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## **RAID ASSOCIATIVE TOOL USE CASES**

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*Catalogue Entry*

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Subject	information management; data management; research data; software requirements
Description	Association is a data development activity that greatly improves the ability of secondary users to contextualize and understand research data. It is of such importance that the ERIM Project proposes a software tool to assist in the construction of associative data records, specifically using the Research Activity Information Development (RAID) modelling method. As a preliminary step towards the development of such a tool, a series of 13 use cases have been constructed to explicate the Project's vision of how the tool would be used in practice.
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## 1. THE USE CASES

A number of use cases are developed here in relation to users of a RAID Associative Tool application – henceforth referred to as ‘RAIDmap’. The use cases are used as the basis for identifying the functional requirements of the RAIDmap application in terms of its behaviour and those actors who interact with it.

### 1.1 Purpose and Scope

The purpose and scope of RAIDmap are documented in detail in the Requirements Definition contained in ‘RAID Associative Tool Requirements Specification’ (ERIM Project document erim6rep101111mjd10.doc).

Principally, the RAIDmap tool is required to provide a research activity data development recording environment which can interact with the user (identified in a number of distinct rôles) and elicit information from the operating system and from record-embedded metadata. The goal is to provide a practical data management tool for use during the research activity which assists the researcher during the research and which will, after completion of the research, provide a ‘map’ of data records associated with the activity (the **Data Case**) which will support others in data re-use and re-purposing. The map will thus constitute a contextualizing record of the Data Case. The information associated with an instance of a data case will principally be textual, this being contained within a **RAID Record**. A sub-set of the information contained within such a record may be visualized through the medium of a **RAID Diagram**. Amendment and elaboration of the RAID Record data may be executed by the user through textual changes directly to the Record or through textual and (limited) graphical changes made to the diagram. Much of the data to be recorded within the RAID Record will be system generated.

### 1.2 In and out of scope

At present only the data record development tool is within the scope of the requirement specification and in the use cases. Out of scope is the extended environment in which it might be embedded (which would provide additional data and record management facilities), the functional ability of the tool to track changes at the datum level and the functionality of the operating system. The operating system, however, constitutes a ‘supporting actor’ in the function of the RAIDmap application as would any embedding tool.

### 1.3 The actors and their goals

There are a number of actors who will have an interest in the RAID tool including the researcher or researchers engaged in the **Research Activity** during which data is acquired and generated and during which data development occurs, and those such as other researchers and data managers who take a post-activity interest in understanding the data assets for the purposes of re-use and re-purposing. An actor is anything having a behaviour, so in this case this will include a researcher, a data manager, a computer programme, including the system being designed. Inevitably, in some instances, the rôles of researcher and data manager will be elided; however their motivations are different hence the distinction drawn between the two actors of researcher and data

manager. It may be that in practice the distinction will be made between researcher and data manager only in terms of the permissions that they are given to make changes in a RAID Record.

<b>ACTOR PROFILES</b>	
<b>Name</b>	<b>Profile: background/skills</b>
Researcher (primary actor)	The person or rôle who is carrying out the research and who, incidentally, develops data records during the research activity. The researcher is principally interested in the research task, not in research data management, but will have a ‘data management’ rôle.
Data Manager (primary actor)	The person or rôle who is responsibility for making research data re-usable by supporting data re-use and by re-purposing data. A researcher may also be a data manager.
RAIDmap (actor)	This is the system under development which will make the RAID record and interact with the user and the operating system in eliciting metadata.

The following task-level goals have been identified for the primary actors; a use-case for each of these can be found in Section 2. Use cases for the system have not been developed.

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	<b>Primary Actor</b>	<b>Task-level Goal</b>	<b>Brief</b>	<b>Priority (required/desirable)</b>
1.	Researcher	Start a new RAID record	The researcher has embarked upon a new Research Activity which has involved either an <b>Initiating Object</b> or an <b>Initiating Event</b> from which data has been acquired. A record is now started of the information development associated with this activity. This record will be elaborated by the RAIDmap application as data development progresses in order to capture or map the context in which the related records are placed.	Required
2.	Researcher/Data Manager	Get a RAID record data case metadata digest (i.e. the metadata for the record itself and for the data records in the data case	A data manager checks to see what data record content is available for re-use under the recorded licensing/confidentiality constraints, and where the data records are located.	Required
3.	Researcher/Data Manager	Get a visualization (i.e. a RAID diagram) of a RAID record	The user identifies the current status of the records which constitute the Data Case, to understand their relationship with each other in the context of the research activity. A RAID diagram presented by the RAIDmap application provides also the opportunity to update or add to the information represented, thereby enhancing the underlying RAID record.	Required
4.	Researcher/Data Manager	Check completeness/status of RAID record metadata	A data manager checks the minimal required metadata has been recorded for a research activity and volunteers some of the missing data.	Required
5.	Researcher/Data Manager	Check completeness/status of DR metadata	A data manager checks that the minimal required metadata has been recorded for an individual data record and updates some out-of-date information. The manager also checks the terms under which the data may be re-used.	Required
6.	Researcher/Data Manager	Annotate a RAID Diagram	A researcher is preparing the data assets in a data case for re-use and adds additional information to the RAID diagram to assist later interpretation of the data set.	Required
7.	Researcher	Add an additional (pre-existing or newly generated) data record to a RAID record	A researcher has added a new data record to the data case and wishes to record its place in the research activity information development. Once the new data record is identified by the system, it will prompt the user for mandatory metadata which it is unable to find for itself. The user has the opportunity, also, of adding non-mandatory information about the new	Required

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	Primary Actor	Task-level Goal	Brief	Priority (required/desirable)
			record.	
8.	Researcher/Data Manager	Update record metadata	The researcher adds additional information relating to a data record which will add to the knowledge captured about this record. Extra information may, where appropriate, be represented in the RAID diagram as a result of an addition to the metadata.	Required
9.	Researcher	Associate any data record with any other data record	Through the medium of the RAID diagram a researcher associates two data records using a graphical entity appropriate for this action. The RAID record is updated as a result.	Required
10.	Researcher	Associate any data case with any another	At project end the researcher is preparing the project data for archiving, mindful of the requirements for re-use. The researcher uses the facility provided by RAIDmap to associate all the separate data cases stemming from the research project with each other.	Desirable
11.	Researcher	Decompose a single Data Case into a number of separate cases.	During the project it becomes clear that the data records would be better handled at a higher level of decomposition. The researcher uses the facility provided by RAIDmap to identify one or more sub-sets of records that constitute logically different data cases.	Desirable
12.	Researcher/Data Manager	Select a sub-set of data records in a RAID diagram for inspection	A data manager is interested in inspecting a particular data development path in a data case. The user selects a start or end-point record in a path which highlights all records associated with the selected record.	Desirable
13.	Researcher	Associate and label a sub-set of data records through a RAID Diagram	A researcher is viewing a RAID record through the medium of a RAID Diagram and wishes to make clear the relationship that a number of data records have amongst those in the data case. The researcher does this by using a graphical function to draw a border around the data record entities that require association and then labelling the box in which they have been grouped.	Required

## 2. THE RAIDMAP USE CASES

These use cases are based upon the task-level goals identified above and are structured upon a template suggested for *requirements elicitation* in Cockburn (2001, p133).

Note that throughout the use cases the RAIDmap application will be referred to as the ‘system’.

### USE CASE 1. Start a New RAID Record

Context: The user needs to start a new RAID Record so that mapping of the data development for the research activity can be initiated. What constitutes the research activity is a matter of choice for the user. It may be that the project is sufficiently narrow that a single ‘map’ of the prospective data development will suffice. Alternatively, the research activity may be that related to a work package, a single experiment, and so on and therefore the set of records (the Data Case) will be characterized accordingly.

Primary Actor: Researcher

Preconditions: The user must be registered with and logged onto the system. This is required because RAIDmap will require mandatory contextualizing metadata related to the user.

Triggers: The user selects the ‘New record’ function.

Main Success Scenario:

1. The user selects the ‘New record’ function.
2. The system populates the record with mandatory metadata from local metadata and requests the user for missing data.
3. The system prompts the user to characterise the initiating object or initiating event, and then to identify and describe (using metadata) the related data record.
4. The system presents the RAID record as a RAID diagram.
5. The user selects ‘Save file’, enters a file name and directs the system to save the file in a selected location.

Extensions:

- 5a1. The user selects ‘Close file’.
- 5a2. The system prompts the user to enter a file name and location, and saves the file accordingly.

Open Issues: A means must be provided for allowing a new record to be created even when the full set of ‘mandatory’ metadata cannot be provided at this point either by the system or the user. The fact that the metadata provided does not conform to the mandatory minima must be flagged in some way.



### **USE CASE 2. Get a RAID Record Metadata Digest**

Context: In the quest for existing research data, a data manager has identified a data set that has potential for re-use. In order to understand the data better the data manager now requires as much information as possible. In conjunction with a RAID diagram, a metadata digest will provide as much information as the system has about the target data.

Primary Actor: Researcher or Data Manager

Preconditions: The user is logged on to the system and has selected a RAID record from the set of such records on the system. This record is now in scope for the application.

Triggers: The user selects the 'Get metadata digest' function.

Main Success Scenario:

1. The user selects the 'Get metadata digest' function and then the 'RAID Record' sub-function.
2. The system prints to screen a digest of the information that it has about the RAID record.

Open Issues: None

### **USE CASE 3 . Get a RAID diagram**

Context: The RAIDmap application has within scope the records of a number of data cases, each of which is associated with a research activity. The user wishes to see, at a glance, whether there are any context-bearing records related to a specific data case which will help the interpretation of one of the Research Data Records in that case.

Primary Actor: Researcher or Data Manager

Preconditions: The user is logged on to the system and has selected a RAID record from the set of such records on the system. This record is now in scope for the application.

Triggers: The user selects the 'Get RAID diagram' function.

Main Success Scenario:

1. The user selects the 'Get RAID diagram' function.
2. The system prints to screen the RAID diagram of the RAID record in scope.

Open Issues: None

### **USE CASE 4. Check the Completeness of a RAID Record Mandatory Metadata Set**

Context: A **Mandatory Metadata Set** has been defined for RAID records which is considered to be the minimum necessary to make data as accessible as possible for data re-use within the context of the RAID approach to research data management. The system will function without having this set complete, but its behaviour will be

designed to support system- and user-provision of this data. To this end, a reporting function is provided that allows the user to check easily the status of the metadata related to a RAID record (i.e. related to a Data Case) and make additions or amendments.

Primary Actor: Researcher or Data Manager

Preconditions: The user is logged onto the system

Triggers: The user selects the 'Check mandatory data set' function

Main Success Scenario:

1. The user selects the 'Check mandatory data set' function and then selects 'RAID Report'.
2. The system displays a list of records of the RAID record type and the user selects one item from the list.
3. The system displays a mandatory metadata capture box allowing the user to fill in missing metadata at will.
4. The system validates the data type for each entry and returns an error message on failure.
5. The user presses the 'Save' button.
6. The system saves the newly created data.

Extensions:

- 5a1. The user closes the mandatory metadata capture box with unsaved information.
- 5a2. The system invites the user to save the changes.
- 5a3. The user selects the 'Save' function.

Open Issues: Access permissions for user to maintain security of metadata.

### **USE CASE 5. Check Completeness/status of a Data Record**

Context: A mandatory metadata set has been defined for data records which is considered to be the minimum necessary to make data as accessible as possible for data re-use. The system will function without having this set complete, but its behaviour will be designed to support system- and user-provision of this data. To this end, a reporting function is provided that allows the user to check easily the status of the metadata related to a single data record and make additions or amendments.

Primary Actor: Researcher or Data Manager

Preconditions: The user is logged onto the system

Triggers: The user selects the 'Check metadata record' function

Main Success Scenario:

1. The user selects the 'Check metadata record' function and then selects 'Data record'.
2. The system displays a list of data records of the appropriate type and the user selects one item from the list.
3. The system displays a two-choice menu {mandatory metadata set; all metadata}.
4. The user selects the mandatory metadata capture box, which opens allowing the user to fill in missing metadata at will.
5. The system validates the data type for each entry and returns an error message on failure.
6. The user presses the 'Save' button.
7. The system saves the newly created data.

Extensions:

- 5a1. The user closes the metadata capture box with unsaved information.
- 5a2. The system invites the user to save the changes.
- 5a3. The user selects the 'Save' function.

Open issues: Access permissions for user to maintain security of metadata. There is some question as to whether it should be possible to change a RAID record only during a set period, say during the research activity itself. Allowing post-activity changes may propagate mis-interpretation.

#### **USE CASE 6. Annotate a data record through a RAID Diagram**

Context: A researcher is viewing a RAID record through the medium of a RAID Diagram, and wishes to update the record in order to make later interpretation of the data easier for the user at that time. It is possible to add information to any data record which is represented already in the diagram or to modify any of the associative information. In addition there are a limited number of graphical functions available to the user including enclosing elements in a box, which can then be labelled (see Use Case 13).

Primary Actor: Researcher

Preconditions: The user is logged on to the system and has selected a RAID record to be displayed as a RAID diagram.

Triggers: The user selects the 'Annotate diagram' function.

Main Success Scenario:

1. The user selects the 'Annotate diagram' function and clicks on the element in the diagram in which an information change is required.
2. The system presents a data box which contains the data for the element.
3. The user adds or amends the information.
4. The system validates the data type for each entry and returns an error message on failure.

5. The user presses the 'Save' button.
6. The system will save the newly created data and then update the RAID diagram.

Extensions:

- 5a1. The user closes the data box with unsaved information.
- 5a2. The system invites the user to save the changes.
- 5a3. The user selects the 'Save' function.

Open Issues: There is some question as to whether it should possible to change a RAID diagram only during a set period, say during the research activity itself. Allowing post-activity changes may propagate mis-interpretation.

### **USE CASE 7. Add a Data Record to a RAID record**

Context: During the course of the research activity a new data record has been created as a result of a data development activity (rather than having been acquired as a pre-existing object). The researcher now wishes to add a new data record to the RAID record.

Primary Actor: Researcher

Preconditions: The user is logged on to the system and has selected a RAID record to be displayed as a RAID diagram.

Triggers: The user selects the 'Add data record' function.

Main Success Scenario:

1. The user selects the 'Add data record' function.
2. The system prompts the user to select, from a pre-determined list, the type of event (data development activity) that forms the context of the new data record; the user does so.
3. The system presents a data box in which the user can record metadata.
4. The user enters all the mandatory metadata and volunteers some additional information.
5. The system prompts the user to identify the entity from which this data record was created. A three-choice menu is provided {existing object; initiating object; initiating event}..

Open Issues:

- a. Can the recording of a new data record generated as a result of one of the data development activities be done at the system level or, failing this, can the system identify the occurrence of new data record creation and prompt the user for the information necessary for RAID record updating?
- b. Should this function be available through the RAID drawing?

### **USE CASE 8. Update Record Metadata**

Context: A user wishes to amend and augment the metadata that has been collected for a data record. A metadata set has been defined for data records which is considered to be appropriate to the activities of data management in general and such that it supports data re-use and re-purposing. The default method of augmenting a data record's metadata is through a textual interface. In addition to this the values for a sub-set of metadata can be added to a data record through annotation of the RAID diagram for that record and will be reflected in the RAID diagram when the record is updated through the text-based interface.

Primary Actor: Researcher

Preconditions: The user is logged onto the system and has appropriate permissions to update records.

Triggers: The user selects the 'Update data record' function.

Main Success Scenario:

1. The user selects the 'Update record' function and then selects 'Data record'.
2. The system displays a list of data records and the user selects one item from the list.
- 3.
4. The system displays a a choice menu {mandatory metadata set; all metadata}.
5. The user selects the all-metadata capture box, which opens allowing the user to fill in missing metadata at will.
6. The system validates the data type for each entry and returns an error message on failure.
7. The user presses the 'save' button.
8. The system will save the newly created data.

Extensions:

- 5a1. The user closes the all-metadata capture box with unsaved information.
- 5a2. The system invites the user to save the changes.
- 5a3. The user selects the 'Save' function.

Open issues: Access permissions for user to maintain security of metadata.

### **USE CASE 9. Associate a data record with another data record**

Context: During the research activity a contextualizing data record which has been recorded and contextualized in a RAID record is updated with reference to a research data record. Hitherto these two records were not related; however, now that they are the researcher wishes to associate the records with each other.

Primary Actor: Researcher

Preconditions: The user is logged on to the system with appropriate permissions to make changes to the RAID record and a RAID record has been selected and is thus in the application's scope.

Triggers: The user selects the 'Associate data record' function.

Main Success Scenario:

1. The user selects the 'Associate data record' function.
2. The system presents the user with a 'Select record' list from which the user will select a single data record.
3. The system presents the user with a 'Select related record' list from which the user will select one or more data records.
4. The system will present the user with a choice of association types from a list of authorized relations, including each of the data development activities.
5. The user selects the 'Save' function.
6. The system updates the data record metadata with associative data.

Extensions:

- 5a1. The user closes the metadata capture box with unsaved information.
- 5a2. The system invites the user to save the changes.
- 5a3. The user selects the 'Save' function.

Open Issues:

- a. Consideration might be given to providing a facility for associating one-to-many and many-to-one records in a single operation.
- b. This activity can also be carried out using the 'annotate RAID diagram' function.

#### **USE CASE 10. Associate one Data Case with Another**

Context: At project end the researcher is preparing the project data for archiving, mindful of the requirements for re-use. The researcher uses the facility provided by RAIDmap to associate all the separate data cases stemming from the research project with each other into a single overarching data case which can be represented by a single RAID diagram. The researcher may go on to annotate the RAID diagram to help clarify the different data cases,

Primary Actor: Researcher

Preconditions: The user is logged on to the system with appropriate permissions. At least two RAID records can be accessed by the system.

Triggers: The user selects the 'Associate data cases' function

Main Success Scenario:

1. The user selects the 'Associate data cases' function

2. The system presents the user with a 'Select RAID record' list from which the user will select any number of RAID records.
3. The user selects the 'Save' function.
4. The user provides a file name and the system saves the information.
5. The system displays the newly constructed RAID diagram

Extensions:

- 3a1. The user closes the list with unsaved information.
- 3a2. The system invites the user to save the list.
- 3a3. The user selects the 'Save' function.

Open Issues: None

### **USE CASE 11. Decompose a Single Data Case into Two or More**

Context: A complex research activity has been completed. To help manage the data records the researcher wishes to arrange the data records into a number of logically separate Data Cases, which can then be labelled appropriately. This function can be used also to select and isolate components of a RAID record which constitute a coherent data development path.

Primary Actor: Researcher

Preconditions: The user must be logged onto the system with the appropriate permissions and a RAID record must be in the application's scope.

Triggers: The user selects 'fragment RAID record' function.

Main Success Scenario:

1. The user selects 'Fragment RAID record' function and the 'Select tool' function.
2. The user uses the select tool to highlight the items in the RAID diagram that are to be represented as a separate data case.
3. The system shows the selected elements of this 'data development path' in a contrasting way.
4. The user selects the 'Save RAID record' function and the system prompts the user to name the record.
5. The system saves the new RAID record.
6. The user is now prompted to delete the highlighted items from the existing RAID the diagram of which remains open.

Open Issues: Open Issues: how to handle fragmentation of a single RAID record into multiple data cases in one hit.

**USE CASE 12. Select a Sub-set of Data Records in a RAID Diagram for Inspection**

Context: A Data Manager is wishing to inspect a single data development path, or group of data records at the same time selecting the associated metadata for inspection.

Primary Actor: Researcher or Data Manager

Preconditions: The user is logged onto the system and a RAID diagram is being displayed by the system.

Triggers: The user selects the 'Highlight data development' function.

Main Success Scenario:

1. The user selects the 'Highlight data development' function and selects a start point and end point of the development path from legitimate elements of the RAID diagram (these include only data records or initiating objects or events).
2. The selected elements and those which are intermediate are contrasted visually by the system.
3. The user unselects those elements which are of no interest.
4. The user selects the 'Show metadata' function.
5. The system presents a digest of the metadata for each of the highlighted data records and objects.

Open Issues: None

**USE CASE 13. Associate and label a sub-set of data records through a RAID Diagram**

Context: A researcher is viewing a RAID record through the medium of a RAID Diagram and wishes to make clear the relationship that a number of data records have amongst those in the data case. The researcher does this by using a graphical function to draw a border around the data record entities that require association and then labelling the box in which they have been grouped.

Primary Actor: Researcher

Preconditions: The user is logged on to the system and has selected a RAID record to be displayed as a RAID diagram.

Triggers: The user selects the 'Annotate diagram' function.

Main Success Scenario:

1. The user selects the 'Annotate diagram' function and then the 'draw box' function.
2. The user uses the mouse to draw and size a hatched box around a number of data record graphical entities.



3. The user double-clicks on the box entity to open the hatched box dialogue box; a label is typed in.
4. The system validates the data type for the entry and returns an error message on failure.
5. The user presses the 'Save' button.
6. The system will save the newly created data and then update the RAID diagram.

Extensions:

- 5a1. The user closes the data box with unsaved information.
- 5a2. The system invites the user to save the changes.
- 5a3. The user selects the 'Save' function.

Open Issues: There is some question as to whether it should be possible to change a RAID diagram only during a set period, say during the research activity itself. Allowing post-activity changes may propagate mis-interpretation. However, the sort of activity represented in this use case is precisely of the sort that would be useful during post-research management of the data case.

### 3. UTILITY

The use cases identified above suggest the basic user functions to be elaborated for the RAIDmap application. These and other (system) functions can be found described in detail in 'RAID Associative Tool Requirements Specification' (ERIM Project document erim6rep101111mjd10.doc).

### 4. REFERENCES

Cockburn, A. (2001). Writing Effective Use Cases. Addison-Wesley, Boston.

### 5. GLOSSARY

Note: The following terms are taken from the more complete ERIM Terminology of terms associated with data re-use and re-purposing which can be found [here](#).

**Associate.** To make explicit the relationship between items of Data, Data Records or Data Cases.

**Associative Data Record** A Record containing Associative Data.

**Child Record** A data record identified as having been created from the precursor (Parent Record) through any of the Data Development Activities

**Context Data.** Data that support the Research Activity but do not describe the research object nor are the research object itself.

**Context Data Record (CDR).** A Record containing Context Data.

**Data Case** The set of Data Records (Research Data Records and Context Data Records) associated with some discrete Research Activity (project, task, experiment, etc.).

**Data Object.** Either a Physical Object or a Digital Object.

**Data Record (DR).** The Data Object which contains the Data.

**Data.** Reinterpretable representations of information in a formalized manner suitable for communication, interpretation or processing

**Initiating Event** Any happening subject to research scrutiny and which is the precursor to the recording of data as manifest in a data record. Examples of events include interviews, meetings design episodes and so on.

**Initiating Object** Any object subject to research scrutiny and which is the precursor to the recording of data as manifest in a data record. Such objects include physical objects from which data are generated or from which data is obtained by observation or, singularly, a Research Object Data Record.

**Mandatory Metadata Set** This is the set of metadata which is considered currently to be the minimum necessary to make data as accessible as possible for data re-use within the context of the RAID approach for research data management.

**Parent Record** A data record which is the precursor of one or more successor (Child) records which have been created from or associated with the precursor through any of the Data Development Activities.

**RAID Diagram** A 2-D graphical representation of the data records within a data case and their associations and principal characteristics. The RAID diagram visualizes a part of the data contained within the RAID Record.

**RAID Modelling** A method of modelling the development of data during the research activity which identifies data records, their relations, associations and metadata.

**RAID Record** The underlying record of a data case containing information about data records constituting the case, their temporal ordering, relations and association and principal characteristics. Also a data file in which the record is contained identified as such by the RAIDmap application suffix .rmap

**Research Activity.** The process through which Research Data and Context Data are accumulated and developed, these being contained within Research Data Records or Context Data Records.