpose, “to apply their knowledge to a certain problem” (Hasson, Keeney & McKenna, 2000). Adopted criteria are:

1. the search has been geographically confined to Italy;
2. online bibliographic databases and web search engines, online news services, mailing lists, institutional web sites, conferences, journals will be scanned looking for digital library-related professors, researchers, specialists and University library professionals;
3. library professionals working at the University of Camerino will be involved at different levels of the research. According to their background and competences, they will be invited either to participate to the panel, or to the focus group activity intended to revise and discuss findings;
4. the researcher is likely to establish a trustworthy relationship with panellists to maintain their commitment and interest until the process is completed (Hasson, Keeney & McKenna, 2000; Mullen, 2003), to be objective for methodological, pragmatic and ethical reasons (Beretta, 1996; Rauch, 1979; Rowe, Wright & Bolger, 1991) and gain cooperation from the academic staff, prior to her role of moderator, both during the panel activity and the focus group activity.

### **3.4 Data collection**

More than one technique has been chosen to gather data, thus pursuing reliability and validity enhancement and providing, through different approaches, a cross-check of findings (Bryman, 1992) and a coverage of all the issues raised by the research problem:

1. Review of documents;
2. Questionnaires;
3. Focus groups;
4. Research journal.

**Review of documents.** Prior to the administration of questionnaires, documents about projects, standards, implementations on performance measurement concerning digital library services will be analysed according to their theoretical validity. Results will be compared and assembled to produce an initial tree-like evaluation model made of categories, items and indicators. Their content validity will then be checked against the panellists' responses during the Delphi rounds.

**Questionnaires.** The discovery of opinion is the first concern of a Delphi research. The conventional asset of the Delphi method prescribe the use of questionnaires or "rounds" to be administered to panellists as many times as necessary to reach consensus (Sumsion, 1998; Okoli & Pawlowski, 2004) and the first round to take the form of a series of open-ended questions to allow complete freedom (Hill & Fowles, 1975; Hasson, Keeney & McKenna, 2000). Nevertheless, evidence shows that two or three rounds are commonly estimated preferable for diverse reasons, including time and panellists' dropouts (Bardecki, 1984; Mitchell, 1991; Woudenberg, 1991) and modifications of the first round have proved equally accurate (Kwak et al., 2002; Howze & Darlymple, 2004; Harer & Cole, 2005). Being the definition of consensus fixed at the outset, rounds will be thus organised:

**Round 1.** To avoid bias and distortions, findings from the review of documents will ground the questionnaire, where respondents will be fed an initial list of items and indicators to be rated by relevance on a five-point Lickert-type scale (Niero, 1988). It is also strongly recommended that participants could add to the list items and indicators and give narrative comments on their choices.

**Round 2.** A modified list, made of results with the addition of those new items and indicators deemed as appropriate in the first round, as well as data elicited from comments, will be given back to participants and the process will be iterated.

**Round 3.** It will be administered if the previous round won't score valid results.

**Focus groups** will be employed as a follow-up to bring a step further the findings of the Delphi study and contextualise them to the University of Camerino, to determine people's reactions, attitudes and thinking (Krueger, 2000) on the applicability of the evaluation model, perceptions on its accuracy and how to make it part of the organisational culture.

**Research journal.** Assuming that writing is thinking (Gorman & Clayton, 1997), a journal is kept throughout the research process to record, in as much as possible organised way, ideas and reflections, possibly generating new insights on the study.

### 3.5 Data analysis

Data analysis must forcibly take into account the management of qualitative and quantitative data. Unstructured Delphi and focus group data will be dealt with using content analysis techniques (Gorman & Clayton, 1997; Marshall & Rossman, 1999) for categorisation and coding, taking care that participants' wording is kept as far as the Delphi data are concerned (Hasson, Keeney & McKenna, 2000). Graphics and tables will be used to organise and present qualitative data.

As for quantitative, already structured data, ratings of the items will produce descriptive statistical summaries using measures of central tendency (mean and median) to represent the group opinion of the panel and levels of dispersion (standard deviation) as a measure of spread to represent the amount of disagreement within the panel (Greatorex, 2000; Niero, 1988).

Findings of each round will be presented in tables, showing mean and standard deviation, with information on how to interpret and locate them in the general asset of the research.

Records will be kept to ensure their availability and a final summary of findings will be provided to all participants.

#### **4. Reciprocity and ethical considerations**

The researcher is aware of the demanding commitment asked for, both to the institution involved and to the panel of experts, and recognises her being indebted and her readiness to give back, in whatever form, what she receives (Marshall & Rossman, 1999).

Ethical issues arising during the study will be dealt with according to the principles of approval from the organisation, anonymity, as for judgements and opinions expressed (Mullen, 2003), informed consent, voluntary participation and feedback (Woudenberg, 1991; Gorman & Clayton, 1997; Marshall & Rossman, 1999)

#### **5. Significance of the study**

This study is likely to contribute to research and practice. A Delphi approach to library and information science issues in general and digital library performance measurement in particular is not new, but not so widespread in international literature and appears to be quite new from an Italian perspective. This study may contribute to raising interest towards the method and its applicability in the field.

The importance of the issue of performance measurement in a digital library environment in an Italian academic library context is certainly felt, given the everyday confrontation with access, management and evaluation of digital services, but up to now no systematic approach has been undertaken as for the definition of indicators apt for measurement. The results of this study may represent a step forward in that direction.

The research will also contribute to the foundation of a culture of measurement in the organisation involved in the first place, to devise strategies of quality assessment and user's satisfaction.

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## 7. Appendix 1

| Time schedule  | Nov | Dec | Jan | Feb | Mar | Apr | Ma | Jun | Jul | Aug | Sept |
|--|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|------|
|  | .   | .   | .   | .   | .   | .   | y  | .   | .   | .   | .    |
| <b>Planning – Research paradigm</b>                    |     |     |     |     |     |     |    |     |     |     |      |
| Literature review                                      | ■   | ■   | ■   |     | ■   | ■   | ■  | ■   | ■   | ■   | ■    |
| Research journal                                       | ■   | ■   | ■   |     | ■   | ■   | ■  | ■   | ■   | ■   | ■    |
| Analysis of research problem                           |     | ■   |     |     |     |     |    |     |     |     |      |
| Identification of methodology                          |     | ■   |     |     |     |     |    |     |     |     |      |
| Identification of sample                               |     |     | ■   |     |     |     |    |     |     |     |      |
| Research proposal                                      |     |     | ■   |     |     |     |    |     |     |     |      |
| <b>Fieldwork</b>                                       |     |     |     |     |     |     |    |     |     |     |      |
| Cross-analysis and categorisation of existent research |     |     |     |     | ■   |     |    |     |     |     |      |
| Draft table of performance indicators                  |     |     |     |     | ■   |     |    |     |     |     |      |
| Delphi 1 <sup>st</sup> round pilot                     |     |     |     |     |     | ■   |    |     |     |     |      |
| Delphi 1 <sup>st</sup> round                           |     |     |     |     |     | ■   |    |     |     |     |      |
| Analysis of findings                                   |     |     |     |     |     | ■   |    |     |     |     |      |
| Dissemination of findings                              |     |     |     |     |     |     | ■  |     |     |     |      |
| Delphi 2 <sup>nd</sup> round                           |     |     |     |     |     |     | ■  |     |     |     |      |
| Analysis of findings                                   |     |     |     |     |     |     | ■  |     |     |     |      |
| Dissemination of findings                              |     |     |     |     |     |     |    | ■   |     |     |      |
| Delphi 3 <sup>rd</sup> round                           |     |     |     |     |     |     |    | ■   |     |     |      |
| Analysis of findings                                   |     |     |     |     |     |     |    | ■   |     |     |      |
| <b>Final analysis of Delphi rounds</b>                 |     |     |     |     |     |     |    |     |     |     |      |
| Performance indicators model                           |     |     |     |     |     |     |    |     | ■   |     |      |
| <b>Fieldwork</b>                                       |     |     |     |     |     |     |    |     |     |     |      |
| Focus group pilot and reunions                         |     |     |     |     |     |     |    |     | ■   |     |      |
| <b>Analysis</b>  |     |     |     |     |     |     |    |     |     |     |      |
| Cross-analysis (Delphi, Focus group)                   |     |     |     |     |     |     |    |     | ■   |     |      |
| <b>Research report</b>                                 |     |     |     |     |     |     |    |     |     |     |      |
| Report   |     |     |     |     |     |     |    |     |     | ■   | ■    |