

# A Risk Prioritisation Tool for Cultural and Arts Infrastructure

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## Abstract

*Museums, art galleries and theatres are examples of social infrastructure with quite different risk profiles, depending on who and how many people use them, their building and utility age, and the functions they perform. An asset's risk profile is a factor in the allocation of funding by social infrastructure management authorities. There is no established method to develop a relative risk ranking for this type of infrastructure.*

*This paper presents a method to transparently risk rank social infrastructure in order to prioritise funding allocation. A list of risk criteria is developed based on semi-structured interviews with a number of personnel in Culture and the Arts Portfolio and other experts from around the world. Text analysis identifies safety and essential services, housing of collection items, condition of building systems, reputation, technical facilities, service delivery, and public exposure as key criteria. A five point scale is developed to rate each criterion on two scales: importance and vulnerability. The expert group then rates each building asset in their portfolio against these scales in each criterion. The results generate a prioritisation score, which can be displayed on a 2x2 importance and vulnerability matrix and on a spider chart. This provides a transparent view of the risk profile of assets in the Culture and the Arts Portfolio.*

## 1. Introduction

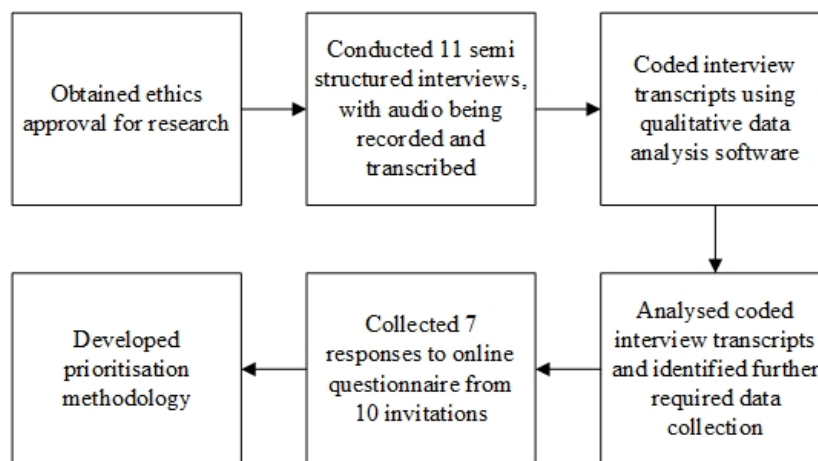
The Culture and the Arts Portfolio ('the Portfolio') consists of the Art Gallery of Western Australia, the Department of Culture and the Arts (DCA), Perth Theatre Trust, ScreenWest, the State Library of Western Australia and the Western Australian Museum. The mission of the Portfolio is to promote the culture and the arts sector within the community as well as preserve Western Australia's collections. Amongst its six constituent independent agencies the Portfolio is responsible for managing around 40 building assets ('assets') in metropolitan and regional areas. There is ongoing pressure for the Portfolio to improve the management of its assets in order to further the service it provides to the community. This poses a challenge for the Portfolio, as it receives limited government funding, and must find a way to utilise its funding efficiently and effectively.

The Portfolio has identified a number of key opportunities for the improvement of its asset management. One such opportunity is the development of a risk based methodology for the prioritisation of its assets. There is no widely accepted methodology for the prioritisation of social infrastructure such as the Portfolio's assets. This prioritisation is necessary in deciding which of the Portfolio's assets require a higher level of funding and attention.

There is very little existing literature on the management of social infrastructure. However extensive research has been conducted on decision making methodologies in the management of other physical assets such as roads, pipelines and plant equipment. Many of these methodologies involve techniques such as fuzzy logic and analytic hierarchy processes. Methodologies which have been widely accepted in a number of industries are Martilla and James' (1977) importance-performance analysis (IPA) as well as multi-criteria analysis (MCA) (Greco, 2005).

## 2. Process

The process by which the research is conducted is summarised in Figure 1.



**Figure 1** Process map summarising the tasks conducted throughout the research.

Because the research involves human participants, ethics approval was sought and obtained. Data was collected through 11 semi-structured interviews with key personnel both internal and external to the Portfolio, ranging from 40 minutes to 80 minutes in length. Interviewees external to the Portfolio included experts from other organisations assisting with the management of the Portfolio's assets, such as the Department of Finance Building Management and Works, as well as asset management experts from around the world, such as the New South Wales Department of Treasury and Finance. Interviewees internal to the Portfolio included personnel involved in asset management from five of the six Portfolio agencies. A mix of internal and external interviewees was chosen in order to gain insight from a range of perspectives. In four of the five Portfolio agency interviews, the interviewees included both the facilities manager of the agency as well as an employee in a strategic position such as a general manager or director. The purpose of concurrently interviewing these two roles was to collect both a strategic and operational response to the interview questions.

11 hours of interview audio was recorded. Once the interviews had been transcribed they were coded using NVivo, a qualitative data analysis software package. Using NVivo, sections

within the interview transcripts were coded according to the discussion topic. This allowed 29 potential prioritisation criteria to be identified.

An initial analysis of the interview results was conducted. The least mentioned criteria were discarded. Portfolio agency interviewees were then invited to complete an anonymous online questionnaire. From the 10 Portfolio agency personnel invited to complete the questionnaire, seven completed the questionnaire. The questionnaire allowed the respondents to rate the importance of the 16 remaining criteria from the interviews. This was done on a five point Likert scale, with a score of five allocated to criteria perceived to be extremely important and a score of one allocated to criteria perceived to be not at all important. The respondents' ratings of the criteria generated a score for each criterion, allowing them to be ranked by their score. All criteria scoring higher than a four (very important) were then used in the prioritisation methodology.

In order to develop the prioritisation methodology, a review of the literature as well as current and past DCA prioritisation techniques was conducted. Numerous consultations with the DCA were also held in order to gain an understanding of the client's need. A strong focus on simplicity, usability, transparency and understandability was expressed by the DCA. With input from both previous literature and DCA consultations, a methodology was then developed. The key prioritisation criteria identified through the online questionnaire was then used as the criteria in the methodology.

### 3. Results and Discussion

#### 3.1 Key Criteria

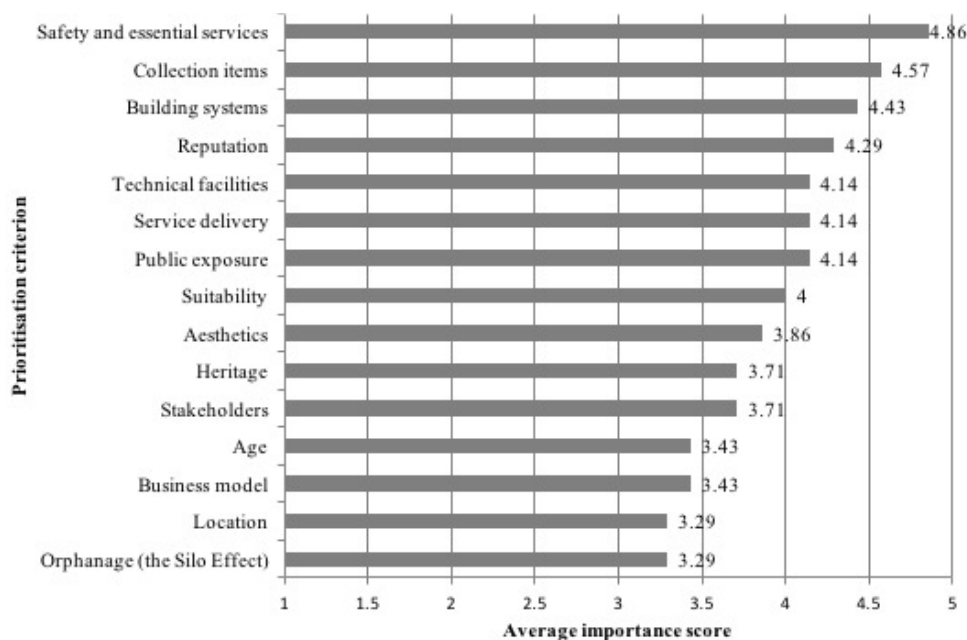
29 criteria for the prioritisation of an asset were identified from the 11 interviews conducted. From an analysis of the interview transcripts in NVivo, it was determined which of these criteria were mentioned most frequently in the interviews and were discussed in the most interviews. Table 1 shows both of these results for a random sample of the identified criteria.

Criteria	Mentions	Interviews
Age	5	4
Environment	1	1
Heritage	4	3
Mechanical systems	12	5
Public exposure	13	8
Reputation	15	7
Stakeholders	7	7

**Table 1** The number of times each criterion was mentioned and number of interviews the criterion was mentioned in. Figures for only a random sample of the total mentioned criteria are displayed.

From the online questionnaire following the interviews, the criteria rated by the participants on average as having a greater importance than "very important" (average rating of four) were: safety and essential services; housing of collection items; condition of building systems; reputation; technical facilities; service delivery; and public exposure. The average ratings of each of the 16 criteria are shown in Figure 2. Figure 2 shows seven criteria clearly

rated above four and perceived by the respondents as having a greater importance than “very important”.



**Figure 2: Average ratings of each of the 16 criteria in the online questionnaire.**

### 3.2 Prioritisation Methodology

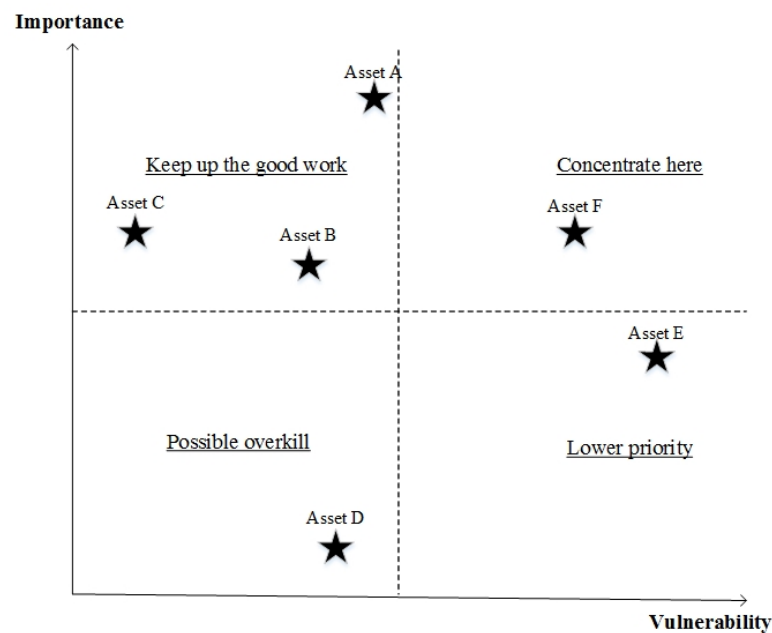
From the literature review, it was found that the decision technique most appropriate for the prioritisation methodology was a modified version of Martilla and James' (1977) IPA combined with an MCA approach. These two techniques were deemed as being the most practical in providing the DCA with a sufficiently sound prioritisation methodology.

A MCA approach to prioritising a given asset is taken by rating the importance and vulnerability of each criterion for the asset. The importance is defined as the extent to which the criterion is related to the mission of the Portfolio. The vulnerability is the extent to which the asset is performing poorly in the given criterion. For example, a performing arts venue would rate low on importance for “collection items” if it doesn't house any collection items. By rating an asset in each criterion in these two dimensions, priority is given to assets that are both essential to the Portfolio as well as in poor condition, as opposed to assets that are essential but in good condition, or any other combination of the two factors.

The ratings are processed and visualised in three different ways to provide insight on the level of prioritisation of the asset. The three ways are: a prioritisation score; an importance-vulnerability matrix (Figure 3); and a spider plot (Figure 4). Figures 3 and 4 have taken example data for illustrative purposes.

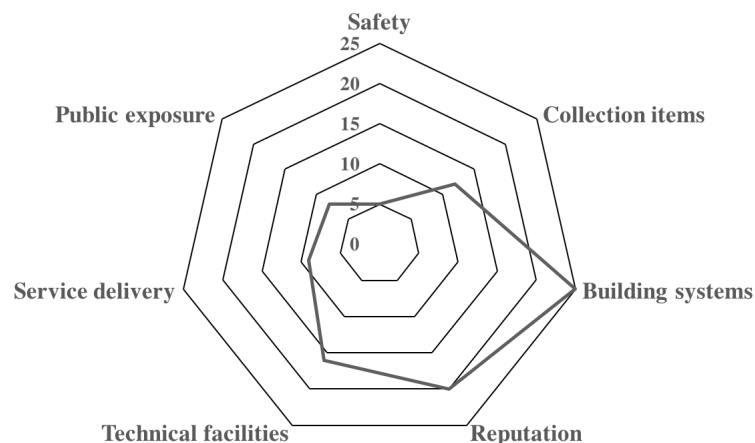
A prioritisation score for the asset is generated by summing the products of each criterion's importance and vulnerability matrix. For example, a given asset that rates four in the importance of “reputation” and three in the vulnerability of “reputation” is assigned a criterion score of 12 for reputation. The criterion scores are then summed to generate the prioritisation score for the asset.

The importance-vulnerability matrix shown in Figure 3 allows for a comparison of the Portfolio's assets in terms of their relative importance and vulnerability to failure. Based on Martilla and James' (1977) importance-performance matrix, it is split into four quadrants with each describing the asset management of the assets within it. The importance-performance matrix suggested by Martilla and James has been modified by inverting the horizontal axis, placing lower performing assets to the right of the graph as opposed to on the left as suggested by Martilla and James. This modification has been made in order to generate a higher prioritisation score for low performing assets.



**Figure 3:** An importance-vulnerability matrix providing a visual representation of the relative importance and vulnerability to failure of different assets.

In order to visualise the level of prioritisation of each asset in greater detail, a spider chart can be used as shown in Figure 4. The spider chart allows identification of the criteria to be prioritised within an asset. Each of the asset's criterion scores are plotted, with the criterion score being the product of the criteria's importance rating and likelihood of failure rating. For example, Figure 4 illustrates an example where the asset requires the most attention to its building systems and reputation.



**Figure 4:** A spider chart showing an asset's score for each of the criteria.

## 4. Conclusions and Future Work

This study has identified seven key criteria to be used for the prioritisation of Portfolio's assets. From these key criteria, a methodology has been developed to provide the Portfolio insight into how funding can be allocated most effectively. This methodology involves rating the importance and vulnerability of each criteria for a given asset. The ratings can be used in three key tools to assist with funding allocation: a prioritisation score; an importance-vulnerability matrix; and a spider chart. The study is yet to implement the prioritisation methodology to the Portfolio's assets in order to produce a preliminary ranking of the Portfolio's assets.

There is potential for the methodology to be developed further. No criteria weightings have been assigned in the methodology in order to maintain the methodology's simplicity. A methodology including weightings is an opportunity for future work. The methodology has been developed primarily in consultation with the DCA. There is an opportunity to gain feedback from the other Portfolio agencies on the methodology through a workshop, using the feedback to test, modify and improve methodology. While a subjective element still remains in the prioritisation methodology from the rating process, there is a potential to eliminate this by using numerical inputs such as performance indicators in the prioritisation methodology.

## 5. Acknowledgements

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## 6. References

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