1. **Non-Functional Requirements – Backwoods Regional Library**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **NFR** | **Trigger Question** | **Impact Cost** | **Benefit** | **Answer** | **Strategy** | **Priority** |
| Security | Anything valuable?  Are there authorisation levels in terms of access?  Is identity important?  Are personnel details retained?  Does the system deal with money?  Does the system interact with other libraries?  Are there password requirements?  If a user is inactive, is a timeout required?  How long before an inactive user timeout is actioned? | Usability decreases  Cost increases  Implementation complexity increases  Takes longer to implement  Infrastructure footprint increases | Protects members personal information  Allows determination of who is doing what.  Ensures only authorised people can do specific authorised things | Library physical items (books, etc.) are valuable  Ensuring only authorised library personnel can access the system for performing restricted tasks (discharging loans, adding members, adding / removing items, etc.), therefore identification and authorisation is critical.  The tracking of members, library items and loans is important to ensure the library can account for location of their items.  Protection of information regarding library items is not important (low risk).  Retaining sensitive personal information probably a good idea.  For protection of member details and library items, an inactive user timeout should be implemented after approx. 30 secs | Authentication and authorisation. Library personnel are required to have a login and password to allow unrestricted access.  Possible encryption of personal data.  Magnetic identity cards for members and librarians.  Apply inactive user timeout after 30 secs. | Very important - critical |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **NFR** | **Trigger Question** | **Impact Cost** | **Benefit** | **Answer** | **Strategy** | **Priority** |
| Audit | Do transactions need to be tracked?  What transactions need to be tracked?  What elements of a transaction need to be tracked (time, location, date, member, book, etc.) | Space requirements keep increasing with storing of more data.  Cost increases  Implementation complexity increases  Takes longer to implement  Infrastructure footprint increases  Potential decrease in performance. | Ability to know which member has what library items on loan.  Ability to know which member has fines and how much money is owed.  Reduction in liability due to data loss.  Possible security benefit | Transactions require tracking.  Loans require tracking, including (member, return date, library items, date, event (borrow, return, extension, reserve, et), location, etc.).  Member and library item actions require tracking (adding, removing, changing status, fines, payments, etc) | Multiple log files periodically archived?  Database?  Store to removable / replaceable media? | Critical to track loans  (core function) |
| Performance | Are there any specific response times required after user input (swipe card, scan book, etc.)?  Is a refresh time required? If so, after what time?  Are there required maximum processing times when creating, discharging loans?  When performing a catalogue search, is there a required maximum processing time? | Cost increases  Implementation complexity increases  Takes longer to implement | Increased efficiency when performing tasks.  Potential to increase member’s  satisfaction with using the system (useability). | It should take less than 2 secs to bring up a member’s borrowing record once a barcode is scanned.  Other response, processing, reporting times are not critical, however less than 3 secs is desirable. | Minimise communication between components. | Important |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **NFR** | **Trigger Question** | **Impact Cost** | **Benefit** | **Answer** | **Strategy** | **Priority** |
| Capacity | How many members  does the library have?  How many items for loan are in the library?  What is the growth rate?  How often are items borrowed?  What is the transaction rate?  How far back do you need to keep information?  How many items are removed from service each year?  What sort of online resources are there and where are they held? | Storage cost is relatively cheap, however marginal cost increase expected.  Archive costs might increase - infrastructure could be an issue. | Fit the system, recover data.  Less liability to data loss. | Sufficient capacity is fundamental.  It is likely there are 1000s of library members  The likely growth rate of members is approximately ~3%  It is expected there are 10s100s transactions per hour, with 1-10 library items per transaction  It is likely there are 1000s of library items  The growth rate is likely to be ~1-2% accounting for items removed from the system.  It is likely that each transaction record is only required for a maximum of 10 years.  Storage of library item details may be expected to be indefinite.  Member details are likely to be retained for up to 60 years. | Buy a larger than required storage disk to allow for expansion / redundancy. | Very important, but easily satisfied |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **NFR** | **Trigger Question** | **Impact Cost** | **Benefit** | **Answer** | **Strategy** | **Priority** |
| Availability | What are the opening hours of the library?  Are there out of hours services?  Does access need to be provided external to the library (online access, Blackwood council members, etc)?  Is 24/7 availability required? If so, for what elements  (borrowing, reserving, searching catalogue, etc)? | Implementation complexity increases  Takes longer to implement  Highly available systems can be very expensive (cost increases) | Improved service and access to remote  members and those  with restricted library access hours (due to work, schedule, etc.).  Enables remote library / council personnel to access data without physically visiting the library. | It is likely that there are 10 opening hours (8am to 6 pm) and not open on Sundays.  The catalogue is to be available to online users 24/7 to browse and / or reserve items.  However, 24/7 access is not critical. | Inclusion of website / mobile app. to allow for 24/7 access  Remote access to the server  (system) for library  / council personnel. | Local availability is critical.    Remote is desirable |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **NFR** | **Trigger Question** | **Impact Cost** | **Benefit** | **Answer** | **Strategy** | **Priority** |
| Reliability | How often can the system go down?  How long can it be down if it does crash?  If relevant, can different branches crash without stopping the system?  Do different aspects of the systems have different reliability requirements? | Cost increases  Implementation complexity increases  Takes longer to implement | Infrequent system crashes increase user confidence in the system.  Increases library efficiency  Less liability to data loss. | It is likely that 2-3 times a year is acceptable for the system to go down, irrelevant to the different aspects.  Regular / scheduled maintenance (downtime) - about 1-2 hours per week.  Out of hours access can be a “fix during business hours” response.  It is likely that during business hours, it is desirable that the system should be back up within 5 - 10 mins. | Maintain a localised system to  ensure independence from other branch crashes.  All hardware should be readily  available for replacement purposes, if required.  Utilise a secondary back-up (council server or removable / replaceable media) to ensure rapid recovery  Implement a maintenance program to fix bugs | Important |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **NFR** | **Trigger Question** | **Impact Cost** | **Benefit** | **Answer** | **Strategy** | **Priority** |
| Integrity | Is it important to  ensure member and  library item data is entered correctly to the system?  Is it important that all fields are completed when generating new members, library items?  Is it important to control duplicate members (i.e. not create a new member for an existing one)?  Are electronic interface failures required to be handled? | Cost increases  Implementation complexity increases  Takes longer to implement | Ensures that the data extracted by library personnel and members is accurate and complete.  Ensures the correct information is obtained during searches and when  performing transactions.  Minimises time spent investigating missing or incorrect data / library items. | The addition of new members and library items must be complete and accurate to ensure that searches and transactions are completed efficiently and correctly.  Duplicate memberships for the same person must not occur to ensure accurate transactions are applied to the member.  Electronic interface failures must be handled so that it reverts to the previous valid state. | If a failure occurs, or the user cancels, any changes will be reversed.  Verification of data entry will be applied to ensure  all fields are completed, using correct format, and that duplicate entries cannot be made. | Very important |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **NFR** | **Trigger Question** | **Impact Cost** | **Benefit** | **Answer** | **Strategy** | **Priority** |
| Recovery | How is the system to be recovered in case of crash?  How is retained data (members, library items, loans) to be recovered?  How often is transactional, member and library item data backed-up?  How often is the system code backed up?  How long should a previous instance take to be restored? | Cost increases  Implementation complexity increases  Takes longer to implement  May effect performance due to constant backups. | Less liability to data loss.  Reduces impact on library efficiency  Reduced cost of getting a new custom-built software | The system is to be recovered using stored back-ups, this includes any data retained for members, loans, library items, transactions, etc.  It is likely that the  transactional, member and library item data is backed up daily.  The system code is only required to be backed-up due to code changes.  It is likely that the desired time for a previous instance to be restored is within 5 - 10 mins. | All hardware should be readily  available for replacement purposes, if required.  Utilise a secondary back-up (council server or removable / replaceable media) to ensure rapid recovery | Important |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **NFR** | **Trigger Question** | **Impact Cost** | **Benefit** | **Answer** | **Strategy** | **Priority** |
| Compatibility | Do you need to talk to any other systems (other council libraries)?  Is it likely that your hardware / operating systems will change?  What devices would you like the remote access to be applied to (computers, mobiles, etc.)?  Are any third-party applications to be incorporated for payments, remote user authentication, etc.? | Cost increases  Implementation complexity increases  Takes longer to implement | Allows members to borrow books from others council libraries.  Allow members to update personal details online.  Allows members access to the system on numerous devices. | It is likely that the library is integrated with other council libraries to support the catalogue search and interlibrary loans.  It is unlikely that the hardware or operating system will change.  It is likely a payment portal is to be incorporated.  An online payment system is not required. | Must adhere to inter-library API.  Use payment portal? | Important |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **NFR** | **Trigger Question** | **Impact Cost** | **Benefit** | **Answer** | **Strategy** | **Priority** |
| Maintainability | Are there any council or library standards which must be adhered to?  Are there any requirements for the acquisition and storage of member’s personal information?  Is the frequency of planned maintenance of importance? If so, at what frequency is desired?  Is maintenance to be conducted by an external third party or in-house personnel? | Cost increases  Implementation complexity increases  Takes longer to implement  Higher maintenance frequencies result higher costs  Training required for in-house or other third-party personnel for maintenance purposes | Ensures the system is compliant with required standards and guidelines  Maintenance ensures the system is operating acceptably and allows for bug fixes and improvements to be implemented. | It is likely that the council / library has standards / guidelines which are required to be adhered to.  Privacy laws must be adhered to when acquiring and storing personal information.  It is likely that maintenance is to be conducted as required, or designated time period (3 monthly) by in-house personnel. | Ensure the system is compliant with required standards and guidelines, including privacy laws.  Implement a maintenance program | Important |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **NFR** | **Trigger Question** | **Impact Cost** | **Benefit** | **Answer** | **Strategy** | **Priority** |
| Usability | What usability requirements are there?  Do different users have different requirements?  Who are the intended users?  What input / output devices are to be used (barcode scanner, keyboard, touch screen, printers, etc.)?  Do different devices require different usability (website vs search terminals vs self-service borrowing station vs librarian’s station)? | Implementation complexity increases  Takes longer to implement  Increased cost depending on input / output devices used. | Might attract more patrons  Increased library usage  Patron / library personnel satisfaction  Reduces library personnel workloads Increased efficiency | The self-service system should be intuitive and easy to use even for technically challenged users.  It is likely that the self-service system can utilise a touch screen and barcode scanner for input and a receipt printer for output.  The search terminals and remote access (website) would require a keyboard input to enable specific word searches. No output is required, though a printer may be desirable.  Library personnel should be provided training.  As a local council service is to be provided, disabled / special needs members need to be accounted for. This may mean they use the librarian station to perform tasks.  Possibly needs multilingual support. | Consistency between local and remote interfaces.  General consistency with other library interfaces.  Simplified interface required for self-service station due to the restricted functionality (borrow a book, check current loans).  Multilingual service potentially provided. | Critical |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **NFR** | **Trigger Question** | **Impact Cost** | **Benefit** | **Answer** | **Strategy** | **Priority** |
| Documentation | Do library personnel require a user manual / standard operating procedure?  Do members require any instructional documentation? | Cost increases  Takes longer to implement | Enables library personnel to have a reference point when unsure how to perform required actions.  Can include troubleshooting elements to reduce recovery times.  Provides support to members which may struggle using the electronic system. | A user manual is likely to be desired for the library personnel members, allowing for a quick reference point and source for troubleshooting advice / actions.  User manual may include maintenance items to ensure the system continues to operate satisfactorily.  The supply / availability of quick reference cards (low content) are likely to be advantageous for some members. | Generate a user manual for library personnel use.  Generate a quick reference card for members use.  These do not need to be incorporated into the software.  A help menu for the website would be beneficial to users. | Desirable - not relevant to system architecture. |

# Prioritization of NFRs

## Priority 1 - Usability

Backwoods Regional Library is wanting to implement a new electronic library system so that members can create and manage their own loans, to an extent.

Therefore, the system must be designed so that all members, regardless of their technical capabilities, find the system intuitive and easy to use.

Additionally, the implementation of the electronic system is also intended to increase library personnel efficiency, and therefore decrease library costs (salaries), by simplifying tasks such as member, loan and library item management.

If the system is not easily useable, the goal of implementing the system will not be achieved. Members will be disinclined to use the system is it is not useable and library personnel efficiency will not decrease.

The benefits of having an intuitive and easy to use system include, but are not limited to;

* increased library usage;
* attraction of more key members (library expansion);
* increase in member and personnel satisfaction; and
* reduction in personnel workload = increased personnel efficiency = lower costs.

However, the costs of having this highly usable system include, but are not limited to;

* increased cost of implementation;
* increased implementation time; and
* potentially increased complexity of the system.

Additionally, depending on the hardware selected to optimize usability for the system (bar code scanners, self-service borrowing system, supported devices etc.), the costs, complexity and implementation time will also be affected.

## Priority 2 - Availability

For a system to be utilized, it must be available.

If the system is not available, the librarians will be working inefficiently, and members may experience delays or poor service due to the added demands on the library personnel.

With the system available, members are able to create and manage their own loans. This reduces the demands on the library personnel and allows for increased efficiency and cost (salary) reduction.

## Priority 3 - Auditing

The library items are the assets of the library and therefore the location of these items must be known at all times. This means that who has what on loan must be tracked, including loan due dates, fines, etc.

Therefore, tracking specific detail regarding the library items, members and transactions (loans, fines, payments, etc.) should be recorded and retained for defined periods of time to reduce the liability of the library.

## Priority 4 - Security

Personal information regarding members is intended to be collected and stored and therefore should be handled according to relevant privacy policies / laws.

The functionality of the system must also be restricted for members as they must only be allowed to create / check loans, conduct catalogue searches and reserve items, if desired. Only library personnel are to be able to add / remove library items, discharge loans, handle outstanding fine payments, etc. Without this security functionality the library items and members are at risk.

## Priority 5 - Reliability

The library system is to be the primary tool for completing all library operations / transactions. Therefore, if the system is not reliable the efficiency of the library will be reduced as will the usability and availability.

Priority 6 - Integrity

Priority 7 - Compatibility

Priority 8 - Capacity

Priority 9 - Performance

Priority 10 - Recovery

Priority 11 - Maintainability

Priority 12 - Documentation