

# Information Quality and Accessibility

Owen Foley\* and Markus Helfert\*\*

\* Galway Mayo Institute of technology/Computing, Galway, Ireland. Email: owen.foley@gmit.ie

\*\* Dublin City University/Computing, Dublin, Ireland. Email: markus.helfert@computing.dcu.ie

**Abstract**—This research examines the relationship between information quality dimensions across information quality frameworks. An examination of the literature reveals that several information quality frameworks have been developed in an attempt to measure the phenomenon of information quality. These frameworks consist of information quality dimensions. Current research has placed much emphasis on dimensions such as accuracy, completeness and consistency. However little if any research has been conducted with respect to the consistency of dimension measures across frameworks? The literature also points out that research into conceptual dimensions is limited. This research endeavours to address these shortfalls by examining the accessibility dimension. The research is conducted within the context of information quality frameworks and assessment methodologies. Over the last number of years, access methods to information systems have also evolved. This has resulted in a diverse number of architectures accessing multiple information systems. Much research has concluded that accessibility is an influence on information quality. An experimental research methodology is employed to tackle the research questions. The research to date has examined different information systems' access methods and their affect upon information quality dimensions. The affect upon other dimensions that make up the information quality framework is measured. The findings to date indicate that the timeliness dimension is most affected. The restriction of access to information systems via web services is also significant.

**Keywords**—Information Quality; Accessibility; Experiment

## I. INTRODUCTION

The increased interest in Information Quality (IQ) stems directly from a critical reliance by enterprises at all levels on information systems for completion of their core business activities. The access to Information Systems has also increased with widespread deployment of Web Servers. Many of these businesses have mission critical information systems, yet have no measure of the quality of the information that they derive their business and profit from. In stark commercial terms Colin White [1] president of Intelligence Business Strategies estimates that poor quality customer data cost U.S. business \$611 billion a year and that 50% of the companies examined by the research have no plans for improving data quality. Many researchers have examined IQ, as a result.

However the measurement of the accessibility dimension has to date been by and large a subjective measure of the users' perceptions. This it is argued does not provide an adequate or objective enough measure and has the potential to skew results unfavourably. In our

research we aim to address the lack of research in this area and focus on the development of an objective measure that has the potential to improve IQ. The perceptions of users, novice or expert will always have the potential to vary, however the objective measure of the accessibility dimension taken with the subjective view can it is argued provide a more accurate measure. This paper proposes a framework for these objective measures, thus contributing to improve IQ.

This paper is structured as follows. An initial examination of the concept of Data Quality is presented followed by identification of the key dimensions from previous research. The concept is then set in context with respect to these dimensions. A discussion of the value and necessity of metrics for these dimensions is followed by an outline of the challenge with respect to the measurement in particular of the accessibility dimension. A proposed framework is put forward along with the presentation of interim results followed by conclusions and the research challenges that are presented.

## II. INFORMATION QUALITY – DEFINITION

The importance of data like many commodities is only ever realised when there is scarcity or complete lack of it. Quality data is a vital commodity in a modern knowledge driven economy. The concept of IQ has received a significant amount of attention from non Information Systems professional since the terrorist attacks on The World Trade Centre in 2001. The lack of quality data or 'bad' data was a contributing factor in failing to prevent the attacks [3]. The non accessibility to vital information with respect to engineering details was a contributing factor. The lack of joined up communication systems to share the available information among many of the emergency services came in for criticism. The aim of IQ research is to minimise the impact of inadequate information.

The concept of IQ must be examined in context. Previous database research concentrated on intrinsic values such as accuracy [4] and completeness [5] and did not consider the data in context. The independent examination of data argues Strong et al [6] does not offer a true reflection of quality. The concept of fitness for use as described by Tayi et al [7] is a definition that implies that the concept of IQ is relative to the use of the data with respect to a particular task. There are many dimensions that make up IQ [2] as outlined in Table 1 below.

TABLE I. INFORMATION QUALITY DIMENSIONS

Dimension
Accessibility
Appropriate Amount of Data
Believability
Completeness
Concise Representation
Consistent Representation
Ease of Manipulation
Free-of-Error
Interpretability
Objectivity
Relevancy
Reputation
Security
Timeliness
'Understandability'
Value-Added

### III. THE ACCESSIBILITY DIMENSION

There is no simple definition of accessibility. Users and IS professionals have [8] indicated to researchers that they consider it fundamental to the concept of IQ. In its simplest form Loshin [9] has described it in terms of ease of access to the information in the system and access to the complete amount of information required. He further asserts that information must be in a format that allows for satisfactory presentation. Accessibility argues Lee et al [10] is simply the 'ease of attainability of the data'. The research completed by Wang et al [2] have indicated that it is a separate IQ category with the characteristics being described as 'Accessibility' and 'Access Security'. The definition has been further added to by Batini et al [11] where it is described as 'the ability to access the data from his/her own culture, physical status / functions and technologies available'. This definition is followed by guidelines with respect to web site design and interface layout that maximises ease of access.

These definitions while offering an understanding of the concept does not provide a comprehensive definition that allow for accurate measurement as a dimension. The above definitions are reliant on interested and informed users in order to obtain a true reflection of the accessibility as a dimension of IQ. The research presently being conducted is examining these characteristics with a view to implementing objective measures and overcoming the problem of subjective measurement.

TABLE II. VIEWS OF INFORMATION QUALITY

Academics	Practitioners
Accessibility	Reliability of delivery
Ease of Operations	Security
Security	Privacy
System Availability	Accessibility
Transaction Availability	'Obtainability'
Privileges	Flexibility
'Usableness'	Robustness
'Quantitativeness'	
Assistance	
Convenience of Access	
Ease of Use	
'Locatability'	

### IV. INFORMATION QUALITY MEASUREMENTS

This research has examined the dimensions as outlined by Wang et al [2] with a view to identifying corresponding measures or metrics. The following dimensions summarized in Table 3 are a sample of the metrics that have been identified in the literature. The purpose of the table is to indicate measurements that are currently in use with respect to IQ and identify areas for more detailed analysis with respect to the accessibility dimension. The objective measures of dimensions such as accuracy and consistency could possibly provide a basis for building an objective measure with respect to the accessibility dimension, in a web environment.

TABLE III. IQ DIMENSIONS AND ASSOCIATED METRICS

Dimension	Metric
Appropriate Amount of Data	Measure of User Requests for data change.
Believability	Measure of Consumer Expectation
Completeness	Sampling, Tracking
Concise Representation	Ratio, Min or Max, Weighted Average
Consistent Representation	Column Analysis Domain Analysis, Statistical Analysis
Ease of Manipulation	Ratio, Min or Max, Weighted Average
Free-of-Error	Ratio, Min or Max, Weighted Average
Interpretability	Gap Analysis, Cronbach's Alpha. 1 to 10 scale of user satisfaction
Objectivity	Meets users expectations
Relevancy	Functional Score Card
Reputation	Meets users expectations
Security	Protection of privacy Existence of encryption, Storage Policy, Security Constraints
Timeliness	Multiple Channel Measurement
'Understandability'	Rating of effectiveness
Value-Added	Gap Analysis, Cronbach's Alpha.