# Evidence Based Library and Information Practice

# The Library Assessment Capability Maturity Model: A Means of Optimizing How Libraries Measure Effectiveness

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Résumé de l'article

Objective – This paper presents a Library Assessment Capability Maturity Model (LACMM) that can assist library managers to improve assessment. The process of developing the LACMM is detailed to provide an evidence trail to foster confidence in its utility and value.

Methods – The LACMM was developed during a series of library benchmarking activities across an international network of universities. The utility and value of the LACMM was tested by the benchmarking libraries and other practitioners; feedback from this testing was applied to improve it. Guidance was taken from a procedures model for developing maturity models that draws on design science research methodology where an iterative and reflective approach is taken.

Results – The activities decision making junctures and the LACMM as an artifact make up the results of this research. The LACMM has five levels. Each level represents a measure of the effectiveness of any assessment process or program, from ad-hoc processes to mature and continuously improving processes. At each level there are criteria and characteristics that need to be fulfilled in order to reach a particular maturity level. Corresponding to each level of maturity, four stages of the assessment cycle were identified as further elements of the LACMM template. These included (1) Objectives, (2) Methods and data collection, (3) Analysis and interpretation, and (4) Use of results. Several attempts were needed to determine the criteria for each maturity level corresponding to the stages of the assessment cycle. Three versions of the LACMM were developed to introduce managers to using it. Each version corresponded to a different kind of assessment activity: data, discussion, and comparison. A generic version was developed for those who have become more familiar with using it. Through a process of review, capability maturity levels can be identified for each stage in the assessment cycle; so too can plans to improve processes toward continuous improvement.

Conclusion – The LACMM will add to the plethora of resources already available. However, it is hoped that the simplicity of the tool as a means of assessing assessment and identifying an improvement path will be its strength. It can act as a quick aide-mémoire or form the basis of a comprehensive self-review or an inter-institutional benchmarking project. It is expected that the tool will be adapted and improved upon as library managers apply it.

**Evidence Based Library and Information Practice**

*Research Article*

## The Library Assessment Capability Maturity Model: A Means of Optimizing How Libraries Measure Effectiveness

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**Abstract**

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## Introduction

The improvement of processes has become increasingly important in libraries, especially within the higher education context. This has been in response to wider economic pressures that have seen limited budgets and the rise of accountability (Lilburn, 2017). Libraries have prioritized the need to demonstrate a return on investment, show that users' needs are being met, remain relevant, offer (added) value, and align with wider strategic imperatives (Matthews, 2015; Oakleaf, 2010; Sputore & Fitzgibbons, 2017; Tenopir, Mays & Kaufman, 2010; Urquhart & Tbaishat, 2016). A drive for efficiency and effectiveness has culminated in calls to foster cultures of quality, assessment, and evidence based decision-making (Atikinson, 2017; Crumley & Koufogiannakis, 2002; Lakos & Phipps, 2004). Business as usual is no longer enough. Doing more with less while continuing to improve is the new norm. Applying assessment processes and improving upon them has become imperative for library mangers

(Hiller, Kyrillidou, & Oakleaf, 2014). The challenge is how can assessment be conducted and improved efficiently and effectively. This paper documents the development of a tool—the Library Assessment Capability Maturity Model (LACMM)—that can meet this need.

## Literature Review

The issue of library assessment is well documented (Heath, 2011; Hufford, 2013; Town & Stein, 2015). Signposts, "how to" manuals, and examples of practice are readily available (Oakleaf, 2010; Wright & White, 2007). A range of comprehensive books have been published (Appleton, 2017; Brophy, 2006; Heron, Dugan, & Nitecki, 2011; Matthews, 2015).

The tools to measure effectiveness are continually evolving—from the questionnaire employed by the Advisory Board on College Libraries across Carnegie libraries in the 1930s (Randel, 1932) to Orr's framework for quantitative measure for assessing the goodness

of library services (Orr, 1973) to more contemporary tools like LibQual+® surveys (Association of Research Libraries, 2012) and web based assessment tools offered by Counting Opinions (n.d.). Significant investment has been made to strengthen librarians' assessment practices, for example through the ACRL program *Assessment in Action: Academic Libraries and Student Success* (Hinchliffe & Malenfant, 2013). Work has been undertaken to identify factors important to effective library assessment (Hiller, Kyrillidou, & Self, 2008) as well as to identify factors influencing an assessment culture (Farkas, Hinchliffe, & Houk, 2015). In discussing the history of library assessment, Heath (2011) noted that "recent years have seen a collaborative culture of assessment reach its full maturity" (p. 14).

Despite the rich literature that exists on assessment practices, the concept of maturity in assessment has only received limited attention in libraries. Cosby (1979) popularized the concept of maturity of business processes by considering them in stages building on each other, offering an effective and efficient means for the analysis and measurement of the extent to which a process is defined, managed, assessed, and controlled. The application of capability maturity within a framework emerged out of the software engineering industry where Paulk, Curtis, Chrissis, and Weber (1993) conceived a Capability Maturity Model (CMM). Subsequently, CMMs have been applied in a range of other industries and organizations to assess the level of capability and maturity of critical processes, such as project management capability (Crawford, 2006), people capability (Curtis, 2009), and contract management process capability (Rendon, 2009).

A CMM has five levels of capability maturity, as illustrated in Figure 1 (adapted from Paulk, Curtis, Chrissis, & Weber, 1993). Each level represents a measure of the effectiveness of any specific process or program, from ad-hoc

immature processes to disciplined, mature, and continuously improving processes. The CMM provides criteria and characteristics that need to be fulfilled in order to reach a particular maturity level. Actual activities are compared with the details at each level to see what level these best align to. Consideration of the details in the levels above where activities align provide guidance on where improvement can be made (Becker, Knackstedt, & Pöppelbuß, 2009).

The first reported instance of the CMM being utilized in developing a maturity model in a library setting was by Wilson and Town (2006). Here the CMM was used as a reference model to develop a framework for measuring the culture of quality within an organization. As part of her doctoral research, Wilson (2013) went on to develop a comprehensive and useful Quality Maturity Model (QMM) and Quality Culture Assessment Instrument for libraries (www.qualitymaturitymodel.org.uk). Subsequently the CMM has been used to develop maturity models in library settings to map knowledge management maturity (Mu 2012; Yang 2009, 2016) and digital library maturity (Sheokhshoaei, 2018). Only Wilson (2013) and Sheokhshoaei (2018) provided a detailed account of how their model was developed.

There are other instances of developing maturity models in a library setting. Gkinni (2014) developed a preservation policy maturity model; however, this used a maturity assessment model promoted by de Bruin and Rosemann (2005). Howlett (2018) has announced a project to develop an evidence based maturity model for Australian academic libraries. It will describe characteristics of evidence based practice and identify what library mangers can implement to progress maturity at a whole organization level. At this stage, it is not known whether this will follow the structure of the CMM.
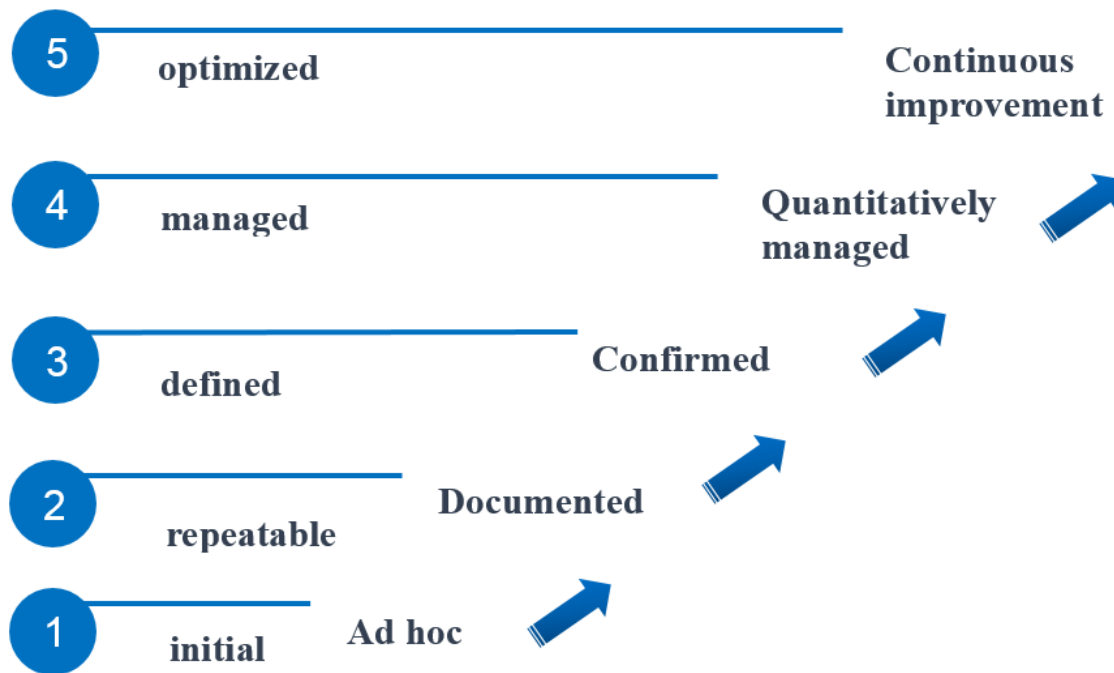
# Capability Maturity Model



Figure 1
Capability maturity model.

There are limited instances of the application of CMMs within the library literature. An early version of the QMM was applied by Tang (2012) in benchmarking quality assurance practices of university libraries in the Australian Technology Network. Egberongbe and Willett (2017) refer to an assessment of quality maturity level in Nigerian university libraries that applied the Prince 2 Maturity Model from the field of project management. Similarly, within a university library in Sri Lanka, Wijetunge (2012) reported using a version of a knowledge management maturity model; however, like Willett (2017), this also did not apply a CMM in its development.

**Aims**

This paper shares the LACMM, a tool that can assist library mangers with improving assessment. The LACMM offers managers an effective tool where, through a process of self-review, assessment processes can be simplified and considered in a stage-by-stage manner along an anticipated, desired, and logical path to identify how well developed and robust processes actually are. It offers efficiency as it acts as a diagnostic tool that helps to identify a course of action to optimize performance. The process of developing this tool is presented with an evidence trail to foster confidence in its utility and value.

**Methods**

The LACMM was developed during a series of library benchmarking activities across a group of seven universities from across the world, the Matariki network (https://matarikinetwork.org/). The authors of this paper coordinated the development of the LACMM and managed the benchmarking activities. One author is a library

director (H.A.) and the other (S.H.) has assessment responsibilities as a significant component of his role. The network libraries shared in the development of the LACMM as they addressed the following question: If we enable and support the academic endeavour, how do we measure our effectiveness? Guidance was taken from Becker, Knackstedt, and Pöppelbuß (2009), who offered a procedures model for developing maturity models that draws on design science research methodology (Hevner, 2004). This provided a clear flow of activities and decision-making junctures, emphasising an iterative and reflective approach.

The benchmarking activities included structured case studies from each of the university libraries that were assessed and best practice examples and resources that were shared. Decisions were made through consultation via shared discussion documents. These conversations occurred during three day-long annual meetings between 2013 and 2017 when the seven library directors met as part of a series of Matariki Humanities Colloquia that had emerged as part of the network activities. Prior to each meeting staff from the libraries responded to a series of questions with reference to their library's case study. The responses were shared via an online collaborative workspace. Using the workspace allowed each library to come to the activity as resources allowed. Each case study could be reviewed prior to the meeting where more questions could be answered and each library could report on what they learned from considering each other's best practice examples. This process ensured a rich and productive interaction during the meetings (Hart & Amos, 2014).

Benchmarking topics focused on activities and practices for library programs that supported teaching, research, and the student experience. Aligned to wider strategic priorities, the topics included transition of first year students to university life, library space that support students' experiences, planning for change to

support research, how the library helps researchers measure impact, and the cost and contribution to the scholarly supply chain. As the library directors considered possible areas of improvement, the need to improve assessment processes was acknowledged. Early on in the benchmarking process, the library directors agreed to investigate, as a separate but aligned activity, the use of a CMM for library assessment as a shared response to address "how we measure our effectiveness" (Hart & Amos, 2014, p. 59).

To encourage wide application of the tool, the authors promote the use of terms "assessment" and "evaluation" as interchangeable within the library context. While some argue for a distinction between assessment and evaluation (Hernon & Dugan, 2009) it needs to be recognized that this call is made within the context of higher education, where historically care has been taken to differentiate between assessing learners and evaluating things or objects (Hodnett, 2001). In contrast, Hufford (2013) concedes that among librarians the use of each term is ambiguous, and their uses have changed over time.

**Results**

*Problem Definition*

The idea of developing a guide or roadmap that a CMM could offer appealed to the library directors within the network. They acknowledged that there were plenty of good case studies, resources, and lists of what had to be in place to advance a culture of assessment. For example, see bibliographies by Hufford (2013) and Poll (2016). While these are useful to learn about what others are doing, they did not offer systematic guidance on how to improve assessment processes within current and planned activities and programmes. It was confirmed that testing the model across a group of international libraries would strengthen its application to a wider audience (Maier, Moultrie & Clarkson, 2012; Wendler, 2012).

Applying the CMM to library assessment was further validated when one of the partner libraries shared their experience using the revised Australasian Council on Online, Distance and e-Learning (ACODE) benchmarking tool, which focuses on technology-enhanced learning (McNaught, Lam, & Kwok, 2012; Sankey, 2014a). The ACODE tool includes eight benchmarks with each containing a series of criteria-based performance indicators using a 1 to 5 scale of capability. It comprises a two-phased application, where it is applied in a self-assessment process and then used to develop a team response within or between institutions (Sankey, 2014b). This example was useful as it allowed the library directors to conceptualize what a LACMM may look like and how it may be utilized. It was recognized that through the benchmarking activities the library directors could review their assessment processes against criteria, compare with what others had done, and draw upon this to improve practices.

### Comparison with Existing Models

Having defined the problem and agreed upon an approach, the next stage of the procedures model required comparison with existing models. Here Wilson's (2013) comprehensive QMM was considered. The QMM included 40 elements grouped into 8 facets. Those elements that focussed on assessment processes included progress monitoring, performance measurement, gathering feedback, collation of feedback, responding to feedback, and acting on feedback. Despite this focus, the QMM was rejected for this activity because of its complexity and size. The aim was to provide an efficient tool that would not overwhelm those using it. It was also rejected because overall the facets did not provide direct alignment to library assessment. Instead, it focused on the broader concept of quality of which assessment is a smaller part. It was noted that, when it came to assessment, the QMM tended to focus more on feedback and not on assessment as a process. As noted earlier, with no other suitable model

dealing with the issue of library assessment available, the need to develop a distinctive LACMM was confirmed.

### Iterative Model Development

To provide guidance in determining the characteristics of a LACMM, the literature on library assessment was reviewed. Bakkalbasi, Sundre, and Fulcher's (2012) work on assessing assessment was considered. In presenting a toolkit to evaluate the quality and rigor of library assessment plans, their work draws on the elements of the assessment cycle. The elements include (1) establishing assessment objectives, (2) selecting and designing methodologies and collecting data, (3) analyzing and interpreting data, and (4) using the results. It was decided that focusing on these elements would reduce the complexity of the design and simplify the development of the LACMM. A template of the LACMM was determined, as illustrated in Figure 2.

The LACMM template was shared with library managers and assessment practitioners at international forums. Presentations were made at the 11th Northumbria International Conference on Performance Measurement in Libraries and Information Services 2015, the OCLC 7th Asia Pacific Regional Council Conference 2015, and the Council of Australian University Librarians Forum: Demonstrating and Measuring Value and Impact 2016. During the discussions at these presentations, attendees confirmed the utility, value, and simplicity of the model (Amos & Hart, 2015; Hart, 2016; Hart & Amos, 2015).

As part of the shared development of the LACMM, each library in the Matariki network was invited to populate the model as an additional part of a benchmarking activity. They were asked to consider the assessment applied in the case study they were reporting on in the benchmarking activity, to rank the level of capability for each stage of assessment in the project, and then to provide notes of the criteria

# Library Assessment Capability Maturity Model

| | | Stages of the Assessment cycle | | | |
|---|---|---|---|---|---|
| | | **Objectives** | **Methods and data collection** | **Analysis and Interpretation** | **Use of results** |
| **Levels of capability** | **Optimized** | | | | |
| | **Managed** | | | | |
| | **Defined** | | | | |
| | **Repeatable** | | | | |
| | **Initial** | | | | |

Figure 2
Library assessment capability maturity model template.

for each of these. When only three of the seven libraries completed this task with varying degrees of success, the project lead decided to change tack to get more buy in. The decision was made, in line with the iterative nature of the procedures model, that a group of library staff at the University of Otago would draft criteria for the network libraries to consider in the next benchmarking activity.

The Otago staff selected for this task all had experience in either business management and or assessment roles. They included the University Librarian, the Resources Assessment Librarian, the Library Programmes Manager, and the Policy Planning and Evaluation Librarian. Drawing on their practice and knowledge, these staff met several times to discuss, develop, and revise criteria. Following this, a draft version was then tested with the staff at Otago who were responsible for undertaking the next benchmarking activity.

In reviewing the version completed by Otago staff as part of the benchmarking activity, the project lead noted that a number of different kinds of assessment activities had been documented. Furthermore, the different types of activities were reported on in the different assessment stages of the LACMM. For example, survey data were covered in objectives, methods, and results, while group interviews were reported on in analysis. Reflecting on this, the project lead decided to use the Otago criteria group to produce three versions of the model for different types of assessment activities. The wording of the criteria in each corresponded to the particular assessment activity:

1. Data, to cover assessment activities that included usage data and surveys
2. Discussion, to cover assessment activities that included group interviews and focus groups
3. Comparison, to cover assessment activities that included benchmarking,

case studies, standards, or best practice examples

To add more clarity, descriptions were provided for each of the levels of capability maturity and the stages of the assessment cycle (see Figures 3, 4, and 5). These three versions were then distributed to the Matariki Libraries as part of the next benchmarking activity.

*Testing the Model*

Distributing three versions of the LACMM, including specific criteria for each, proved a successful strategy with six of the seven libraries completing them. The library that did not submit indicated that the project they reported on did not lend itself to assessment activities. Overall, four libraries reported on one type of assessment activity that was applied in the project, and two libraries reported on two types of activities. Each library ranked their capacity maturity across each of the four stages of the assessment cycle, providing evidence about how they met the criteria.

Applying the model provided each library the opportunity to review their performance and see where they could improve. Following this, each of the libraries' responses were shared among one another and then discussed at a face-to-face meeting. This meeting provided the opportunity to clarify any issues and seek more tacit information from each other on assessment processes and resources—in particular, from those who scored a higher level of capability maturity.

At the meeting, feedback on the criteria and templates for different assessment processes in the LACMM were received and then confirmed. Feedback primarily focused on the wording used. Fine tuning terminology across a group of international libraries helped to provide wider appeal and utility. The library directors agreed that having a template for different kinds of assessment activities assisted their staff to complete the model in the first instance.

However, as their staff become familiar with using the LACMM, the directors agreed that using one generic version for any type of assessment activity would be sufficient. The directors confirmed the usefulness of the tool and decided that they had sufficiently addressed the question of how they measure their effectiveness. Having built a structure and precedence for collaborating and sharing resources through the benchmarking activities, the directors agreed to refocus on other projects that support scholarly communications and digitizing collections. Nevertheless, most committed to applying the LACMM in projects at a local level. Two directors commented that it was hard to get their staff interested in participating in benchmarking. However, it was acknowledged that within the activities each partner had the flexibility to come to the benchmarking as resources allowed. As Town (2000) asserts, "benchmarking is as much a state of mind as a tool; it requires curiosity, readiness to copy and a collaborative mentality" (p. 164).

In line with the procedure model, further testing of the generic LACMM was carried out when it was shared with the Council of Australian University Librarians Value and Impact Group. The group acts as a community of practice with practitioners from New Zealand and Australian university libraries with a quality or communication role. Overall the practitioners confirmed its utility and value. They suggested including more examples in the assessment activities and that brief "how to" instructions be included. The generic version that resulted from this testing is shown in Figure 6. When advancing to using the generic LACMM, it is useful to understand that the term "data" used in each of the criteria statements refers to "what is collected from each of the different assessment activities."

**Discussion**

Put simply, the LACMM is designed to assist library managers in assessing their assessment activities and in identifying how these can be

## Library Assessment Capability Maturity Model: Data

| Assessment activities: usage data / survey | | Stages of the Assessment cycle | | | |
|---|---|---|---|---|---|
| | | **Objectives:** Establishing a clear and shared idea of what is to be achieved from the assessment | **Methods and data collection:** Selecting and designing methodologies and collecting data | **Analysis and Interpretation:** Describing and making sense of the results | **Use of results:** Communicating and applying results in the realization of benefits and in the improvement of services |
| **Levels of capability maturity** | **5. Optimized:** Continuous process improvement is enabled by quantitative feedback from the process and from piloting innovative ideas and technologies. | Setting objectives is data driven. Wider trends are considered. | The optimum methods and data collection are used. | There is an analysis of trends. Predictive analysis is employed. | Data drives planning. Use of data and subsequent change is reported. |
| | **4. Managed:** Detailed measures of the process and product quality are collected. Process and product are quantitatively understood and controlled. | Objectives are monitored as part of quality improvement. | There are multiple methods and data collected. Methods and data collection are measured and reviewed. | Data analysis methods are measured and reviewed. | Data is applied in planning. The audit trail is transparent and it is reported . |
| | **3. Defined:** Processes are documented, standardized and integrated. All instances use an approved tailored process. | There is an identified and well documented gap in your existing data. There are clear research questions being examined. Objectives align with methods and analysis. | Data collection is organized to meet assessment objectives. Data collection is valid, reliable and reproducible. | Data analysis methods are documented. Bias is taken into account. Others will get same interpretations from the data. | There are established ways of making data available. There is an audit trail of how results are applied. |
| | **2. Repeatable:** Basic processes are established to track resourcing, scheduling and function. Can repeat earlier success that are similar. | There is limited documentation of the need for data. There is a general understanding of the need to collect data. | Some data is collected on a regular basis. There may be some purpose for collecting the data that aligns with the objective. | Data analysis methods can be repeated but are not reviewed. | There is some reporting of the data. There is a limited audit trail of how results are applied. |
| | **1.  Initial:** Processes are ad hoc and occasionally even chaotic. Few processes are defined and success depends on individual effort and heroics | There is no priority of the need for data. Data may be collected on a case by case basis. | Processes are not clear or reproducible. The reason for collecting the data may not necessarily align with the assessment objectives. | Data is selected to align with the outcome you are looking for. | Results are not feedback / reported. There is no audit trail of how results are applied |

Figure 3
Library assessment capability maturity model for data.

## Library Assessment Capability Maturity Model: Discussion

| Assessment activities: group interview / focus group | Stages of the Assessment cycle | | | |
|---|---|---|---|---|
| | **Objectives:** Establishing a clear and shared idea of what is to be achieved from the assessment. | **Methods and data collection:** Selecting and designing methodologies and collecting data. | **Analysis and Interpretation:** Describing and making sense of the results. | **Use of results:** Communicating and applying results in the realization of benefits and in the improvement of services. |
| **5. Optimized:** Continuous process improvement is enabled by quantitative feedback from the process and from piloting innovative ideas and technologies. | Setting objectives is drive by the results from the analysis of the views and ideas of others. Wider trends are considered. | The optimum methods are used in discussion with others to collect their views and idea. | There is an analysis of trends. Predictive analysis is employed. | The results from the analysis of the views and ideas of others drives planning. Use of the results from the analysis of the views and ideas of others and the subsequent change is reported. |
| **4. Managed:** Detailed measures of the process and product quality are collected. Process and product are quantitatively understood and controlled. | Objectives are monitored as part of quality improvement. | There are multiple methods used in discussion with others. Methods and processes used to collect the views and ideas of others are measured and reviewed. | Methods used to analyse the views and ideas of others are measured and reviewed. | The results from the analysis of the views and ideas of others is applied in planning. The audit trail is transparent and it is reported |
| **3. Defined:** Processes are documented, standardized and integrated. All instances use an approved tailored process. | There is an identified and well documented gap in your need for the views and ideas of others. There are clear research questions being examined. Objectives align with methods and analysis. | Collecting the views and ideas of others is organized to meet assessment objectives. Processes used in the discussions with others are valid, reliable and reproducible. Methods for identifying participants are understood and consistently applied. | Methods used in the analysis of the discussions with others are documented. Bias is taken into account. Others will get same interpretations from the analysis of the views and ideas of others. | There are established ways of making the results from the analysis of the views and ideas of others available. There is an audit trail of how results are applied. |
| **2. Repeatable:** Basic processes are established to track resourcing, scheduling and function. Can repeat earlier success that are similar. | There is limited documentation of the need for input from others. There is a general understanding of the need to collect the views and ideas of others. | Some views and ideas of others is collected on a regular basis. There may be some purpose for your discussion with others that aligns with the objective. | Methods used to analyse the views and ideas of others can be repeated but are not reviewed. | There is some reporting of the results from the analysis of the views and ideas of others. There is a limited audit trail of how results are applied. |
| **1. Initial:** Processes are ad hoc and occasionally even chaotic. Few processes are defined and success depends on individual effort and heroics | There is no priority of the need for input from others. The views and ideas of others may be collected on a case by case basis. | Processes used in discussion with others are not clear or reproducible. The reason for collecting the views and ideas of others may not necessarily align with the assessment objectives. | The views and ideas of others are selected to align with the outcome you are looking for. | Results from the analysis of the views and ideas of others are not feedback / reported. There is no audit trail of how results are applied. |

*Levels of capability maturity*

Figure 4
Library assessment capability maturity model for discussion.

## Library Assessment Capability Maturity Model: Comparison

| Assessment activities: benchmarking / case studies / standards / best practice | Stages of the Assessment cycle | | | |
|---|---|---|---|---|
| **Levels of capability maturity** | **Objectives:** Establishing a clear and shared idea of what is to be achieved from the assessment | **Methods and data collection:** Selecting and designing methodologies and collecting data | **Analysis and Interpretation:** Describing and making sense of the results | **Use of results:** communicating and applying results in the realization of benefits and in the improvement of services |
| **5. Optimized:** Continuous process improvement is enabled by quantitative feedback from the process and from piloting innovative ideas and technologies. | Setting objectives is driven by the results from comparing and reviewing services. Wider trends are considered. | The optimum methods for comparing and reviewing services are used. | There is an analysis of trends. Predictive analysis is employed. | The results from comparing and reviewing services drives planning. Use of the results and the subsequent change is reported. |
| **4. Managed:** Detailed measures of the process and product quality are collected. Process and product are quantitatively understood and controlled. | Objectives are monitored as part of quality improvement. | There are multiple methods applied when comparing and reviewing services. Methods are measured and reviewed. | Processes for considering the details from comparing and reviewing services are measured and reviewed. | The results from comparing and reviewing services is applied in planning. The audit trail is transparent and it is reported. |
| **3. Defined:** Processes are documented, standardized and integrated. All instances use an approved tailored process. | There is an identified and well documented gap in your knowledge and understanding of how your service compares with others best practice. There are clear research questions being examined. Objectives align with methods and analysis. | Methods for comparing and review of services is organized to meet assessment objectives. Methods used to compare and review services are valid, reliable and reproducible. | Processes for considering the details from comparing and reviewing services are documented. Bias is taken into account. Others will get the same interpretations from the details. | There are established ways of making the results from comparing and reviewing services available. There is an audit trail of how results are applied. |
| **2. Repeatable:** Basic processes are established to track resourcing, scheduling and function. Can repeat earlier success that are similar. | There is limited documentation of the need for comparing and reviewing services. There is a general understanding of the need to compare and review services. | Some comparing and review of services is carried out on a regular basis. There may be some purpose for the comparison and review that aligns with the objective. | Processes for considering the details from comparing and reviewing services can be repeated but are not reviewed. | There is some reporting of the results from comparing and reviewing services. There is a limited audit trail of how results are applied. |
| **1. Initial:** Processes are ad hoc and occasionally even chaotic. Few processes are defined and success depends on individual effort and heroics | There is no priority of the need to compare and review services. Comparing and reviewing services may be undertaken on a case by case basis. | Processes are not clear or reproducible. The reason for comparing and reviewing services may not necessarily align with the assessment objectives. | Details from comparing and reviewing services are selected to align with the outcome you are looking for. | Results from comparing and reviewing services are not feedback / reported. There is no audit trail of how results are applied. |

Figure 5

Library assessment capability maturity model for comparison.

# Library Assessment Capability Maturity Model: Generic

This tool is designed to assist Library managers in assessing their assessment activities and identifying how these can be improved until they are optimized. By considering each of the different kinds of assessment activities applied in a piece of work a manager can compare their effort with each level of capability maturity across each of the four stages of the assessment cycle; Objectives, Methods and data collection, Analysis and interpretation, Use of results. The criteria at each level of capability maturity at the particular stage of the assessment must be met to move up a level, from 1. Initial through to 5. Optimizing. By reviewing the criteria above what was achieved a manager should identify what needs to change and be applied in the next piece of work. It is useful to relate the term 'data' used in each of the criteria statements to refer what you collect / gather from each of the different assessment activities.

| Assessment activities: usage data / observation / service blueprint/ journey map / usability study / survey / group interview / focus group / benchmarking / case studies / expert view / standards / best practice | **Stages of the Assessment cycle** | | | |
|---|---|---|---|---|
| | **Objectives:** Establishing a clear and shared idea of what is to be achieved from the assessment | **Methods and data collection:** Selecting and designing methodologies and collecting data | **Analysis and Interpretation:** Describing and making sense of the results | **Use of results:** Communicating and applying results in the realization of benefits and in the improvement of services |
| **5. Optimized:** Continuous process improvement is evidence-based and **informed by** piloting innovative ideas and technologies. | Setting objectives is data driven. Wider trends are considered. | Optimum methods and data collection are used. | The analysis is appropriate, thorough and assists in achieving the objectives/answering the question of interest. There is an analysis of trends. Predicative analysis is employed. | The results drive planning. The use of data and subsequent change is reported. |
| **4. Managed:** Detailed measures of the process and product quality are collected. Process and product are understood and controlled. | Objectives are monitored within a quality improvement framework. | There are multiple methods and data collected. Methods and data collection are measured and reviewed. | Data analysis methods are measured and reviewed. | There is a monitoring process to ensure correct processes are followed with audit trails. |
| **3. Defined:** Processes are documented, standardized and integrated. All instances use an approved process that meets your organisation's needs. | There is an identified and well documented gap in existing data. There are clear research questions being examined. | Methods and data collection are organized to meet assessment objectives and are well documented. Methods and data collection are valid, reliable and reproducible. | Data analysis methods align with objectives and are well documented. Bias is taken into account. Limitations are documented. Others will get the same interpretations from the data. | There are established and well documented ways of making results available. There is an audit trail of how the results are applied. |
| **2. Repeatable:** Basic processes are established to track resourcing, scheduling and function. Can repeat earlier success that are similar. | There is limited documentation of the need to collect data. There is a general understanding of the need to collect data. | Some data is collected on a regular basis. There may be some purpose for collecting the data that aligns with the objectives. | Data analysis methods can be repeated but are not reviewed. | There is some reporting of the results. There is a limited audit trail of how the results are applied. |
| **1. Initial:** Processes are ad hoc and occasionally even chaotic. Few processes are defined and success depends on individual effort and heroics | There is no priority of the need for data. Data may be collected on a case by case basis and may lack clear links to over-arching objectives. | Processes are not clear or reproducible. The reason for collecting the data may not necessarily align with the assessment objectives. The data may not be sufficient to answer the question of interest. | Data is selected and analysed without taking into account possible bias and pre-conceptions. Assumptions and weaknesses are not explicit. Data analysis methods and interpretation are dependent on individual expertise which cannot be relied upon. | Results are not reported to appropriate people or acted on. There is no audit trail of how results are applied. |

*Levels of capability maturity*

Figure 6

Library assessment capability maturity model generic version.

improved until they are optimized through continuous improvement. In the first application of the LACMM, there is benefit in using a recent piece of work or an example that is considered leading practice. Managers can choose a piece of work that included assessment activities or that was an assessment activity. For example, the assessment activity could be something that was carried out to inform an initiative or to review the effectiveness of an initiative.

Once a piece of work has been selected, the next step is to identify the kinds of assessment activities that were applied in terms of data, discussion, or comparison (see Figures 3, 4, and 5). Then, for each kind of assessment activity, managers should make notes on what was carried out at each stage of the assessment cycle, including *Objectives*, *Methods and data collection*, *Analysis and interpretation*, and *Use of results*. These notes should then be compared with the criteria listed at each level of capability maturity from the *Initial* level upwards to the *Optimized* level for each of the stages of the assessment cycle. All of the criteria at a particular level must be met for that level to be attained. This comparison should be carried out for each kind of assessment activity applied in the piece of work.

When managers are familiar with using the LACMM for the different kinds of assessment activities, they can then move to using the generic model. Here it is useful to understand that the term "data" refers to "what is collected for each of the different assessment activities."

When comparing a piece of work, managers may identify that the first three elements of the assessment cycle meet the criteria for the *Defined* level because the assessment processes in the piece of work are documented, standardized, and integrated. However, when it comes to the *Use of results,* what was carried out may only meet the criteria for the *Repeatable* level. For example, the piece of work may have inconsistent reporting with no audit trail of how results are applied. For guidance on improving

this element, a manager can review the criteria in the *Capability* level and apply those criteria in the next project. In addition, managers, especially those who attain projects with higher levels of capability, could share their experiences of using the LACMM and the processes and resources they applied.

Having applied the LACMM to a representative range of assessment activities, a manager can characterize their whole assessment program. This may be a useful exercise to help set targets for improving capability across the library or for benchmarking. However, as was seen through testing the LACMM, comparing examples of leading practice where tangible examples could be shared was also beneficial.

The LACMM has advantages over other tools and processes available. In only considering the four stages of the assessment cycle, the LACMM is not as complex as Wilson's (2013) QMM, which includes 40 elements grouped into 8 facets. By focusing on assessment processes in a stage-by-stage manner, self-review is simplified. The LACMM offers efficiency as both a self-review tool and as a means of identifying improvements. Although this tool will add to the plethora of resources already available (see Farkas, Hinchliffe, and Houk, 2015 and Hiller, Kyrillidou, and Self, 2008), the simplicity of the tool as a means of assessing assessment and identifying an improvement path is its strength. It can act as a quick aide-mémoire and form the basis of a comprehensive self-review or an inter-institutional benchmarking project (Sankey, 2014b).

The benchmarking exercises provided a unique opportunity to develop the LACMM where it could be applied and tested against actual case studies of best practice across an international group of university libraries. The development utilized staff experience at different levels of the organization, including both practitioners and leaders. The results at decision-making junctures were verified at international forums of library managers and assessment practitioners.

Drawing on design-science research methodology (Hevner, 2004) was also beneficial. The iterative approach allowed methods to be trialled and revised as required. The schedule of annual meetings with each benchmarking exercise stretched over a year provided ample time for reflection in the shared development of the LACMM as a useful artifact. Being flexible with timeframes allowed each partner to come to the exercise as resources allowed (Hart & Amos, 2014). The successful use of the design science research methodology demonstrates the potential of this approach to other library and information practitioners.

Several limitations to the LACMM and its development must be acknowledged. First, the LACMM is sequential in nature and represents a hierarchical progression. Some may argue that real life is not like that. Some may legitimately be content to be at a certain level and not prioritize resourcing to improve practice. Second, the authors acknowledge that bias may have influenced the development of the LACMM because it became the only means for participating libraries to respond to the question of how they measure their effectiveness. However, when deciding this path, no other options were put forward by other network partners. Third, limitations exist because the LACMM was developed solely within the context of university libraries. Input from other areas within the wider library and information management sector would provide additional insight into the relevance and usefulness of the LACMM.

The LACMM does not replace the comprehensive and useful QMM as a means of assessing the quality of library quality (Wilson, 2015). It does, however, provide an effective and efficient means of assessing library assessment.

## Conclusion

The LACMM is an effective tool that, through self-review assessment processes, can be simplified and considered in a stage-by-stage

manner along an anticipated, desired, and logical path to identify how mature assessment processes actually are. Managers can compare their effort with each level of capability maturity from the *Initial* level through to the *Optimized* level across each of the four stages of the assessment cycle (*Objectives*, *Methods and data collection*, *Analysis and interpretation*, and *Use of results*. The LACMM offers efficiency as it acts as a diagnostic tool that helps identify a course of action to improve performance. Criteria at each level of capability maturity at the particular stage of the assessment must be met to move up a level. The level above a particular stage provides guidance on how assessment process can be improved.

It is anticipated that providing the evidence trail of the development of the LACMM will further foster confidence in its utility and value. It is expected that the tool will be adapted and improved upon as library managers apply it. As this resource is being shared with a Creative Commons Attribution–NonCommercial–ShareAlike license, it will support other practitioners in sharing their work with and improving the LACMM as a means of optimizing how libraries measure their effectiveness.

## Acknowledgements

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